

SUSTAINABILITY OF TURKEY (*MELEAGRIS GALLOPAVO*) PRODUCTION IN GASHUA, YOBE STATE, NIGERIA

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A study was conducted to assess the sustainability of Turkey production in Gashua, Yobe state, Nigeria based on breed and age effect on body weight and blood parameters of Turkey. A total of 100 (50 pure breed and 50 cross breed) day old turkeys were used for the study. Each breed was repeated five times with ten birds per repetition. The experimental design was a 2x2 factorial arrangement in a completely randomised design. The results obtained for body weight at 3 and 6 months were 2.96 kg and 4.93 kg for pure breed while for cross breed the body weight at 3 and 6 months were 2.15 kg and 3.55 kg respectively. The pure breed have significantly ($P<0.05$) higher body weight than the cross breed. The result of blood parameters showed that there were significant ($P<0.05$) differences between the breeds. It was concluded that pure breed turkeys were superior to the crossbred in terms of high body weight and fast growth.

Keywords: turkey, age, breed, sustainability

Turkey (*Meleagris gallopova*) has been found to contribute to the economic and social life of Nigerians in that they are used during festive periods (Smith, 1990). Growth is defined as the increase in the numbers of cell of the body. Growth performance of an animal is the phenotypic expression of the animal genetic makeup (genotype), (Oluyemi and Roberts, 2000). Linear body measurements are useful in live weight determination (Gul *et al.*, 2005). The relationships existing among linear body traits provide useful information on performance, productivity and carcass characteristics (Kabir *et al.*, 2010). A number of external body parts are known to be positively correlated with body weight

(Okon *et al.*, 1997). Ibe and Ezekwe (1994) reported that body weight and linear body measurements have been documented and found useful in qualifying body size and shape. Bounous *et al.* (2000) observed that publications for white blood cell counts and differentials, serum albumin, aspartate transaminase (AST) and alanine transaminase (ALT) have not been previously reported for domestic or wild turkeys. Warren (1995) reported that there are differences between serum chemistry characteristics of different breeds of turkey at different ages from different geographical and agricultural zones of the world. Adejumo *et al.* (2005) reported that serum biochemical values have been established in most domestic mammalian species and limited information is available for domestic avian species and even less has been established for Turkey species. It was in view of the above that this study was conducted to investigate the effect of breed and age on growth rate and blood parameters of turkeys.

MATERIALS AND METHODS

Experimental Site

This research was carried out at the Poultry Research Unit, Department of Animal Science, Faculty of Agriculture, Federal University, Gashua, Nigeria. It has an area of 772km² and Coordinates: 12°52'5"N 11°2'47"E. The hottest months are March and April with temperature ranges of 38-40°C. In the rainy season, June-September, temperatures fall to 23-28°C, with rainfall of 500 to 1000 mm (Climatemp, 2018).

Source of Experimental Birds

Day old Poults of two breeds of Turkey were purchased from ZARTECH Farms Ltd, Ibadan, Oyo State, Nigeria. A total of 100

day old poults comprising 50 pure breed and 50 cross breed was used for this study. The pure breed has white plumage while cross breed has black plumage and the eye colour is brown.

Management of Experimental Birds

Before the arrival of the poults, the brooding room was cleaned, disinfected and fumigated. On arrival, the birds were brooded with the aid of kerosene stoves and electric bulbs as sources of heat. The birds were allowed *ad libitum* access to feed and water. Vaccines, antibiotics and anticoccidiosis were administered to the birds at appropriate time to protect them from diseases. The experiment lasted for 9 months.

Experimental Design

The study was a 2-way factorial arrangement with breed and age in 2×2 factorial. Each breed was repeated five times with ten birds per repetition.

Data Collection

Body weight (kg)

The body weight of an individual bird was taken with a weighing scale in the morning before feeding at an interval of 3 months (i.e. 3 months and 6 months) respectively. All birds were weighed and the mean body weight was calculated for each breed.

Linear body measurements

Linear body measurements were taken at an interval of 3 months (i.e. 3 months and 6 months) respectively and they included shank length (cm), back length (cm), chest girth (cm), neck length (cm), thigh length, and wing length. All measurements were taken 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 (cm).

