EFFECT OF STRAINS ON SOME GROWTH TRAITS OF MEAT-TYPE CHICKENS REARED IN DERIVED SAVANNA ENVIRONMENT OF NIGERIA.

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ABSTRACT
The study focuses on the effect of strains on some growth traits of meat type chickens. Data were obtained on 200 broiler chicks consisting of 100 each of Ross and Anak birds respectively. They were divided into two sex groups-male and females lines and parameters measured at 1- 8 weeks of age and were analysed for fixed effect of strain and sex in a Completely Randomized Design (CRD). Significant sex ($P<0.05$) differences were obtained among the growth traits. Body weight, shank length, breast width and thigh length in both sexes were significantly ($P<0.05$) differed at 1 and 3 weeks, bodyweight was only significantly different ($P<0.05$) in female strains chicken. Significant ($P<0.05$) differences were obtained for body weight, breast width, shank length and thigh circumference in both sexes except that thigh length were not significantly ($P>0.05$) different in female strain chicken at 5th week. At later age, significantly sex differences ($P<0.05$) for all traits measure also favoured male Ross strain. A highly positive significant ($P<0.001$) correlation coefficient was observed for body weight and thigh. The interaction between strain and sex had no significant effect.
Keywords: Sex, Strains, Growth traits, Derived savanna.

INTRODUCTION
Poultry keeping is an important means of rapidly increasing the availability of animal protein in the developing countries where malnutrition is a great problem (Anyanwu and Okoro, 2006). Poultry product is considered to be one of the most popular options in Nigeria in reducing the incidence of malnutrition particularly protein deficiency in the diets of populace (Obasoyo et al., 2005). Broiler chickens therefore provide a fast means of producing animal protein to meet the nutritional needs of teeming population (Taiwo et al., 2005). At present, there is an improvement in potential of broiler strains to provide high quality meat at lower cost (Kemp and Kenny, 2003). Therefore, the production of fast maturing birds such as broilers which have the ability to grow fast with respect to sex, age and strains had to be adopted in this environment.

Today, with the vast majority of poultry product being marketed in cut-up (parts), yield of high value items such as breast and shank have become critical to processors and consumers (Young et al., 2001). Watts and Kennett (1995) reported that demand for high quality parts have driven poultry industry to change their marketing practices to cut-up (parts) in response to consumers needs. Many studies report that sex influenced the growth rate, male birds show higher proportion than female birds, female birds were known for their higher breast proportion than males counterpart (Sonaiya and Benji, 1983; Mallo et al., 1997).

Breeders of meat-type chickens have become interested in adult body weight and other growth traits, aimed at big-bodied weight at early age in order to attract better price at

marketing (Malik et al., 1997) since the age at which broiler chicken are sold is greatly influenced by consumer preferences (Omage et al., 2006). Reports from Mallo et al., (1997); Ojedapo et al., (2008) and Amao, (2009) stressed their findings on the different strains of commercial broilers in term of growth traits. Therefore, the aim of this study is to examine the effect of strains on some growth traits of meat type chickens in the derived savanna zone of Nigeria.

MATERIALS AND METHODS

Study site

The experiment was carried out at the Poultry Unit, Teaching and Research Farm of the Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria. Ogbomoso is situated in the derived Savanna zone of Nigeria on Longitude 4^0 15^1 East of the Greenwich Meridian and Latitude 8^0 15^1 North-Eastwards from Ibadan, the capital of Oyo-State. The altitude is between 300m and 600m above sea level. The mean annual temperature is 27^0C while that of rainfall is 1247mm (Oguntoyinbo 1978).

Experimental Birds and Management

A total of 200 day old broiler chicks comprising of 100 Ross and Anak strain each purchased in a reputable hatchery were used for the experiment. The birds were divided into two sex groups of 50 male and female birds each for both strains. Each strain was identified by wing tag and also given a separate pen in an environmentally controlled brooder house. Wood shavings were used as litter material and it was kept dry throughout the experimental period. All necessary vaccinations were administered accordingly.

