GENETIC VARIATION AND BODY WEIGHT AND LINEAR BODY MEASUREMENTS OF THREE NIGERIAN LOCAL CHICKEN STRAINS.

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ABSTRACT
The body weight and linear body measurements of the Nigerian local chicken strains were studied with a view to assess their relationship and contribution to the growth of the birds. A total of three hundred (300) local chicken strains comprising one hundred (100) frizzle feathered (FF), one hundred (100) naked neck (NN) and one hundred (100) normal feathered (NM) birds each replicated ten (10) times with ten (10) birds per replicate, were used in the study. Data on body weight (BW) in grams (g) and linear body measurements (cm) – body length (BL), heart girth (HG), neck length (NL) and shank length (SL) were collected weekly for ten (10) weeks and analyzed in a completely randomized design (CRD) of SAS, statistical package. Significantly different means were separated using the Duncan multiple range test (DMRT). Results showed that there were significant ($p<0.05$) variations in BW, BL, NL and SL, an indication that breed differences is implicated in the growth and development of chickens.

Key Words: Genetic variation, linear measurement, local chickens, strains

DESCRIPTION OF PROBLEM

Breeders have tried to establish a relationship between body weight and some linear body measurements in order to speed up selection and improve breeding programs in animals (1, 2,3), which provides critical information regarding the productivity and performance of the birds (1). Body weight is significant for any selection and breeding program, feeding, vaccination, and drug dosage in animal production (4) and in ascertaining the growth rate of an animal and its price during marketing. Its relationship with other linear body measurements has been described to have important implications. Hence, the success of a breeding program relies on the ability to establish relationships that exist between identified traits (4). It is very important to consider the relationship between body weight and body measurement traits as this could be a useful selection criterion for improving body weight (1). Body weight is important in that it helps in evaluation of growth performance, feed efficiency and the market price, and assessment of growth in livestock. However, other growth traits related to body morphometric are relevant factors considered by poultry breeders/farmers for assessment of growth in livestock, as they also serve as growth indicators (5, 6,7), playing a pivotal role in routine farm management activities such as drug administration dosage, assessment of the amount of feed consumed, and response thereof to that feed (8,9,5).

Growth in animals could be evaluated from the component parts of the animal. This implies that improvements in the body measurements will invariably lead to a corresponding improvement in the body weight (1), as they make up the skeleton which determines the general shape of the body, which carries the body and is closely related to the muscles (10). Based on the fact that most linear measurements reflect primarily the length of the bones of animals, its relationship with body weight is important as this could be useful as a selection criterion to improve the body weight (1). Moreover, the knowledge of an animal's weight and weight changes is also key in determining responses to selection (11,12). This study was therefore carried out to assess the linear body measurements in different strains of the Nigerian local chickens.

MATERIALS and METHODS

Three hundred local chickens comprising of one hundred (100) Frizzle feathered (FR), one hundred (100) Naked neck (NN) and one hundred (100) Normal feathered (NM) strains sourced from local markets in Uyo, Uruan, Ibesikpo Asutan, Ibiono Ibom, Ikono and Ikot Ekpene Local Government Areas were used in this study. They were replicated ten (10) times with ten (10) birds in each replicate. They were kept in deep litter system with wood shaving litter material. Commercial growers mash and water were given *ad libitum*. The birds, aged between sixteen (16) to twenty – four (24) months, were kept for ten (10) weeks. The study was conducted in the poultry unit of the Department of Animal Science, University of Uyo where birds were raised. Body weight and phenotypic (morphometric) traits (linear body measurements) were taken on the animals. The morphometric traits were:

Body length (BL): measured from nasal opening with neck carefully stretched and along the back to the pygostyle. Heart girth (HG): measured by wrapping a tape rule around the breast under the wings. Neck length: Distance from the back of the head to the shoulder blade. Shank length (SL): Distance between the foot pad and hock joint. Data on body weight (g) and body measurements (cm) - heart girth, body length, neck length and shank length) were collected weekly and analyzed in a completely randomized design (CRD) of SAS (2001) statistical package, while Duncan Multiple Range Test (DMRT) was used to separate means that show significant differences.

