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Effect of Genotype and Feeding Plan on Growth and Laying Parameters of Nigerian Indigenous Chickens

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Abstract

The study was conducted to evaluate growth and laying parameters of light (LBW) and heavy (HBW) body weight chickens fed commercial feed (CF) or locally formulated feed (LF). Two hundred and sixty (260) day old chicks (130/genotype, sexes combined) were used for the study. They were separated into sexes after 8 weeks of brooding and females of each genotype were assigned to either CF (T1) or LF (T2). Feed and water were provided *ad libitum*. Data collected included body weight (BW) from 0-8 weeks (sexes combined) and 8-20 weeks (females), daily feed intake (FI), pause length and number, and clutch length and number. Body weight gain (BWG) and feed conversion ratio (FCR) were computed. Genotypes and rations were compared using independent samples t – test. Genotypes differed significantly ($P < 0.05$) in all the traits except pause length, pause number and clutch number. Heavy local chickens were higher in BW, BWG, FI and FCR. Heavy local chickens fed either CF or LF had higher BW, BWG, FI, FCR, and clutch length compared to their light body weight counterparts. Genotype x feed type interaction significantly ($P<0.05$) influenced the growth parameters but not the laying parameters. It was concluded that genotype and feed type influenced growth and laying parameters in the local chickens and that variations due to genotype could be utilized in the genetic improvement of the local chicken of Nigeria while the favourable effect of locally made feeds could help in reducing the cost of feeding local chickens.

Key words: Feeding plan, genotype, growth parameters, local chicken, ration.

