

ASSESSMENT OF GROWTH PERFORMANCE CHARACTERISTICS OF CROSSBRED TURKEYS REARED IN ABIA STATE

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ABSTRACT

A total of 215 day-oldpoults were used to evaluate the growth performance traits of three strains of local turkey crossbred (*Meleagris gallapavo*) reared in Abia State. The experiment was conducted using three phenotypes of indigenous turkeys with plumage colours: black, white and lavender (spotted). The poults used for the study were hatched from a foundation stock of 86 turkeys comprising 25 Hens and 5 Toms for black and white phenotypes each, respectively and 21 Hens and 5 Toms for lavender (spotted) phenotype. The experiment was designed as Complete Randomized Design (CRD). Data obtained were subjected to analysis of variance (ANOVA). Results obtained showed that body weight (BW) and Linear body measurements (body length, wing length, drumstick length, breast width, shank length, keel length and neck length) significantly ($P < 0.05$) increased as age (week) increased for the main crossbred (black x lavender (spotted), BxS) and Lavender x Black compared with its purebred (Black x Black, (BxB), White x White (WxW) and lavender x lavender (SxS) counterparts. Final body weights for main crossbred (3710.25, 3732.42 and 3738.66g) and reciprocal crossbred (3791.58, 3795.72 and 3797.44g) differed significantly ($P < 0.05$) across the weeks. Positive heterosis (hybrid vigour) was observed for BW and all LBMs measured in the main (direct) (BxW, BxS, and WxS) and reciprocal crossbreds (WxB, SxB and SxW) studied, ranging from 0.12 to 34.16%, respectively. Reciprocal effect was not significant ($P > 0.05$) for BW and all LBMs with the values ranging from -0.015 to 0.661 for BxW, BxS and WxS crossbreds.

Keywords: Assessment, Growth Performance, Crossbred, Turkey, Phenotype

INTRODUCTION

Turkey is not common among poultry growers in Nigeria. However, some farms are beginning to rear the bird at commercial level owing to increasing interest in turkey as a provider of meat complementing chicken (Amao *et al.*, 2015). They are mostly located in farms close to urban cities and are gradually spreading even to village farms. The fast growth in the industry requires an intensive research approach to boost its production especially considering the potentials associated with it (Amao *et al.*, 2015). Improvement in economic characters of local turkeys can be achieved by incorporating the local turkey into breeding programmes aimed at producing an indigenous meat and egg type breed adapted to the tropical environment with a heterozygous advantage (Khawaja *et al.*, 1999; Amao *et al.*, 2015). Breeding programmes will involve crossbreeding of various genotypes/strains of turkey to improve the already existing breeds (Khawaja *et al.*, 1999; Amao *et al.*, 2015), hence, leading to generation of subsequent progenies with hybrid vigour (positive heterosis) which is the major reason for crossbreeding in farm animals.

Growth is normally accompanied by an orderly sequence of maturational changes and involves accretion of proteins and increase in length and size, not just an increase in body weight (Gous, 1999). Increased body weight and linear traits have been used as pre-requisite for selection by most local poultry farmers and researchers (Olowofeso, 2009). Body weight of local turkeys at 27 weeks ranges from 7 to 8 kg in males and from 4 to 5 kg in hens (Singh and Sharma, 2005). Growth traits are useful to livestock farmers and geneticists in improving the market quality of breeding stocks (Nwachukwu *et al.*, 2011). According to Ilori *et al.* (2010), the means of the body weights up to the age of eighteen weeks. The investigation on growth performance and linear traits of Bronze and White turkeys had shown that there were significant differences in body weights between Bronze and White turkey genotypes and between sexes. The average body weights of Bronze (male and female) and White (male and female) turkeys were 3799.0-5065.0 and 8330.9-10122.0g at 14 weeks and also 4843.0-7495.0 and 11797.0-15844.0g at 18 weeks, respectively. The average body weights of female Bronze and White turkeys were significantly ($P < 0.05$) lower than those of their male counterparts (Ilori *et al.*, 2010).

