

Survey On the Production and Morphometric Measurements of Indigenous Ducks in Delta State, Nigeria

Ebomah, F. E.* and Benneth, H. N. *

*Department of Animal Science, Faculty of Agriculture,
University of Port Harcourt; Nigeria.

Corresponding Author: febomah012@uniport.edu.ng; humphrey.benneth@uniport.edu.ng
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Abstract

The waning number of Nigerian indigenous ducks in recent years especially those raised in Delta State have become a serious cause for concern as production is noticed to be on the decrease, improvement efforts insignificantly low and conservation highly necessary especially with the increase in demand for alternative protein sources of animal origin. Using a cross-sectional survey, data was collected from 150 duck farmers through structured questionnaires while data on morphometric characters were recorded from 150 ducks across sixteen (16) LGAs in three senatorial districts of Delta State. The resulting data was analyzed for means through descriptive statistics and subjected to ANOVA using SPSS. The result revealed that 67.33% of duck farmers were concentrated in the rural areas while 32.67% were urban dwellers. Females were seen to be more slightly involved in duck farming, representing 55.37% of the farming population as compared to their male counterparts covering 44.67%. Farmers in the age bracket of 55 years and above dominated ownership with 48.67% with the age group 16-30 years participating less with 16.67% score. About 53.33% of the farming population attained primary education followed by 26.67% with tertiary education. Personal savings (63.33%) dominated as the primary source of capital, with limited reliance on family support (30.00%) or grants (6.67%). About 49.30% of ducks were primarily kept for food while 38.67% was raised for income generation. The impact of religious views on duck production (4.00) made one of the key challenges duck farming face in the area. Morphometric analyses revealed considerable diversity in sex, plumage, body weight, and length. This study concludes that strategic interventions especially farmer education on status, phenotypic characteristics and sustainable management practices, are essential to enhance the productivity and survivability of indigenous ducks in Delta State.

Keywords: *Morphometric characters, Indigenous Poultry, Conservation, Baseline data*

INTRODUCTION

The advent of commercial fast-growing and egg-laying strains of chickens has relegated to the background the relevance and relative contribution of indigenous poultry species such as chicken, duck, guinea fowl and pigeon, amongst others. According to Oguntunji and Ayorinde (2014), this trend has adversely affected growth and improvement of indigenous poultry species (especially ducks), as exemplified in the remarkably reduced population, low demand for its meat and/or egg, and dearth of empirical studies directed towards improving management strategies while paying attention to genetic improvement and conservation of this

waterfowl in Nigeria. Despite the potentials of the local ducks for meat and egg, it has been highly neglected and greatly prejudiced against, resulting in the waning number of the waterfowls in recent years, corroborating with the reports of Oguntunji and Ayorinde (2015), of the near total neglect of this poultry species by farmers.

Considering the teeming population, animal protein shortage has become an issue of major concern in Nigeria, as lack of it could potentially result in adverse affect on the health and wellbeing of the population (Ahaotu *et al.*, 2010). According to Ahaotu *et al.* (2011), over 70% of Nigerians are living in poverty and the huge majority struggle to access adequate animal protein. Although the Nigerian local ducks have been severally implicated to present a viable solution to this problem due to their immense potential (i.e. fast growth under improved management, high fecundity, efficient feed conversion, natural resistance to common poultry diseases and good quality meat amongst others), little attention is paid to its improvement and conservation at this time. These desirable characters can be taken advantage for the economic and nutritional benefits ducks offer especially necessary to improve on the short fall in animal protein supply in family diets (Ikani, 2001). But, due to the lack of detailed knowledge on the production status and/or patterns and a baseline data on the morphometric characters of indigenous ducks in this study area, it became very necessary to carry out this research to determine the production status and provide a baseline data of morphometric measurements of indigenous ducks raised in Delta State.

MATERIALS AND METHODS

Study area

The study was carried out in about (15) Local Government Areas in the Three Senatorial Districts (North, Central and South) of Delta State, characterized by a continuum of Mangrove Swamps along the coast to the Evergreen Forest in the middle and Savannah in the Northeast. Delta enjoys a tropical seasonal weather pattern, exhibiting high temperatures on average 26.9°C with average annual rainfall of up to 1894 mm under high humidity above 80%.

