

Effect of Genotypes on Growth Performance, Linear Body and Carcass Traits of Chickens Reared in a Humid Tropical Environment

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Abstract

Poultry chickens, bred for rapid growth and meat production, exhibit diverse genotypes, leading to variations in growth rate, feed efficiency, and other traits. Understanding the genetic makeup of chickens is crucial for optimizing breeding programs and production practices. This work was conducted to investigate the effect of genotype on growth performance, linear body, and carcass traits of Arbor Acre, Noiler and Yoruba ecotype chickens. Three hundred 1-day-old chicks, 100 each of Arbor Acre, Noiler and Yoruba ecotype chickens were used. The experimental design used was a Completely Randomized Design (CRD) while the statistical analysis was done using the generalized linear procedure of the SAS Institute (2001). The traits considered were: linear body traits; body length (BLL), body depth (BD), shank length (SL), wing length (WL), and drumstick length (DSL), growth performance traits - body weight gain, feed conversion ratio (FCR) and carcass traits. Significant differences ($P < 0.05$) were observed in final body weight, feed intake and feed conversion ratio. The Arbor Acre genotype recorded the highest value in final body weight (1570g) and had a Better Feed Conversion Ratio (3.28) followed by the Noiler genotype (721.17g) and (3.77 g), lastly, the Yoruba ecotype which had (592.92 g) and (6.18) respectively. The result of body weight and linear body traits showed significant weekly variations among the three genotypes. Based on overall mean values, the Arbor Acre genotype exhibited significant superiority in body weight (864,90g), body length (17.77cm), shank length (5.80), wing length (14,50cm) and body depth (20.78cm). The Noiler strain recorded the least significance in keel length (6.27cm), drumstick (7.96cm) and shank length (5.30cm). The Noiler and Yoruba ecotype genotypes did not differ significantly in body weight and body length which showed genetic similarity but differed in wing length and body depth in which the Noiler genotype was genetically superior. The Yoruba ecotype was most significant in drumstick length (9.08cm) and equally had a higher keel length and shank length than the Noiler genotype, whereas it equated to the Arbor Acre in keel length. The results obtained in body weight and linear traits in this study implied that the growth responses of chickens are affected by their genetic potential. Significant higher values were obtained in the Arbor Acre genotype in live weight (1566.67g), de-feathered weight (1416.67g) and dressed weight (1131.67g) compared to the values obtained respectively in the Noiler genotype (1100.00g, 800.00g and 600.00g) and Yoruba ecotype (766.67g, 600.00g and 460.00g, respectively). The three genotypes showed strong genetic similarities in the internal organs except in the kidney. The differences and similarities observed in this study may be attributed to genotypic influences and the result shows that the Noiler hybrid performed better than the Yoruba ecotype while it equated with the Arbor Acre strain in growth performance and carcass traits.

Keywords: growth performance, linear body traits, carcass traits, ecotype, genotype



Effet Des Génotypes Sur Les Performances De Croissance, Les Caractéristiques Linéaires Du Corps Et Les Traits De Carcasse Des Poulets Elevés Dans Un Environnement Tropical Humide

