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EFFECTS OF SEXUAL DIMORPHISM ON TWO STRAINS OF BROILER BIRDS (ANAK AND SHAVER)

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Abstract

The study was conducted to determine the effects of sexual dimorphism on two strains of broiler birds (Anak and Shaver). A total of one hundred and eighty two (182) chicks comprising thirty six (36) and fifty three (53) female of Anak and forty four (44) male and forty nine (49) female of Shaver was used, respectively. Body parameters that included body weight, body length, body girth, shank length, drumstick length, thigh length, keel length and wing length were taken fortnightly from day old up to eight weeks of age which hitherto were used to determine the effects of sexual dimorphism at each stage of two broiler strains (Anak and Shaver). The mean body weight at 0, 2, 4, 6 and 8 weeks of age were 47.78g, 227.15g, 596.73g, 965.38g and 1366.67g for Anak male and 49.78g, 227.15g, 545.10g, 923.8g and 1233.0g for Anak female respectively. The respective values in Shaver were 46.74g, 183.92g, 513.10g, 957.70g and 1313.64g for Shaver male and 47.53g, 154.36g, 422.20g, 776.67g and 1102.04g for Shaver females. It was concluded that body weight of Anak and Shaver broilers were similar (P>0.05) at 0 and 6 weeks of age while that of Anak were significantly heavier at 2, 4 and 8 weeks.

Keywords: Strain, Sex, Dimorphisms and Broilers.

INTRODUCTION

Poultry refers to all domesticated birds of economic value to man. The commonest one in Nigeria is chicken, turkey, pigeon, duck, geese and guinea fowl.

It is believed that modern chicken probably originated from four wild ancestors namely:

Gallus gallus, Gallus lafayetli, Gallus sonneratli and *Gallus varius.* Thus, it is likely that *Gallus gallus* is the main ancestor of four wild species (Atteh, 1989).

Dues to regional variation in Human population, poultry production accounted for about 17% of meat production and rise to about 27% in year 2000 (FAO, 1985).

The recent development in poultry production is due to improved management, genetics, disease control and understanding of nutrient requirement of birds which made possible brooding and rearing of large number of birds in a small space.

In poultry industry, feed constitutes about 70% of total cost of production thereby determine the success of its operations. Serious efforts are being made to discover new and better additives that would hasten the maturity of broilers to reach market

weight at early age. Breeding programmes for meat producing chicken (broilers) naturally place major emphasis on growth, body conformation and composition, efficiency to convert feed into body tissues. (8)

There is need to understand the differences in biology and behaviour between modern broilers and other strains of domestic fowl that arises as a consequence of genetic selection for faster and more efficient production of chicken meat.

The performance of modern broiler represents the increase in livestock production achieved by selective breeding.

Thus, sexual dimorphism is a natural phenomenon in all growing animals and is characterized by manifested visible differences between males and female. This is observed in body weight, gain, size, shape and behaviour of birds.

The objectives of this study are:

a. To determine the effects of sexes and strains on the body weight and other linear body measurements.
b. To compare the interaction between sexes and strains of two broiler birds (Anak and Shaver).

MATERIALS AND METHOD

Study area:

The experiment was carried out at the Animal Production Department, Faculty of Agriculture, University of Ilorin, Kwara State, Nigeria. It bears a coordinate of 8^0 30' 0" N Longitude and 4^0 33' 0" E Latitude. It is located in the ancient city of Ilorin, about 500kilometres from Abuja, the federal capital.

Experimental animals and management

A total of 181 Birds were collected and comprised of 89 Anak strains and 92 Shaver strains from Zartech Breeders, Ibadan and Best Food Farms, Ogbomosho both in Oyo State. Birds of each strain were randomly distributed into replicates of 10 per cage. The metabolic cage was electrically brooded to maintain the required temperature and relative humidity needed by the birds. The birds were fed *ad-libitum* with broiler starter diet (0 – 4weeks) [(23%cp and metabolizable energy (ME) 3,200kcal/kg)] and broiler finisher diet (5 – 8weeks)[(20% cp and ME 3,000kcal/kg)] of age. They were wing-tagged right from 3rd day to distinguish males from females as they increase in their growth.