Sampling and experimentation

One hundred and fifty (150) well-structured questionnaires were administered orally and with the farmer's consent following sampling to determine the status of duck production (to include; socioeconomic status of farmers, production patterns employed and challenges faced by duck farmers) in the study area. One hundred and fifty (150) well-structured animal record sheets were used to collect data on sex; body weight (total weight of live duck); body length (length between the tip of the Rostrum maxillare (bill) and that of the Cauda (tail, without feathers); thigh length (Measured as the distance between knee and end of femur bone); thigh circumference (measured as the circumference at the widest point of the thigh); breast circumference (taken under the wings at the edge of the sternum); bill length (measured as the distance between the base of the bill and the tip of the bill) amongst others. Measurements were restricted to healthy birds that conform to the species classification description (ensuring a representative mix of breed and sex). A 5kg measuring scale/ electronic scale was used for measuring weight while body measurements were obtained using a measuring/tailor's tape calibrated in centimeters (cm).

Analysis of data

Data on production dynamics among duck farming households obtained from the survey in the study area were used to generate Means, frequencies, and percentages using Simple Descriptive Statistics. Data collected from morphometric measurements were subjected to One-way Analysis of Variance (ANOVA) using the Statistical Package of Social Science (SPSS, 2007). The differences in the mean were separated using the Least Significant Difference (LSD).

RESULTS

Socio-economic Status of duck farmers in delta state

Table 1 presents the socio-economic characteristics of duck farmers in Delta State. It revealed that 67.33% which formed the majority resided in rural areas while 32.67% were urban dwellers. Female farmers made up 55.37% of the duck farming population slightly outnumbering their male counterparts at 44.67%. About 48.67% were above 55 years followed by the 30-55 years age group 34.67%. More people attained primary education with fewer attaining tertiary at (53.33% and 26.67% respectively). Personal savings (63.33%) dominated as the primary source of capital as grants as a source was least exploited (6.67%). Ducks were primarily kept for food (49.30%), while 38.67%) of the respondents kept ducks for income generation.

Table 1: Socio-Economic Characteristics of Duck Farmers in Delta State

| Socio-economic characteristics | Frequency (n=150) | Percentage (%) |
|--------------------------------|-------------------|----------------|
| Location | | |
| Urban area | 49 | 32.67 |
| Rural area | 101 | 67.33 |
| Gender | | |
| Female | 83 | 55.33 |
| Male | 67 | 44.67 |
| Marital Status | | |
| Single | 35 | 23.33 |
| Married | 70 | 46.67 |
| Widowed | 45 | 30.00 |
| Age | | |
| Above 55 years | 73 | 48.67 |
| 30-55 years | 52 | 34.67 |
| 16-30 years | 25 | 16.66 |
| Level of Education | | |
| Primary | 80 | 53.33 |
| Secondary | 30 | 20.0 |
| Tertiary | 40 | 26.67 |
| Farming experience | | |
| 1 – 10 years | 50 | 33.33 |

| | | |
|---------------|----|-------|
| 11 – 20 years | 15 | 10.00 |
| 21 – 40 years | 10 | 6.67 |
| Over 40 years | 75 | 50.00 |

Source of capital

| | | |
|--|----|-------|
| Grants | 10 | 6.67 |
| Personal savings | 95 | 63.33 |
| Support from family, friends and Relatives | 45 | 30.00 |

Do you know the estimate flock distribution in the community

| | | |
|-----|-----|-------|
| Yes | 27 | 18.00 |
| No | 123 | 82.00 |

Reason for keeping ducks

| | | |
|---------------|----|-------|
| Food | 74 | 49.33 |
| Money | 58 | 38.67 |
| Social status | 18 | 12.00 |

Production Pattern of Ducks in Delta State

As highlighted in Table 2, 60.6% of the study population kept mixed duck breeds, while 39.4% kept just the Muscovy breed. About 61.3% managed their ducks extensively while 56.67% provided partial restrictions, offering feed, water, and night shelter. Commercial feed was used by 75.80% of farmers, while 24.20% depended on household waste for supplementary feeding. Swimming units were provided by 24.20% of farmers, with 75.80% not providing them.

