



## EFFECT OF OUTDOOR AND PASTURE FORAGING ACCESSIBILITY ON PERFORMANCE AND CARCASS CHARACTERISTICS OF NOILER BIRDS

Jibia Z.S.<sup>1</sup>, Garba M.G.<sup>1</sup>, Sabo M.N.<sup>1</sup>, Gaddafi S.<sup>1</sup>

and Ibrahim M.<sup>2</sup>

<sup>1</sup>Department of Animal Science, Federal University Dutsin-Ma, Katsina State, Nigeria

<sup>2</sup>Department of Agricultural extension, Federal University Dutsin-Ma, Katsina State, Nigeria

Correspondent author; [sanigaddafi4@gmail.com](mailto:sanigaddafi4@gmail.com); Phone: +234-7067212353

### Cite this article:

Jibia Z.S., Garba M.G., Sabo M.N., Gaddafi S., Ibrahim M. (2023), Effect of Outdoor and Pasture Foraging Accessibility on Performance and Carcass Characteristics of Noiler Birds. African Journal of Agriculture and Food Science 6(3), 16-22. DOI: 10.52589/AJAFS-S5WCVYN3

### Manuscript History

Received: 29 July 2023

Accepted: 18 Sept 2023

Published: 10 Oct 2023

### Copyright © 2023 The Author(s).

This is an Open Access article distributed under the terms of Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International (CC BY-NC-ND 4.0), which permits anyone to share, use, reproduce and redistribute in any medium, provided the original author and source are credited.

**ABSTRACT:** *This experiment was carried out to determine the effect of outdoor and pasture foraging accessibility on performance responses and carcass characteristics of Noiler birds. A total number of 320 Noiler birds were divided into 5 treatments and each treatment was replicated 4 times with 16 birds per replicate. At the end of the brooding phase (2 weeks), the birds were placed in a 2 x 2 factorial arrangement (outdoor durations and pasture accessibility were considered as factors) in a completely randomised design (CRD). T1 serves as control (indoor), T2 4 hours outdoor accessibility, 8 hours outdoor, 4 hours outdoor plus pasture foraging and 8 hours outdoor plus pasture foraging for T2, T3, T4 and T5 respectively. The data obtained in this study were subjected to Analysis of Variance (ANOVA) where means were separated using Duncan Multiple Range Test (DMRT) of the Statistical Analysis Software package (SAS). The birds in T2 had significantly ( $P < 0.05$ ) higher final weight; similarly, higher ( $P < 0.05$ ) weight gain were observed in birds reared in T2. The result revealed that there are no significant ( $P > 0.05$ ) differences in both carcass and visceral weight proportion across all the treatments. However, considerable numerical variations exist. Higher dress weight was observed in T3 (70.333%) followed by T5, T2, T4 and T1 with 67.853, 67.372, 63.901 and 59.888% respectively. The result however, suggests non-significant ( $P > 0.05$ ) differences in initial weight, feed conversion ratio, feed cost per kilogram diet. It is therefore concluded that outdoor and pasture foraging has a profound effect on the performance profile of Noiler birds. It is therefore recommended for enhanced body weight and weight gain birds should also be enriched with pasture foraging material and at least 4 hours outdoor accessibility.*

**KEYWORDS:** Outdoor, Foraging, Performance, Noiler Birds.



## INTRODUCTION

There is a growing demand for poultry meat worldwide, particularly in developing countries partly in response to population growth and growing affluence (Elkashaf *et al.*, 2016). In response, poultry industries have intensified, adopting high stocking densities and rapid growth genetics to maximise output and profitability. Crowded living space can have a significant positive impact on farmers' incomes, which generally increase with stocking density (Bessei, 2018). However, decrease in space allowance is likely to have detrimental effects on the welfare of the birds (Bessei, 2006; Meluzzi & Sirri, 2009). Free range and organic poultry production systems were developed following a growing awareness of human health and nutritional concerns (Fanatico *et al.*, 2007). Consumers ascribed greater quality and security of meat and high standards of animal welfare to specialty products obtained from such alternative systems, although there is little scientific evidence supporting these perceptions (Ponte *et al.*, 2008). There is a growing body of literature that recognises the importance of allowing chickens to express their natural behaviour by providing outdoor access. However, studies investigating the effects of outdoor access to housed meat chickens in the tropics are scarce (Sanchez-Casanova *et al.*, 2019).

