

SEXUAL DIMORPHISM IN TWO STRAINS OF LOCAL TURKEY AT EARLY REPRODUCTIVE STAGE UNDER INTENSIVE SYSTEM OF MANAGEMENT IN ZARIA

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ABSTRACT

The study was designed to access the variations existing in traits of local turkey's strains at their early reproductive ages with the purpose of recommending useful economic traits for selection at early reproductive age. Body weights, body length, neck length, breast girth, thigh length, shank length and keel length of 36 early reproductive turkeys reared in the intensive system of management were taken and analyzed in a one-way ANOVA. The results showed that variability was prominent between the two sex of turkey which favoured the male as an expression of sexual dimorphism for all traits while the white strain was superior over the black in traits of body weight and breast girth. It can be concluded that breeders can select this unimproved local turkey strains considering the high level of coefficient of variation exhibited between sexes and strains for improved productivity.

Key words: Sexual dimorphism, Strain, Local Turkey, Intensive system

INTRODUCTION

Turkey (*Meleagris gallopavo*) is a large gallinaceous bird that belongs to the of family *Meleagridae* and occupies an important global position next to chicken and duck in world poultry population (Besbes, 2009). In Nigeria, Turkey is not common among poultry growers: a number of farms are beginning to multiply the bird at commercial level owing to increasing interest as a provider of lean meat among all domestic avian species and complementing chicken meat (Das *et al.*, 2018). They are mostly located in urban areas and are gradually spreading even to village farms (Ogah, 2011). They have a unique and remarkable phenomenon in adaptability to wide range of climatic conditions and can be raised successfully almost everywhere in the world if they are well fed and protected against diseases, predators and adverse weather conditions (Bhanja and Majumdar, 2001). Apart from the role in protein supply where some consumers refer to its meat as luxury meat (Das *et al.*, 2018), the birds have an aesthetic value due to their beauty (Ogundipe and Dafwang, 1980). Many varieties of turkeys exist around the globe however principal varieties that have attained commercial importance in many parts of the world are, broad breasted large white and broad breasted bronze. Other varieties are White Holland, Beltsville small white, Black Turkey, Bourbon Red and Narrangansett Turkey (Ogundipe and Dafwang, 1980). Sexual dimorphism is a phenomenon where variations exists between the male and female either in size, plumage colour or ornamentals. In size or bodyweights, male animals are adjudged to be consistently bigger than their female counterparts, an attributed linked to sex differential hormonal effect on growth (Musa *et al.*, 2015). Therefore, this current study is focused on investigating the body and linear measurements of two local Turkey strains at their early reproductive stage under intensive system of management in Zaria.

MATERIALS AND METHODS

Experimental location

The study was conducted at the Teaching and Research Farm of the Department of Animal Science, Faculty of Agriculture, Ahmadu Bello University, Zaria, Nigeria. The farm is located at latitude 11° 09' 06' N and longitude 7° 38' 55' E, at an altitude of 706 m above sea level (Ovimaps, 2019). The climate is relatively dry with a mean annual rainfall of 700-1400mm occurring from late April to mid-October. The temperature varies from 26°C to 35°C depending on the season while the relative humidity during the hamattan period, hot and wet seasons are 21, 37 and 77% respectively (IAR, 2019).

EXPERIMENTAL DESIGN AND DATA COLLECTION

A total of thirty-six (36) poult turkey toms and hens of two different strains (black and white plumage strains) were purchased from an open market in Gurbi, Zurmi Local government area of Zamfara State, Nigeria. The birds were initially quarantine for a period of about two (2) weeks and given anti-biotic medications against any possible infection. After which the birds were managed on the deep litter system with each of the turkey in separate pens for proper identification and collection of data. The birds were fed with compounded feed meant for adult turkey birds containing 3,350Kcal/kg metabolizable energy and 17% crude protein. Feed and clean drinking water were given *ad libitum*.

EXPERIMENTAL DESIGN AND DATA COLLECTION

Thirty-six (36) adult turkeys of two different strains (black and white plumages) were used for the study. They were randomly assign into individual pens in a completely randomized design (CRD) for easy data collection. Body measurements taken were as described by Gueye *et al.* (1998) with the weight taken with the aid of a weighing scale while body measurements were taken using a flexible measuring tape.

Body weight: This is the weight of the birds taken by use of a 20kg weighing scale in kilogram.

Neck length: This was considered as the distance between the occipital condyle and the cephalic borders of the caracoids.

Shank length: This was measured from the hock joint to the tarso-metarsus digit-3 joint.

Thigh Length: This was taken as the distance between the hock joint and the pelvic joint.

Body length: This was measured as length of the body from the base of the neck to the base of the tail.

Keel Length: This was taken as the length of the cartilaginous keel bone or metasternum.

Breast girth: This was taken under the wing at the edge of the sternum.

Statistical Analysis

Data collected from the study were subjected to one-way Analysis of Variance (SAS, 2002) and the differences between means were separated using the Duncan Multiple Range Test (Duncan, 1955). The appropriate statistical model used was:

$$Y_{ijk} = \mu + T_i + A\sigma_j + e_{ijk}$$

Where Y_{ijk} = observation of the k^{th} random error on the j^{th} covariate of age effect on the i^{th} strain of turkey. μ = the overall common mean, T_i = the effect of i^{th} strain of turkey ($i = 1, 2$), $A\sigma_j$ = the covariate of age, e_{ijk} = random error.