Table 2: Production Pattern of Ducks in Delta State

| Production Pattern | Category | Frequency (n=150) | Percentage (%) |
|---|----------|-------------------|----------------|
| I keep the Muscovy duck breed only | Yes | 40 | 39.40 |
| | No | 110 | 60.60 |
| I keep mixed duck breeds | Yes | 110 | 60.60 |
| | No | 40 | 39.40 |
| I let my birds scout for their own feed and water with little or no supervision | Yes | 92 | 61.33 |
| | No | 58 | 38.67 |

| | | | |
|---|-----|----|-------|
| I provide my ducks with feed, water, and night shelter under partial restrictions | Yes | 85 | 56.67 |
| | No | 65 | 43.33 |
| The management system employed is completely intensive | Yes | 8 | 12.1 |
| | No | 58 | 87.9 |
| I rely on hired labour | Yes | 8 | 12.1 |
| | No | 58 | 87.9 |
| I use commercial feed for my birds | Yes | 50 | 75.8 |
| | No | 16 | 24.2 |
| Household waste suffice as source of supplementary feeding | Yes | 16 | 24.2 |
| | No | 50 | 75.8 |
| Forms of swimming units are provided | Yes | 16 | 24.2 |
| | No | 50 | 75.8 |
| Provision of laying nests for my ducks | Yes | 55 | 83.3 |
| | No | 11 | 16.7 |
| Ducks are mainly brooded naturally | Yes | 58 | 87.9 |
| | No | 8 | 12.1 |

Challenges of duck production

Table 3 shows the most significant challenges encountered farmers in the study area are issues of inadequate visits by agricultural extension agents (4.00), limited veterinary services (4.00), difficulty accessing grants or loans (4.00), and the impact of religious views on duck production (4.00). Besides the aforementioned, very notable challenges such as reliance on ethnoveterinary measures (3.66), low profitability (3.66), poor market patronage (3.20), poor technical knowledge (3.05), and inadequate knowledge of duck production (3.38) were observed. The less critical challenges observed included high chick mortality due to natural causes (2.77), disease- related mortality (2.83), Community prejudice for ducks (2.13), unavailability of markets (2.20), and poor awareness of duck product utilization (2.30) amongst others. Scores of 2.50 or higher were used to indicate significant challenges, while those below 2.50 were

used to indicate relatively minor challenges.

Table 3: Challenges Faced by Duck Farmers in Delta State

| Challenges | Mean |
|--|------|
| High rate of chick mortality due to natural cause | 2.77 |
| High mortality due to disease incidence | 2.83 |
| Mortality due to human accidents | 2.00 |
| Mortality due to predators | 3.00 |
| Poor technical know-how and/or ability to identify disease incidence | 3.05 |
| Reliance on ethnoveterinary measures | 3.66 |
| Lack of affordable Veterinary experts | 2.60 |
| Inadequate availability of Vets. | 4.00 |
| Poor housing hygiene and bird management. | 3.00 |
| Inadequate visit of agricultural extension agents | 4.00 |
| Knowledge on duck production and management is hardly available | 3.38 |
| Unavailability of markets | 2.20 |
| Poor access to markets | 2.45 |
| Poor patronage | 3.20 |
| Low profitability | 3.66 |
| Reduced production system due to limited available space | 2.00 |
| Difficulty to access grants/ loans by duck keepers | 4.00 |
| High dislike for ducks in my community | 2.13 |
| Poor/inadequate availability of feed/feeding materials | 3.00 |
| Cost of feeding | 2.80 |
| Difficulty in accessing feed supplements. | 3.00 |
| High cost of vaccination | 3.00 |
| Poor Awareness on utilization of duck and duck products. | 2.30 |
| Poor production and consumption resulting from Local taboo | 3.00 |
| Poor production resulting from religious views | 4.00 |

The mean values represent the average ratings based on a Likert scale (1 = not a challenge, 5 = very severe challenge) as perceived by the respondents. Mean values ≥ 2.50 = Significant challenge; mean value < 2.50 = Insignificant challenge.

Morphological characteristics of ducks

The morphological characteristics of ducks in Delta State revealed distinct patterns across various traits, including sex distribution, plumage color, as evidenced by the data in Table 4. The sex distribution of the duck population indicated a slight female dominance, with females comprising 54.70% (82 ducks) and males representing 45.30% (68 ducks) of the total population. White ducks were the most prevalent, accounting for 44.67% (67 ducks) of the population, followed closely by black ducks with 26.67%. Ducks with black shanks were the most common, representing 53.33% of the total population with pale-red shanks being less frequent at 6.00%. 56.67% of the duck population were predominantly black billed followed by yellow bills at 30.00%.