The body weight, body length, body girth, shank length, drumstick length, thigh length, and keel length were measured using triple beam balance, metre-rule and tape-rule at 0, 2, 4, 6 and 8 weeks of age. (1) Thus, males were separated at 6th week based on growth of their comb and wattle.

The birds were given antibiotics at 1st week, Gumboro vaccine at 2nd week and repeated at 5th week and Lasota at 3rd week orally. Dewormer was given at 4th and 6th week and coccidiostat at 2nd and 4th week respectively through water. Feed and water were supplied on daily basis *ad-libitum* and fed broiler starter [(23%cp and metabolizable energy 3,200kcal/kg)] and Broiler finisher [(20% cp and ME 3,000kcal/kg)]. (5 and 9)

STATISTICAL ANALYSIS

The data collected were subjected to statistical analysis using t-test.

$$t = \frac{xi - xj}{s\sqrt{\left(\frac{1}{ri} + \frac{1}{rj}\right)}}$$

Where:

t = t-test

x_i = means for i^{th} variables

x_j = means for j^{th} variables

r_i = total number of replicates for i^{th} variables

r_j = total number of replicates for j^{th} variables

s = standard error

To know $S = \sqrt{\frac{Ni(Si)^2 + Nj(Sj)^2}{Ni + Nj - 2}}$

Where:

N_i = Number of variables for i^{th} variables

N_j = Number of variables for j^{th} variables

S_i = Standard deviation for i^{th} variables

S_j = Standard deviation for j^{th} variables (6)

RESULTS AND DISCUSSIONS

Table 1 – 8, shows the results of overall means and standard errors of body weight and linear body measurements of male and female broilers of Anak and Shaver strains at 2,4,6 and 8 weeks old.

The results of body weight are shown in table 1. At week 2, 4, 6 and 8, there were significantly differences in male than female in terms of body weight (P>0.05) in both strains. Thus males were heavier than the females. It was observed that Anak birds were also heavier than the Shaver birds. These results agreed with that of Ajayi and Ejiofor, 2009 who reported that male broiler birds were superior to the female in all growth traits in Anak and Ross. They also reported that differences in body weight between the two genotypes were significant (P<0.05) at all ages except body weight at week 3.

The results of body length are shown in table 2. At week 2, 4, 6 and 8, there were significant differences between male and female of both strains (P>0.05) with male slightly longer than female while the Anak birds were significantly longer than the Shaver birds. This could be as a result of genotypic effect.

The results of body girth are shown in table 3. At week 2, 6 and 8, there were not significant differences between male and female (P<0.05) but at week 4 body girth was of higher value in Anak than in Shaver. This correspond s with the results of Ajayi and Ejiofor, 2009.

The results of thigh length are shown in table 4. It was similar in both sexes and strains except at week 8 when male birds showed longer thigh length than female birds (P>0.05). This shows that strain has effect on body girth at 8 week and this could bring about genetic gain in the flock.

The results of drumstick length are shown in table 5.At week 2, 4, 6 and 8, there were not significant differences between male and female (P<0.05). Shaver differed at week 2 and 8, while Anak had a significant longer drumstick at 2, 4, and 6 weeks of age (P>0.05).

The result on keel length is shown in table 6. There were no significant differences at week 4 and 6 in Anak and week 4, and 6 in Shaver (P<0.05), but there were significant differences in both strains at 6 and 8 weeks

old (P>0.05). These results slightly disagreed with the report of Ajayi and Ejiofor, 2009 who revealed the significant differences in Ross and Anak birds at week 3.

The results on shank length are shown in table 7. There were no significant differences in both sexes and strains at week 2,4, and 6 in Anak and week 4,6, and 8 in Shaver(P<0.05). Male had significantly difference at week 2, 4, and 6, but similar at week 8 (P>0.05) in both sexes and strains. Whereas, Ajayi and Ejiofor, 2009 only reported significant differences in shank length at 9 week and not between week 1 and 8.

The results on wing length are shown in table 8. At week 2 and 4, there were not significant differences in both sexes and strains (P<0.05). At week 6, no significant difference in Anak but in shaver (P<0.05). At week 8, there were significant differences in both sexes and strains at week 2, 4, and 6 (P>0.05). This means that strain has effect on wing length and could be a tool for selection purpose.