Résumé

Les poulets de volaille, sélectionnés pour leur croissance rapide et leur production de viande, présentent des génotypes divers, entraînant des variations dans leur taux de croissance, leur efficacité alimentaire et d'autres caractéristiques. Comprendre la constitution génétique des poulets est essentiel pour optimiser les programmes d'élevage et les pratiques de production. Ce travail a été mené pour étudier l'effet du génotype sur les performances de croissance, les caractéristiques linéaires du corps et les traits de carcasse des poulets Arbor Acre, Noiler et de l'écotype Yoruba. Trois cents poussins d'un jour, 100 de chaque génotype (Arbor Acre, Noiler et écotype Yoruba), ont été utilisés. Le dispositif expérimental employé était un plan complètement randomisé (CRD), et l'analyse statistique a été réalisée à l'aide de la procédure GLM de SAS Institute (2001). Les traits étudiés comprenaient : les caractéristiques linéaires du corps (longueur du corps, profondeur du corps, longueur du tarse, longueur de l'aile et longueur de la cuisse), les performances de croissance (gain de poids corporel, indice de consommation) et les traits de carcasse. Des différences significatives ($P < 0,05$) ont été observées dans le poids corporel final, la consommation alimentaire et l'indice de consommation. Le génotype Arbor Acre a enregistré la valeur la plus élevée en poids corporel final (1570 g) et un meilleur indice de consommation (3,28), suivi du génotype Noiler (721,17 g et 3,77), et enfin de l'écotype Yoruba (592,92 g et 6,18). Les résultats du poids corporel et des caractéristiques linéaires ont montré des variations hebdomadaires significatives entre les trois génotypes. Sur la base des valeurs moyennes globales, le génotype Arbor Acre a présenté une supériorité significative en poids corporel (864,90 g), longueur du corps (17,77 cm), longueur du tarse (5,80 cm), longueur de l'aile (14,50 cm) et profondeur du corps (20,78 cm). La souche Noiler a affiché les valeurs les moins significatives pour la longueur du bréchet (6,27 cm), la longueur de la cuisse (7,96 cm) et la longueur du tarse (5,30 cm). Les génotypes Noiler et Yoruba n'ont pas montré de différences significatives en poids corporel et en longueur du corps, indiquant une similarité génétique, mais ont divergé dans la longueur de l'aile et la profondeur du corps, où le Noiler était génétiquement supérieur. L'écotype Yoruba s'est démarqué par la longueur de la cuisse (9,08 cm) et a également présenté une longueur de bréchet et de tarse supérieure à celle du Noiler, tout en égalant l'Arbor Acre pour la longueur du bréchet. Les résultats obtenus en poids corporel et en traits linéaires suggèrent que les réponses de croissance des poulets sont influencées par leur potentiel génétique. Des valeurs significativement plus élevées ont été observées chez le génotype Arbor Acre pour le poids vif (1566,67 g), le poids déplumé (1416,67 g) et le poids éviscéré (1131,67 g) par rapport aux valeurs respectives du Noiler (1100,00 g, 800,00 g et 600,00 g) et de l'écotype Yoruba (766,67 g, 600,00 g et 460,00 g). Les trois génotypes ont montré de fortes similarités génétiques dans les organes internes, à l'exception des reins. Les différences et similarités observées dans cette étude peuvent être attribuées aux influences génotypiques. Les résultats indiquent que l'hybride Noiler a surpassé l'écotype Yoruba tout en égalant la souche Arbor Acre en performances de croissance et en traits de carcasse.

Mots-clés : performances de croissance, caractéristiques linéaires du corps, traits de carcasse, écotype, génotype.

Introduction

Poultry eggs and are of great importance in a balanced and healthy diet. It is important to determine the quality characteristics of these products, which have both nutritional properties

(Aysondu and Ozyurel, 2021). Therefore, the expansion and improvement of poultry industries has been one of the major focuses of the federal government of Nigeria to improve the protein consumption of her citizenry (CBN, 2017). To

improve the increasing demand for poultry products, new strains of chicken need to be developed with fast growth rate and improved carcass quality with less abdominal fat through breeding programmes and principles. For breeding programmes to be successful, a breeder must, among others, take into consideration the inter-relationship between body weight and body conformation traits. Such conformation traits include shank length, breast girth, thigh length and body length. Most of these conformation traits are good indicators of body weight and market values of chicken. Previous studies have reported that the relationship between body weight and conformation traits is direct and opposite (Sam *et al.*, 2020). Body weight according to Lakew *et al.*, 2017, is the most frequently used indicator of growth. Body weight is a quantitative trait, meaning it's influenced by multiple genes and environmental factors. It's also highly heritable, meaning genetic factors play a significant role in determining an individual's weight. According to Obike *et al.* (2016), the performance of birds is affected by their strain as well as the environment. Strain x environment interaction may cause loss of fitness traits for strains not suited for rearing in a particular environment. Apart from strain, body weight and conformation traits are also good estimators of growth and market values (Yahaya *et al.*, 2010). Thenard *et al.* (2024) reported that Selection programs in farm animals primarily focus on economic traits that directly impact profitability and sustainability. Amao *et al.* (2012) also stated that animal linear body measurement has been used to predict live gain, examine the relationship between economic characteristics, and reproductive performance, and study the relationship between genotypic effect and environment. It has been shown that crossbreeding of indigenous and exotic breeds improves growth traits which include traits like liver weight, daily gains, and feed intake (Asiedu and Weever, 1993; Dzungwe *et al.*, 2024).

