



Comparative growth performance among Noiler chickens of black and brown plumage patterns at starter phase

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Abstract

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The study was conducted to compare growth performance among noiler chickens of black and brown plumage varieties at starter phase. Fifty noiler day old chickens were raised till 4th week (28th day) at the Teaching & Research Farm, Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria. Day old chickens were divided into black and brown plumage; and fed with commercial diet (22% crude protein, 2900kcal/kgME). Data on average feed consumption, average weight gain, feed conversion ratio and feed efficiency were recorded biweekly. The result showed that all parameters recorded were not significant ($P>0.05$) at the first two weeks for both black and brown plumage noiler chickens. The second biweekly data, showed significant difference ($P<0.05$) for black and brown plumage respectively at average weight gain ($568.75\pm55.92\text{g}$; $490.38\pm45.43\text{g}$), feed conversion ratio (0.63; 0.78) and feed efficiency (1.59; 1.30); while the average feed consumption showed no significant difference ($P>0.05$). Therefore, in conclusion, the black plumage starter noiler chickens, had good feed efficiency utilization and better growth performance, hence the information could be useful in improving noiler chicken production practices.

INTRODUCTION

The importance of plumage colour or patterns cannot be overemphasized in poultry production. It is a key genetic trait, though pleiotropic, in the interaction between chickens due to their developed system of visualization; and a marker for identification of breeds, populations and breeding groups (Akumbugu *et al.*, 2023). Plumage pattern also serves as a key factor

in making informed decisions by farmers and consumers in poultry management and production.

Different patterns of plumage occur when pigments or structural colours of organisms are non-uniformly distributed. This variation in plumage and its patterns occur among species, and during their ontogenetic developmental stages,

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phenological seasons within species, sexes, physiological conditions and social statuses (Price and Pavelka, 1996, Galeotti *et al.*, 2003) (Mason and Bowie, 2020).

Plumage varieties have been reported to have different roles on avian species such as camouflage against predators, sexual selection, social cues (Mason and Bowie, 2020); productive performance (Adetunji and Ola, 2020); and importantly on growth performance in poultry species. They are even a factor in the development of particular lines in breeding programs. Plumage pattern is also considered by consumers in their preferences and desires. Though it is physically and clearly observed with ease, however it is governed by both qualitative and quantitative traits (Klungland and Vage, 2000; Park *et al.*, 2013).

Plumage pattern in avian species may occur at multiple scales being coordinated and localized patterns of within-feather colour variation (Mason and Bowie, 2020). This could generate repeated patterns or motifs in a localized area (Prum and Williamson, 2002; Mason and Bowie, 2020). The differences in color among feather tracts of various body patches create broader-scale patterning across an organism's body (Stoddard and Prum 2008; Mason and Bowie, 2020).

Noiler chicken is an improved local breed in Nigeria characterized with varieties of plumage such as barred, white, brown, black etc. It is a dual purpose breed of chicken that is, for both meat and egg (Bamidele *et al.*, 2019; Suleiman *et al.*, 2019); developed by Amo Farm Sieberer Hatchery Limited. They are suitable for rural communities and smallholder farmers

to address food insecurity and improving household income due to their high production performance (Ajayi *et al.*, 2020). Similar improved local chickens in Nigeria are FUNAAB Alpha, Shika-Brown and Fulani breeds (Bamidele *et al.*, 2019; Ajayi *et al.*, 2020).

Presently, few studies and publications are available on Noiler chickens perhaps being newly introduced improved local breed in Nigeria and low in supply. The effect of plumage on egg production was reported in the works of Dogara *et al.* (2021) on black, brown and spotted noiler; Yakubu *et al.* (2007) among Bovan brown and Lohman brown commercial layer hens; Stojic (2012) on white and brown chickens; and on the body measurements and heat tolerant traits of indigenous chicken by Akumbugu *et al.* (2023). However, the objective of this study was to compare the growth performance among Noiler chickens of black and brown plumage patterns at starter phase.

MATERIALS AND METHODS

Samples and Location: The study was carried out at the Teaching and Research Farm of the Adekunle Ajasin University, Akungba-Akoko, Ondo State, Nigeria. Fifty Noiler chickens each of black and brown plumage were used. Day old chicks were obtained from Amo Farm Sieberer Hatchery Limited, Awe, Oyo State, Nigeria.

Experimental Design: 50 Noiler chickens each for all-black (herein referred to as black) and all-brown (herein referred to as brown) plumage patterns were used for this study. Twenty-five (25) birds each for black and brown plumage colour chickens were duplicated per treatment using a deep litter system, in a completely randomized design.

Data were obtained on average feed consumption and average weight gain biweekly till end of 4th week (28 days). Feed conversion ratio (FCR) and Feed Efficiency (FE) were also calculated. The data obtained were subjected to statistical analysis using the General Linear Models (GLM) procedure of software (SAS, 2002).