The demand for better tasting meat, improved animal welfare, and environmentally friendly production has led to the modification of production systems practised in Europe and the United States (Comert *et al.*, 2016).

Noiler farming in Nigeria is made possible by Amo Farms; they introduce it into the Nigerian market. At the moment, Noilers are hatched and produced (as Amo Noiler) at the Amo Farm located in Awe Area of Oyo in Oyo State, Nigeria (Bamedele *et al.*, 2019). The rate at which Noiler farming in Nigeria has been accepted is increasingly becoming alarming. One tremendous advantage of Noiler farming is that they are a dual-purpose (both egg and meat breed). The ability of these birds to convert agricultural, household and natural waste abundant in our homes, surrounding and villages into sumptuous edible protein, for human consumption, growth and healthy living makes Noiler farming in Nigeria popular. It also provides a substantial income for the farmer, his family and the rural poor; this is what makes Noiler farming in Nigeria a game-changer.

In Nigeria, it is observed that the practice of animal ethics is lacking or non-existent. Animal ethics and welfare issues are hardly taught in schools and rarely table for discussion at scientific conferences and workshops. The reasons for this fragrant neglect are not known. Poultry farmers may be absolved of blame since they are generally ignorant of animal management and welfare issues (Babeyemi & Bamikola, 2010). However, the concern of the populace towards animal ethical practices is a fast growing field in some developed countries in the world especially in the United States. This may be due to its positive effects on the animal, their products and by-products for the use of man (Akinyemi *et al.*, 2011).

Commercial broilers welfare is receiving increasing scrutiny from the media and non-governmental organisations concerning welfare issues associated with rapid growth and rearing conditions. Currently, in Nigeria there is little scientific information regarding the effect of outdoor access on the performance of both fast-growing and slow-growing meat producing birds. The free-range production system which is one of such systems has been observed to increase the flavour of chicken compared with conventionally confined systems with high density. Poultry products derived from free range or organic production are very popular



sources of food with consumers' preferring these poultry products because they believe that the products have a superior sensory quality and meat security coupled with high standards of animal welfare (Babeyemi & Bamikola, 2010). The objectives of this study were to determine the effect of outdoor and pasture foraging accessibility on performance responses and carcass characteristics of Noiler birds.

## MATERIALS AND METHODS

### Experimental Site

The experiment was conducted at the Poultry unit of the Livestock and Teaching and Research Farm, Department of Animal Science, Federal University Dutsin-Ma, Katsina State, Nigeria. Dutsin-Ma LGA lies at latitude 12°26'N and longitude 07°29'E. Rainfall is between May and September with a peak in August. The average annual rainfall is about 700 mm. The mean annual temperature ranges from 29°C – 31°C. The highest air temperature normally occurs in April/May and the lowest in December through February (Abaje *et al.*, 2014).

### Experimental Birds and Design

A total 320-day-old chick Slow-growing (Noiler) meat type birds was procured from a reputable hatchery. The birds were brooded in an indoor floor pen.

At the end of the brooding phase (2 weeks), the birds were placed in a 2 x 2 factorial arrangement in a completely randomised design. The factors were housing on deep litter without outdoor or deep litter with outdoor access and pasture foraging) and 4- or 8-hours outdoor accessibility. Therefore, there were five treatments as shown below:

1. Treatment one – Noiler birds reared on deep litter without outdoor accessibility.
2. Treatment two – Noiler birds reared on deep litter with 4 hours outdoor accessibility.
3. Treatment three – Noiler birds reared on deep litter with 8 hours outdoor accessibility.
4. Treatment four – Noiler birds reared on deep litter with 4 hours outdoor + Pasture foraging.
5. Treatment five – Noiler birds reared on deep litter with 8 hours outdoor + Pasture foraging.

Sixty-four (64) birds were assigned to each of the treatments above; each treatment had four (4) replications of 16 birds each. The Deep Litter group was reared indoors on concrete floors without access to outdoors while the Deep Litter and Pasture Foraging group had indoor pens that opened onto separate yards, which was surrounded by net fencing. The indoor portion of each pen had 1 fount-type or bowl drinker and a hanging conical feeder and pasture for foraging groups. The outdoor portion of each DLFR pen was 2 x 20m<sup>2</sup> (4m<sup>2</sup> per bird) with 1 drinker and a feeder with a rain shield.



