



## **Effect of Breed and Sex on Body Weight and Linear Body Measurements of Turkeys (*Meleagris gallopavo*)**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Author IMC designed the study, performed the statistical analysis, wrote the protocol, and wrote the first draft of the manuscript. Authors MK and OO managed the analyses of the study. Author AAM managed the literature searches. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Aim:** The aim of this study was to investigate the effect of breed and sex on body weight and linear body measurements of 100 Turkeys which included 50 Norfolk and 50 Mammoth breeds each.

**Study Design and Duration:** The experiment lasted for 20 weeks during which the performance parameters were monitored in 100 Turkeys using completely randomized design.

**Methodology:** The body weight and linear measurements were taken at an interval of two weeks (i.e. day 1, 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 weeks). Parameters monitored were shank length (cm), back length (cm), chest girth (cm), neck length (cm), thigh length, and wing length and body weight.

**Results:** Result obtained showed that there were significant differences ( $P < 0.05$ ) in body weight across the breed with Norfolk having  $2.70 \pm 0.04$  and Mammoth  $2.55 \pm 0.04$ . The linear measurements studied (body length, neck length, back length, shank length, thigh length, wing length, and chest girth) showed that the Norfolk had superiority over the Mammoth breed.

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**Conclusion:** Result showed remarkable and better growth performance of male turkeys than their female counterparts for all traits and ages. Also, higher values in linear body parameters noted in males.

*Keywords: Turkey; breed; sex; body weight; linear measurement.*

## 1. INTRODUCTION

It is well noted that *Meleagris gallopavo*, commonly known as Turkey is a high source of protein and one of the world most demanded poultry products and it is also consumed in large quantities in all over Nigeria. During festive periods, the bird has been found to contribute to the social and economic life of Nigerians [1]. It was reported earlier that despite the huge demand for turkey consumption in Nigeria, no large scales commercial farms are available to mitigate the ever increasing demand [2]. The time of slaughter can be accessed on the basis of body weight and general development which depends on growth is defined as the increase in the numbers of the cell of the body [3].

Adeniji and Ayorinde [4] reported that establishment of a relationship between body weight and conformation traits such as shank length, thigh length, breast width, neck length and back length makes the work of breeders easier and faster as efforts can be concentrated on those traits that are easier to be measured. Ibe and Ezekwe [5] reported that body weight and linear body measurements have been documented and found useful in qualifying body size and shape therefore the objective of the study was to determine the effect of breeds of turkey (Norfolk-black and Mammoth-bronze) on body weight and linear body measurements and the effect of sex of the birds on body weight and linear body measurement of two different breeds of turkey (Norfolk-black and Mammoth-bronze).

## 2. MATERIALS AND METHODS

### 2.1 Experimental Site

This research was carried out at the Poultry Unit of the Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Zaria. Zaria is Located within the Northern Guinea Savannah Zone of Nigeria, on the latitude 11°9' 45" N and longitude 7° 38' 8" E, at an altitude of 610m above sea level [6].

### 2.2 Source of Experimental Birds

Day old Poultts of two breeds of Turkey were purchased from ZARTECH Farms Ltd, Ibadan, Oyo State of Nigeria. A total of 100 day old Poultts of Turkey comprising of 50 Norfolk-black and 50 Mammoth-bronze were used for this study. The experiment lasted for 20 weeks.

### 2.3 Experimental Design

The study was a 2-way factorial arrangement with breed and sex in 2 × 2 factorial in Completely Randomized Design (CRD), each breed was replicated five times with ten birds per replicate.

### 2.4 Body Weight (kg)

The body weight of an individual bird was taken with a weighing scale in the morning before feeding at the interval of two weeks (i.e. day 1, 2 weeks, 4 weeks, 6weeks, 8 weeks, 10weeks, 12 weeks, 14 weeks, 16weeks, 18 weeks and 20 weeks). All birds were weighed and the mean body weight was calculated for each breed.

