COMPARATIVE ANALYSIS OF GROWTH PERFORMANCE AND HAEMATOLOGY OF THREE STRAINS OF COMMERCIAL BROILER CHICKENS

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ABSTRACT

A study was conducted to compare growth performance and haematology of three commercial broiler chicken strains. A total number of 150 (comprising of 50 chicks each of Arbor Acre, Hubbard and Anak strains) day old chicks were used for the study. The birds were randomly allotted into three treatments with five replicates each. Data were collected on growth performance and haematology. Data collected were subjected to one way analysis of variance procedure of Statistical Analysis System software and significant means were separated using Tukey. The results revealed that all the haematological parameters were not significantly (P>0.05) affected by strain at both phases of growth with the exception of packed cell volume and white blood cell counts at the finisher phase. Results on growth performance showed that all the parameters were not significantly influenced (P>0.05) by strain effect except body weight and feed intake. Arbor-acre strain recorded higher (P<0.05) body weight and feed intake than Hubbard and Anak strains who had comparable record for these parameters at starter phase while the finisher phase result showed that strain had significant (P<0.05) effect on all the growth performance parameters studied. Arbor-acre was slightly superior (P<0.05) than Anak and Hubbard. It was therefore concluded that the Arbor-acre strain had better performance due to its fast growth, feed intake, feed conversion ability and feed cost per kg gain.

Keywords: Broiler, Haematology, growth, strains.

INTRODUCTION

Poultry industry is advancing due to the continuousimprovement of the genetic potential of new broiler strains (Kemp and Kenny, 2003) to provide the high-quality and low-cost protein requirements of the human population world-wide. The performance of the modern broiler represents one of the remarkable achievements of selective breeding. In the last 30 years, the time taken to produce a chicken weighing 2 kg has been halved from more than 10 weeks to less than 6 weeks (Kay, 1997).Presently, there is an improvement in the potential of broiler strains to provide high quality meat at lower cost (Kemp and Kenny, 2003). Many strains of broiler chickens have been imported into Nigeria. The performance of these birds is affected by genotype, environment and their interaction. Genotype by environment interaction may cause loss of fitness traits for those genotypes not suited to a particular environment. Therefore broiler farmers should choose for rearing those strains that are best suited in a particular environment (Udeh *et al.*, 2015). Typical factors to consider in choosing strains of broiler for production are growth performance and fitness traits such as variations in haematological indicators for health evaluation and also cost effectiveness of such venture. This study was therefore conducted tocompare the growth performance and haematology of commercial broiler strains with the aim of determining the most suitable strain for Anyigba environment.

MATERIALS AND METHODS

The experiment was conducted at the Poultry Unit of the Teaching and Research Farm of the Department of Animal Production, Kogi State University, Anyigba. Anyigba is located on latitude 7^0 N and longitude $6^043'$E, 420m above sea level. The zone is characterised by 6-7 months of annual rainfall ranging from 1400-1500mm and daily temperature of 25- 35^{0}C with the highest temperature been in June-July (Ifatimehin, 2011). A total of 150 unsexed day-old broilers chicks were used for the experiment comprising of three strains (Hubbard, Anak and

Arbor-Acre). The birds were randomly allotted in a completely randomized design (CRD) to three treatments and five replicates each. Each replicate contained 10 birds. Standard management practices were adopted. The birds were fed with diet containing 2967.66kcal/kg ME and 23.23% CP during starter, 2968.91kcal/kg ME and 20% CP during finisher phases, respectively. Data were collected on performance traits and haematological parameters. For haematology, blood samples were collected from 15 randomly selected birds (one bird per replicate) into Ethylene Diamine Tetra acetic Acid (EDTA) bottles and were immediately taken to the laboratory for analysis. The collected blood samples wereanalysed for haemoglobin (Hb), White Blood Cell (WBC), Percentage Heterophils, Lymphocytes, and eosinophils using the cyanomethamoglobin method (Schalm *et al.*,1975) while Packed Cell Volume (PCV) were analysed using the microhaematocrit method. Mean Corpuscular Haemoglobin Concentration (MCHC) were also estimated. Data on growth performance and haematology were subjected to analysis of variance procedure of Statistical Analysis System (SAS, 2002). Significant means were separated using Tukey.

