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Evaluation of growth performance traits in three strains of broiler chickens reared in derived savanna environment of Nigeria

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ABSTRACT [ENGLISH/ANGLAIS]

The evaluations of some growth performance traits on Ross, Anak and Marshall strains of broiler chickens were carried out. Data were obtained on growth performance traits (body weight, daily gain, feed intake, feed conversion ratio and phenotypic correlation coefficients of each strain of broiler used). There were significant ($p < 0.05$) strain differences for body weight, average daily gain, average feed intake and feed conversion ratio while Ross strain were more favoured for body weight and average daily gain but lower feed intake and feed conversion ratio. There were significant differences among the phenotypic Pearson's correlation coefficients for all growth performance traits for all strains. Strains of the bird showed highly significant ($p < 0.01$) and positive correlation for body weight, daily gain feed intake and feed conversion ratio, while a very highly significant ($p < 0.001$) and positively correlation exist between feed conversion ratio and feed intake. The positive relationship for all the growth performance traits measured was a good indicator and thus shows that the two strains can performed as expected with improve in other aspect of management

Keywords: Environmental influences, meat chickens, correlations coefficient, savanna environment

RÉSUMÉ [FRANÇAIS/FRENCH]

Les évaluations de certains traits de la performance de croissance sur Ross, Anak et Marshall souches de poulets de chair ont été réalisées. Les données ont été obtenues sur les traits de la performance de croissance (poids, gain de poids quotidien, la prise alimentaire, le ratio de conversion des aliments et des coefficients de corrélation phénotypique de chaque souche de poulets à griller utilisé). Il était significative ($p < 0,05$) entre la souche du poids corporel, le gain moyen quotidien, la prise alimentaire moyenne et le ratio de conversion des aliments tout en souche Ross ont été plus favorisées pour le poids corporel et le gain moyen quotidien, mais l'apport d'alimentation inférieur et le taux de conversion des aliments. Il y avait des différences significatives entre les coefficients de corrélation de Pearson phénotypique pour tous les traits de la performance de croissance pour toutes les souches. Les souches de l'oiseau a montré hautement significative ($p < 0,01$) et la corrélation positive pour le poids corporel, la prise alimentaire quotidienne de gain et de taux de conversion alimentaire, tandis qu'un ($p < 0,001$) très hautement significative et positive corrélation existe entre les taux de conversion alimentaire et la prise alimentaire. La relation positive pour tous les traits de la performance de croissance mesurée était un bon indicateur montre donc que les deux souches peuvent fonctionné comme prévu avec l'amélioration dans les autres aspects de la gestion.

Mots-clés: Influences de l'environnement, poulets de chair, les corrélations coefficient, l'environnement de savane

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INTRODUCTION

In Nigeria, there are many reports on the genetic parameter estimates for broiler growth traits and reports of Amao et al. [1], Ojedapo et al. [2], and Oluyemi and Roberts [3] suggested the need to generate these estimates as baseline data for any future improvement

efforts. Carborg et al. [4] obtained significant strain differences on broiler bird weight, feed intake and feed efficiency. There is evidence that there are genetic differences in growth rate between strain and the changes in weight ranking may be critical in the age ranged between eight to twelve weeks [5].

The development of suitable strains of broiler chickens for the tropical environment is a research interest which has engaged the attention of a number of poultry geneticists and breeders for the past two decades [6]. Therefore, the aim of this study was to evaluate the growth performance traits and estimate phenotypic correlation using three commercial strains of broiler chicken in derived savanna environment of Nigeria.

MATERIALS AND METHODS

Site of the study

This research was carried out between July – October, 2008 at the Poultry unit of Teaching and Research Farm of the Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria. Ogbomoso lies on the Longitude 4°15' East of the Greenwich Meridian and Latitude 8°15' North of the equator. The altitude is between 300 and 600 metres above sea level. The mean temperature is about 27°C while the annual mean rainfall is 1247 mm [7].

Experimental Birds and Managements

A total of 300 day-old broiler chick strain comprising 100 Ross, 100 Anak and 100 Marshall, were used for this study. Each strain was identified by wing tag and also given a separate pen in an environmentally controlled brooder house with a floor covered with wood shavings which was kept dry throughout the experimental period by replacing the litter regularly. All necessary vaccinations were administered accordingly.

All the chicks were fed *ad libitum* with a commercial broiler starter diet containing 24% Crude Protein and 2,880 kcal/kg Metabolized Energy up to 4 weeks of age. Thereafter the birds were given broiler finisher ration containing 21% Crude Protein and 3,000 kcal/kg Metabolized Energy up to twelve weeks. Fresh, cool drinkable water was given *ad libitum* to the birds throughout the experimental period.

Data collection

Data were collected on final body weight, feed intake, average daily gain and feed conversion ratio.

Statistical analysis

Data on growth traits were analysed using the General Linear Model (GLM) procedure of [8], means were separated using Duncan multiple range test of the same package.

RESULTS AND DISCUSSION

The least square means of growth traits for three strains of broiler chickens were shown in Table 1. There were significant ($p < 0.05$) differences for growth traits measured among the strains. At the end of the experiment, that is, 8th week, the bodyweight ranged from 2000 - 2400g with Ross strain having the highest value of 2445g followed by Anak 2340g and Marshall 2100g.