RESULTS AND DISCUSSION

The descriptive statistics showing means standard error ($\pm$ SE) and coefficient of variation estimate (CV) of body weight and linear body measurements of the two strains of local turkey at early reproductive age has affected by sex is presented in Table 1 while Table 2 showed the pooled descriptive statistics. The result on sex effects showed that all the traits had significant ($p < 0.05$) differences thereby been ascribed to sexual dimorphism. The pooled effect by strain showed that body weight, breast girth and keel length were significantly ($p < 0.05$) different with the white strain been superior. This result shows a variance with that of Ogah (2011) who reported lesser values for body weight, neck length, thigh length and breast girth in indigenous turkeys. However, it was similar for shank length, body length and keel length with that of Ogah (2011). Similarly, the results in this present study differs from those of Fayeye *et al.* (2019) who reported black and mixed strain being superior over the white strain in body weights. In the report of Janjecic and Muzic (2007) in Zagorje turkey, body weights of 6.01kg for male and 3.97kg for female were similar with those of this current study. Oblakova (2007) reported different values on turkey broiler parents which is not in agreement with this study. The differences between this study and similar once could be associated to age, strain or management differences although these studies were able to identifier the phenomenon of sexual dimorphism. Also, the difference with those from tropical region may have been due to the unfavourable environmental conditions such as temperature, feed supply and non-selection characteristics of tropical animal genetic resources as discussed by Ogah (2011) and as observed from the high coefficient of variations in some traits. Furthermore, the differences could be attributed to sex

differential hormonal effect which affect growth and muscle development more in males as discussed by Musa *et al.* (2015).

CONCLUSION

The variations observed from the various traits between the sexes supports the phenomenon of sexual dimorphism as noted from the descriptive analysis while the white strain demonstrate superiority in traits of bodyweight and breast girth. Therefore, breeders can select this unimproved turkey strains considering the variability and high level of coefficient of variation between sex and strain for improved productivity.

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Table 1: Descriptive statistics of body weight and linear measurements ($\pm$ SE) of two strains of local Turkeys has affected by sex at early reproductive age

Traits	Black strain				White strain			
	Sex		CV	P-value	Sex		CV	P-value
	Hens	Toms			Hens	Toms		
Body weight (g)	3400 $\pm$ 39.31 ^b	5411 $\pm$ 50.12 ^a	10.84	0.04	3602 $\pm$ 38.92 ^b	6004 $\pm$ 50.12 ^a	8.32	0.042
Body length (cm)	33.2 $\pm$ 5.74 ^b	38.29 $\pm$ 6.00 ^a	12.37	0.051	36.4 $\pm$ 5.80 ^b	40.46 $\pm$ 6.00 ^a	10.14	0.051
Neck length (cm)	20.3 $\pm$ 4.20 ^b	28.0 $\pm$ 4.35 ^a	4.33	0.04	21.03 $\pm$ 4.10 ^b	29.25 $\pm$ 4.35 ^a	3.06	0.04
Breast girth (cm)	52.4 $\pm$ 5.95 ^b	54.19 $\pm$ 5.60 ^a	16.39	0.05	64.3 $\pm$ 5.90 ^b	65.42 $\pm$ 5.60 ^a	12.02	0.05
Thigh length (cm)	18.01 $\pm$ 3.00 ^b	23.38 $\pm$ 3.01 ^a	12.98	0.04	18.44 $\pm$ 3.01 ^b	24.05 $\pm$ 3.01 ^a	11.45	0.04
Shank length (cm)	11.91 $\pm$ 1.24 ^b	14.63 $\pm$ 1.47 ^a	14.06	0.05	11.01 $\pm$ 0.19 ^b	14.58 $\pm$ 1.47 ^a	13.11	0.05
Keel length (cm)	13.55 $\pm$ 1.11 ^b	17.24 $\pm$ 1.50 ^a	25.41	0.04	11.27 $\pm$ 1.10 ^b	14.69 $\pm$ 1.51 ^a	23.04	0.04

^{ab} = means in the same column with different superscript differ significantly ($p < 0.05$), cv = coefficient of variation

Table 2: Pooled descriptive statistics of body weight and linear measurements ($\pm$ SE) of two strains of local Turkey at early reproductive age

Traits	Black strain	White strain	CV	P-value
Body weight (g)	4406 $\pm$ 45.02 ^b	4803 $\pm$ 45.02 ^a	18.01	0.04
Body length (cm)	35.75 $\pm$ 4.00 ^{ns}	38.43 $\pm$ 4.00 ^{ns}	6.25	0.13
Neck length (cm)	24.17 $\pm$ 4.05 ^{ns}	25.13 $\pm$ 4.05 ^{ns}	9.38	0.20
Breast girth (cm)	53.32 $\pm$ 5.32 ^b	64.86 $\pm$ 5.32 ^a	20.10	0.04
Thigh length (cm)	20.68 $\pm$ 3.00 ^{ns}	21.24 $\pm$ 3.01 ^{ns}	6.00	0.06
Shank length (cm)	13.27 $\pm$ 1.41 ^{ns}	12.81 $\pm$ 1.41 ^{ns}	10.23	0.09
Keel length (cm)	15.04 $\pm$ 1.10 ^a	12.99 $\pm$ 1.10 ^b	30.24	0.05

^{ab} = means in the same column with different superscripts differ significantly ($p < 0.01$), ns = not significant, cv = coefficient of variation