

EFFECT OF ECOTYPE AND SEX INTERACTION ON BODY WEIGHT AND BIOMETRIC TRAITS OF NIGERIAN LOCAL CHICKENS

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ABSTRACT

This experiment was conducted to study the effect of ecotype and sex interaction on body weight and biometric traits of three indigenous chickens in north central Nigeria. From the chicks hatched, a total of 108 indigenous local chickens of three strains (Normal feathered =36), Tiv= 36 and Jos= 36) were used for the experiment. A 3×2 factorial experiment comprising 3 ecotypes and 2 sexes in a Completely Randomized Design (CRD) was used. Data were collected on body weight, body length, wing length, chest circumference, thigh length, chest length, shank length and comb length. The fixed and interaction effects of data collected were analysed using IBM SPSS version 28 and significant means were separated using Duncan's Multiple Range Test. The results showed that ecotype and sex interaction significantly ($p<0.05$) influenced all the parameters with the exception of the wing length and chest length. The Jos ecotype males had significantly higher body weight (700.12 ± 14.20 g) but similar to Tiv ecotype males (680.12 ± 13.20 g) and the least was found in normal feathered females (452.20 ± 10.11 g) but similar to Jos ecotype and Tiv ecotype females. Similar trends were observed for body length, chest circumference, thigh length, shank length and comb length. In terms of higher body weight, Jos and Tiv ecotype cocks are recommended. The current information can aid future genetic improvement programmes and management practices for higher productivity.

Keywords: Indigenous chickens, Strains, Morphometric traits, Interaction, Genetic Improvement

INTRODUCTION

Native livestock breeds play an increasingly important role in safeguarding genetic diversity, enhancing food security, and managing agriculture sustainably. Over many generations, native chicken breeds have changed and adapted to their surroundings. They are designed to withstand challenging environmental factors like extreme temperatures and scarcity of resources (Pius *et al.*, 2021). Their resistance to extreme temperatures has reduced the need for expensive veterinary interventions and medications. Poultry production in tropical countries is based on the traditional scavenging system and chickens are the most important poultry species. Village chickens are typically native breeds of birds that coexist almost harmoniously with human settlements (Yakubu, 2010).

Nigerian local chickens are widely divers with promising genetic potentials. Quantifying the morphological structure of genetic diversity in different Nigerian chickens' populations is of importance in optimizing genetic improvement, conservation and utilization strategies (Gambo *et al.*, 2020). The current study, therefore aimed at determining the interaction effect of ecotype and sex on body weight and biometric traits of indigenous Normal feathered, Tiv and Jos chickens in north central Nigeria

MATERIALS AND METHODS

The experiment was carried out at the Teaching and Research Farm of the Faculty of Agriculture, Nasarawa State University, Keffi, Shabu-Lafia Campus. Lafia is located on latitude $08^{\circ} 35''$ and longitude $08^{\circ} 33''$. The design was 3 x 2 factorial experiment in a completely randomized design involving 3 chicken ecotypes and 2 sexes. This gave a total of six treatment groups. Each treatment group was replicated three times giving a total of eighteen groups (this corresponded to 18 pens). A total of 108 birds of average age of six weeks of age (growers) and of both sexes, were used. This corresponded to thirty-six (18 males and 18 females) Tiv ecotype, thirty-six Jos ecotype (18 males and 18 females) and thirty-six normal feathered (18 males and 18 females) chicken genotypes. The birds were reared on deep litter. The birds were given anti stress on arrival, and were dewormed, and dusted for ectoparasites and allowed to acclimatize for two weeks. They were fed a diet of 20 percent crude protein and 3000 kcal/kg metabolizable energy. The birds were provided with feed and water *ad libitum*.

The experiment lasted for a period of 12 weeks. The biometric traits (measured weekly) included body length, wing length, chest circumference, thigh length, chest length, shank length and comb length. The measurements were taken using a plastic tailor meter.

The data collected were analyzed using IBM SPSS version 28. Data on body weight, morphometric, thermo-physiological, carcass and osteological traits were tested for normality with the Shapiro-Wilk's test ($P>0.05$) and by visual inspection of the histograms. Levene's test was used to confirm homogeneity of variances ($P>0.05$) as described by Brown *et al.* (2017). The data were then subjected to analysis of variance (ANOVA) to test the effect of ecotype and sex interaction on body weight and morphometric traits. Significant differences ($P<0.05$) between means were separated using Duncan's Multiple Range Test.