Table 4: Distribution of Ducks According to Sex, Plumage colour, Shank colour, and Bill colour.

| Category | Frequency (n=150) | Percentage (%) |
|------------------------------|-------------------|----------------|
| Sex Female Male | | |
| Plumage colour | | |
| White Black Brown | 82 | 54.70 |
| White/black mix Shank | 68 | 45.30 |
| colour Black | | |
| Yellow Pale-red Bill | | |
| colour Black Yellow | 67 | 44.67 |
| Brown | 40 | 26.67 |
| Brown/black mix | 36 | 24.00 |
| | 7 | 4.67 |
| | 80 | 53.33 |
| | 61 | 40.67 |
| | 9 | 6.00 |
| | 85 | 56.67 |
| | 45 | 30.00 |
| | 15 | 10.00 |
| | 5 | 3.33 |

Morphometric measurements

As shown in Table 5, on average, ducks in Delta State recorded a body weight of 1.53 kg. Across Local Government Areas (LGAs) however, Isoko-North had the highest average body weight of 3.13 kg, while ducks in Ika-North and Burutu had lower weights of 1.00 kg each. Body length on average for state was recorded to be 29.62 cm. The longest body length across the LGAs was observed in ducks from Isoko-North (59.95 cm) and Ika-South being the least at (32.20 cm). The average body circumference (BC) of 6.87 cm reflects variations, with ducks from Isoko-North presenting the largest measurements (16.82 cm) and Ughelli-North the

smallest (6.40 cm). Measurements for neck length (NL) and neck circumference (NC) average 5.87 cm and 4.59 cm, respectively, with a notable neck length in Isoko-North (12.11 cm). Shank length (SL) averaged 5.93 cm, with the longest measurements recorded in Isoko-North (11.73 cm). Ducks from Isoko-North recorded higher Wing Span (87.86 cm) with Oshimini South recording least at 37.50cm.

TABLE 5 Morphometric measurements of ducks across Delta State.