## Growth Performance

For feed intake and live weight gain: A given quantity of feed was measured and fed to the birds on a weekly basis. From which weekly feed intake was measured. Daily feed intake and total feed intake was determined. The birds were weighed at two weeks as they are assigned to the various treatments. From thereon, they were weighed early in the morning before receiving any feed and water using a weighing balance at weeks' interval during the experimental period. Initial and final body weights of the birds were measured at the beginning and end of the experiment respectively. Average daily weight gain and feed conversion ratio was determined.

## Carcass Characteristics

At the end of this experiment four birds were randomly treated, one from each replicate for carcass and visceral organs evaluation. The birds were starved overnight for 12 hours but allowed access to water. The fastest live weights were recorded prior to slaughter and slaughtered by severing the jugular vein; well-bled carcasses were scalded, de-feathered and eviscerated. The weights were adequately recorded at each of the processing stages and organs (liver, gizzard, heart, intestine proventriculus) weight were taken. Carcass weights (plucked, eviscerated and dressed weight) were calculated as percentages of live weight. The organ weights were calculated as percentages of carcass weight. The weights were measured with the aid of a sensitive digital weighing scale.

## Statistical Analysis

All data generated were analysed using the General Linear Model (GLM) procedure of Statistical Analysis System (SAS) package version 9.2 software (Statistical Analysis System, 2007, SAS Institute Inc., Cary, NC, USA) and statistical significance was set at  $P < 0.05$ . Statistical difference was separated using Duncan's Multiple Range Test method in the software.

## RESULT AND DISCUSSION

The results on the growth performance of slow growing meat birds raised with outdoor accessibility and foraging were presented in table 1 below. The result revealed that there are non-significant ( $P > 0.05$ ) differences in initial weight of the birds in this study. This thus implies that the birds were all homogenous in terms of body weight before the commencement of this study while the final weight indicates significant ( $P < 0.05$ ) differences with increase in outdoor accessibility and pasture foraging of birds in this study. Birds raised in T2 had the highest final body weight (1.717) followed by 1.703, 1.647, 1.640 and 1.623 for T3, T4, T1 and T5 respectively. Similarly, there are significant ( $P < 0.05$ ) differences in weight gain of the Noiler birds with access to outdoor and pasture foraging practices. 1.012% in T2 was the highest weight gain obtained in this study while 0.902 in T5 was the lowest weight gain value obtained in a bird raised with outdoor accessibility and pasture foraging.

The results in the study indicate that total feed intake, feed conversion ratio and feed conversion per kilogram live weight gain were not statistically ( $P > 0.05$ ) different among the slow growing



birds raised in this study despite numerical differences between treatment mean. The result further revealed that there is no significant ( $P>0.05$ ) difference in feed cost per kilogram gain.

The increase in growth rate for those in outdoor accessibility may be linked to increase in welfare and sunlight accessibility compared to confinement groups. This will, however, support the study conducted by Cao *et al.* (2008) that suggested that increased growth of male birds under different light wavelengths has been attributed to increased levels of testosterone and growth hormone production, which in turn stimulates the myofiber growth of the pectoral muscles.

**Table 1: Effect of outdoor accessibility and pasture foraging on Noiler bird's performance**

Parameters	T1	T2	T3	T4	T5	SEM
Initial body weight (kg)	0.735 <sup>a</sup>	0.705 <sup>a</sup>	0.717 <sup>a</sup>	0.732 <sup>a</sup>	0.721 <sup>a</sup>	0.013
Final body weight (kg)	1.640 <sup>bc</sup>	1.717 <sup>a</sup>	1.703 <sup>ab</sup>	1.647 <sup>bc</sup>	1.623 <sup>c</sup>	0.026
Weight gain (kg)	0.905 <sup>b</sup>	1.012 <sup>a</sup>	0.987 <sup>ab</sup>	0.915 <sup>b</sup>	0.902 <sup>b</sup>	0.026
Total feed intake	4.419 <sup>a</sup>	4.562 <sup>a</sup>	4.474 <sup>a</sup>	4.463 <sup>a</sup>	4.351 <sup>a</sup>	0.089
FCR	4.889 <sup>a</sup>	4.507 <sup>a</sup>	4.545 <sup>a</sup>	4.545 <sup>a</sup>	4.831 <sup>a</sup>	0.123
FC/Kg Feed (₦)	1095.20 <sup>a</sup>	1009.56 <sup>a</sup>	1018.00 <sup>a</sup>	1082.15 <sup>a</sup>	1082.08 <sup>a</sup>	27.600