Husbandry of Chickens: The Noiler chickens were brooded at the *T & R Farm, AAUA* and raised to 4 weeks old (28th day), the starter phase, in a deep litter system. The first 2 weeks were used for the brooding for the black and brown plumage chicken; then followed by the last 2 weeks. They were fed *ad libitum* with commercial starter diet (22% crude protein, 2900kcal/kgME). Fresh and clean water was given to the birds daily.

Statistical analysis: The data obtained on average feed consumption, average weight gain, FCR and FE were subjected to two-way analysis of variance (ANOVA) using General Linear Model (GLM) procedure of software SAS, 2002 (SAS Institute, 2002) at 5% probability. The means were compared with Duncan Multiple Range Test option of the software. The results were then presented as mean ± standard deviation. The model is given below:

$$Y_{ik} = \mu + \alpha_i + \epsilon_{ik}$$

Where,

Y_{ik} = the observed response of the kth

parameter (e.g. average feed consumption) of the ith replicate or of the treatment (e.g. black plumage pattern)

μ = overall mean

α_i = effect of ith treatment (e.g. black plumage pattern)

ϵ_{ik} = random error

RESULTS AND DISCUSSION

Table 1 revealed the performance of starter noiler chicken based on their plumage colour pattern at the first two weeks; while Table 2 indicated their performance at the second two weeks. At the first two weeks, the average feed consumption showed no significant difference ($P > 0.05$) for the black plumage starter Noiler chickens (203.18±75.43g) and the brown plumage (189.74±51.66g). Also, other parameters such as average weight gain, feed conversion ratio, and feed efficiency revealed no significant difference ($P > 0.05$) respectively for black plumage starter Noiler chickens (220.6±67.21g; 0.79; 1.27) and the brown plumage (198.54±48.52g; 0.77; 1.30). The second two weeks also showed no significant difference ($P > 0.05$) at the average feed consumption for both black and brown plumage Noiler starter chickens. However, other parameters such as average weight gain, feed conversion ratio, and feed efficiency were significantly different ($P < 0.05$) respectively for both black (568.75±55.92g; 0.63; 1.59) and

Table 1. Performance of Noiler chickens based on plumage colours at first 2 weeks of starter phase

Parameters	Black Plumage	Brown Plumage
Average feed consumption (g)	203.18±75.43	189.74±51.66
Average weight gain (g)	220.6±67.21	198.54±48.52
Feed conversion ratio	0.79	0.77
Feed efficiency	1.27	1.30

Table 2. Performance of Noiler chickens based on plumage colours at second 2 weeks of starter phase

Parameters	Black Plumage	Brown Plumage
Average feed consumption (g)	360.64±35.16	386.72±45.41
Average weight gain (g)	568.75 ^a ±55.92	490.38 ^b ±45.43
Feed conversion ratio	0.63 ^a	0.78 ^b
Feed efficiency	1.59 ^a	1.30 ^b

^{ab}: Means within a row with different superscripts are significantly different (P<0.05).

brown (490.38±45.43; 0.78; 1.30) starter Noiler chickens.

The data obtained on average feed consumption for all the weeks showed no significant difference (P>0.05) throughout this study for both black and brown plumage starter noiler chickens. However, major difference was revealed at the second biweekly data obtained, whereby the feed conversion ratio which measures the efficiency, and gives the amount of feed required to gain one kilogram of weight, indicated significant difference, and same occurred for the feed efficiency which is another measure of performance, that is the amount of weight gain per unit of feed consumed. Therefore, the black plumage chicken, showed good feed efficiency utilization. This study has shown the influence of plumage colour on growth and it is in line that black plumage poultry has better performance with the data obtained by Dahloum *et al.* (2018) that Algerian indigenous naked-neck chickens of black feathered layers produced the biggest eggs in comparison to the white and brown-feathered layers of the same species. Moreover, Adetunji and Ola (2020) also reported the black-feathered noiler hen produced overall average egg weight and egg weight at 52nd week of age (though not statistically significant) in comparison to the brown noiler hens. The better growth performance of the black plumage

compared to the brown may be attributed to genetic dissimilarities in their genotype as explained by Stojcic *et al.* (2012) in the egg production among white and brown chickens. Moreover, the better performance could also be attributed to its black plumage being more adapted to tropical weather condition as reported by Yakubu *et al.* (2007) for Bovan Nera Black chicken, based on genotype by environment interaction that black plumage is more adaptable to tropical weather conditions.

CONCLUSION

In conclusion, this study suggested that the performance of noiler chicken at the starter phase was influenced by plumage colour. Black plumage had better performance at the second biweekly evaluation. Further studies could investigate the genetics of plumage colour and underlying mechanisms behind these differences and explore potential management strategies to optimize performance for different plumage groups. This information could also be useful for chicken farmers and breeders in making informed decisions about the management and breeding of noiler chickens with varieties of plumage and could be used to improve poultry production and management practices to maximize efficiency.

Conflict of interest: The authors declare no conflict of interest.

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