| LGA | SEX | AGE | BW | BDL | TL | TC | BC | BL | NL | NC | SL | WS | TLL | WL | PL | SKC | SHC | BIC |
|---------------|------|------|-------|-------|-------|-------|-------|-------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Isoko-North | 3.13 | 10.2 | 2.92 | 59.95 | 19.42 | 14.68 | 16.82 | 12.11 | 9.31 | 11.73 | 7.01 | 87.86 | 28.97 | 34.31 | 6.27 | 5.07 | 9.40 | 5.30 |
| Ughelli-South | 1.71 | 6.43 | 1.49 | 29.05 | 10.33 | 7.13 | 7.13 | 5.60 | 4.80 | 5.16 | 14.29 | 40.09 | 16.41 | 18.53 | 2.86 | 2.14 | 3.14 | 2.29 |
| Ika-Northeast | 1.00 | 8.50 | 1.12 | 29.70 | 12.45 | 5.75 | 7.85 | 6.40 | 4.75 | 5.95 | 3.75 | 44.85 | 14.75 | 17.85 | 3.50 | 3.00 | 4.00 | 2.00 |
| Ika-South | 2.00 | 5.00 | 1.46 | 32.20 | 14.45 | 6.90 | 8.95 | 5.90 | 4.35 | 6.20 | 4.25 | 37.50 | 16.15 | 15.85 | 3.00 | 2.00 | 4.00 | 4.00 |
| Oshimili- | 1.67 | 6.33 | 1.47 | 27.90 | 11.22 | 6.37 | 7.60 | 4.97 | 4.63 | 5.68 | 3.18 | 44.03 | 14.73 | 17.13 | 4.17 | 2.33 | 3.00 | 2.50 |
| South | 1.50 | 3.75 | 1.45 | 28.18 | 12.05 | 6.40 | 7.33 | 4.93 | 5.70 | 4.90 | 2.83 | 45.98 | 14.05 | 16.63 | 4.00 | 2.00 | 4.00 | 2.50 |
| Ughelli-North | 1.00 | 3.50 | 1.55 | 27.70 | 13.05 | 7.55 | 7.80 | 6.30 | 4.15 | 6.05 | 3.05 | 40.00 | 16.90 | 14.70 | 5.00 | 1.00 | 4.00 | 2.50 |
| Ika-North | 1.75 | 4.25 | 1.37 | 32.27 | 10.38 | 6.95 | 8.48 | 5.65 | 4.30 | 5.53 | 3.45 | 46.40 | 13.68 | 16.93 | 3.50 | 1.50 | 4.00 | 2.50 |
| Uvwie | 1.67 | 7.33 | 1.51 | 32.53 | 10.33 | 6.70 | 6.57 | 6.87 | 3.93 | 5.83 | 4.00 | 47.87 | 14.57 | 17.70 | 3.00 | 1.67 | 3.00 | 2.33 |
| Warri-South | 1.60 | 5.00 | 1.166 | 29.30 | 11.30 | 8.00 | 8.22 | 5.90 | 4.30 | 6.94 | 3.54 | 42.06 | 14.70 | 17.54 | 3.60 | 3.40 | 1.60 | 2.20 |
| Aniocha- | 1.50 | 3.75 | 1.46 | 30.35 | 12.75 | 6.88 | 8.60 | 5.65 | 4.78 | 6.50 | 3.00 | 48.20 | 13.48 | 17.40 | 3.75 | 3.25 | 5.50 | 2.75 |
| South Sapele | 1.50 | 8.50 | 1.99 | 28.50 | 10.33 | 6.23 | 7.85 | 6.65 | 4.75 | 6.40 | 3.23 | 43.83 | 15.80 | 17.98 | 5.00 | 2.50 | 2.50 | 3.00 |
| Patani | 1.25 | 7.75 | 1.29 | 28.92 | 10.55 | 6.03 | 8.40 | 7.03 | 5.05 | 6.13 | 3.23 | 46.55 | 16.10 | 15.38 | 4.00 | 2.00 | 5.50 | 2.00 |
| Ethiope-East | 1.50 | 6.83 | 1.26 | 30.40 | 11.87 | 6.38 | 7.22 | 5.75 | 4.33 | 6.35 | 3.77 | 40.98 | 13.81 | 18.63 | 2.83 | 3.17 | 3.00 | 2.67 |
| Ndokwa- | 1.50 | 7.50 | 1.19 | 29.85 | 13.60 | 7.55 | 9.66 | 5.15 | 3.25 | 6.00 | 3.10 | 45.40 | 12.45 | 17.55 | 4.50 | 2.00 | 4.00 | 2.50 |
| West | 1.00 | 3.50 | 1.42 | 27.95 | 9.50 | 7.15 | 8.80 | 5.70 | 4.40 | 5.70 | 4.00 | 48.00 | 13.80 | 18.05 | 3.50 | 2.00 | 4.00 | 3.00 |
| Ndokwa-East | 1.53 | 5.81 | 1.46 | 29.62 | 11.1 | 6.87 | 7.96 | 5.87 | 4.59 | 5.93 | 4.56 | 43.84 | 14.75 | 17.34 | 3.57 | 2.41 | 3.69 | 2.54 |
| Burutu | 0.06 | 0.35 | 0.43 | 0.34 | 0.29 | 0.139 | 0.153 | 0.154 | 0.11 | 0.161 | 0.785 | 0.744 | 0.250 | 0.257 | 0.172 | 0.209 | 0.354 | 0.097 |
| Total | | | | | | | | | | | | | | | | | | |
| SEM | | | | | | | | | | | | | | | | | | |

(LGA: Local government area, BW: Body weight, BDL: Body length, TL: Thigh length, TC: Thigh circumference, BC: Breast circumference, BL: Bill length, NL: Neck length, SL: Shank length, WS: Wingspan, TLL: Total leg length, WL: Wing length, PL: Plumage colour, SKC: Skin colour, SHC: Shank colour, BIL: Bill colour). Source: Field Survey conducted by researcher and supervisor, 2024.

DISCUSSION

Socio-economic status of farmers

The demography and socio-economic characteristics of duck farmers in Delta State shown in Table 1 reveals that more farmers (67.33%) were based in rural areas while only 32.67% live in urban centers. This suggests that duck farming is primarily a rural activity in Delta State, which is typical of many agricultural practices in Nigeria where rural areas are the main hubs of agricultural production (Okoruwa and Adeniyi, 2018). The higher concentration of farmers in rural areas aligns with broader trends in Africa, where farming is a dominant activity in less urbanized regions (FAO, 2020). Source of capital was mostly through personal savings at about 63.33%. The heavy reliance on personal savings highlights the financial constraints many farmers face, as access to formal credit in rural areas is often limited (FAO, 2020).