Introduction

Indigenous chickens have been acclaimed as reservoirs of valuable genes for productivity under marginal environments (FAO, 2006). These genetic endowments include enormous resilience, disease resistance, thriftiness, reproductive efficiency, and conversion of poor nutritive feed stuffs to valuable products – meat and egg (FAO, 2006; Reta, 2006; Reta, 2009). The Nigerian local chicken (NLC) plays very significant roles in the socio-cultural and economic life of the rural populace in addition to acting as a buffer to scarcity of poultry and poultry products. The NLC has been classified into light and heavy body weight genotypes (ecotypes) based on growth and body weight characteristics (Momoh and Nwosu, 2008). This fundamental grouping suggests genetic differences in growth performance and/or adaptive potentials within and between local chicken populations under similar management and environmental factors. Two major factors influence the phenotypic value of the native chicken. These are the natural endowment of the bird for the trait(s) of interest and the environment in which the bird exists. The natural endowments constitute all genetic attributes (the genotype) while the environment constitutes all non genetic factors which influence performance. These include climatic factors, housing, management, nutrition and health. Rearing condition is an important management input in poultry production (Jin and Craig, 1994; Gerzilov *et al.*, 2012; Ojedapo, 2013). Of the management inputs, health and nutrition (feeding) are the most important and directly influence performance of poultry birds (Ravindran, 1995; Achi *et al.*, 2007). Ravindran (1995) stated that up to 65% of the production cost incurred by poultry farmers under small farm conditions are due to feeding. Management strategies to reduce the cost of feeding chickens without significantly compromising performance will enhance profit and sustainability (Piyaratne *et al.*, 2012). The type of ration (locally formulated or commercial ration) to feed to local and exotic poultry strains reared under small holder rural poultry systems has been subjects of considerable research (Ochetim, 1993; Mussaddeq *et al.*, 2002; Reta *et al.*, 2012). The same with the best combination of available ingredients for the different production parameters (Silversides and Hruby, 2009; Amoah and Martin, 2010; Tahir and Pesti, 2012). Effort has also been geared towards finding least cost formulations based on locally available ingredients (Piyaratne *et al.*, 2012; Rahman *et al.*, 2013). It is widely believed that the performance of the local chicken can be improved through improved husbandry: intensive rearing on deep litter and/or in cages (Yousif and Eltayeb, 2011), improved nutrition (Yousif and Eltayeb, 2011; Reta *et al.*, 2012), age and body weight grouping (Ogbu and Omeje, 2011) as well as through selection and selective breeding (Hammack, 2003; Ogbu, 2012). Improved husbandry and nutrition will enable the realization of the genetic endowments of the local chicken in the economically important traits. Imported commercial rations and those produced locally by multinational companies generally enhance the performance of poultry stocks (ACIAR, 2008) due to better nutrient composition and balance compared to diets formulated from locally available feed stuffs (Ochetim, 1993; Mussaddeq *et al.*, 2002; Reta *et al.*, 2012). However; commercial feeds are usually very exorbitant and beyond the reach of the small scale poultry farmers (Ochetim, 1993; ACIAR, 2008; Piyaratne *et al.*, 2012). Furthermore, feeding unimproved local chickens with commercial rations formulated to support high performances in the improved breeds would not only result in nutrient wastage (Piyaratne *et al.*, 2012) but would also be economically unsustainable in the long run. Piyaratne *et al.* (2012) stated that the objective of the modern nutrition and feeding management programmes is to deliver an exact quantity of nutrient to the birds at lowest financial and environmental costs. A ration that provides adequate nutrition for the local chicken at relatively cheaper costs to the farmer will therefore be more sustainable (Ochetim, 1993; Piyaratne *et al.*, 2012). The evaluation of locally formulated feeds for poultry will enable the realization of locally grown rations (based on locally available feed resources) that support optimal indigenous chicken performance (Ochetim, 1993; Piyaratne *et al.*, 2012). A number of studies (Ochetim, 1993; Mussaddeq *et al.*, 2002; ACIAR, 2008; Reta *et al.*, 2012) have evaluated and compared locally formulated rations with commercial rations for various productive variables in local and exotic strains of chickens under indigenous poultry production system. These studies advocate the realisation of home grown rations for rural poultry production as a panacea for high feed costs. It is believed that careful selection and combination of locally available feed stuffs could yield least cost formulations that would increase the profit margin in indigenous chicken production (Mussaddeq *et al.*, 2002; ACIAR, 2008; Reta *et al.*, 2012). Such an approach will enhance the utilization of the local chicken for commercial purposes and thus motivate their conservation and genetic improvement. It was against this backdrop that the present study was conducted to evaluate the growth performance and short term laying parameters of two local chicken genotypes (light and heavy body weight genotypes or ecotypes) fed commercial and locally formulated rations.

Materials and Methods

The study was carried out in the poultry farm of the Department of Animal science, University of Nigeria, Nsukka. Three hundred and sixty (360) day old indigenous chickens belonging to two genotypes (180 each of light, LBW and heavy, HBW body weight genotypes) generated from random breeding populations of each genotype were used for the study. The classification into light and heavy genotypes (ecotypes) was based on body weight characteristics as previously reported by Momoh and Nwosu (2008) and Ogbu and Omeje (2011). The birds were brooded from day old to 8 weeks of age and were fed *ad libitum* on chicks mash formulated from locally available feed stuffs (19.5% CP, 2700 Kcal ME/kg) during this period. Thereafter, males and females belonging to each genotype were separated and reared as such from the growing phase to maturity. The present report focuses on evaluation of the growth and short-term (16 week) laying parameters of pullets from 8 weeks of age. After the brooding phase, pullets belonging to the two genotypes were randomly assigned to two treatments (T) namely treatment 1 (T1), birds fed commercial feed (CF) and treatment 2 (T2), birds fed locally formulated feed (local feed, LF). These birds were reared on deep litter from 8 to 20 weeks of age. At 20 weeks of age, the birds belonging to each treatment were moved into individual battery cages and were monitored for short-term laying parameters (Clutch length, clutch number, pause length and pause number). For each treatment, feed and water were provided *ad libitum* to the birds. Appropriate prophylactic medications were given as and when due or necessary to ensure optimal health of the birds. Data collected included body weight (BW) and daily feed intake (FI) from hatch to 8 weeks of age (brooding phase, sexes combined) and from 8 to 20 weeks (growing phase, pullets only). Body weight gain (BWG) and feed conversion ratio (FCR) were calculated from BW and FI values. Groups (genotypes and ration) were compared using the independent samples t – test at $P < 0.05$ probability level.