According to available information, Noiler birds are produced in Nigeria and it is a dual-purpose breed that is used in the production of both meat and egg and can also adapt well to our humid tropical environment (Adamu *et al.*, 2021). It comes in different colours, it takes a longer time and more consumption to reach market size (Alabi *et al.*, 2024). It is tastier than broilers but bonier and has a higher resistance to diseases than the broilers and Yoruba ecotype strains (Adamu *et al.*, 2021). Some of the cocks are above 3kg at 14 weeks of age (Alabi *et al.*, 2024). However, the breeding was made to improve the quality and production trait of our local Yoruba ecotype strain, and this research aimed at accessing the genetic effect in the growth performance, linear body, and carcass characteristics of this Noiler hybrid compared to the local Yoruba ecotype strain and exotic broiler (Arbor Acres) reared in a humid tropical environment.

Materials and Methods

Experimental Site

The experiment was conducted at the poultry unit of the Teaching and Research farm of Michael Okpara University of Agriculture, Umudike, Abia State. The farm is located on Latitude 05° 29' North and Longitude 07° 32' East. The farm lies at an altitude of 122m and within the rainforest zone of south-east Nigeria, which has a bimodal rainfall pattern and total annual rainfall of 2177mm, maximum ambient temperature range of 22°C to 36°C during the hot dry season of the year (November – March) and minimum ambient temperature range of 20°C-26°C during the cold rainy season (April - October). The relative humidity ranges from 50-90 % depending on the season (NRCRI, 2017).

Management of Experimental Birds

A total of 300 1-day-old chicks, 100 each of Arbor Acres broiler, Noiler, and Yoruba ecotype strains were purchased from reputable hatcheries in Ibadan, Nigeria. . The brooding was carried out for two weeks at the temperature of 35°C with

adequate water and feed provided *ad libitum*. Antibiotics, vitamins, and vaccines were given to them to prevent possible outbreaks of diseases. Before the arrival of the birds, the pens were cleaned and disinfected against insects and diseases. Light was provided 24 hours during the brooding to prevent to provide warmth. The temperature was reduced weekly as brooding progressed. Wood shavings were used as litter materials.

Experimental Procedure

After brooding for two weeks, each strain were allocated into five replicates with 20 birds per replicate. The linear body measurements of the birds of each strain was taken at 2, 4, 6, and 8 weeks. At the end of the experiment, three birds

Data Collection

Data were collected on the following parameters:

Growth Performance Traits

a) Average weight gain (g):
$$\frac{\text{Final live weight} - \text{initial live weight}}{\text{Number of birds} \times 42 \text{ days}}$$

b) Feed intake (g):

$$\frac{\text{Food consumed} - \text{leftover}}{\text{Number of birds} \times 42 \text{ days}}$$

c) Feed conversion ratio (FCR):

$$\frac{\text{Feed intake (g)}}{\text{Average body weight gain}}$$

Body Weight and Linear Body Measurements

Body weight (g): This was measured using sensitive electronic weighing scale in grams

Body length (cm): This was obtained from the tip of the beak over the neck to the tail.

Body depth (cm): This was measured as the circumference of the body under the wing through the anterior border of the breast crest and central thoracic vertebrae.