Bodyweight, daily weight gain, feed intake and feed conversion ratio were significantly ($p < 0.05$) different among the strains. The body weight of Ross showed significantly ($p < 0.05$) higher value than the other strains, followed by Anak and then Marshall. This is in agreement with the findings of Reddish and Lilburn [9] and Dairo et al. [10] that Ross strain had higher body weight than other strains used. The authors attributed this to the genetic merits of Ross over other strains in the derived savanna zone.

Average daily feed intake and weight gain were significantly ($p < 0.05$) higher in Ross than other strains. The propensity with which Ross strain consumed higher feed to put on higher body weight could be attributed to its genetic make up over other strains. The better ($p < 0.05$) feed conversion ratio was observed in Ross than other strains. This indicates better utilization of feed by Ross birds as they had the least feed conversion ratio since the lower the feed to gain ratio the better the diet and this in the line with the report of Amao et al. [11].

Table 2 shows the phenotypic Pearson correlation coefficient of growth traits for Ross, Anak and Marshall birds. The traits measured for Ross strain were very high and positive, ranging from 0.68 between average daily gain and feed intake, to 0.98 between feed conversion ratio and feed consumption by the Ross birds. The daily gain, feed intake and feed conversion ratio showed high significant ($p < 0.01$) positive correlation against bodyweight with the highest value were obtained for feed intake against bodyweight (0.89). This present results confirmed earlier reports findings of Zerehdaran et al. [12]. These authors reported that feed intake, feed conversion ratio against daily gain were also high, positive and significantly ($p < 0.01$) correlated.

However, feed conversion ratio against feed intake were very significantly high ($p < 0.001$) and positively correlated. This trend of results was in line with the findings of [13] who revealed that the phenotypic correlation coefficients were very high for feed conversion ratio over other growth traits measured.

TABLE 1

Table 1 shows the least square means of growth traits as affected by strain effects

Growth traits	Ross	Anak	Marshall
Body weight (g)	2445.32 ± 60.02 ^a	2340.75 ± 39.04 ^b	2100.21 ± 61.23 ^c
Average daily gain (g)	58.34 ± 6.04 ^a	50.45 ± 3.14 ^b	51.37 ± 6.32 ^b
Average feed intake (g)	124.38 ± 12.24 ^b	137.49 ± 14.02 ^a	131.34 ± 15.00 ^a
Feed conversion ratio	2.32 ± 0.01 ^b	3.50 ± 0.08 ^a	3.65 ± 0.03 ^a

^{abc} Means in the same row with different superscript are significantly different ($p < 0.05$)

TABLE 2

Table 2 shows the Phenotypic Pearson's correlation coefficient of growth traits for Ross, Anak and Marshall strains broiler chickens

Growth traits	Body Weight	Daily gain (g)	Feed intake
Ross Strain			
Daily gain (g)	0.85**	-	-
Feed intake (g)	0.89**	0.68**	-
Feed conversion ratio	0.86**	0.87**	0.98***
Anak Strain			
Daily gain (g)	0.74**	-	-
Feed intake (g)	0.80**	0.65**	-
Feed conversion ratio	0.84**	0.86**	0.96***
Marshall Strain			
Daily gain (g)	0.78**	-	-
Feed intake (g)	0.80**	0.64**	-
Feed conversion ratio	0.84**	0.86**	0.95***

*** = " $p < 0.001$ "; ** = " $p < 0.01$ "

The phenotypic Pearson correlation coefficient of growth traits for Anak broiler birds was also shown in Table 2. Similar trends were achieved as Ross birds but lower numerical values were observed for bodyweight against daily gain (0.74), feed intake (0.80) and feed conversion ratio (0.84), the daily gain against feed intake (0.80) and feed conversion ratio (0.86). All these traits were high significantly ($p < 0.01$) and positively correlated, while very significantly high ($p < 0.001$) and positively correlation coefficient exist only between the feed conversion ratio and feed intake with lower numerical value (0.96) compared to Ross strain. These results were in agreement with the reports of Adekunmisi et al. [14] but disagreed with the work of [15] who reported a negative genetic correlation for broilers. The similar

responses have been reported by [16] for Ross and Anak broiler chickens.

Table 2 also revealed the phenotypic Pearson correlation coefficient of growth traits of Marshall birds. Similar trends in Anak birds were observed among the growth performance traits. The bodyweight against daily gain, feed intake and feed conversion ratio showed significant high ($p < 0.01$) positive correlated. These findings were in line with the reports of Le Bihan-Duval et al. [17] who confirmed a ranged of genetic correlation with growth and body composition of broiler bird while Tabatabaei et al. [18] also reported a significant positive correlation in their findings with high correlation reveals common gene acting additively.

Feed intake against daily gain, and feed conversion ratio were also high ($p < 0.01$) and positively correlated while the very highly ($p < 0.001$) significant and positive correlation also existed between the feed conversion ratio and feed intake. These results were compatible with the works of Orunmuyi et al. [19]. These authors revealed a result that followed the same trend for two strains of Rhode Island chickens while the positive range of pattern observed in this study were in agreement with the report of Nargish et al. [20] for broiler chicks.

CONCLUSION

The positive relationship for all the growth performance traits measured is a good indicator and thus shows that the two strains can performed as expected with improve in other aspect of management.

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CONFLICT OF INTEREST

No conflict of interest was declared by authors.

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