All the chicks were fed ad libitum with a commercial broiler starter diet containing 24% crude protein and 2880kcal/kg ME up to 4 weeks of age. Thereafter, the birds were given broiler finisher ration containing 21% crude protein and 3000kcal/kg ME up to 12 weeks. Fresh cool drinkable water was given ad libitum to the birds throughout the experimental period.

DATA COLLECTION

Data collections commenced at the end of each week and 40 birds were selected randomly from each strain with regard to sex. The birds were weighed with weighing balance to determine the body weight in gramme. Shank length, breast width, keel length, thigh length and thigh circumference were all measured with tailor's tape rule and expressed in (cm) every week and lasted for eight weeks of age.

STATISTICAL ANALYSIS

The data obtained were subjected to statistical analysis using the General Linear Model (GLM) procedure of SAS (2003), means were separated using Duncan multiple range test of the same package.

Model:

$Y_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + e_{ijk}$

Where Y_{ijk} = individual observation

μ = Overall mean

α_i = fixed effect of i^{th} sex (i= 1, 2)

β_j = effect of j^{th} strain (j= 1,2)

$(\alpha\beta)_{ij}$ = interaction effect of sex and strain
e_{ijk} = Random error

RESULTS AND DISCUSSION

Tables 1- 4 show the least square means of growth traits between sexes of two broiler chicken strains. Significant ($P < 0.05$) differences were observed (Table 1) for all the traits measured except ($P>0.05$) for keel length and thigh length in both sexes between the strains at 1 week of age. This result was in line with the findings of Okoro and Ogundu (2006) in turkey breeds at 2weeks of age. Significant sex ($P<0.05$) differences were observed at 2 weeks of age for body weight in male strains only while Ross body weight were higher than the Anak male. This was in agreement with the work of Adeniji and Ayorinde (1990) who predicted bodyweight of broilers at different ages from some linear measurements.

The body weight, breast width and thigh length in Table 2, 3rd week were significantly sex ($P<0.05$) differed, which was not in agreement with the report of Okoro and Ogundu (2006). They reported significant effects on breast width and thigh circumference for turkey at this age. Table 2 at 4th week of age also revealed a significant ($P<0.05$) differences with respect to body weight, shank length, breast width and keel length for males birds, while thigh length was significantly ($P<0.05$) different for female birds at this age; this conformed with the findings of Okon et al., (1997) on broiler and Okoro and Ogundu (2006) for turkeys at this similar age. The coefficient of variation also shows an estimate of the relative variation of the measured traits. The coefficient of variation were similar to the reports of Okon et al., (1997) for Lohman brown broilers, Okoro and Ogundu (2006) for turkey but disagreed with the findings of Adeniji and Ayorinde (2006), who reported lower values of coefficient variation for Cobb broiler strains.

Table 3 shows the least square means of growth traits between sexes of two strains of broiler chickens at 5 and 6 weeks of age. Significant sex differences ($P<0.05$) was observed among the traits for bodyweight, shank length, breast width and thigh circumference and thigh length for males strains only. The values were higher for Ross birds in both sexes. This was in line with the reports of Rondelli et al., (2003). They reported similar results for Ross broilers against Avian farm broilers.

Significant differences ($P<0.05$) in bodyweight, breast width and thigh length was noticed between sex and strain (6th week) while higher values were obtained for Ross strain in both sexes. This agrees with the findings of Kabir et al., (2008) for Anak 2000 broiler chickens at this age and also Vali et al., (2005) for Japanese quails but disagreed with the findings of Okoro and Ogundu, (2006) for turkey who reported that only breast width and thigh circumference were affected at this age.

The growth traits at the 7th and 8th weeks is shown in Table 4. At 7th week, there were only significant sex ($P<0.05$) differed in respect to bodyweight and thigh circumference for both strains and breast width for female birds. This was in conformity with the findings of Adeniji and Ayorinde (1990) but differed with the works of Okon et al., (1997). This may be due to the different environments involved in the rearing of the birds.