Results and Discussion

Table 1 presents the percentage composition of the local feeds (LF) while Table 2 shows the proximate analysis (analysis of the nutrient composition) of the experimental (commercial and local) feeds. The commercial feeds were higher in energy and fibre contents compared to the locally formulated feed (3260 vs 2800 KcalME/kg and 15.0 vs 7.0% for energy and fibre contents of grower feeds, respectively and 3300 vs 2900 Kcal ME/kg and 14.5 vs 6.0% for energy and fibre contents of layers mash, respectively) while locally made layers feed was higher in crude protein and ash content compared to the commercial feed (18.0 vs 16.3 and 15.5 vs 11.5%, respectively). Table 3 shows significant ($P>0.05$) effect of genotype on body weight (BW) at hatch and across the age periods (except at week 4), body weight gain (BWG) at week 8, 16 and 20, feed intake (FI) across the age periods, feed conversion ratio (FCR) from week 4 to 20 and in clutch length during short term egg production in battery cages. Heavy body weight (HBW) chickens were higher in BW, and BWG; consumed more feed and had longer clutches but was inferior in FCR compared to their LBW counterparts. The higher body weight values observed for the HBW birds is in agreement with the classification into body weight genotypes or ecotypes within the Nigerian local chicken populations (Momoh and Nwosu, 2008; Ogbu and Omeje, 2011; Ogbu, 2012). Ogbu and Omeje (2011) had shown that the local chickens of Nigeria can be segregated into body weight groups based on growth rate and that these birds bred true over generations under random mating. Thus the consistent significant differences in BW across the age periods suggests a genetic background for variation in growth performance and that the HBW birds could be used as slow growing meat type chicken (Rahman *et al.,* 2013) as well as to develop fast growing meat-type birds for the indigenous poultry industry while the LBW genotype could be improved for egg production (Ogbu, 2012). Ogbu et al. (2014) had shown that the local chicken population harbour considerable genetic variation for growth that could be exploited for genetic improvement of this trait.

Table 1: Percentage composition of locally formulate ration

Ingredient	Chick mash	Growers mash	Layers mash
	Percentage composition		
Maize	53.0	44.0	43.0
Wheat offal	13.0	30.0	18.0
Soya cake	18.0	10.0	17.0
Palm kernel cake	9.0	10.0	9.0
Fish chaff	3.0	3.0	3.0
Bone meal	3.0	2.5	3.0
Lysine	0.25	0.25	0.25
Methionine	0.25	-	0.25
Vit/mineral premix	0.25	-	0.25
Salt	0.25	0.25	0.25
Oyster shell	-	-	6.0
Total	100	100	100
Calculated composition			
Crude protein	18.0	15.0	16.5
Energy (kcal/kg)	2800	2670	2600

Table 2: Proximate composition of experimental ration

Analysed samples	CP (%)	Energy (kcal/kg)	Fibre (%)	Ether extract (%)	Ash (%)	Moisture (%)
Formulated chick mash	19.5	2700	6.5	3.0	7.5	8.5
Commercial growers mash	17.5	3260	15	1.5	14.5	9.0
Formulated growers mash	18.0	2800	7.0	2.0	15.0	8.5
Commercial layers mash	16.3	3300	14.5	3.5	11.5	8.5
Formulated layers mash	18.0	2900	6.0	3.5	15.5	9.5

