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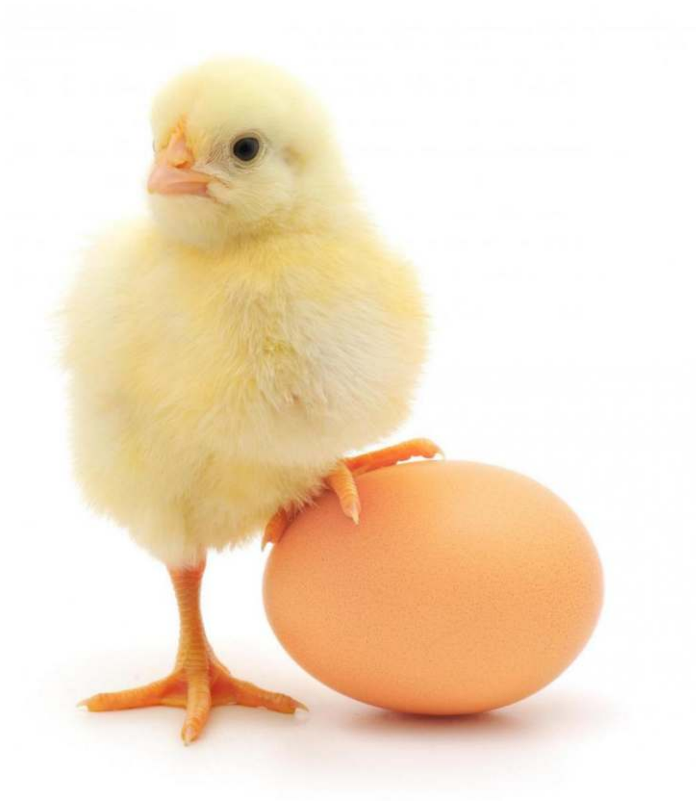

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Dietary Energy and Crude Protein Requirement for Chicks of Nigeria Local Fowl and Crossbreeds

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Abstract: Unsexed chicks of the Nigeria local fowl were mated *inter se* and the birds mated with males of improved eggs strain (local x medium) or from broiler strain (local x large) were raised on 240g/kg or 200g/kg dietary crude protein and 3000kcal/kg of metabolizable energy from day old to 12 weeks of age on deep litter to determine their performance on different dietary energy and crude protein rations. Whereas the pure local birds grew significantly (P<0.05) slower than the crossbreeds and were not affected in growth rate by dietary regime, the crossbreeds showed improved benefit from the higher dietary crude protein with age to the extent of their growth potentials. Initial rearing of the birds had the most favourable effect with the local birds crossed with broiler type on 240g/kg followed by 200g/kg crude protein transferred at 8 weeks of age of the birds, while the local birds crossed with egg type males are intermediate. The performance of the birds was worse regardless of the initial dietary crude protein and the age of transfer. It is concluded that the Nigerian Local fowl performs slower than their crossbreeds and are unaffected in growth rate by dietary manipulations.

Key words: Age, crossbreeds, crude protein, local fowl, performance

Introduction

The need for empirical evidence on poultry population for policies in the sub-sector necessitated a national poultry census by Akinwumi *et al*. (1979) which showed that, the local chicks were more numerous than the imported in Nigeria. This implied that there was a substantial contribution to poultry meat consumption from the local chickens in the country. Possibly, in recognition of this, attempt was made to improve the genotype of the birds through their up grading with the imported breeds during the colonial period.

It appeared the objective was not fully realized, and in any case, available evidence by Oluyemi (1976) indicated that up grading could transform the local chicks to as close to the improved breeds more possible than the direct importation of the improved genotype. The author further asserted that, the response of the birds to selection for growth rate was also slow.

Although Nwosu and Omeje (1985) predicted the productive ability of the Nigerian local fowls to be in the range of forty and eighty eggs, they noted the fowl real genetic potential for production to be about 125 eggs. The Nigerian domestic fowl is discovered to lay both the desirable brown and white eggs (Olori, 1992). Oluyemi *et al*. (1982) and Adebambo *et al*. (1999) postulated that the Nigerian local fowl could be a suitable genetic material for the development of layer strain for the Nigerian market and the tropical environment because of its heat tolerance and adaptation competence to the tropics.

Earlier Oluyemi (1979) demonstrated that the first filial generation (FI) of the local birds crossed with improved Rock was superior to the local and manifested heterosis. That is to say, even at the level of FI cross, increase potential was already achieved and this might be explained through genotype – nutrient interaction.

Hitherto, information in respect of exploring for economic benefit the genotype – nutrient interaction in improving the performance of the Nigerian domestic fowl and it crosses has been scanty. We therefore experimented in this study to determine the performance of the chicks of the Nigerian domestic fowl and the crosses of this, with the improved strains at different dietary energy and crude protein rations.

Materials and Methods

The study was conducted when they monthly range of temperature and relative humidity were 21.4-31.4°C and 52-93% respectively. The average annual rainfall was 1171mm, with the solar radiation average of 14.6MJ/m^2/day in South Western Nigeria (University of Ibadan, Meteorological Station, 2004).