CONCLUSION

Anak strain performed better than Shaver strain while male performed better than the female.

RECOMMENDATION

It is therefore recommended that strain and sexual dimorphism could be used as broiler characterization.

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Table 1: Body weight (g) of Anak and Shaver

		STRAINS			
		ANAK		**SHAVER**	
Age (week)	**SEX**	**X**	**S.D**	**X**	**S.D**
2	**MALE**	227.15	52.84	183.92	38.04
	FEMALE	217.31	45.24	154.36	43.52
	ALL	222.23^{x}	948.45	168.09^{y}	43.02
4	**MALE**	596.73	110.86	513.17	147.45
	FEMALE	545.08	147.45	422.18	152.40
	ALL	570.90^{x}	130.49	462.61^{y}	156.67
6	**MALE**	965.39	239.26	957.70^{a}	217.80
	FEMALE	923.08	270.51	776.67^{b}	256.26
	ALL	944.23^{x}	251.13	860.71	252.16
8	**MALE**	1366.67	303.32	1313.64^{a}	342.25
	FEMALE	1233.08	301.91	1102.04^{b}	328.18
	ALL	1287.08^{x}	307.90	1202.15	349.61

Table 2:Body length (cm) of Anak and Shaver

		STRAINS			
		ANAK		SHAVER	
Age (week)	SEX	X	S.D	X	S.D
2	MALE	19.04	1.13	18.37[a]	1.08
	FEMALE	19.17	1.15	17.13[b]	1.93
	ALL	19.07[x]	1.12	17.71[y]	1.68
4	MALE	26.45[a]	1.38	25.12[a]	2.06
	FEMALE	25.28[b]	1.88	23.57[b]	2.42
	ALL	25.87[x]	1.72	24.29[y]	2.36
6	MALE	32.58[a]	1.38	30.98[a]	2.01
	FEMALE	30.37[b]	3.42	29.22[b]	2.58
	ALL	31.47[x]	2.80	30.04[y]	2.46
8	MALE	35.05	1.76	34.84[a]	3.22
	FEMALE	34.43	2.83	33.06[b]	3.35
	ALL	34.68	2.48	33.90[y]	3.39

Table 3: Body girth (cm) of Anak and Shaver

		STRAINS			
		ANAK		SHAVER	
Age (week)	SEX	X	S.D	X	S.D
2	MALE	14.21	1.30	13.05[a]	1.21
	FEMALE	14.20	1.01	12.57[b]	1.25
	ALL	14.20[x]	1.14	12.80[y]	1.23
4	MALE	19.72[a]	1.75	18.62[a]	2.24
	FEMALE	19.34[b]	1.78	16.97[b]	2.67
	ALL	19.53[x]	1.74	17.73	2.58
6	MALE	23.45	2.05	22.52[a]	2.56
	FEMALE	22.81	2.65	20.88[b]	2.73
	ALL	23.13[x]	2.34	21.64[y]	2.78
8	MALE	24.49	2.36	24.64[a]	2.48
	FEMALE	24.57	2.74	23.40[b]	2.71
	ALL	24.54[x]	2.58	23.98[y]	2.66

Table 4: Thigh length (cm) of Anak and Shaver

		STRAINS			
		ANAK		SHAVER	
Age	**SEX**	**X**	**S.D**	**X**	**S.D**
(week)	**MALE**	4.23	0.37	3.93	0.30
2	**FEMALE**	4.18	0.26	3.84	0.36
	ALL	4.21^{x}	0.31	3.88^{y}	0.33
	MALE	6.09	0.43	5.96	0.69
4	**FEMALE**	5.84	0.62	5.48	0.77
	ALL	5.97^{x}	0.54	5.70^{y}	0.76
	MALE	7.62	0.51	7.13	0.50
6	**FEMALE**	7.23	0.77	6.68	0.77
	ALL	7.43^{x}	0.67	6.89^{y}	0.69
	MALE	8.80	0.61	8.55	0.77
8	**FEMALE**	8.59	0.78	8.17	0.86
	ALL	8.67	0.72	8.35	0.84