Wing length: This was obtained by stretching the wing and measurements taken from the scapula joint to the last digit of the wing.

per replicate were randomly selected for carcass yield measurement. The birds were deprived of feed overnight to avoid gut fill, weighed, and slaughtered by slitting the jugular vein. Complete bleeding was ensured and feathers were removed. The carcass was weighed after removing the head, shanks, and viscera to determine the dressing percentage of carcass weight. The carcass was cut up into breast, wings, drumstick, back, shank, and thigh which were weighed and expressed as percentage of the live weight. The internal organs were isolated, weighed on a sensitive electronic weighing scale (0.01g sensitivity) and also expressed as percentage of the live weight.

Shank length (cm): This was measured with measuring tape as the distance from the foot pad to the hock joint.

Drumstick length (DSL): This was measured from the tips of the tarsus to the ball joint.. Keel length (cm): This was measured from the V-joint end to the sternum.

All the linear body parameters were measured using a tailor's tape in centimeters. To ensure accuracy, each measurement was taken twice.

Carcass and Internal Organ Parameters

Carcass characteristics measured were live weight (g), dressed weight (g), breast (g), thigh (g), drumstick (g), wing (g) shank (g) and keel (g) while the internal organs were head, lung, heart, kidney, gizzard, liver, proventriculus, spleen and pancreas. The parameters were determined using the following formula:

Statistical Analysis and Experimental Design

The experimental design used was a Completely Randomized Design (CRD) and the data collected were subjected to Analysis of variance (ANOVA) using SAS (2001) package and the separation of significant means were done using the Duncan's new multiple range test (DNMRT) as described by Duncan (1955). The model of analysis is as shown below:

$$Y_{ij} = \mu + G_i + e_{ij}$$

where,

Y_{ij} = single observation

μ = overall mean

G_i = effect of i^{th} strain ($i=3$)

e_{ij} = Random error (iind, 0, σ^2)

Results and Discussion

Table 2 shows the growth performance of Arbor Acres, Noiler, and Yoruba ecotype strain chicken strains. Significant differences ($P<0.05$) were observed in the final weight, daily weight gain, daily feed intake, and feed conversion ratio (FCR). No significant difference ($P>0.05$) was observed in their initial weights as expected. The Arbor Acre chicken recorded the highest ($P<0.05$) final weight and daily weight gain followed by the Noiler hybrid strain and lastly the Yoruba ecotype strain. The mid-performance of the Noiler hybrid strain compared to the Arbor Acre chicken and the Yoruba ecotype strain may be attributed to hybrid vigour. The Arbor Acre chicken recorded the most significant daily feed intake value of 90.03g/bird, followed by the Yoruba ecotype strain with 61.76 g/bird and lastly the Noiler hybrid strain recorded 45.92g/bird. This is in agreement with earlier reports of significant differences in feed intake

among strains of chickens (Rondelli *et al.*, 2003; Taha *et al.*, 2010; Udeh *et al.*, 2015) who found significant differences in feed intake among strains of chicken. This shows that it may be more economical to produce Noiler hybrid chickens compared to the Yoruba ecotype strain since the Noiler hybrid strain obtained its comparatively higher final weight and daily weight gain with less intake compared to the Yoruba ecotype strain. The highest feed intake value obtained for the Arbor Acre chicken was expected since its high body weight had to be met with high feed intake. Feed Conversion Ratio (FCR) was significantly highest ($P<0.05$) in the Yoruba ecotype strain with 6.18, which implies that the Yoruba ecotype strain is a poor feed converter compared to the Arbor Acre which has (3.28) and Noiler hybrid recorded (3.77). Our data on feed conversion ratio were consistence with previous studies in the literature (Rondelli *et al.*, 2013). FCR was least significant in the Arbor Acre strain suggesting that it is the most efficient feed converter followed by the Noiler hybrid strain which performed midway between the Arbor Acre and Yoruba ecotype strain chicken strain. Significant variations among Arbor Acre strains on feed conversion ratio have also been observed. Similar to our finding, Olawumi *et al.* (2012) found superior ($P<0.05$) FCR for Arbor Acre over other strains of chicken from 1st to 7th week of age. Yakubu *et al.* (2010) also found better feed conversion efficiency in Arbor Acres. Obike *et al.* (2016) also found the Arbor Acres strain as a better converter of feed to flesh and at maturity could generate good returns compared to other strains. From the result of the growth performance, it could be deduced that the Noiler hybrid strain performed averagely compared to the Arbor Acres and Yoruba ecotype strain chicken which may be attributed to hybrid vigour. This result shows that the progeny has superior performances and characteristics than the combined parent. In this study, it was observed that the strain with the highest feed conversion

ratio recorded the lowest mean value in feed efficiency while, the strain with the lowest feed conversion had the superior mean value for feed efficiency (Olawumi *et al.*, 2012).

