

## EVALUATION OF BODY WEIGHT AND MORPHOMETRIC TRAITS OF TWO STRAINS OF LAYER CHICKEN AT GROWER PHASE OF PRODUCTION

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### ABSTRACT

*This study was conducted to evaluate the effect of strain on body weight and morphometric traits of Isa brown and Nera black strains of layer chicken at grower phase of production. A total of 90 pullets at nine weeks (45 Isa Brown and 45 Nera Black) were used for this experiment. The birds were divided into 2 treatment groups according to strains of 45 birds. Each group were randomly replicated 3 times and each replicate of 15 birds were housed in a deep litter pen. Data obtained were subjected to independent t- test using SPSS package. The results indicated significant ( $p < 0.05$ ) differences in body weight between the two strains studied. The results showed that Nera black had a higher ( $P < 0.05$ ) body weight than Isa brown from week 9 to 17. The values obtained for body weight of Isa brown was  $520.51 \pm 0.61$ ,  $151.35 \pm 0.01$ ,  $1140 \pm 1.21$ ,  $1350 \pm 1.68$  and  $1560 \pm 6.60$ g at weeks 9, 11, 13, 15 and 17 respectively. Whereas the values obtained for Nera black were  $600.90 \pm 6.55$ ,  $1050 \pm 2.21$ ,  $1260 \pm 8.41$ ,  $1470 \pm 4.95$  and  $1680 \pm 4.01$ g for weeks 9, 11, 13, 15 and 17 respectively. The results also revealed that the morphometric traits measured had no significant ( $P > 0.05$ ) different between the two strains studied. It was concluded that Nera black could be chosen by farmers as better option for faster production because of its ability to reach matured body weight for laying earlier.*

**Keywords:** Body weight, Strains, Chicken, Morphometric traits

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### INTRODUCTION

The poultry industry is considered one of the most lucrative industries in agriculture and has expanded rapidly due to its adaptability and short generation time (Akpa *et al.*, 2010; Sam *et al.*, 2019; Ebong *et al.*, 2023). However, challenges remain, such as the inability to meet the growing protein demands caused by Nigeria's increasing population (Essien and Sam 2018; Usoro *et al.*, 2023). Factors like nutrition, growth rate, breed, sex, and age significantly influence the performance of chickens, with strain and sex playing a crucial role in genetic improvement (Ukpanah *et al.*, 2024; Sam and Essien 2024). Research indicates that black and brown plumage layer strains perform differently in hot climates, with black layer strains showing better adaptability and lower mortality rates (Olawumi and Dudusola, 2011; Sam *et al.*, 2024).

Morphometric traits, including body weight, body length, and shank length, are reliable indicators of growth and egg production, crucial for assessing the productivity of layer birds (Robinson *et al.*, 1993). These traits also influence feed efficiency, egg quality, and bird welfare, making them essential tools in poultry management (Onagbesan *et al.*, 2021). Linear body measurements are widely used to predict live weight, evaluate strain performance, and study interactions between genetics and the environment (Udeh and Ogbu, 2011). This research is designed to investigate the influence of strain on body weight and morphometric traits during the grower phase, helping farmers select birds with desirable traits and improve overall poultry production.

### MATERIALS AND METHODS

#### Experimental Site

This study was carried out at the Teaching and Research Farm, Department of Animal Science, Faculty of Agriculture, Akwa Ibom State University, Obio Akpa. Obio Akpa is located between latitudes  $4^{\circ}30'N$  and  $5^{\circ}00'N$  and longitudes  $7^{\circ}30'E$  and  $8^{\circ}00'E$ . The area is characterized with an annual rainfall ranging from 3500 – 5000 mm and average monthly temperature of  $25^{\circ}C$ , and relative humidity between 60 – 90 %. It is in the tropical rainforest zone of Nigeria. (AKSG, 2022).

#### Experimental Animals and their Management

A total of 90 pullets at nine weeks (45 Isa Brown and 45 Nera Black) already raised in the poultry unit of Akwa Ibom State University were used for this experiment. The birds were divided into 2 groups according to strain of 45 birds. Each group were further replicated 3 times with fifteen birds per replicate and were housed in a pen of 2m-by-2m dimensions. Wood shavings were used as litter materials.

Grower mash containing 2600kcal/kg Metabolizable energy and 16% crude protein content was fed to the experimental birds and water were given *ad libitum*. All necessary prophylactic medications and vaccinations was provided accordingly.

### Experimental Design

Each strain represented a treatment and each treatment contained 45 birds. Each treatment was randomly replicated three times with 15 birds in each replicate.

### Data Collection

Body weight and six morphometric traits (wing length, shank length, breast girth and neck length) were measured on each bird using the method described by Sam and Okon (2022) from 9-17 weeks of age.

### Statistical Analysis:

Data collected in the experiment were subjected to an independent T-test to compare means between the two strains using SPSS (2011) version 23. The statistical model used is as shown below:

$Y_{ik} = \mu + A_i + e_{ij}$ , where;

$Y_{ij}$  = Record of measurable traits,

$\mu$  = population mean,

$A_i$  = effect of strain ( $i = 1$  and  $2$ ), and

$e_{ij}$  = random error

### RESULT AND DISCUSSIONS

The mean  $\pm$  SE of body weight and morphometric traits of Isa brown and Nera black pullet at weeks 9, 11, 13 15 and 17 are shown in Table 1.