The observed higher FI in the HBW chickens follows from the higher BW of this group while the higher FCR indicate inferior feed efficiency compared to the LBW genotype in agreement with Missohou *et al.* (2003). This result suggests the need for genetic improvement of the HBW genotype for feed utilization efficiency alongside other growth traits. The superior feed efficiency (lower FCR) observed in the LBW genotype at most of the age periods is in line with reports that the dwarf gene (dw) present in most light breeds of chickens enhances feed utilization and feed efficiency (Nordskog, 1980; Missohou *et al.,* 2003). The longer clutch length observed for the HBW chickens indicate better egg sequence and more eggs over a given laying period in this genotype and suggests that the heavy birds could also be improved as a dual purpose bird (Momoh and Nwosu, 2008). Similar significant variation in performance traits have been reported among indigenous chicken genotypes (ecotypes) by other workers elsewhere (Yousif and Eltayeb, 2011; Rahman *et al.,* 2013).

There were significant (P>0.05) effects of type of feed on the performance of light and heavy body weight chickens fed either local (LF) or commercial (CF) rations (Table 4).

Table 3: Growth parameters of indigenous domestic chickens reared in deep litter system

Trait	LBW	HBW
0-4 weeks of age (sexes combined)		
BWT_0 (g)	24.47 ± 0.30^a	29.80 ± 0.37^b
BWT_4	114.24 ± 3.29	117.05 ± 1.19
BWG_4 (g)	3.16 ± 0.24	3.13 ± 0.01
FI_4 (g)	26.85 ± 0.34^a	29.42 ± 0.25^b
FCR_4	9.07 ± 0.16^a	10.72 ± 0.07^b
8 weeks of age (pullets)		
BWT_8 (g)	251.88 ± 6.78^b	308.20 ± 6.09^a
BWG_8 (g)	5.31 ± 0.27^b	7.86 ± 0.02^a
FI_8 (g)	32.72 ± 0.89^b	38.22 ± 0.32^a
FCR_8	8.11 ± 0.11^a	5.11 ± 0.86^b
12 weeks of age (pullets)		
BWT_{12} (g)	504.49 ± 9.94^a	550.71 ± 9.76^b
BWG_{12} (g)	12.58 ± 0.21	11.80 ± 0.01
FI_{12} (g)	42.87 ± 0.57^a	45.67 ± 0.25^b
FCR_{12}	4.33 ± 0.06	4.29 ± 0.02
16 weeks of age (pullets)		
BWT_{16} (g)	663.57 ± 13.55^a	765.05 ± 7.10^b
BWG_{16} (g)	11.41 ± 0.37^a	15.55 ± 0.03^b
FI_{16} (g)	51.24 ± 0.26^a	55.71 ± 0.31^b
FCR_{16}	3.45 ± 0.04^a	4.33 ± 0.02^b
20 weeks of age (pullets)		
BWT_{20} (g)	753.95 ± 7.30^a	823.95 ± 5.97^b
BWG_{20} (g)	7.16 ± 0.24^a	8.24 ± 0.01^b
FI_{20} (g)	60.85 ± 0.79^a	64.31 ± 0.35^b
FCR_{20}	4.69 ± 0.03^a	5.17 ± 0.03^b
Short term (16 weeks) laying parameters		
Pause length (day)	3.08 ± 0.23	2.60 ± 0.15
Pause number	6.84 ± 2.38	6.60 ± 0.35
Clutch length (day)	2.46 ± 0.24^a	3.38 ± 0.32^b
Clutch number	6.91 ± 0.20	7.21 ± 0.42

a, b: means are significantly different at P < 0.05, LBW: Light body weight, HBW: Heavy body weight.