Table 3 shows the body weight and linear body measurements of Arbor Acres, Noiler, and Yoruba ecotype chicken strains. A significant difference ($P < 0.05$) was observed in the body weight and linear parameters of the three chicken strains in weeks 2, 4, 6, and 8. The Arbor Acres chicken strain recorded the most significant ($P < 0.05$) values in all the parameters except wing length in week 2; keel length and drumstick length in week 4; keel length, drumstick length, shank length, and wing length in week 8. In week 6, all the Arbor Acre chickens recorded the most significant values in all the parameters. More so, based on the overall means, the Arbor Acre chicken strain recorded the highest values in all the parameters except drumstick length. In this study, it was observed that the Arbor Acre strain was significantly higher ($P < 0.05$) for all parameters evaluated more than the Noiler and Yoruba ecotype strain and the result obtained in this study compared favourably with the works of earlier researchers (Olawumi *et al.*, 2012, and Udeh *et al.*, 2015; Obike *et al.*, 2017). The linear body traits of the Yoruba ecotype strain chicken recorded higher values in body length, drumstick, shank length, and wing length).

The growth pattern of Yoruba ecotype strains over the periods is shown, although there was a difference ($P < 0.001$) in live weight between strains, the dressing percent (53 -54%) of different strains was similar ($P > 0.05$). A similar trend was found in the case of the effect of age of slaughter on live weight ($P < 0.001$) and dressing percent ($P > 0.05$) whereas, the Noiler hybrid chicken recorded higher values in body weight and body depth in week 2. The Noiler hybrid and Yoruba ecotype strains obtained similar results in body weight, body length, and shank length in week 4. However, the Yoruba ecotype strain recorded higher values in keel length and

drumstick; the Yoruba ecotype strain on the other hand recorded higher values in wing length and body depth in week 4. In week 6, the Noiler and Yoruba ecotype strains recorded similar values in body weight, body length, keel length, drumstick length, shank length, and body depth except wing length which recorded a higher value for the Yoruba ecotype strain. This result is in line with reports of Sonaiya *et al.* (1986) that age is a major significant in growth and physiological development. Omega and Nwosu (1999) opined that these relationships could be utilized in the genetic improvement of growth through selection. Giordani *et al.* (2011) also reported significant differences in the growth performance of different strains of birds. Again, the Noiler hybrid and the Yoruba ecotype strain performed similarly in drumstick, shank length, wing length, and body depth except in body weight, body length, and keel length. The Noiler hybrid recorded higher body weight and keel length than the Yoruba ecotype strain in week 8. Drumstick, shank length and wing length were significantly higher ($P < 0.05$) than the Arbor Acre strain. Keel length was most significant in the Noiler hybrid strain, Based on overall mean performance, the Noiler hybrid and Yoruba ecotype strains had similar levels of significance only in body weight and body length which were lower than the Arbor Acres strain. The Yoruba ecotype strain recorded a higher keel length than the hybrid strain but equates with the Arbor Acres strain. The Noiler hybrid, however, recorded higher wing length and body depth values compared to the Yoruba ecotype strain but lower than the Arbor Acre strain. The growth pattern result from this study showed that it was in agreement with the conclusion of Adeniji and Ayorinde (1990) that the body weight of birds can easily be predicted from any given value of six body measurements (body length, body girth, keel length, shank length, drumstick length, and shank thickness). Also, the significant differences observed in the growth rate of the Yoruba ecotype strain, Noiler