RESULTS AND DISCUSSION

Effect of strain on growth performance is presented in Table1. At the starter phase, all parameters studied were significantly ($P<0.05$) influenced by strain with the exception of feed cost. The Arbor-acre strain performed significantly better compared to the Anak and Hubbard strains in all parameters while the Anak and Hubbard revealed similar performances with the Anak having nominally higher means in certain parameters.At finisher phase, parameters such as the initial weight, final weight and feed intake were significantly ($P<0.05$) affected by strain while weight gain and feed conversion ratio were not affected ($P>0.05$). Abor-acre recorded the highest initial and final weights which were significantly ($P<0.05$) higher than the weights recorded by Hubbard and Anak strains. The higher body weight recorded by Arbor-acre suggests that Abor-acre has genes for rapid growth during the starter phase. Since weight gain among the strains did not change during the finisher phase, it is perhaps an indication of the presence of genes for rapid growth in Arbor-acre strain. The result of significant effect of strains on body weight is consistent with the findings of other authors (Deeb and Lamont, 2002) who reported that there are genetic differences in growth rate between strains. Similar results were reported by Elisabeth *et al.* (1999) and Price *et al.* (1999) who reported significant differences in weight gain in different strains of broiler due to their genetic potential and environment. The result of significant effect of strain on body weight obtained in this study however disagreed with the findings of Souza *et al.* (1994) who reported that Hubbard and Arbor Acre are not significantly different in their body weight. This discrepancy may be due to difference in environment and duration of study. The values obtained in this study for weights, feed conversion ratio and feed intake at the starter phase are similar to the values reported by other researchers (Sarker *et al.*, 2001; 2002). The significantly higher initial and final weight as well as weight gain in Arbor-acre also suggests the presence of genes for rapid growth. The higher feed intake recorded by the Arbor-acre strain also suggest that the birds have a healthy appetite that could have contributed to the superior body weight of the strain. The result in this study on feed conversion ratio is consistent with the report by Hossain *et al.* (2014) who recorded higher feed conversion ratio value in Hubbard. This however disagrees with the studies by other authors (Sarker *et al.*, 2001; 2002) who recorded best feed conversion ratio in Hubbard. The discrepancy in result could be as a result of difference in the age of birds, environment, and variation in the quality of strains produced by breeders. However, the results of this study revealed that Arbor-acre strains had better feed conversion ability/efficiency than the Hubbard which means were able to convert the feed consumed into flesh.

All haematological parameters studied at the starter phase were not significantly ($P>0.05$) affected by strain affect except Packed cell volume (PCV) and White blood cell (WBC) (Table 2). Hubbard strain had higher ($P<0.05$) PCV than Anak while Arbor-acre had comparable ($P>0.05$) mean value. Hubbard strain also had a higher ($P<0.05$) mean value of WBC than Arbor-acre while Anak had comparable (P>0.05) mean value.The PCV range (34.05 – 42.33%) obtained in this study was slightly above the reference value of 22.00 – 35.00% (Jain, 1993) and the range of 22.00 - 37.00% reported by Simaraks *et al*. (2004) but were comparable to the findings of Ladokun *et al*. (2008), Abdi-Hachesoo *et al*. (2011) and Isidahomen and Njidda (2012) who variously reported values of 32.60 to 48.80%. The difference in values may be due to differences in environment and method of determination of the trait. Since the values obtained for PCV in this study were within and slightly over the reference values, it implies that the birds were healthy and did not suffer from anaemia. The higher PCV in Hubbard may also mean they had better potential to transport oxygen and absorbed nutrients (Isaac *et al*., 2013). The higher WBC (major component of the body's defences against disease) counts in Hubbard may suggest the presence of infection. At the finisher phase, results showed that there was no significant (P>0.05) effect of strains on all the parameters studied. This suggests that the strains had similar genetic potential to retain health. This agrees with the findings of some authors (Christopher and Link, 2007; Plas *et al*., 2002) who stated that the remarkable steady-state constancy of numbers of peripheral red and white blood cells reflects a network of homeostatic mechanisms that retain the *status quo* in health

CONCLUSIONS

From this study, Arbor-acre strain has been seen to exhibit higher body weight and feed intake which could be as a results of presence of genes for rapid growth. However, feed conversion ratio was similar among the stains which indicate that any of the strains can be raised in Anyigba and give similar returns to the farmer. Furthermore, the strains studied also have similar genetic potential to retain health since they all had similar blood profile.