RESULTS

The effect of ecotype $\times$ sex interaction on the body weight and biometric traits of Nigerian local chickens is shown Table 1. The results showed that ecotype $\times$ sex interaction had significant ($p<0.05$) effect in all the parameters except on the wing length and chest length. The Jos ecotype males had significantly higher body weight (700.12 ± 14.20 g) but similar to Tiv ecotype males (680.12 ± 13.20 g) and the least was found in normal feathered females (452.20 ± 10.11 g) but similar to Jos ecotype and Tiv ecotype females. Similar trends were observed for body length, chest circumference, thigh length, shank length and comb length where all combinations with females were lower compared to the combinations with males.

Table 1: Effects of Ecotype $\times$ Sex Interaction on the Body weight and Biometric Traits of Nigerian Local Chickens

Parameters	NF		JOS		TIV		P-value
	Male	Female	Male	Female	Male	Female	
Body weight (g)	602.12 ± 10.20^b	452.20 ± 10.11^c	700.12 ± 14.20^a	472.28 ± 12.04^c	680.12 ± 13.20^a	470.23 ± 12.20^c	0.0321
Body length (cm)	24.00 ± 0.10^b	22.40 ± 0.20^c	27.00 ± 0.13^a	23.40 ± 0.12^c	26.80 ± 0.01^a	23.80 ± 0.12^c	0.0399
Wing length (cm)	14.00 ± 0.01	13.00 ± 0.03	16.03 ± 0.02	13.23 ± 0.11	15.2 ± 0.04	13.24 ± 0.10	0.6231
Chest circumference (cm)	7.01 ± 0.01^a	6.20 ± 0.11^b	8.21 ± 0.26^a	6.70 ± 0.02^b	7.96 ± 0.02^a	6.71 ± 0.01^b	0.0420
Thigh length (cm)	6.20 ± 0.11^a	4.92 ± 0.10^b	6.34 ± 0.1^a	5.11 ± 0.10^b	6.30 ± 0.02^a	4.98 ± 0.11^b	0.0492
Chest Length (cm)	3.21 ± 0.02	2.71 ± 0.12	3.34 ± 0.01	3.00 ± 0.11	3.01 ± 0.21	2.90 ± 0.11	0.8027
Shank length (cm)	5.92 ± 0.21^a	4.43 ± 0.23^b	5.45 ± 0.18^a	4.13 ± 0.21^b	4.89 ± 0.20^a	4.21 ± 0.11^b	0.4567
Comb length (cm)	3.01 ± 0.1^a	2.00 ± 0.21^b	2.90 ± 0.01^a	2.01 ± 0.11^b	3.00 ± 0.10^a	2.10 ± 0.00^a	0.0097

^{abc} means within the same row with different superscripts are significantly ($p<0.05$) different, NF= Normal feathered

DISCUSSION

The consistent findings that males have higher body weight and larger linear body measurements than females align with well-documented sexual dimorphism in chickens. Males generally grow faster and achieve larger body sizes due to hormonal influences (testosterone) that promote muscle development and bone growth (Olawunmi *et al.*, 2008). The Jos ecotype males showing the highest body weight and larger biometric traits likely reflects genetic and environmental adaptations. Jos ecotype chickens may be genetically predisposed to larger body size, possibly due to their origin in montane or savannah zones where larger body size confers survival advantages. In contrast, the normal feather and Tiv ecotypes may be adapted to different ecological niches with smaller body sizes, and this is similar to the report of Udeh *et al.* (2024). The lack of significant ecotype $\times$ sex interaction on wing length and chest length suggests these traits may be more conserved across ecotypes and sexes, possibly due to functional constraints related to flight and respiratory capacity that limit variation. Alternatively, these traits may have lower heritability or be less influenced by sex hormones compared to other traits.

As observed in this study, females consistently had lower values in the combinations or interactions for body weight and biometric traits and this is expected due to their physiological role in reproduction, where energy is often allocated to egg production rather than growth. This trade-off results in smaller

body size and linear measurements compared to males and this agreed with the findings of Adamu (2023). The significant ecotype $\times$ sex interaction implies that selection and management strategies should consider both genetic background and sex of birds.

CONCLUSION

The current findings revealed that body weight and biometric traits of male Jos ecotype chickens consistently showed higher values. Therefore, Jos and Tiv ecotype cocks are recommended for higher body weight. The current information can be exploited in genetic improvement and management practices for higher productivity.

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