Table 5: Drumstick length (cm) of Anak and Shaver

		STRAINS			
		ANAK		SHAVER	
Age	**SEX**	**X**	**S.D**	**X**	**S.D**
(week)	**MALE**	5.66	0.38	5.10^{a}	0.39
2	**FEMALE**	5.52	0.63	4.71^{b}	0.50
	ALL	5.59^{x}	0.51	4.89^{y}	0.48
	MALE	6.97	0.49	6.69	0.71
4	**FEMALE**	6.76	0.72	6.28	0.88
	ALL	6.87^{x}	0.61	6.47^{y}	0.82
	MALE	9.06	0.52	8.48	0.82
6	**FEMALE**	8.64	0.95	7.87	0.98
	ALL	8.85^{x}	0.78	8.16^{y}	0.95
	MALE	11.33^{a}	0.86	11.00^{a}	1.07
8	**FEMALE**	10.75^{b}	0.93	10.50^{b}	1.06
	ALL	10.98	0.94	10.74	0.84

Table 6: Keel length (cm) of Anak and Shaver

		STRAINS			
		ANAK		SHAVER	
Age	**SEX**	**X**	**S.D**	**X**	**S.D**
(week)	**MALE**	6.05	0.70	5.77	0.42
2	**FEMALE**	5.99	0.52	5.36	0.58
	ALL	6.02^{x}	0.61	5.55^{y}	0.54
	MALE	9.27	0.54	8.82^{a}	0.77
4	**FEMALE**	8.75	0.99	8.03^{b}	0.99
	ALL	9.01^{x}	0.83	8.40^{y}	0.97
	MALE	11.27	0.61	10.80^{a}	0.87
6	**FEMALE**	10.83	1.13	10.01^{b}	0.92
	ALL	11.05^{x}	0.92	10.38^{y}	0.97
	MALE	12.75^{a}	0.79	12.58^{a}	1.78
8	**FEMALE**	12.24^{b}	1.09	11.93^{b}	1.16
	ALL	12.45	1.01	12.24	1.51

Table 7: Shank length (cm) of Anak and Shaver

		STRAINS			
		ANAK		SHAVER	
Age	**SEX**	**X**	**S.D**	**X**	**S.D**
(week)	**MALE**	4.83	0.39	4.18	0.41
2	**FEMALE**	4.74	0.38	3.99	0.46
	ALL	4.78^{x}	0.38	4.08^{y}	0.44
	MALE	6.76	0.55	6.31^{a}	0.21
4	**FEMALE**	6.41	0.57	5.54^{b}	0.81
	ALL	6.58^{x}	0.58	5.90^{y}	0.85
	MALE	8.24	0.52	7.75^{a}	0.82
6	**FEMALE**	7.92	0.77	7.06^{b}	0.98
	ALL	8.08^{x}	0.66	7.38^{y}	0.96
	MALE	9.40^{a}	0.66	9.20^{a}	0.91
8	**FEMALE**	8.85^{b}	0.78	8.47^{b}	0.86
	ALL	9.07	0.78	8.81	0.95

Table 8: Wing length (cm) of Anak and Shaver

		STRAINS			
		ANAK		SHAVER	
Age (week)	**SEX**	**X**	**S.D**	**X**	**S.D**
2	**MALE**	10.56	0.66	10.12	0.64
	FEMALE	10.46	0.64	9.67	0.80
	ALL	10.51^{x}	0.64	9.88^{y}	0.75
4	**MALE**	15.30	1.00	14.27	1.26
	FEMALE	14.60	1.88	13.41	1.47
	ALL	14.95^{x}	1.52	13.81^{y}	1.42
6	**MALE**	18.65	1.08	17.60^{a}	1.12
	FEMALE	17.48	1.70	16.21^{b}	1.67
	ALL	18.07^{x}	1.52	16.86^{y}	1.58
8	**MALE**	20.45^{a}	2.37	20.86^{a}	2.25
	FEMALE	19.80^{b}	2.02	19.25^{b}	1.97
	ALL	20.06	2.18	20.01	2.25