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

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

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

Neck length (NL): The neck was gently straightened out and the length will be measure (cm).

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

Haematology and Serum Biochemistry

A total of forty (40) birds were randomly selected. They comprised of twenty (20) birds from each breed in which ten (10) males and ten (10) females of each breed were used at 3, 6 and 9 of age respectively. Two (2) mls of blood sample was collected from each bird through their wing vein with a sterile syringe and each blood sample was transferred immediately to a test tube containing EDTA (ethylene diamine tetraacetic acid) for haematological analysis while 3 mls of blood sample was collected into tubes without anticoagulant for serum analysis. Thin smears on glass slides were made immediately placed after the blood collection to avoid any interference on cell structure. Total red blood cell (RBC) and total white blood cell (WBC) counts were analysed by a manual method using blood diluted on 0.01% toluidine blue stain (Zinkl, 1986). The haemoglobin concentration was measured by cyanmethemoglobin method. The Packed Cell Volume (PCV) was determined by the microhematocrit method in capillary tubes and centrifuged for 5 minutes. Serum was obtained by centrifugation and the serum samples were stored until analyzed. Total protein was determined by Kjeldahl method as described by Kohn and Allen (1995), albumin by the method of Doumas *et al.* (1971), Creatinine was determined by the methodology of Harrison (1947). The liver enzymes; Aspartate aminotransferase (AST) and Alanine aminotransferase (ALT) were also determined using spectrophotometric method as described by Rej and Holder (1983).

Statistical Analysis

The data generated was subjected to Generalized Linear Model (GLM) procedure of SAS (2002). Differences among the breeds in terms of body weight, linear body measurements and carcass traits were compared using Duncan Multiple Range Test (DMRT) Duncan, (1955).

Model for the experiment:

$$Y_{ijk} = \mu + B_i + A_j + (B \times A)_{ij} + e_{ijk}$$

Where:

Y_{ijk} = Observations μ = Overall population meanB_i = the effect of ith breed (i = Pure breed, Cross breed)A_j = the effect of jth age (j= 3, 6,)B×A_{ij} = interaction of breed and age**RESULTS**

The results of body weight and linear body measurements as affected by breed and age

is shown in Table 1. There were significant differences (P<0.05) in all the parameters measured except for body length at 3 months. Furthermore, only shank and wing lengths were not significantly (P>0.05) different at 6 months of age. The pure breed turkeys recorded significantly higher values (P<0.05) than the cross breeds in most of the parameters.

The results of haematological parameters as affected by breed and age is shown in Table 2. There were significant differences (P<0.05) in the packed cell volume and pH

Table 1: Breed effects at various ages on body weight (kg) and linear body measurement (cm) of Turkeys

Age (month)	Traits	Pure breed	Cross breed	SEM	LOS
3	BW	2.96 ^a	2.15 ^b	0.04	*
	NL	23.70 ^a	21.65 ^b	0.19	*
	BL	28.40	28.76	0.25	NS
	TL	17.16 ^a	16.60 ^b	0.26	*
	SL	14.28 ^a	12.48 ^b	0.25	*
	CG	36.60 ^a	31.94 ^b	0.40	*
	WL	28.85 ^a	27.32 ^b	0.26	*
6	BW	4.93 ^a	3.55 ^b	0.04	*
	NL	28.50 ^a	26.85 ^b	0.19	*
	BL	31.80 ^a	31.07 ^b	0.25	*
	TL	18.68 ^a	19.29 ^b	0.26	*
	SL	15.84	15.48	0.25	NS
	CG	44.10 ^a	43.00 ^b	0.40	*
	WL	31.45	31.05	0.26	NS

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 significant, NS=not significant,