Production pattern of ducks in delta state

In Delta State, the production pattern of ducks reveals a diverse set of practices adopted by farmers, based on the local context and available resources. From the table 2, 39.4% of farmers focus on raising the Muscovy breed, which is known for its higher meat yield and adaptability to different environments, making it a popular choice among those seeking specific traits (Gbemisola *et al.*, 2019). However, 60.6% of farmers raised the muscovy and mallard breed (mixed) together to probably improve for resilience, productivity and adaptability across various environments. Raising duck breeds this way has been shown to make them thrive better in a range of conditions, offering the farmers flexibility in their farming practices (Olajide *et al.*, 2016). About 61.33% of the farmers allowed their ducks to scout for food and water with minimal supervision. This practice reflects an evolving yet traditional system of duck farming, where birds are given freedom to forage, potentially reducing feeding costs but possibly leading to inconsistency in nutrient intake (Omonona, 2019). However, a small portion of farmers (24.2%) supplement their ducks' diet with household waste, reflecting a more resourceful approach in the absence of sufficient commercial feed (FAO, 2020).

Challenges faced by duck farmers

Following results in Table 3, challenges resulting in "high mortality due to incidence of diseases" received a mean score of 2.83, while "high rate of chick mortality due to natural causes" scored 2.77. These issues are linked to inadequate disease management strategies and highlight the need for farmers to improve their knowledge in disease prevention and management (Olajide *et al.*, 2016). Financial barriers also play a major role in the challenges faced by farmers. The mean score for "difficulty in accessing grants/loans by duck keepers" is high (4.00), indicating that securing funding for farm expansion or improvements is a significant obstacle. This is consistent with the findings of Omonona (2019), who opined that limited access to financial resources is one of the most critical barriers to agricultural development in Nigeria.

Morphological characteristics of ducks

The distribution of morphological characters of local ducks in Delta State drawn from Table 4 reveals significant diversity in sex, plumage color, shank color, and bill color. This variability is not in variance with assertion by Yakubu *et al.*, (2018), that indigenous duck populations exhibit a range of morphological traits due to selective breeding and local adaptation. It was observed that 39.7% of the duck population had a white plumage while 29.4% were black

ducks. This color distribution may reflect a selective preference among farmers for white and black plumage, possibly for aesthetic reasons or for traits associated performance like the colour related genes as opined by Ayorinde (2004).

Morphometric measurements of ducks in Delta State

Body weight varied among ducks raised In Delta State. Table 5 shows that, ducks in Isoko-North displayed the highest average body weight (3.13 kg), while ducks in Ika-North and Burutu had lower weights on average of 1.00 kg. This regional contrast in weight aligns with Peters *et al.*, (2010), that various factors although not limited to environmental sources, influence body weight and growth across agro-ecological zones. The average body length (BDL) of ducks in the study area was 29.62 cm. However, ducks in Isoko-North recorded the longest body length at 59.95 cm, which could reflect a regional advantages, possibly stemming from access to better feed resources. This is consistent with the observation of Ogah *et al.*, (2011), that access to robust resources to meet production needs and/or individuals with stronger genetic predispositions often report longer body lengths. These variations support studies such as Nwagu *et al.*, (2014), which argue that environmental conditions play a crucial role in shaping morphometric characteristics among local duck populations in Nigeria.

Colour diversity, as well as morphometric variations, has practical implications for conservation, as noted by Yakubu *et al.*, (2009). Selective breeding programs that recognize these physical traits can support productivity and resilience in specific ecological contexts, allowing for more effective management of duck populations.

CONCLUSION

This study provided a systematic survey on the status indigenous ducks in Delta State, Nigeria, highlighting key factors influencing distribution, socio-economic status of duck farmers and challenges faced in duck production , revealing the morphologic and morphometric characteristics of the ducks in the study area. This is necessary as it contributes valuable insight into the duck production dynamics in Delta State, providing a foundation for developing more effective breeding programs necessary for improvement and conservation.

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