LATE GROWER PHASE PERFORMANCE OF THREE GENOTYPES OF THE NIGERIAN NATIVE CHICKENS REARED UNDER INTENSIVE SYSTEM IN BENUE STATE

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ABSTRACT
The study investigated the growth performance of naked neck, normal and frizzle-feathered Nigerian native chickens during grower phase (9 to 18 weeks), under intensive system. 150 chicks, comprising 50 chicks from each genotype, were used in a 3 X 2 factorial arrangement in a Completely Randomized Design (CRD). Data were collected weekly on body weights and the data subjected to statistical analysis using SPSS software version 22.0 and mean separation done using Duncan multiple range test. The result showed a significant genotype effect ($p<0.05$) on body weights from week 9 to 18. Naked neck and frizzle-feathered chickens had comparable but higher ($p<0.001$) body weight than normal feathered indigenous chickens. Sex had highly significant ($p<0.001$) influence on body weight from week 9 to week 18 and on total weight gain. Genotype X sex interaction had no significant ($p>0.05$) effects on body weight of Nigerian indigenous chickens from week 9 to week 18. Naked neck and frizzle-feathered males had comparable total weight gain, which were higher than that of normal feathered males and all females irrespective of genotype. Naked neck females had significantly ($P<0.01$) higher total weight gain than normal and frizzle-feathered females, which had comparable total weight gain. It could be concluded that the naked neck genotype performed better than the frizzle and normal-feathered Nigerian native chickens under intensive system of management.
Keywords: Genotypes, Growth, Native chicken, Guinea savannah, Body weight

INTRODUCTION

The Nigerian indigenous chickens, also known as the native chickens are well-adapted to the country's diverse ecological zones and thrive under extensive and semi-intensive systems of management. It has been reported that the Nigerian native chickens may have adapted in response to combined effects of locally prevailing environmental conditions, uncontrolled breeding, in addition to the forces of natural selection, mutation and random genetic drift (Ukwu *et al.,* 2017). These chickens play major roles not only in rural economies but also contribute substantially to the gross national product (Momoh *et al.,* 2007).

Among the major genes operating in the native chickens found in the guinea savannah region of Nigeria are the normal, frizzle-feathered and the naked neck. Consequently, some researchers have grouped the Nigerian native chickens based on major gene into naked neck, normal and frizzle feathered conditions and dwarfism (Daikwo *et al.*, 2015). The guinea savannah is characterized with high temperature which can affect poultry production. In order to identify the most productive and sustainable choice for local farmers, it is of import to understand the growth rates of each genotype as it could also provide more information that could be used to develop future breeding programmes aimed at improving resilience, adaptability and productivity in local poultry. This study, therefore, was designed to evaluate the late growth performance of naked neck, normal and frizzle-feathered Nigerian native chickens reared under intensive system of management in Benue State.

MATERIALS AND METHODS

Experimental Site

The research was conducted at the Livestock Teaching and Research farm, Joseph Sarwuan Tarka University, Makurdi, Benue State. Makurdi is located at Latitude7°44'N and longitude 8°21'E), It lies within the middle Guinea Savannah region of Nigeria. The area is warm with a temperature range of 29.8 – 35.6 °C. Rainfall is between 508 – 1016 mm and relative humidity is 44% - 86% (TAC, 2015).

Experimental Animals and Management

150 Nigerian native chickens already 8 weeks of age, comprising 50 birds from each genotype (naked neck, normal and frizzle-feathered chickens) were used. The genotypes were housed separately in deep litter pens and were tagged for easy identification. They were fed commercial grower's mash for a

period of ten weeks. Feed and water were provided *ad libitum*, and other management practices observed.