and Yoruba ecotype strain implied that the strains have different genetic potential for growth (Obike *et al.*, 2017). Fayeye *et al.*, (2005) obtained the body weight of Fulani ecotype chicken ranging from 306-312 at 8 weeks, Adedeji *et al.* (2006) obtained the body weight for naked neck, frizzle, and normal chicken as 348.61, 360.46, and 351.31 respectively and 351.22 in an exotic breed (white leghorn). The values obtained by this research for the local chickens and exotic strains at 8 weeks are far lower than the 8-week value (721.17) obtained from the hybrid of Yoruba ecotype and Arbor Acre crossed in this present study.

Table 4 shows the carcass cut parts of Arbor Acre, Noiler, and Yoruba ecotype strain chicken strains. Significant differences ($P < 0.05$) were observed in live weight, de-feathered weight and dressed weight. No significant differences ($P > 0.05$) were observed in percent dressed weight, breast, drumstick, wings, back-cut, shank, and keel. The Arbor Acre chicken strain recorded the most significant ($P < 0.05$) value in live weight, de-feathered weight, and dressed weight. The Noiler and Yoruba ecotype strain chicken strains recorded similar levels of significance in live weight, de-feathered weight, and dressed weight. The Noiler hybrid strain did not show any significant advantage of hybrid vigour concerning the significant parameters. The non-significant result obtained for the percent values shows the three strains did not show genetic differences about those parameters. This result corroborates the findings of Yakubu *et al.*, (2010) who reported that the Arbor Acre strain had significantly ($P < 0.05$) higher relative (%) fasted body, carcass, back, neck and wing weights compared to other strains. Earlier, Mendes *et al.*, (1994) studied Arbor Acre strains and observed that strain had a significant effect on carcass yield and percentage of breast meat. Obike *et al.* (2016) also studied the back, neck, breast, wing, and drumstick and all the organ characteristics did not

differ significantly ($P > 0.05$) between the two strains. These results confirm that genetic potential, nutrition, and environment are major determinants of carcass and organ yield.

Table 5 shows the internal organ proportion of Arbor Acre, Noiler, and Yoruba ecotype chicken strains. No significant difference was observed in the lungs, heart, gizzard, liver, proventriculus, spleen, and pancreas. Significant difference ($P < 0.05$) was obtained in the percent kidney of the three strains. The Yoruba ecotype strain recorded the highest kidney value 0.81% followed by the Arbor Acre strain at 0.65% and the least was obtained in the Noiler strain which recorded 0.55 %. The non-significance or rather the similarity exhibited by the three strains in all the parameters evaluated except the kidney shows there were no genetic differences concerning internal organ proportions including the head and the neck. In this study, there is evidence that heritability increases in levels of performance through change may be the result of genetic variation and this result agrees with the previous study of Berri *et al.* (2005) that meat quality characteristics are affected by genetic factors such as appropriate choice of breed.

Conclusion and Recommendations

This study compared the growth performance, linear body, and carcass traits of three strains of chickens; Arbor Acre, Noiler, and Yoruba ecotype. The result of growth performance showed that the Arbor Acre strain recorded the most significant final weight 1570g and feed conversion ratio 3.28 followed by the Noiler strain 721 g and 3.77 and lastly, the Yoruba ecotype strain which recorded 592.92g and 6.18 respectively. The result of body weight and linear body traits showed significant weekly variations among the three strains. Based on overall mean values, the Arbor Acre strain exhibited significant superiority in body weight (864.90g), body length (17.77cm), shank length (5.80), wing length (14.50cm), and body depth (20.75cm). The

Noiler strain recorded the least significance in keel length (6.27cm), drumstick (7.96cm), and shank length (5.30cm). The Noiler and Yoruba ecotype strain did not differ significantly in body weight and body length which showed genetic similarity but differed in wing length and body depth in which the Noiler strain was genetically superior. The Yoruba ecotype strain was most significant in drumstick length (9.08cm) and equally had a higher keel length and shank length than the Noiler strain, whereas it equated to the Arbor Acres in keel length. Differences and similarities in body weight and linear traits may be attributed to genotypic or genetic factors.