Table 4: Growth parameters of indigenous chickens fed commercial or formulated ration and reared in deep litter

	LBW		HBW	
Trait	Commercial feed	Local feed	Commercial feed	Local feed
12 week of age				
BW (g)	484.39 ± 7.33[a]	524.60 ± 12.55[b]	535.77 ± 8.59[a]	565.66 ± 10.92[b]
BWG (g)	12.25 ± 0.13[a]	12.91 ± 0.3[b]	11.52 ± 0.01[a]	12.09 ± 0.01[b]
FI (g)	45.42 ± 0.22[a]	40.33 ± 0.36[b]	44.75 ± 0.22[a]	46.56 ± 0.29[b]
FCR	4.77 ± 0.07[a]	3.90 ± 0.05[b]	4.50 ± 0.03[a]	4.09 ± 0.01[b]
16 weeks of age				
BW (g)	646.08 ± 22.80	681.07 ± 4.30	766.70 ± 7.98	763.40 ± 6.23
BWG (g)	11.31 ± 0.36	11.51 ± 0.39	15.84 ± 0.02[a]	15.26 ± 0.04[b]
FI (g)	54.65 ± 0.25[a]	47.85 ± 0.28[b]	58.43 ± 0.28[a]	53.00 ± 0.34[b]
FCR	3.96 ± 0.04[a]	3.05 ± 0.04[b]	4.78 ± 0.02[a]	3.89 ± 0.03[b]
20 weeks of age				
BW (g)	773.05 ± 7.25[a]	808.04 ± 6.22[b]	786.33 ± 4.40	788.37 ± 8.69
BWG (g)	7.03 ± 0.21	7.29 ± 0.27	8.33 ± 0.01[a]	8.15 ± 0.02[b]
FI (g)	62.22 ± 0.68[a]	57.59 ± 0.72[b]	65.00 ± 0.40	65.52 ± 0.48
FCR	4.46 ± 0.38	3.95 ± 0.04	4.55 ± 0.01[a]	4.30 ± 0.02[b]

a, b: means are significantly different at P < 0.05, BW: Body weight, BWG: Body weight gain, FI: Feed intake, FCR: Feed conversion ration.

Generally, LBW and HBW birds fed locally made feed performed better than their counterparts fed the commercial ration in BW across the age periods, and in BWG at wk 12 (12.91 ± 0.3 vs 12.25 ± 0.13 and 12.09 ± 0.01 vs 11.52 ± 0.01 for LBW and HBW groups, respectively). Both genotypes consumed more of the commercial feed than the locally formulated feed, except at wk 12 and 20 for the HBW chickens while FCR was generally higher (and inferior) in the groups fed the commercial feed. The better growth performance (BW and BWG) of birds fed with locally made feed could be related to the lesser crude fibre (CF) content of locally made growers feed compared to the commercial feed (7.0 vs 15.0%) which may have enhanced the digestion and utilization of this feed compared to the commercial ration. It has been shown that monogastric animals such as poultry and swine tolerate lesser dietary crude fibre levels in their diets compared to ruminants (3-4% in broilers, 5% in layers, < 7% in poultry, Hsu *et al.,* 2000; Varastegani and Dahlan, 2014; 4-5% in nursery pigs, Kallabis and Kaufmann, 2012; Kerr and Shurson, 2013). The proximate value of 15.0% CF observed for the commercial ration was above the recommended crude fibre level for monogastrics and this may have depressed growth and feed utilization in the chickens fed the commercial ration. Hsu *et al.* (2000) reported significantly lower daily weight gain in goslings with increasing crude fibre levels from 40 to 160g/kg. The higher FCR (reduced feed utilization) across the age periods in birds fed the commercial feed could also be explained based on the higher CF content of this feed in agreement with the reports by Hsu *et al.* (2000) and Varastegani and Dahlan (2014). High dietary CF was reported to decrease carbohydrase (amylase, maltase, and α-glucosidase) activities in all the sections of the gastrointestinal tract of the goose by Hsu *et al.* (2000). The higher feed intake observed for birds fed the commercial feed is also in accord with the reports by Hsu *et al.* (2000) and Varastegani and Dahlan (2014).

Comparison between genotypes fed the same feed type showed significant (P<0.05) genotypic effect on all the traits measured (Table 5).