Data Collection and Analysis

Data were collected on weekly body weights of the birds using sensitive weighing balance. Statistical analysis of data was done using the General Linear Model (GLM) procedure of SPSS software version 22.0. Two-way Analysis of Variance (ANOVA) was performed and mean separation was done using the Duncan multiple range test. The ANOVA model is as shown below:

$Y_{ijk} = \mu + G_i + S_j + (GS)_{ij} + e_{ijk}$

Where: Y_{ijk} = Single observation (body weight)

μ= Overall mean

G_i= Fixed effect of the i^{th} Genotype (1, 2, 3)

S_j = Fixed effect of the j^{th} Sex (1, 2)

$(GS)_{ij}$ = Interaction effect

e_{ijk}= random error.

RESULTS AND DISCUSSION

The main effect of genotype on weekly body weight of the Nigerian native chickens is presented in Table 1. The result showed significant genotype effect ($p<0.05$) on body weights of the Nigerian indigenous chickens. From week 9 to 18 (grower phase), it was observed that the naked neck and frizzle-feathered chickens had comparable but higher ($p<0.001$) body weight than normal feathered indigenous chickens. As expected, there was progressive increase in body weight in all the genotypes as the birds increased in age. This is in accordance with the findings of Olereforuh-Okoleh *et al.* (2017), who worked on a population of normal feathered and naked neck genotypes and observed a more rapid weight gain between 4, 8 and 12 weeks of age, indicating body weight increase with age. The present result showed a significant difference in body weight between the naked neck, frizzle and normal feathered chickens as there was rapid increase in body weight of all genotypes at the late grower phase. This significant influence of genotype on body weight in this study suggests that genetic differences exist among the genotypes for growth traits. The progressive increase in the weekly body weight with age in all the genotypes, which is expected, is in line with the results of Lamido *et al.* (2023) who observed progressive increase in body weights of indigenous normal feathered chicken at different ages.

Table 1: Main Effect of Genotype on Weekly Body Weight (g) of Nigerian Native Chickens

Parameters	Normal feathered	Naked neck	Frizzle feathered	P-value
Week 9	459.26±12.35	510.09±18.71	490.89±13.94	0.052
Week 10	509.77±14.23^{b}	587.35±21.55 ^{a}	545.68±16.05^{ab}	0.010
Week 11	565.42±16.55^{b}	666.28±25.06^{a}	641.30±18.67^{a}	0.001
Week 12	628.95±17.22^{b}	738.84±26.08^{a}	723.69±19.43^{a}	0.001
Week 13	718.44±18.20^{b}	820.17±27.55^{a}	811.67±20.52^{a}	0.001
Week 14	785.80±19.63^{b}	885.31±29.73^{a}	889.43±22.15^{a}	0.001
Week 15	842.33±19.60^{b}	956.01±29.67^{a}	954.09±22.12^{a}	0.001
Week 16	897.35±20.69^{b}	1034.12±23.34^{a}	1030.08±31.33^{a}	0.001
Week 17	968.31±20.86^{b}	1091.52±31.59^{a}	1090.43±23.53^{a}	0.001
Week 18	1037.79±22.36^{b}	1163.07±25.23^{a}	1151.95±33.86^{a}	0.001
TWG	578.53±21.84^{b}	652.98±24.48^{a}	661.06±33.12^{a}	0.032

a,b = means in the same row with different superscripts are significantly different ($p<0.05$; 0.01); TWG = total weight gain

The main effect of sex on weekly body weight of the Nigerian native chickens is presented in Table 2. The result also showed that sex had highly significant ($p<0.001$) influence on body weight from week 9 to week 18. It could be observed that the male native chickens of Nigeria had higher body weight than their female counterpart. This trend continued from week 9 to week 18. The total weight gain of male Nigerian native chickens was significantly ($P<0.05$) higher than that of their female counterparts. Sexual differences in growth traits of local chickens were also observed by Faith *et al*. (2018), Abdulraheem *et al*. (2020) and Lamido *et al*. (2023). According to Zerehdaran *et al.* (2004), the differences between males and females in a trait cannot be attributed to a single factor; factors such as

greater competition for feed, aggressive behavior of males, social dominance, difference in nutritional requirements, and impact of hormones for growth and fatness all play a part.