At 8th weeks of age, significant sex (P<0.05) differences for bodyweight, shank length and thigh length for male only and breast width for female strains while no significant (P>0.05) difference effect was obtained for keel length and thigh circumference. This was in agreement with the findings of Musa et al., (2006) and Amao, (2009). They all reported similar values in the favour of Ross strain due to its generic merit over other broiler strains but are not in agreement with Ojedapo et al., (2008) who reported results that favoured Anak birds. The coefficient of variability for all the parameters measured shows that traits varied between the strains and there were no interactive effect between strain and sex.

Table 5 shows the phenotypic correlation coefficient of the growth traits. There was positive, highly significant (P<0.001) correlation coefficient between the bodyweight and other growth traits. This was in line with the findings of Zerehdraran et al., (2005) and Ojedapo et al., (2008) who reported highly positive correlated with bodyweight and other body parameters. This result therefore shows a direct relationship between all the parameters measured as reported by Okoro and Ogundu (2006) for turkeys as an indicator for body conformation. Also this result was against the findings of Ojedapo et al., (2008) for Ross birds. These authors reveal no significant correlation for Ross birds on evaluated parameters. Thus, this present findings were compatible with those of Chamber (1990); Deeb and Lamots, (2002) who reported significantly positive correlated for broiler chickens.

CONCLUSION

The values observed for body weight and some growth traits in this study coupled with ability of Ross birds offered a baseline that will assist researchers and farmers in evaluating the various growth patterns of broilers as affected by sex in the derived savanna zone of Nigeria.

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Table 1: Least Square Means of Growth Traits between Sexes of Two Strains of Meat-Type Chicken at 1st and 2nd Weeks of Age.

1st Week								
Parameters	**N**	**Ross- Male**		**Anak - Male**		**Ross-Female**	**Anak-Female**	
		Means	**Cov**	**Means**	**Cov**	**Means**	**Cov**	**Means** **Cov**
Body weight (g)	160	148.22±5.32[a]	11.43	130.24±621[b]	11.67	140.25±2.35[a]	10.99	126.24±2.44[b] 10.25
Shank length (cm)	160	4.49±0.45[a]	4.92	4.00±0.01[b]	4.88	4.11±0.21[a]	4.75	3.82±0.11[b] 4.85
Breast width (cm)	160	6.75±0.26[a]	3.72	6.12±0.04[b]	4.25	6.42±0.16[a]	3.11	6.00±0.14[b] 6.12
Keel length (cm)	160	5.96±0.47	4.12	5.82±0.10	4.55	5.61±0.21	4.95	5.60±0.12 11.22
Thigh length (cm)	160	6.46±0.05	2.48	6.40±0.10	3.22	6.30±0.20	2.11	6.26±0.11 8.14
Thigh circumf. (cm)	160	8.11±0.10[a]	5.66	7.60±0.01[b]	5.57	8.00±0.01[a]	5.85	7.60±0.01[b] 4.51

2nd Week									
Body weight (g)	160	265.25±6.75[a]	13.11	241.41±2.41[b]	11.90	239.51±6.25	10.35	235.11±8.95	16.66
Shank length (cm)	160	5.48±0.18	6.24	5.42±0.01	6.11	5.40±0.06	6.27	5.39±0.04	6.48
Breast width (cm)	160	7.72±0.11	5.42	7.61±0.03	5.90	7.45±0.04	8.20	7.40±0.01	7.44
Keel length (cm)	160	6.99±0.01	6.21	6.90±0.12	6.42	6.85±0.02	6.11	6.82±0.02	7.11
Thigh length (cm)	160	8.67±0.22	6.58	8.60±0.03	11.54	8.45±0.01	9.55	8.42±0.02	11.82
Thigh Circumf. (cm)	160	12.92±0.17	4.24	12.90±0.01	4.50	12.80±0.02	5.14	12.75±0.03	8.15

[ab]Means in the same row with different superscript for each sex and week are significantly different (P<0.05)
Cov = Coefficient of Variation
N = Number of observation

Table 2: Least Square Means of Growth Traits between Sexes of Two Strains of Meat-Type Chicken at 3rd and 4th Weeks of Age.