FCR = Feed conversion ratio, FC/KG = Feed cost per kilogram feed, SEM = Standard error mean

### Effect of Outdoor Accessibility and Pasture Foraging on Noiler Birds Carcass Characteristics

The carcass characteristics of Noiler birds reared with outdoor accessibility and pasture foraging were presented in table 2 below. The result revealed that there were no significant ( $P>0.05$ ) differences in both carcass and visceral weight proportion across all the treatments, however, considerable numerical variations exist. Higher dress weight was observed in T3 (70.333%) followed by T5, T2, T4 and T1 with 67.853, 67.372, 63.901 and 59.888% respectively. Dressing percentage is affected by weight of birds, environment/housing type, plane of nutrition, pre-slaughter activities and dressing method (Aduku & Olukosi, 2000). Since other factors that affect dressing percentage were kept constant except the housing nature, it is no doubt that the housing outdoors had an effect on the numerical increases of carcass characteristics despite the fact that it is not statistically significant in this study. The breast weight percentage showed that T5 had the highest weight of 19.004%, followed by T3 (18.273%), T2 (18.136%), T1 (16.508%) while T4 had the lowest breast weight percentage (15.357%). A considerable numerical increase was observed in wing weight percentage in this study, where birds that spent more time outdoors had the highest (10.636 and 10.048%) values for T3 and T5 respectively. These could be attributed to increase in musculoskeletal activities and ability of birds to display a variety of active behaviour such as wing flapping among others because exercise helps in muscle contraction which will subsequently lead to muscular tissue building.



**Table 2: Effect of Outdoor Accessibility and Pasture Foraging on Noiler Birds Carcass Characteristics**

Parameters	T1	T2	T3	T4	T5	SEM
Live weight (kg)	1.900 <sup>a</sup>	1.900 <sup>a</sup>	1.750 <sup>a</sup>	1.866 <sup>a</sup>	1.617 <sup>a</sup>	0.199
Dress weight (%)	59.888 <sup>a</sup>	67.372 <sup>a</sup>	70.334 <sup>a</sup>	63.901 <sup>a</sup>	67.853 <sup>a</sup>	4.093
Breast weight (%)	16.508 <sup>a</sup>	18.136 <sup>a</sup>	18.273 <sup>a</sup>	15.357 <sup>a</sup>	19.004 <sup>a</sup>	2.951
Wing weight (%)	7.799 <sup>a</sup>	9.053 <sup>a</sup>	10.636 <sup>a</sup>	9.221 <sup>a</sup>	10.049 <sup>a</sup>	1.903
Back weight (%)	13.690 <sup>a</sup>	11.626 <sup>a</sup>	15.532 <sup>a</sup>	11.838 <sup>a</sup>	14.677 <sup>a</sup>	2.729
Neck weight (%)	6.545 <sup>a</sup>	5.435 <sup>a</sup>	6.408 <sup>a</sup>	4.579 <sup>a</sup>	7.012 <sup>a</sup>	1.563
Thigh weight (%)	17.743 <sup>a</sup>	18.926 <sup>a</sup>	19.303 <sup>a</sup>	21.788 <sup>a</sup>	21.924 <sup>a</sup>	3.757
Legs weight (%)	3.041 <sup>a</sup>	4.087 <sup>a</sup>	4.461 <sup>a</sup>	3.699 <sup>a</sup>	4.230 <sup>a</sup>	0.745
Intestine (%)	4.973 <sup>a</sup>	5.505 <sup>a</sup>	6.639 <sup>a</sup>	6.030 <sup>a</sup>	6.919 <sup>a</sup>	1.108
Gizzard (%)	2.275 <sup>a</sup>	2.821 <sup>a</sup>	3.575 <sup>a</sup>	2.537 <sup>a</sup>	2.538 <sup>a</sup>	0.549
Heart (%)	0.409 <sup>a</sup>	0.404 <sup>a</sup>	0.595 <sup>a</sup>	0.459 <sup>a</sup>	0.521 <sup>a</sup>	0.100
Liver (%)	1.473 <sup>a</sup>	1.583 <sup>a</sup>	1.765 <sup>a</sup>	1.759 <sup>a</sup>	2.331 <sup>a</sup>	0.282
Proventriculus (%)	0.327 <sup>a</sup>	0.414 <sup>a</sup>	0.484 <sup>a</sup>	0.451 <sup>a</sup>	0.453 <sup>a</sup>	0.077