### 2.5 Linear Body Measurements

Linear measurements were taken at interval of two weeks (i.e. day 1, 2, 4, 6, 8, 10, 12, 14, 16, 18 and 20 weeks respectively) and they included shank length (cm), back length (cm), chest girth (cm), neck length (cm), thigh length, and wing length. All measurement was done with a tailor's tape rule calibrated in centimetre.

*Shank length (SH):* The bones of tarso-metatarsus were measured from hock joint to the base of three toes that make the shank.

*Back length (BL):* The back was measured from the base of the neck to the uropygial gland at the base of the tail.

*Chest girth (CG):* The measurement w across the keel bone from left armpit to the right armpit.

*Thigh length (TL):* The measurement was taken from the hock joint to the hinge joint.

**Neck length (NL):** The neck was gently straightened out and the length was measured.

**Wing length (WL):** The wing was measured from the shoulder joint to the extremity of terminal phalanges.

### 2.6 Statistical Analysis

The data generated were subjected to the General Linear Model (GLM) procedure of SAS [7]. The difference among the breeds in terms of body weight, linear body measurements were compared using Duncan Multiple Range Test (DMRT) Duncan, [8].

**Model for the experiment:**  $Y_{ijk} = \mu + B_i + S_j + (B \times S)_{ij} + e_{ijk}$

Where:  $Y_{ijk}$  = Observations,  $\mu$  = Overall population mean,  
 $B_i$  = the effect of  $i^{th}$  breed ( $i$  = Norfolk-black, Mammoth-bronze)  
 $S_j$  = the effect of  $k^{th}$  sex ( $k$ = male, female),  $B \times S_{ij}$  = interaction of breed and sex  
 $e_{ijk}$  = random error term

### 3. RESULTS AND DISCUSSION

From the result obtained, there were significant differences ( $P < 0.05$ ) in body weight across the breed with Norfolk having  $2.70 \pm 0.04$  and Mammoth  $2.55 \pm 0.04$ , this result is not the same with the report of Popescu-Vifor And Puscatu, [9], which may be due to the breed's genetic makeup and environmental factors where the birds were raised. Linear body measurement results showed that growth potentials varied between two breeds of turkeys. The studied linear measurements (body length, neck length, back length, shank length, thigh length, wing length, and chest girth) showed that superiority of

the Norfolk over the Mammoth breed, which was similar with the result obtained by Gous [10], who reported that growth is normally accompanied by an orderly sequence of maturational changes and involve accretion of protein and increase in length and size, not just an increase in body weight.

**Table 1. Body characteristics of two breed Turkey at 20 weeks of age**

Traits	LSM±SE	
	Norfolk	Mammoth
BW(kg)	3.70±0.04 <sup>a</sup>	3.55±0.04 <sup>b</sup>
NL(cm)	28.04±0.08 <sup>a</sup>	26.44±0.08 <sup>b</sup>
BL(cm)	31.54±0.11 <sup>a</sup>	31.34±0.11 <sup>b</sup>
TL (cm)	18.63±0.11 <sup>a</sup>	18.90±0.11 <sup>b</sup>
SL (cm)	15.47±0.11 <sup>a</sup>	14.88±0.11 <sup>b</sup>
CG(cm)	44.65±0.17 <sup>a</sup>	42.65±0.17 <sup>b</sup>
WL(cm)	31.55±0.11 <sup>a</sup>	30.84±0.11 <sup>b</sup>

*ab means with different subscripts on the same row are significantly different ( $p < 0.05$ ). BW= body weight; NL=Neck length; BL=Back length; TL= Thigh length; SL= Shank length, CG= Chest Girth, WL= Wing length. SE= standard error, LSM= least square mean*

**Table 2. Body characteristics of two sex of Turkey at 20 weeks of age**

Traits	LSM±SE	
	Male	Female
BW(kg)	3.94±0.03 <sup>a</sup>	2.93±0.03 <sup>b</sup>
NL(cm)	28.27±0.09 <sup>a</sup>	26.19±0.09 <sup>b</sup>
BL(cm)	32.97±0.09 <sup>a</sup>	29.94±0.09 <sup>b</sup>
TL (cm)	20.29±0.09 <sup>a</sup>	17.23±0.09 <sup>b</sup>
SL (cm)	16.34±0.09 <sup>a</sup>	14.01±0.09 <sup>b</sup>
CG(cm)	45.59±0.15 <sup>a</sup>	41.69±0.15 <sup>b</sup>
WL(cm)	32.48±0.09 <sup>a</sup>	29.90±0.09 <sup>b</sup>