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Table 1: Growth Performance of Commercial Broiler Strains at Starter and Finisher phases

Parameters	Hubbard	Anak	Arbor-acre	SEM	LOS
		Starter phase			
Initial weight (g)	438.48[ab]	392.42[b]	490.24[a]	11.63	*
Final weight (g)	1053.52[b]	1119.94[b]	1337.72[a]	18.15	*
Weight gain (g)	615.04[b]	727.52[ab]	847.48[a]	21.24	*
Weight gain/day (g)	43.93[b]	52.00[ab]	60.53[a]	1.52	*
Feed intake/bird (kg)	1.39[a]	1.36[b]	1.46[a]	0.05	*
Feed intake/day (g)	98.90[b]	96.98[b]	104.06[a]	0.37	*
Feed conversion ratio	2.32[b]	1.88[ab]	1.72[a]	0.07	*
Feed cost/kg (₦)	106.00	106.00	106.00	-	NS
Cost of feed intake/bird (₦)	146.76[b]	143.92[b]	153.42[a]	0.55	*
Feed cost/kg gain	246.14[b]	198.66[ab]	182.51[a]	7.36	*
		Finisher phase			
Initial weight (g)	1079.00[b]	1120.00[b]	1324.20[a]	17.44	*
Final weight (g)	1998.40[b]	2040.20[b]	2312.80[a]	28.69	*
Weight gain (g)	919.4	920.2	988.6	22.14	NS
Weight gain/day (g)	43.78	43.82	47.07	1.05	NS
Feed intake/bird (kg)	2503.60[b]	2495.80[b]	2683.60[a]	8.47	*
Feed intake/day (g)	119.22[b]	118.85[b]	127.79[a]	0.40	*
Feed conversion ratio	2.73	2.73	2.74	0.06	NS
Feed cost/kg (₦)	106	106	106		NS
Cost of feed intake/bird (₦)	265.38[b]	264.55[b]	284.462[a]	0.89	*
Feed cost/kg gain	289.23	289.74	290.31	6.51	NS

NS-Means with similar letter are not significantly (P<0.05) different, *-Means with significant (P>0.05) differences, SEM- Standard Error of Mean, LOS- Level of Significance

Table 2: Haematology of Commercial broiler Strains at Starter and Finisher phases

Parameters	Hubbard	Anak	Arbor-acre	SEM	LOS
		Starter phase			
PCV (%)	42.33[a]	34.05[b]	40.12[ab]	1.19	*
Hb (g/dl)	210.40	194.20	216.40	7.18	NS
WBC ($x10^3$/ml)	9.96[a]	7.84[ab]	4.54[b]	0.66	*
HET (%)	28.40	29.20	26.60	2.44	NS
LYMPH (%)	42.40	38.20	46.40	1.70	NS
PH	7.80	8.00	7.80	0.21	NS
EOSI (%)	3.20	2.60	2.80	0.56	NS
MCV (fl)	96.80	99.00	92.80	4.13	NS
MCH (pg)	25.36	20.66	28.84	2.61	NS
MCHC (%)	278.20	279.80	287.80	15.76	NS
		Finisher phase			
PCV (%)	38.19	37.86	37.12	0.76	NS
Hb (g/dl)	196.60	191.60	180.20	6.75	NS
WBC ($x10^3$/ml)	7.74	7.56	6.13	6.13	NS
HET (%)	52.20	52.60	51.20	1.28	NS
LYMPH %	36.40	34.60	34.60	1.40	NS
EOSI (%)	1.40	1.40	1.60	0.23	NS
MCV (fl)	82.40	92.60	98.00	3.84	NS
MCH (pg)	19.98	23.66	26.34	1.77	NS
MCHC (%)	249.00	241.20	212.60	12.17	NS

NS-Means with similar letter are not significantly (P<0.05) different, *-Means with significant (P>0.05) differences, SEM- Standard Error of Mean, LOS- Level of Significance