RESULTS AND DISCUSSION

The effect of strain on body weight and linear body traits of the investigated indigenous chicken strains is presented in Table 1. Genotype had significant ($p < 0.05$) effect on body weight, body length, neck length and shank length. The frizzle feathered (1041.24 g) and the naked neck (1065.21 g) strains did not differ from each other but were significantly ($p<0.05$) higher in body weight than the normal feathered strain (973.42 g). The frizzle feathered strain had a significantly ($p < 0.05$) higher body length (19.34 cm) and shank length (6.84 cm) than the normal feathered strain with body length (18.18 cm) and shank length (6.37 cm), but showed no significant ($p>0.05$) differences in these parameters from the naked neck strain with body length (19.00 cm) and shank length (6.78 cm). The naked neck strain was significantly ($p<0.05$) higher in neck length (12.12 cm) than the normal feathered strain (11.53 cm) but was not different from the frizzle feathered strain (11.77 cm) in this parameter. However, the heart girth showed no significant ($p>0.05$) difference among the three strains.

Table 1: Strain effect on body weight and linear body traits

Traits	Frizzle feathered	Normal feathered	Naked Neck
Body weight (g)	1041.24 ± 13.94^{a}	973.42 ± 19.30^{b}	1065.21 ± 27.78^{a}
Heart girth (cm)	28.54 ± 0.29	28.51 ± 0.20	28.79 ± 0.24
Body length (cm)	19.34 ± 0.14^{a}	18.18 ± 0.06^{b}	19.00 ± 0.20^{ab}
Neck length (cm)	11.77 ± 0.14^{ab}	11.53 ± 0.18^{b}	12.12 ± 0.17^{a}
Shank length (cm)	6.84 ± 0.17^{a}	6.37 ± 0.11^{b}	6.78 ± 0.17^{ab}

^{abc} = Means within the same row with different superscripts are significantly ($p<0.05$) different from each other.

The naked neck and frizzle feathered strains of chicken, with a body weight that did not show any significant difference amongst them, had higher body weights, which differed significantly ($p<0.05$) from that of the normal feathered strain of chicken. This is in line with the reports of (13, 14) , that these strains perform differently, and (15), that the frizzle feather and naked neck genes allows for a better feed conversion on them which in turn may equally have accounted for the increased body weight as exhibited by them. Body girth showed no differences in the strains, an indication that strain differences had no effect on body girth. This result differs from that of (16) where the naked neck cockerels had a higher body girth, while the normal feathered pullet had a higher body girth than the other strains.

The body length of the frizzle feathered local chicken was higher than the normal feathered but not different from naked neck strains. This is an indication that frizzles and naked neck genotypes enhance body development. The result is in line with that of (14) where the broad helmeted guinea hens had a higher body length than the narrow-helmeted hens. Similarly, the cocks had a significantly ($p<0.05$) higher body length than the hens. The naked neck species equally had a longer body length than the frizzle and normal feathered species (16).

The neck length of the naked neck and the frizzle feathered strains were longer than that of the normal feathered. This agreed with (14) who reported that the broad helmeted guinea cocks had a longer neck than the narrow-pointed guinea cocks. More so the guinea cocks had a higher neck length than the guinea hens, an indication of strain effect.

The naked neck and the frizzle feathered strains differed ($p<0.05$) significantly in shank length from those with normal feathers, a pointer that there exist strain differences in the development of the component parts of the body of an animal. These results agreed with the fact that the naked neck strain had a higher shank length than the strain with frizzle and normal feathers and that naked neck cockerels had higher shank length than the cockerels of other strains (16).

The Naked neck strain exhibited a higher body weight over the normal and Frizzled-feathered strains which may be due to possessing gene for feather distribution (Naked neck gene) that is involved in reducing feather mass of 20–40%, thus improving heat dissipation through the naked area. This heat dissipation, leads to less depression of appetite and as such good growth especially at high temperatures. More so, producing fewer feathers makes available protein for other tissues like muscle to be synthesized (17).

Body weight and body linear measurements were significantly ($p<0.05$) influenced by the breed of the birds (18), and according to (19), morphometric traits showed slight differences between chicken breeds which indicates that different chicken breeds have different sizes and body weights. Variations in morphometric traits could provide valuable information for the design of genetic improvement and selection programs for chickens, which rely primarily on variations within and between breeds or populations (20) and is an indication that traits could vary due to genotype (21,22).

CONCLUSION AND APPLICATION

There were variations in body weight and the linear body measurements of the different strains of the local Nigerian chickens. This is an indication of strain effect in the performance of these birds and thus should be considered as breeding plans are being designed.

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