*ab means with different subscripts on the same row are significantly different ( $p < 0.05$ ). BW= body weight; NL=Neck length; BL=Back length; TL= Thigh length; SL= Shank length, CG= Chest Girth, WL= Wing length. SE= standard error, LSM= least square mean*

**Table 3. Effect of Turkey breeds and sex on body weight and linear body measurements**

Traits	Norfolk		Mammoth		SEM	LOS
	Male	Female	Male	Female		
BW(kg)	4.15 <sup>a</sup>	2.80 <sup>d</sup>	3.70 <sup>b</sup>	3.02 <sup>c</sup>	0.04	*
NL(cm)	29.59 <sup>a</sup>	26.49 <sup>c</sup>	26.98 <sup>b</sup>	25.90 <sup>d</sup>	0.10	*
BL(cm)	33.38 <sup>a</sup>	29.68 <sup>d</sup>	32.56 <sup>b</sup>	30.20 <sup>c</sup>	0.13	*
TL (cm)	20.31 <sup>a</sup>	16.96 <sup>c</sup>	20.29 <sup>a</sup>	17.50 <sup>b</sup>	0.13	*
SL (cm)	16.60 <sup>a</sup>	14.33 <sup>c</sup>	16.07 <sup>b</sup>	13.69 <sup>d</sup>	0.13	*
CG(cm)	47.57 <sup>a</sup>	41.72 <sup>c</sup>	43.62 <sup>b</sup>	41.68 <sup>c</sup>	0.21	*
WL(cm)	33.29 <sup>a</sup>	29.80 <sup>c</sup>	31.67 <sup>b</sup>	30.00 <sup>c</sup>	0.13	*

*ab means with different subscripts on the same row are significantly different ( $p < 0.05$ ). BW=Body weight, NL=Neck length, BL=Back length, TL=Thigh length, SL= Shank length, CG= Chest girth, WL= Wing length. SEM= standard error of mean, LOS= level of significance*

The obtained results revealed remarkable and better growth performance of male turkeys than their female counterparts for all traits and ages. Also, males turkeys had higher values in linear body parameters as supported by Garcia et al. [11] and Ikeobi et al. [12]. This indicated that sexual dimorphism was in favour of males in the performance of strains of birds studied. Fayeye et al. [13] attributed this difference to the genetic effect of sex which arises from the male sexual activities. These differences due to different sexes were due to differences in hormonal profile, aggressiveness and dominance especially during the rearing of both sexes together [14].

The result showed significant differences ( $P<0.05$ ) within and across the breed in body weight and linear body measurements of both sexes of Turkey at 20 weeks of age, which is similar with the report of Ogah [2], who reported the same for indigenous turkey. His results were also significantly different because the sexual dimorphism was in favour of the male ( $P<0.05$ ), as expressed in all traits studied, with the males being significantly heavier ( $3.38\pm 0.07$ ) than the females ( $2.65\pm 0.02$ ). The values were lower than those reported by Kodinetz [15] from Zagorje turkey at 20 weeks of age (6.01 kg for male and 3.97 kg for female, respectively). When the body weight of this study was compared with the respective traits of temperate region, it was found relatively low, which may be due to the unfavourable environmental conditions such as temperature, feed supply and non-selection characteristics of tropical animal genetic resources [2].

#### 4. CONCLUSION

The result showed remarkable and better growth performance of male turkeys than their female counterparts for all traits and ages. Also, higher values in linear body parameters noted in males.

#### DISCLAIMER

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#### NOTE

This research contributed that the Norfolk is better for the farmers than Mammoth in fast growth and higher body weight.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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