Furthermore, significant differences observed in live weight, de-feathered weight, and dressed weight revealed that the Arbor Acres strain was genetically superior to the Noiler and Yoruba ecotype strains which had similar levels of significance in live weight and dressed weight. The Noiler hybrid did not show any significant advantage of hybrid vigour over the Yoruba ecotype in these parameters. This might be due to environmental stress, management practices and genetic differences

From the foregoing, the Noiler hybrid strain performed lower than the Arbor Acres strain but showed some genetic superiority over the Yoruba ecotype in final weight, FCR, wing length, and body depth. However, both the Noiler and Yoruba ecotype strains exhibited more genetic similarity compared to the Arbor Acres strain in average body weight, body length, and carcass characteristics; whereas, they differ in drumstick, shank length, and keel length. Further improvement efforts should be channeled towards improving the drumstick, shank length, and keel length of the Noiler hybrid strain.

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Experimental Diets

Table 1. Compositions of Experimental Diets (Straight diet)

Ingredients	Percentage %
Maize	50.00
Soya bean meal	25.00
Wheat offal	8.00
Fish meal	3.00
Palm kernel cake	10.00
Bone meal	3.00
Lysine	0.25
Methionine	0.25
Salt	0.25
Vitamin/mineral premix	0.25

Total Calculated (%)	100.00
Calculated nutrients	
Crude protein	22.95
ME (Kcal/kg)	2945

Table 2. Growth Performance of Arbor Acre, Noiler and Yoruba Ecotype Strain Chickens

Parameters	Arbor Acre	Noiler	Yoruba Ecotype	SEM
Initial weight (g/bird)	33.33	33.33	33.33	0.00
Final weight (g/bird)	1570 ^a	721.17 ^b	592.92 ^c	153.81
Daily weight gain (g/bird/day)	27.44 ^a	12.28 ^b	9.99 ^c	2.75
Daily feed intake (g/bird/day)	90.03 ^a	45.92 ^c	61.76 ^b	6.68
Feed Conversion Ratio	3.28 ^b	3.77 ^b	6.18 ^a	0.48

^{abc} Means with different superscripts within the same row are significantly different at $P < 0.05$; SEM – Standard Error of the Mean.

Table 3. Body Weight and Linear Body Measurement of Arbor Acre, Noiler Hybrid and Yoruba Ecotype Chicken strains.

Parameters		Arbor Acres	Noiler	Yoruba Ecotype	SEM
WEEK 2	Body weight (g)	211.18 ^a	124.45 ^b	110.78 ^c	4.33
	Body length (cm)	10.73 ^a	8.85 ^c	9.63 ^b	0.15
	Keel length (cm)	4.87 ^a	4.00 ^b	4.25 ^b	0.09
	Drumstick length (cm)	5.50 ^a	4.70 ^c	5.11 ^b	0.08
	Shank length (cm)	3.98 ^a	3.33 ^b	3.98 ^a	0.07
	Wing length (cm)	8.28 ^b	8.03 ^b	8.93 ^a	0.14
	Body depth (cm)	13.39 ^a	11.42 ^b	9.40 ^c	0.24
WEEK 4	Body weight (g)	576.38 ^a	232.10 ^b	259.93 ^b	13.73
	Body length (cm)	17.83 ^a	13.85 ^b	13.47 ^b	0.33
	Keel length (cm)	8.10 ^b	5.46 ^c	13.53 ^a	0.42

Effect of Genotypes on Growth Performance, Linear Body and Carcass Traits of Chickens Reared in a Humid Tropical Environment