Ojedapo and Amao (2015) reported a strong improvement in the local and exotic turkey's crossbreds. This is because growth in animals could be evaluated from the component parts of the animal. This means that improvement in the body measurements will invariably lead to a corresponding improvement in the body weight of the indigenous Nigerian turkeys especially if the correlation is positive as was observed by Ojedapo and Amao (2015).

MATERIALS AND METHODS

Location of Study

The study was conducted in the Poultry Unit of Teaching and Research Farm of Michael Okpara University of Agriculture, Umudike, Abia State. Umudike lies between latitude 05° 29¹ N, longitude 07° 33¹ E and altitude of 122 m above sea level. The town is within the humid rain forest zone of South Eastern Nigeria and has a bimodal rainfall pattern with a total annual rainfall range of 1700 mm to 2100 mm. The minimum and maximum daily temperatures of the area ranges from 18.6⁰ to 23⁰C and from 26⁰ to 36⁰C during the rainy and dry seasons, respectively while the humidity range from 57.0% to 91.0% depending on the season of the year. The climatic data were taken from the meteorological station of the National Root Crops Research Institute, Umudike.

Mating Design

The mating design was as follows:

Pure crosses

Black male x Black female, White male x White female, Lavender male x Lavender female

Main Crosses

Black Male x White female, Black male x Lavender female, White male x Lavender female

Reciprocal Crosses

White male x Black female, Lavender male x Black female, Lavender male x White female.

Management of Experimental Birds

A total of 86 adult local turkeys of three phenotypic classes based on colour (Black, White and Lavender) were used as a parent population: 28 Black, 28 White and 30 Lavender phenotypes to generate the 251 F₁ poults for the study. They were brooded differently according to phenotypic group (Black, White and Lavender) from day-old to 6 weeks in a battery cage system after which they were transferred to deep litter pen at 6 weeks of age and reared till week 24. Dry wood shavings were used as litter material. Fresh clean water was given *ad libitum* to the poults during this period. Routine management operations were carried out on daily basis. Prophylactic antibiotics and anticoccidial drugs were administered to the birds every month for six months. The birds were also dewormed. Feeds were provided in adequate quantities to the poults twice daily (morning and evening) and drinking water *ad libitum*. Poults (0-6weeks) were fed starter mash containing 28% crude protein and 2800 kcal ME/kg (as labeled). Growing turkeys (7-20 weeks) were fed growers mash containing 20% crude protein and 3000 kcal ME/kg (as labeled). Laying hens (21-30 weeks) were fed layers mash containing 18% crude protein and 3200kcal ME/kg (as labeled) at 5% egg production. At 16 weeks of age, sexing was done and all the males were transferred to different pens for mating and crossing with other phenotypic groups. Massage method was used for collection of semen from the mature selected males at the farm during the mid-day hours of 12-1pm and inseminated artificially. Eggs produced by the base population turkey hens were collected on a daily basis and identified properly with markers, and incubated for 28 days in four (4) sets and hatched to generate the F₁ progenies. The incubator had a relative humidity of 80%, temperature of 55⁰C and proper ventilation.

Parameters Measured

Body weight (BWT), Average daily feed intake (ADFI), Brooding mortality (BM), Body length (BDL), Shank length (SL), Keel length (KL), Wing length (WL), Breast width (BW), Drumstick length (DL) and Neck Length (NL). All parameters except BWT were measured weekly using a tailor's tape calibrated in cm.

Statistical Analysis

Analysis of variance (ANOVA) procedure was used to analyse the data on growth traits and linear body parameters using SPSS (2010) analytical package. Duncan's new multiple range test (Duncan, 1955) was used to compare significant means of the nine (9) phenotypic classes of local turkey.