Table 2: Main Effect of Sex on Weekly Body Weight (g) of the Nigerian Native Chickens

Parameters	Females	Males	P-value
Week 9	427.00±11.38	546.49±13.43	0.001
Week 10	476.95±13.10	618.26±15.46	0.001
Week 11	537.49±15.24	711.17±17.99	0.001
Week 12	598.76±15.86	795.56±18.72	0.001
Week 13	677.23±16.76	889.62±19.77	0.001
Week 14	740.71±18.08	966.32±21.34	0.001
Week 15	797.89±18.05	1037.06±12.30	0.001
Week 16	857.32±19.05	1117.04±22.49	0.001
Week 17	914.92±19.21	1185.26±22.67	0.001
Week 18	977.37±20.59	1257.84±24.30	0.001
TWG	550.37±20.04	711.35±23.78	0.000

*TWG = total weight gain

The effect of genotype X sex interaction on weekly body weight of the Nigerian indigenous chickens in Benue State is presented in Table 3. There were no significant ($p>0.05$) effects of genotype X sex interaction on body weight of Nigerian native chickens from week 9 to week 18.

Table 3: Genotype X Sex Interaction Effect on Body Weight (g) of Nigerian Native chickens

Parameters	Normal Feathered		Naked Neck		Frizzle Feathered		
	Female	Male	Female	Male	Female	Male	P-value
Week 9	403.38±16.61	515.15±18.29	466.26±21.91	570.40±19.18	411.37±20.22	553.92±30.33	0.254
Week 10	450.18±19.13	569.36±21.07	516.70±25.23	658.00±34.93	463.96±23.29	627.40±22.09	0.588
Week 11	496.90±22.26	633.94±24.50	577.30±29.35	755.25±40.63	538.26±27.09	744.33±25.70	0.380
Week 12	552.38±23.16	705.52±25.50	638.35±30.54	841.83±26.74	605.56±28.19	839.33±42.28	0.275
Week 13	631.45±24.47	805.42±26.94	722.17±32.27	945.27±28.25	678.07±29.78	918.17±44.67	0.228
Week 14	694.20±26.40	877.39±29.06	783.04±34.81	1033.97±30.48	744.89±32.13	987.58±48.20	0.191
Week 15	742.78±26.35	941.88±29.01	838.52±34.75	1095.80±30.43	812.37±32.07	1073.50±48.11	0.363
Week 16	793.45±27.83	1001.24±30.63	898.74±36.69	1188.47±32.13	879.78±33.87	1161.42±50.80	0.270
Week 17	855.48±28.05	1081.15±30.88	961.96±36.99	1253.53±32.39	927.33±34.14	1221.08±51.22	0.278
Week 18	917.73±30.07	1157.85±33.11	1024.57±39.66	1336.33±34.72	989.82±36.60	1279.33±54.90	0.266
TWG	514.35±29.37	642.70±32.35	558.31±38.33	765.93±33.98	578.45±35.73	725.41±53.96	0.253

a,b,c,d Means in the same row with different superscripts are significantly different ($p<0.05$); TWG = total weight gain

The naked neck and frizzle-feathered males had comparable total weight gain, which were higher than that of normal feathered males as well as those of all females irrespective of genotype. Also, naked neck females had significantly ($P<0.01$) higher total weight gain than normal and frizzle-feathered females, which had comparable total weight gain. The present study which showed a non-significant disparity in the effect of the interaction between genotype and sex on weekly body weight aligns with the findings of Del Castilho *et al.* (2013) who reported non-significant genotype × sex interaction on body weight gains, feed conversion ratio, and livability in free range broiler chickens in Brazil. The significant genotype × sex interaction effects on body weight at hatch suggest that body weight is controlled jointly by genotype and sex. Significant genotype × sex interactions have been reported by a few authors.

CONCLUSION

It could be concluded that the naked neck genotype performed better than the frizzle and normal-feathered Nigerian native chickens under intensive system of management. The male Nigerian native chickens had better body weight than their female counterpart from week nine to week eighteen.

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