Table 5: Comparative growth parameters of local chickens fed commercial or formulated ration and reared in deep litter

	Commercial feed		Formulated feed	
Trait	LBW	HBW	LBW	HBW
12 week of age				
BW (g)	484.39 ± 7.33[a]	535.77 ± 8.59[b]	524.60 ± 12.55[a]	565.66 ± 10.92[b]
BWG (g)	12.25 ± 0.13[a]	11.52 ± 0.01[b]	12.91 ± 0.30[a]	12.09 ± 0.01[b]
FI (g)	45.42 ± 0.22[a]	44.75 ± 0.22[b]	40.33 ± 0.36[a]	46.56 ± 0.29[b]
FCR	4.77 ± 0.07[a]	4.50 ± 0.03[b]	3.90 ± 0.05[a]	4.09 ± 0.01[b]
16 weeks of age				
BW (g)	646.08 ± 22.80[a]	766.70 ± 7.98[b]	681.07 ± 4.30[a]	763.40 ± 6.23[b]
BWG (g)	11.31 ± 0.36[a]	15.84 ± 0.02[b]	11.51 ± 0.39[a]	15.26 ± 0.04[b]
FI (g)	54.65 ± 0.25[a]	58.43 ± 0.28[b]	47.85 ± 0.28[a]	53.00 ± 0.34[b]
FCR	3.96 ± 0.04[a]	4.78 ± 0.02[b]	3.05 ± 0.04[a]	3.89 ± 0.03[b]
20 weeks of age				
BW (g)	773.05 ± 7.25	786.33 ± 4.40	808.04 ± 6.22[a]	788.37 ± 8.69[b]
BWG (g)	7.03 ± 0.21[a]	8.33 ± 0.01[b]	7.29 ± 0.27[a]	8.15 ± 0.02[b]
FI (g)	62.22 ± 0.68[a]	65.00 ± 0.40[b]	57.59 ± 0.72[a]	65.52 ± 0.48[b]
FCR	4.46 ± 0.38	4.55 ± 0.01	3.95 ± 0.04[a]	4.30 ± 0.02[b]

a, b: means are significantly different at P < 0.05, BW: Body weight, BWG: Body weight gain, FI: Feed intake, FCR: Feed conversion ration.

For birds fed commercial ration, those of HBW group maintained significantly higher BW from wk 12 to 16, BWG and FI across the age periods (12 to 20 weeks) but was inferior in feed utilization efficiency (higher FCR) in week 16. The same trend was observed in the groups fed locally formulated feed except that the LBW birds were superior in BW at week 20 (808.04 ± 6.22 vs 763.40 ± 8.69g), BWG at week 12 (12.91 ± 0.30 vs 12.09 ± 0.01g) and FCR across the age periods (3.90 ± 0.05 vs 4.09 ± 0.01, 3.05 ± 0.04 vs 3.89 ± 0.03, and 3.95 ± 0.04 vs 4.30 ± 0.02 for week 12, 16 and 20, respectively). Thus in spite of the higher growth performance of the HBW birds, their higher FI and FCR indicate higher cost per unit gain compared to the LBW genotype. Genotypic differences in performance traits among domestic chicken genotypes and ecotypes (breeds, strains and lines of domestic chickens) under similar management milieu is widely reported in literature (Momoh and Nwosu, 2008; Reta *et al.*, 2009; Ogbu and Omeje, 2011; Yousif and Eltayeb, 2011; Ogbu *et al.*, 2014). Effect of feed type was not significant (P>0.05) for the short term laying parameters studied (Table 6). Pause length, pause number, clutch length and clutch number were similar for the light and heavy body weight birds fed either commercial or local feeds showing that both rations could support egg production in either genotypes. However the lesser feed consumed by birds fed the local feed indicates a more cost effective laying performance compared to the use of commercial feed.