**Table 1: Mean  $\pm$  SE of Body weight and morphometric traits of Isa Brown and Nera Black Pullets**

| Parameter       | Age | Isa Brown                      | Nera Black                     | SEM    |
|-----------------|-----|--------------------------------|--------------------------------|--------|
| Body weight (g) | 9   | 520.51 $\pm$ 0.61 <sup>b</sup> | 600.90 $\pm$ 6.55 <sup>a</sup> | 78.70  |
|                 | 11  | 151.35 $\pm$ 0.01 <sup>b</sup> | 1050 $\pm$ 2.21 <sup>a</sup>   | 132.33 |
|                 | 13  | 1140 $\pm$ 1.21 <sup>b</sup>   | 1260 $\pm$ 8.41 <sup>a</sup>   | 98.32  |
|                 | 15  | 1350 $\pm$ 1.68 <sup>b</sup>   | 1470 $\pm$ 4.95 <sup>a</sup>   | 67.76  |
|                 | 17  | 1560 $\pm$ 6.60 <sup>b</sup>   | 1680 $\pm$ 4.01 <sup>a</sup>   | 32.87  |
|                 |     |                                |                                |        |
| BL (cm)         | 9   | 15.32 $\pm$ 0.06               | 15.60 $\pm$ 0.23               | 0.26   |
|                 | 11  | 15.55 $\pm$ 0.12               | 15.44 $\pm$ 0.25               | 0.12   |
|                 | 13  | 17.26 $\pm$ 0.50               | 17.70 $\pm$ 0.38               | 0.41   |
|                 | 15  | 17.36 $\pm$ 0.06               | 17.80 $\pm$ 0.49               | 0.32   |
|                 | 17  | 17.39 $\pm$ 0.27               | 17.90 $\pm$ 0.50               | 0.11   |
| WL (cm)         | 9   | 9.20 $\pm$ 0.06                | 9.30 $\pm$ 0.07                | 0.77   |
|                 | 11  | 10.17 $\pm$ 0.08               | 9.77 $\pm$ 0.39                | 2.34   |
|                 | 13  | 10.40 $\pm$ 0.11               | 10.00 $\pm$ 0.50               | 0.21   |
|                 | 15  | 10.47 $\pm$ 0.27               | 10.43 $\pm$ 0.29               | 0.22   |
|                 | 17  | 12.21 $\pm$ 0.63               | 11.77 $\pm$ 0.38               | 1.03   |
| SL (cm)         | 9   | 4.10 $\pm$ 0.33                | 4.17 $\pm$ 0.32                | 0.12   |
|                 | 11  | 4.16 $\pm$ 0.34                | 4.80 $\pm$ 0.33                | 0.21   |
|                 | 13  | 4.32 $\pm$ 0.34                | 5.30 $\pm$ 0.35                | 1.33   |
|                 | 15  | 4.38 $\pm$ 0.37                | 5.60 $\pm$ 0.38                | 1.16   |
|                 | 17  | 4.90 $\pm$ 0.38                | 5.77 $\pm$ 0.39                | 1.06   |
| BG              | 9   | 12.97 $\pm$ 0.29               | 13.92 $\pm$ 0.41               | 1.32   |
|                 | 11  | 12.78 $\pm$ 0.41               | 13.93 $\pm$ 0.42               | 1.21   |
|                 | 13  | 13.03 $\pm$ 0.38               | 14.40 $\pm$ 0.47               | 1.11   |
|                 | 15  | 13.33 $\pm$ 0.81               | 14.83 $\pm$ 0.81               | 1.21   |

|    | 17 | 13.83±0.81 | 15.47±0.37 | 2.11 |
|----|----|------------|------------|------|
| NL | 9  | 7.30±0.33  | 6.53±0.05  | 1.71 |
|    | 11 | 7.33±0.21  | 6.93±0.08  | 1.60 |
|    | 13 | 7.35±0.24  | 7.17±0.09  | 0.61 |
|    | 15 | 7.37±0.51  | 7.38±0.15  | 0.21 |
|    | 17 | 7.38±0.12  | 7.48±0.33  | 0.03 |

BW= Body weight, BL = Body length, WL= Wing length, SL= Shank length, BG= Brest girth, NL= Neck length

The result showed that there were significant differences ( $P<0.05$ ) between body weights of the two strains at week 11-17. There was no significant difference ( $P>0.05$ ) in the morphometric traits. The values obtained for the body weight of Isa brown were 520.51±0.61, 151.35±0.01, 1140±1.21, 1350±1.68 and 1560±6.60g for week 9, 11, 13, 15 and 17 respectively. Whereas the values obtained for Nera black were 600.90±6.55, 1050 ±2.21, 1260±8.41, 1470±4.95 and 1680±4.01g for weeks 9, 11, 13, 15 and 17 respectively. Nera black had the superior ( $P<0.05$ ) body weight. A progressive increase in the body weight was observed in both strains. Ojedapo (2023) opined that a pullet must attend a body weight of 1.6-1.8kg before egg laying commence. Hence body weight of laying birds determines the age at which the first egg is laid (Burra, 2014).

There was no significant difference in the morphometric traits recorded in the study. However, there was a progressive increase in these traits with respect to age. The values for body length of Isa brown for weeks 9, 11, 13, 15 and 17 were 15.32±0.06, 15.55±0.12, 17.26±0.05, 17.36±0.06 and 17.39±0.27cm respectively. Whereas the values for Nera black were 15.60±0.23, 15.44±0.25, 17.70±0.38, 17.80±0.49 and 17.90±0.50cm for weeks 9, 11, 13, 15 and 17 respectively. These values were in line with the values reported by Ahmad and Rahimi (2021), for Isa brown and Ilorin ecotype chicken.

There was no significant difference among the two strains. Udeh and Ogbu (2011) in their result also reported a non-significant difference among Naked neck and Normal feathered chicken.

## CONCLUSION

Based on the result of this study, it was concluded that Nera black strain attains the mature body weight for egg laying earlier than Isa brown in the study area, thus could be recommended to poultry farmers for better productivity.

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