Direct heterosis

Direct and percentage heterosis for each cross was estimated with the method of linear contrasts as outlined by Dickerson (1992), as follows:

Direct heterosis = Mean of the crossbred – Mean of parental purebreds.

$$\text{Percentage heterosis} = \frac{\text{Direct heterosis}}{\text{Mean of purebreds}} \times \frac{100}{1}$$

RESULTS AND DISCUSSION

Table 1 below shows the growth performance of F₁ turkeys (purebred, main crossbred and reciprocal crossbred). There were no significant ($P>0.05$) differences in all the progenies of the purebred, main crossbred and reciprocal crossbreds at day old (initial body weight). In the final body weight, there were no significant ($P>0.05$) differences in the reciprocal crossbred and main crossbred, although they were significantly ($P<0.05$) higher than their purebred counterparts. The result obtained in this study shows improvement in body weights and daily weight gain of purebred and crossbred progenies. It is comparable with the findings of Amao *et al.* (2015) who reported significant ($P<0.05$) increase in daily weight gain and body weights for main and reciprocal crossbreds than its purebred counterparts.

Nwachukwu *et al.* (2005; 2006) also reported a significant ($P<0.05$) increase in weight gain for main and reciprocal crossbreds than its purebred counterpart. Improved genetic potential for growth was evident in the F₁ progeny (main and reciprocal crossbred) more than its purebred counterpart. This increase in weight observed in the progenies as they approach sexual maturity is in line with the findings of Peters *et al.* (2007) who reported consistent increase in body weight as age increased.

Table 1. Growth performance of F₁ turkeys (purebred, main crossbred and reciprocal crossbred).

Parameters	Purebred		Main crossbred			Reciprocal crossbred		
	BxB	WxW	BxS	BxW	WxS	WxB	SxW	SxB
	SxS							
Initial body weight (g)	31.04	31.35	34.86	34.96	35.06	35.02	35.26	
	31.53		(3.41)	(3.45)	(3.48)	35.68		
	(3.18)	(3.86)				(3.47)	(3.55)	
	(3.92)					(3.59)		
Final body weight (g)	2813.30 ^b	2826.84 ^b	3710.25 ^a	3732.42 ^a		3791.58 ^a		
	2829.55 ^b		3738.66 ^a			3795.72 ^a		
	(26.15)	(27.66)	(33.80)	(34.57)		3797.44 ^a		
	(27.83)		(35.11)			(32.61)	(32.87)	
						(33.21)		
Average daily weight gain (g/day)	322.33 ^c	323.55 ^c	329.61 ^b	330.33 ^b		336.67 ^a		
	323.38 ^c		327.33 ^b			338.08 ^a	339.55 ^a	
	(8.03)	(8.27)	(8.13)	(8.29)		(8.41)	(8.53)	
	(8.45)		(8.44)			(8.67)		

^{a-c} means in the same row with different superscripts are significantly different ($P<0.05$). *S.E.M in Parenthesis, Purebred= BxB = Black x Black, WxW = White x White and SxS = Lavender x Lavender, Main crossbred= BxS = Black x Lavender, BxW = Black x White and WxS = White x Lavender, Reciprocal crossbred= WxB = White x Black, SxW = Lavender x Lavender, SxB = Lavender x Black.

Table 2 shows body weight (g) of the F₁ Local Turkeys (purebred, main and reciprocal crossbred) at age 4 to 24 weeks. There were no significant ($P>0.05$) differences in weeks 4 and 6 among the purebred, main crossbred and reciprocal crossbred. However, significant ($P<0.05$) differences were observed from week 8 to 24 with the reciprocal crossbred and main crossbred having better performance than their purebred counterparts. However, the reciprocal crossbred progeny

had significantly ($P<0.05$) higher body weight than the main crossbred in weeks 8, 12, 14, 18, 20, 22 and 24. The main crossbred were significantly ($P<0.05$) higher in body weight than the reciprocal crossbred only in week 10. There was no significant difference ($P>0.05$) between the two in week 16. The significant increase in the mean body weight of crossbred turkey phenotypes suggests that the crossbreds may have potentials for fast growth. This result is similar to the findings of Amao *et al.* (2015) who reported a significant increase in body weights as age increase in main and reciprocal crossbreds of Nigerian Indigenous turkey breeds and their exotic counterparts. This increase in body weight as age increased was probably due to high genetic potentials for growth in the F_1 progeny as they attain sexual maturity age (Ibe, 1993; Peters *et al.*, 2007).