The increase in dressing weight percentage could be linked to the increase in welfare and foraging accessibility of birds in this study which enables birds to pick variety of materials from soil, insect, grasses and other edible materials which in one way might contain proportion of vitamins and minerals that play vital roles in nutrient utilisation and ultimately growth performance. This further indicates that birds in this study were not restricted to only confine feed and this will be supported by Manal *et al.* (2004) reports, who posited that restricted feeding to animals could have negative effects on body weight gain and carcass dressing percentage which is contingent on the amount of feed offered to the animal per time.

## CONCLUSION

It could be concluded that outdoor and pasture foraging has a profound effect on performance profile and carcass dressing percentages of Noiler birds. It is therefore recommended for better final body weight and weight gain birds should be enriched with pasture foraging material and at least 4 hours outdoor accessibility.

## Acknowledgement

We sincerely acknowledged the support of TETFUND for the sponsorship of this research work through the Institute Based Research Grant 2023.



---

**REFERENCES**

- Abaje, I. B., Sawa, B. A. and Ati, O. F. 2014 Climate Variability and Change, Impacts and Adaptation Strategies in Dutsin-Ma Local Government Area of Katsina State, Nigeria. *Journal of Geography and Geology*; Vol. 6, No. 2; 2014.
- Aduku, A.O. and Olukosi, J.O. 2000, Animal products: Processing and handling in the tropics. Living books series. GU Publications Abuja FCT Nigeria. PP 9-13.
- Akinyemi, P.I., Akinwande, V.O. and Babayemi, O.J 2011, Understanding animal welfare and ethics for a start in Nigeria: A review. *Tropical Animal Production Investigation*, 14(1):07-11.
- Babayemi, O.J. and Bamikola, M.A. 2010, Ethics and Animal welfare: is it possible in Nigeria? *Proceeding 35<sup>th</sup> Conference of Society for Animal Production*, 732-734.
- Bamidele. O., E.B. Sonaiya, O.A. Adebambo and T. Dessie. 2019, On-station performance evaluation of improved tropically adapted chicken breeds for smallholder poultry production systems in Nigeria. *Tropical Animal Health Production*, 52:1541-1548. <https://doi.org/10.1007/s11250-019-02158-9>.
- Bessei, W. 2018, Impact of animal welfare on worldwide poultry production. *World Poultry Science Journal*, 74, 211-224.
- Bessei, W. 2006, Welfare of broilers: a review. *Worlds Poultry Science Journal*, 62, 455-466.
- Cao, J., Liu, W., Wang, Z., Xie, L. and Chai, Y. 2008, Green and bleu monochromatic lights promote growth and development of broilers via stimulating testosterone secretion and myofibers growth. *Journal of Applied Poultry Research*, 17, 211-218.
- Elkashaf, O., Sarmiento-Franco, L., Torres-Acosta, J. 2016, Backyard chicken production skills of rural women in Yucatan, Mexico. *Asian Journal Agricultural Extension, Economic and Sociology*, 10, 1-12.
- Fanatico, A.C., Pillai, P.B., Emmert, J.L. and Owens, C.M. (2007). Meat quality of slow- and fast-growing chicken genotypes fed low nutrient or standard diets and raised indoors or without outdoor access. *Poultry Science*, 86:2245-2255.
- Manal, A.F., Tony, M.A. and Ezzo, O.H. 2010, Feed restriction of pregnant nulliparous rabbit does: consequences on reproductive performance and maternal behaviour. *Animal Reproduction Science*, 120:363-374.
- Meluzzi, A., Sirri, F. 2009. Welfare of broiler chickens. *Italian Journal Animal Science*, 8, 161-173.
- SAS 2007, SAS User`s guide: Statistics. Version 9.2 SAS Institute, Carry, NC 27513, USA.