Table 2: Breed effect at various ages on haematological parameters of Turkey

Age(month)	Parameters	Pure breed	Cross breed	SEM	LOS
3	PCV (%)	36.05 ^a	35.95 ^b	0.04	*
	Hb (g/dl)	11.96	12.03	0.33	NS
	pH	5.60 ^b	7.57 ^a	0.14	*
	RBC (×10 ¹² /l)	6.19	6.14	0.15	NS
	WBC (×10 ⁹ /l)	8.84	9.09	0.27	NS
	PCV (%)	34.35 ^b	36.00 ^a	0.04	*
6	Hb (g/dl)	11.41 ^b	12.23 ^a	0.33	*
	pH	8.31	8.57	0.14	NS
	RBC (×10 ¹² /l)	6.00	6.04	0.15	NS
	WBC (×10 ⁹ /l)	7.83	7.84	0.27	NS

ab means with different superscripts on the same row are significantly different (p<0.05). PCV = packed cell volume, Hb = haemoglobin, RBC = red blood cells, WBC = white blood cells, SEM= standard error of mean, LOS=level of significant, * p<0.05.

Table 3: Breed effect at various ages on Serum biochemical parameters of Turkey

Age (month)	Parameters	Pure breed	Cross breed	SEM	LOS
3	Tp (g/dl)	3.24	3.82	0.31	NS
	AST (iu/l)	19.20	16.00	1.78	NS
	ALT (iu/l)	8.40	5.00	1.74	NS
	Crt (mg/dl)	73.40	78.50	8.28	NS
6	Tp (g/dl)	3.31	4.06	0.31	NS
	AST (iu/l)	13.70	13.30	1.78	NS
	ALT (iu/l)	9.50 ^a	5.10 ^b	1.74	*
	Crt (mg/dl)	68.40	59.6	8.28	NS

ab means with different superscripts on the same row are significantly different ($p < 0.05$). Tp = total protein, AST = aspartate transaminase, ALT = alanine transaminase, Crt = creatinine, SEM = standard error of mean, LOS = level of significant, NS = not significant, * $p < 0.05$.

of turkeys at 3 months of age while the both packed cell volume and haemoglobin were significantly different ($P < 0.05$) at 6 months of age.

The results of serum biochemical parameters as affected by breed and age is shown in Table 3. There were no significant differences ($P > 0.05$) in all the parameters measured at 3 months of age while only the alanine transaminase was significantly different among parameters measured at 6 months of age.

DISCUSSION

The result of body weight and linear body measurements as affected by breed and age suggests that the pure breed was superior to cross breed with respect to body weight and linear body measurement. Pure breed therefore possesses gene for faster growth than the cross breed. This result is in line with the reports of Sonaiya *et al.* (1986) that age is a major determinant of growth and physiological development. Omeje and Nwosu (1986) opined that these relationships could be utilized in the genetic improvement of growth through selection. Giordani *et al.* (1993) also reported significant difference in the growth performance of different strains of birds.

The haematological parameters were affected by diurnal fluctuations or changes in daily physical and metabolic activities (Sanni *et al.*, 2000; Piccione *et al.*, 2001, 2005). The mean haematological values RBC, Hb, WBC and PCV of birds vary among breeds, other factors which affect

these parameters include sex and nutrition supplied to the bird (Sturkie, 1965). PCV, Hb concentration and RBC count had been reported to increase with age in chickens (Islam *et al.*, 2004).

Aspartate aminotransferase (AST) values are age-dependent to varying degrees among different species and the cause of this age-dependent increase activity has not been defined (Hochleithner, 1994). Ogundu *et al.* (2013) reported that there are age effects on ALT values of turkeys at 6 and 12 weeks of age. Ibrahim *et al.* (2012) reported that the values of creatinine in poult (4 to 8 weeks) as 0.63 mg/dl, for growers (12 to 20 weeks) as 0.55 mg/dl and that of adult (20 weeks and above) as 0.98 mg/dl in turkeys reared in Semi-Arid environment of Nigeria. The values for this study was not the same with what was obtained by the above authors but the difference may be due to the time or age at which the blood was collected, breed effect and environment where these birds were raised.

CONCLUSION

The significant effect ($P < 0.05$) of breed at different ages on body weight and linear body measurements showed that the pure breed demonstrated higher body weight than the cross breed.

RECOMMENDATION

Cross breed was better for farmers in Gashua, Yobe state, Nigeria due to easy adaptation and resistance to the weather of the environment. However, in terms of

growth, pure breed was better because it gained body weight and growth faster.

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