Table 2. Body weight (g) of the F_1 Turkeys (purebred, main and reciprocal crossbred) at age 4 to 24 weeks

Weeks	Purebred			Main Crossbred			Reciprocal Crossbred		
	WxW	BxB	SxS	BxS	BxW	WxS	WxB	SxW	SxB
4	620 (2.71)	623 (2.73)	622 (2.74)	660 (26.98)	662 (27.27)	663 (28.56)	664 (27.55)	667 (27.83)	665 (27.61)
6	880 (37.71)	879 (36.55)	881 (38.46)	885 (39.26)	886 (40.74)	888 (41.51)	884 (40.32)	885 (40.65)	886 (40.69)
8	1080 ^c (40.22)	1082 ^c (40.24)	1083 ^c (40.25)	1206 ^b (61.33)	1208 ^b (61.64)	1210 ^b (62.48)	1215 ^a (61.88)	1218 ^a (62.51)	1217 ^a (61.93)
10	1208 ^c (61.84)	1211 ^c (62.33)	1209 ^c (61.87)	1515 ^a (51.66)	1518 ^a (52.71)	1522 ^a (53.78)	1488 ^b (68.00)	1490 ^b (68.26)	1486 ^b (67.66)
12	1514 ^c (55.80)	1517 ^c (57.56)	1516 ^c (56.34)	1881 ^b (65.18)	1883 ^b (66.35)	1886 ^b (66.73)	1893 ^a (65.23)	1895 ^a (65.51)	1897 ^a (65.66)
14	1720 ^c (71.00)	1718 ^c (70.89)	1722 ^c (71.50)	2159 ^b (75.03)	2161 ^b (76.81)	2164 ^b (77.08)	2204 ^a (76.05)	2206 ^a (76.49)	2209 ^a (76.83)
16	1965 ^b (69.31)	1966 ^b (70.47)	1968 ^b (70.55)	2630 ^a (79.33)	2632 ^a (82.71)	2638 ^a (83.46)	2651 ^a (78.45)	2653 ^a (78.63)	2656 ^a (78.81)
18	2358 ^c (81.03)	2361 ^c (82.66)	2355 ^c (80.73)	2960 ^a (83.17)	2963 ^a (85.40)	2966 ^a (86.67)	2983 ^b (85.44)	2986 ^b (85.63)	2990 ^b (87.12)
20	2493 ^c (84.45)	2503 ^c (87.03)	2497 ^c (84.86)	3260 ^b (86.05)	3262 ^b (87.57)	3263 ^b (87.68)	3312 ^a (86.78)	3317 ^a (86.94)	3320 ^a (88.05)
22	2755 ^c (85.41)	2753 ^c (84.87)	2765 ^c (86.16)	3510 ^b (89.03)	3512 ^b (90.57)	3514 ^b (91.68)	3528 ^a (89.32)	3531 ^a (90.52)	3534 ^a (91.64)
24	3018 ^c (83.38)	3028 ^c (84.93)	3016 ^c (83.15)	3630 ^b (91.84)	3633 ^b (92.56)	3637 ^b (93.65)	3750 ^a (92.93)	3752 ^a (94.93)	3754 ^a (95.93)

^{a-c} means in the same row with different superscripts are significantly different ($P<0.05$). *S.E.M in Parenthesis, Purebred= BxB = Black x Black, WxW = White x White and SxS = Lavender x Lavender, Main crossbred= BxS = Black x Lavender, BxW = Black x White and WxS = White x Lavender, Reciprocal crossbred= WxB = White x Black, SxW = Lavender x Lavender, SxB = Lavender x Black.

CONCLUSION

Body weight and linear body measurements (LBM) showed significant improvement on the main (Direct) and reciprocal crossbreds from week 2 to week 24, indicating the importance of crossbreeding in domestic turkey. Thus, the linear body traits (body length, wing length, drumstick length, neck length, breast width, shank length and keel length) showed an increase as age increased with the main and reciprocal F_1 crossbreds having best performance compared to their purebred counter parts.

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