Table 6: Effect of type of ration on short-term laying parameters of local chickens reared in battery cages

	LBW		HBW	
Trait	Commercial feed	Formulated feed	Commercial feed	Formulated feed
Pause length	3.03 ± 0.28	3.12 ± 0.18	2.63 ± 0.17	2.56 ± 0.13
Pause number	6.84 ± 2.21	6.84 ± 2.21	6.57 ± 0.38	6.62 ± 0.30
Clutch length	2.46 ± 0.22	2.45 ± 0.29	3.33 ± 0.27	3.43 ± 0.43
Clutch number	6.70 ± 0.24	7.10 ± 0.19	6.80 ± 0.31	7.60 ± 0.57

a, b: means are significantly different at P < 0.05, BW: Body weight, BWG: Body weight gain, FI: Daily feed intake, FCR: Feed conversion ration.

When the laying parameters of light and heavy type birds were compared under either rations (Table 7), no significant genotypic effect was observed in the traits except in clutch length (2.46 ± 0.22 vs 3.33 ± 0.27 and 2.45 ± 0.29 vs 3.43 ± 0.43 days for light vs heavy body weight birds in the groups fed commercial and local feeds, respectively), and in pause length (3.12 ± 0.18 vs 2.56 ± 0.13 days for light vs heavy body weight birds fed locally prepared feed).

Table 7: Effect of genotype on short-term laying parameters of local chickens fed commercial or formulated ration and reared in battery cages

	Commercial feed		Formulated feed	
Trait	LBW	HBW	LBW	HBW
Pause length	3.03 ± 0.28	2.63 ± 0.17	3.12 ± 0.18^{a}	2.56 ± 0.13^{b}
Pause number	6.84 ± 2.21	6.57 ± 0.38	6.84 ± 2.21	6.62 ± 0.30
Clutch length	2.46 ± 0.22^{a}	3.33 ± 0.27^{b}	2.45 ± 0.29^{a}	3.43 ± 0.43^{b}
Clutch number	6.70 ± 0.24	6.80 ± 0.31	7.10 ± 0.19	7.60 ± 0.57

a, b: means are significantly different at P < 0.05, BW: Body weight, BWG: Body weight gain, FI: Feed intake, FCR: Feed conversion ration.

The shorter clutch length and longer pause length observed for the light body weight birds indicate inferior egg production performance compared to the HBW birds and a need for genetic improvement of egg production in this genotype. It could be that interaction of genotype x feed type favoured the HBW groups more than their LBW counterparts in these traits.

Cost benefit analysis of the use of locally made versus commercial feed showed that the cost of 1kg of locally formulated growers mash was ₦79.20 (₦1980.00/25kg) as against ₦88.00 (₦2200.00/25kg) for the commercial feed and that cost of feed for 1kg gain in BW by 20 weeks of age was ₦712.80 for local feed compared to ₦792.00 for the commercial feed or a saving of ₦79.20 per kilogramme gain in body weight. Calculated over a population of 225 birds at 20 weeks of age (as was obtained in the present study) gave the sum of ₦17,820.00 savings which is substantial. The concept of least cost and optimal ration formulation for indigenous chickens aims to deliver required nutrients at optimal levels for optimal performance at the least cost to the farmer and the environment (Piyaratne *et al.*, 2012). The above financial outcomes therefore recommend the use of carefully formulated local feeds in local chicken production. Interestingly, the local feeds used in the present study were formulated using the same basic feedstuffs (except PKC) employed by commercial feed millers in compounding commercial rations. It is hence possible that much of the cost borne by the farmers represent overhead costs (logistics, maintenance, and salaries) incurred by the commercial operators as well as their profit margin.

Conclusion

From the results presented, it is concluded that genotype and feed type influenced growth performance in the local chickens. Variations due to genotype could be utilized in the genetic improvement of the local chicken of Nigeria while the favourable effect of locally formulated ration could help in reducing cost of feeding of local birds thereby increasing the profit margin of rural poultry farmers.

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