	Drumstick length (cm)	9.19 ^b	6.71 ^c	12.97 ^a	0.35
	Shank length (cm)	6.58 ^a	4.66 ^b	4.93 ^b	0.14
	Wing length (cm)	15.81 ^a	14.21 ^b	7.20 ^c	0.47
	Body depth (cm)	19.42 ^a	14.19 ^b	5.20 ^c	0.73
WEEK 6	Body weight (g)	1102.05 ^a	480.95 ^b	419.00 ^b	26.87
	Body length (cm)	20.67 ^a	16.56 ^b	15.92 ^b	0.34
	Keel length (cm)	8.15 ^a	6.85 ^b	6.50 ^b	0.12
	Drumstick length (cm)	10.85 ^a	9.21 ^b	8.52 ^b	0.18
	Shank length (cm)	6.71 ^a	5.85 ^b	6.04 ^b	0.10
	Wing length (cm)	16.67 ^a	15.10 ^c	15.96 ^b	0.14
	Body depth (cm)	25.33 ^a	17.17 ^b	16.92 ^b	0.51
WEEK 8	Body weight (g)	1570.00 ^a	721.17 ^b	592.92 ^c	35.97
	Body length (cm)	21.85 ^a	20.25 ^b	20.25 ^b	0.21
	Keel length (cm)	7.63 ^b	8.75 ^a	8.08 ^b	0.11
	Drumstick length (cm)	9.40 ^b	11.21 ^a	11.00 ^a	0.18
	Shank length (cm)	5.92 ^b	7.38 ^a	7.21 ^a	0.11
	Wing length (cm)	17.23 ^b	18.29 ^a	18.33 ^a	0.16
	Body depth (cm)	24.95 ^a	20.96 ^b	20.46 ^b	0.32
Overall Means	Body weight (g)	864.90 ^a	389.67 ^b	345.66 ^b	16.45
	Body length (cm)	17.77 ^a	14.88 ^b	14.95 ^b	0.28
	Keel length (cm)	7.19 ^a	6.27 ^b	7.53 ^a	0.14
	Drumstick length (cm)	8.73 ^{ab}	7.96 ^b	9.08 ^a	0.16
	Shank length (cm)	5.80 ^a	5.30 ^b	5.60 ^{ab}	0.09
	Wing length (cm)	14.50 ^a	13.91 ^{ab}	13.17 ^b	0.25

Body depth (cm)	20.78 ^a	15.93 ^b	13.80 ^c	0.35
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^{abc} Means with different superscripts within the same row are significantly different at $P < 0.05$; SEM – Standard Error of Mean.

Table 4. Carcass Cut-parts of Arbor Acres, Noiler and Yoruba Ecotype Chicken Strains

Parameters	Arbor Acres	Noiler	Yoruba Ecotype	SEM
Live weight (g)	1566.67 ^a	1100.00 ^b	766.67 ^b	133.19
De-feathered wt (g)	1416.67 ^a	800.00 ^b	600.00 ^b	138.39
Dressed weight (g)	1131.67 ^a	600.00 ^b	460.00 ^b	118.96
Dressed percent (%)	71.91	53.96	62.08	4.54
Breast (%)	21.58	22.32	15.41	2.48
Drumstick (%)	14.55	18.84	14.72	1.35
Wings (%)	12.24	18.22	13.82	1.49
Back cut (%)	23.19	29.07	24.16	1.53
Shank (%)	5.76	9.85	7.41	0.83
Keel (%)	13.85	17.28	14.08	1.23

^{abc} Means with different superscripts within the same row are significantly different at $P < 0.05$; SEM – Standard Error of Mean.

Table 5. Internal Organ Proportions/Offal of Arbor Acres, Noiler and Yoruba Ecotype Chicken Strains

Parameters (%)	Arbor Acres	Noiler	Yoruba Ecotype	SEM
Lungs	0.65	0.53	0.58	0.03
Heart	0.57	0.51	0.55	0.02
Kidney	0.65 ^{ab}	0.55 ^b	0.81 ^a	0.05
Gizzard	2.44	2.64	3.02	0.15
Liver	2.35	1.68	2.34	0.18
Proventriculus)	0.50	0.44	0.55	0.03
Spleen	0.14	0.11	0.18	0.02

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Pancreas	0.25	0.18	0.24	0.02
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^{abc} Means with different superscripts within the same row are significantly different at $P < 0.05$; SEM – Standard Error of Mean.