Parameters	N	Ross-Male		Anak -Male		Ross-Female		Anak-Female	
		Means	Cov	Means	Cov	Means	Cov	Means	Cov
3rd week									
Body weight (g)	160	385.15±6.12[a]	11.82	340.46±2.14[b]	10.22	331.35±6.33[a]	11.11	305.11±8.45[b]	12.32
Shank length (cm)	160	6.38±0.29	5.44	6.35±0.01	5.35	6.30±0.01	6.45	6.32±0.25	11.25
Breast width (cm)	160	9.88±0.18[a]	8.25	9.20±0.25[b]	10.00	8.78±0.20[a]	11.60	8.25±0.01[b]	8.45
Keel length (cm)	160	7.56±0.27	4.35	7.51±0.02	4.45	7.45±0.04	5.56	7.48±0.02	3.47
Thigh length (cm)	160	8.98±0.23[a]	4.31	8.29±0.21[b]	4.11	7.70±0.04[a]	11.25	7.02±0.04[b]	7.49
Thigh Circumf. (cm)	160	16.58±2.34	3.52	16.52±0.03	3.92	15.40±0.02	4.31	16.42±0.03	3.45
4th week									
Body weight (g)	160	595.12±8.22[a]	14.11	530.14±9.15[b]	11.45	514.32±10.10	12.52	504.11±9.10	10.14
Shank length (cm)	160	7.22±0.05[a]	7.21	6.78±0.02[b]	8.11	6.14±0.05	8.92	6.00±0.03	6.53
Breast width (cm)	160	11.53±0.03[a]	10.32	10.95±0.02[b]	11.41	10.80±0.03	6.58	10.85±0.05	10.11
Keel length (cm)	160	7.64±0.05	3.99	7.12±0.04	4.29	6.88±0.02	7.22	6.95±0.03	10.25
Thigh length (cm)	160	9.34±0.18	5.22	9.200±0.14	6.25	9.24±0.21[a]	6.11	9.00±0.02[b]	11.25

Thigh Circumf. (cm) 160 18.47±1.25 10.52 18.20±0.35 11.25 16.52±0.25 10.22 16.41±0.11 10.58

[ab]Means in the same row with different superscript for each sex and week are significantly different (P<0.05)
Cov = Coefficient of Variation
N = Number of observation

Table 3: Least Square Means of Growth Traits between Sexes of Two Strains of Meat-Type Chicken at 5th and 6th Weeks of Age.

5th Weeks								
Parameters	**N**	**Ross – Male**		**Anak- Male**		**Ross-Female**		**Anak - Female**	
		Means	**Cov**	**Means**	**Cov**	**Means**	**Cov**	**Means**	**Cov**
Body weight (g)	160	980.25±8.05[a]	11.45	900.45±9.35[b]	10.01	965.43±830[a]	10.31	900.01±9.45[b]	11.34
Shank length (cm)	160	7.91±0.05[a]	6.32	7.01±0.02[b]	6.11	7.82±0.02[a]	5.03	7.00±0.03[b]	5.31
Breast width (cm)	160	13.69±0.15[a]	9.45	13.12±0.02[b]	9.90	13.78±0.04[a]	8.47	13.03±0.02[b]	9.30
Keel length (cm)	160	8.53±0.09	2.84	8.42±0.03	3.02	8.45±0.04	4.06	8.40±0.01	11.20
Thigh length (cm)	160	10.71±0.04[a]	7.24	9.00±0.02[b]	8.11	10.52±0.02	6.23	10.46±0.02	7.24
Thigh circumf. (cm)	160	16.24±0.05[a]	11.34	18.01±0.25[b]	11.00	18.10±0.01[a]	10.11	17.80±0.02[b]	10.42
6th Weeks									
Body weight (g)	160	1240.54±10.45[a]	13.49	1200.01±8.45[b]	11.40	1220.41±9.32[a]	11.11	1200.05±9.35[b]	10.20
Shank length (cm)	160	8.17±0.06	8.45	8.11±0.02	8.41	8.10±0.02	9.14	8.08±0.01	8.49
Breast width (cm)	160	15.45±0.04[a]	10.36	15.00±0.02[b]	10.45	15.40±0.02[a]	10.11	14.85±0.04[b]	10.00
Keel length (cm)	160	9.49±0.02	4.43	9.42±0.04	4.21	9.45±0.04[a]	4.92	9.40±0.02[b]	4.11
Thigh length (cm)	160	11.02±0.03[a]	8.25	10.81±0.04[b]	8.49	10.92±0.04	8.00	10.78±0.02	8.12
Thigh Circumf. (cm)	160	18.45±1.02	13.45	18.41±0.01	13.94	17.88±0.07	13.47	17.69±0.05	10.23

[ab]Means in the same row with different superscript for each sex and week are significantly different (P<0.05)
Cov = Coefficient of Variation
N = Number of observation

Table 4: Least Square Means of Growth Traits between Sexes of Two Strains of Meat-Type Chicken at 7th and 8th Weeks of Age.

7th weeks

Parameters	N	Ross-Male		Anak-Male		Ross-Female		Anak-Female	
		Means	Cov	Means	Cov	Means	Cov	Means	Cov
Body weight (g)	160	1330.45±6.09[a]	15.22	1296.42±9.56[b]	14.72	1301.12±7.89[a]	13.67	1240.11±9.89[b]	13.40
Shank length (cm)	160	8.55±0.22	9.65	8.35±0.01	5.35	8.40±0.11	6.45	8.24±0.09	6.66
Breast width (cm)	160	15.67±0.18	11.89	15.34±0.56	12.05	15.45±0.56[a]	11.53	14.58±0.01[b]	11.78
Keel length (cm)	160	9.78±0.34	6.32	9.41±0.06	6.43	9.54±0.08	6.55	9.23±0.07	7.17
Thigh length (cm)	160	11.35±0.98	8.91	11.23±0.45	9.56	11.20±0.09	8.67	11.01±0.08	10.55
Thigh Circumf. (cm)	160	19.58±2.34[a]	14.56	19.67±0.07[b]		13.89	19.16±0.08[a]	15.89	18.92±0.06[a]	12.89

8th weeks

Body weight (g)	160	1880.55±12.56[a]	15.05	1810.85±14.45[b]	15.00	1850.61±14.60	16.10	1845.81±15.36	15.32
Shank length (cm)	160	9.51±0.07[a]	10.32	9.11±0.03[b]	10.44	9.09±0.05	10.12	9.05±0.04	10.41
Breast width (cm)	160	17.86±0.42	12.46	17.80±0.03	12.34	17.80±0.06[a]	14.00	17.06±0.06[b]	11.45
Keel length (cm)	160	9.63±0.05	6.47	9.60±0.02	6.58	9.40±0.02	6.48	9.38±0.04	6.00
Thigh length (cm)	160	11.89±0.58[a]	10.20	11.00±0.04[b]		10.45	11.31±0.04	10.65	11.24±0.05	10.78
Thigh Circumf. (cm)	160	20.45±0.26	15.32	20.56±1.89	15.48	20.10±0.45		15.47	20.21±1.67	15.75

[ab]Means in the same row with different superscript for each sex and week are significantly different (P<0.05)

Cov = Coefficient of Variation

N = Number of observation

Table 5: Phenotypic Correlation Coefficient of the Growth Traits

	Bodyweight	Shank Length	Breast Width	keel Length	Thigh Length	Thigh Circumf.
Shank length (cm)	0.75*	-	0.83*	0.35*	0.67*	0.82*
Breast width (cm)	0.68**	0.64**	-	0.78**	0.71**	0.88**
Keel length (cm)	0.45*	0.43*	0.75*	-	0.88*	0.79*
Thigh length (cm)	0.89**	0.56**	0.35**	0.68**	-	0.85**
Thigh circumf.(cm)	0.55*	0.73*	0.55*	0.53*	0.83*	-

****Coefficient is significant at the 0.001 level**

***Coefficient is significant at the 0.01 level**