The experimental birds consisted partly of F2 local pullet chicks crossed with the male of an egg (light) line on the one hand, and the males of meat (heavy) line on the other. To obtain the F2 local and the crosses, the F1

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Table 1: Gross Composition of experimental diets

Ingredient, g/kg	Dietary crude protein		
Level of crude protein (%)	24	20	16*
Maize	320.4	455	500
Wheat	140	86	75
Soy bean Meal	150	120	100
Palm oil	34.4	35	34
Groundnut cake	200	150	130
Palm kernel meal	100	100	105
Fixed ingredients [1]	38	38	38
Methionine (% of diet)	4.7	4.6	4.4
Lysine (% of diet)	11.5	11.4	14.2

*Birds transferred at 4 or 8 weeks of age to this diet.
[1]Fixed ingredients (g/kg) Oyster shell, 20; Bone meal, 10; Salt, 3; Premix[2] 5. [2]Pfizer composition for layers

females numbering 270 were placed in the experimental cages while the adult males of local, light and heavy strains numbering 30, 33 and 36 respectively were maintained in separate pens of an open-sided deep litter house. The local females were randomly divided into 3 groups, which were randomly assigned to the male genotypes.

Clear semen (free of urates and faeces) were collected from the ductus deferens of male of one of the genotypes through abdominal massaging method (Etches, 1996) into diluents. This was diluted with distil water and used for insemination without storage. Insemination was achieved through the eversion of the oviduct, insertion of the pipette and the semen being dispensed after releasing the abdominal pressure to return the oviduct to original position (Brillard, 1993 and Chaudhuri Lake, 1988).

Fertile eggs collected were stored for four days to obtain sufficient settable number of both the local and crossbreeds before setting into the incubator. There were three hatches of chicks, each containing the three genotypes so that there was a triplicate group containing 120 chicks of each genotype per hatch.

The genotypes were designated as LL, LE and LB for local X local, local X Egg type and local X Broiler type, respectively. For the three hatches of each genotype, the experimental chicks were assigned to duplicate groups of two experimental diets composed as in Table 1 to contain 200g/kg or 240g/kg crude protein and isocaloric 3000 kcal/kg of metabolizable energy. The birds in a completely randomized design were fed *ad libitum* and managed using methods of brooding and rearing chickens in the warm wet climates (Oluyemi and Roberts, 2001).

For the first hatch of each genotype, data collected consisted of body weight, feed consumption, feed conversion rate, and mortality of the birds at 4, 8 and 12 weeks of age. Chicks of the third hatch of each genotype were randomly divided into 2, one of which was transferred to 160g/kg crude protein diet (Table 1) at 4 weeks, and the other at 8 weeks of age to determine the age when the birds can be made available to family poultry who would mostly place the birds on lower crude protein that may even be lower than that of commercial grower diet. The data of this group consisted of body weight at 16 weeks of age and mortality.

All data were subjected to analysis of variance (ANOVA) and significant differences among treatment means identified at 5% level using Duncan's multiple range test (Steel and Torrie, 1980).

Results and Discussion

The performance result of the experimental birds as presented in Table 2 shows that the local birds were consistently lighter ($P<0.05$) at both 240g/kg and 200g/kg crude protein than the crossbreeds. The body mass of the local appeared to be statistically unaffected ($P>0.05$) by dietary regimes. The crossbreeds seemed to manifest favourable ($P<0.05$) genotype-nutrient interaction in growth rate, especially for the birds on 240g/kg crude protein, while the birds of the different genotype were not significantly ($P>0.05$) different.

The local X large crossbreeds were significantly ($P<0.05$) heavier than local X medium only when, at their four weeks of age, they were on 200g/kg crude protein. The crossbreeds on 240g/kg crude protein were not significantly ($P>0.05$) different in body weight. At 8 weeks of age, local X large birds were significantly ($P<0.05$) superior in body weight. Similarly, there was a significant ($P<0.05$) difference between 240g/kg and 200g/kg dietary crude protein on the 8 weeks body weight of the local X medium. However, at 12 weeks of age of the birds, the local X large weighed significantly ($P<0.05$) heavier on 240g/kg than on 200g/kg dietary crude protein. But the local X local birds were statistically ($P>0.05$) similar in body weight for the two different diets fed. These birds were significantly ($P<0.05$) heavier than the same genotype on 200g/kg crude protein at 8 weeks.

The body mass and mortality of birds transferred to 160g/kg crude protein at 8 weeks is presented in Table 3. There was a significantly ($P<0.05$) higher body mass between the local X egg type birds transferred at 8 weeks of age and the local X local. The comparison was to determine that compensatory growth could occur in birds initially on 200g/kg crude protein. The Local x Egg type and Local x Local were consistently ($P<0.05$) smaller than Local x Broiler type on 200g/kg transferred to 160g/kg crude protein at 8 weeks.

The superiority in live mass of the crossbreeds in this study agreed with the findings of Oluyemi (1976) which indicated that the small size of the local chickens was due more to the dominant genes or their preponderance that might equalize the pure local and their crossbreeds in body mass. The lighter body mass indicated a correlation between slow growth rate and the inability to benefit from improved dietary programmes.

This suggests that genotype-dietary interaction may not

Table 2: Performance of chick of the Nigerian local fowl and it crossbreeds

Trait	Treatments					
	LL		LE		LB	
Level of CP (g/kg)	240	200	240	200	240	200
Body mass (g)						
Week 0	30	30	31	32	31	31
4	251[c]	248[c]	258[ab]	261[b]	301[a]	302[a]
8	433[c]	240[c]	578[b]	545[b]	630[a]	624[a]
12	658[d]	646[d]	793[b]	709[c]	920[a]	801[b]
Feed intake (g) to week						
4	464	458	559	521	594	570
8	1013[b]	1014[b]	1463[a]	1321	1440[a]	1364[a]
12	2125[c]	2156[c]	2661[b]	2285[d]	3814[a]	2618[b]
Feed conversion rate to week						
4	2.1	2.1	2.2	2.3	2.2	2.1
8	2.5[a]	2.6[a]	2.7[a]	2.4[b]	2.4[b]	2.3[b]
12	3.4	3.5	3.5	3.4	3.5	3.4
Cumulative mortality (n) to week						
4	-	3	-	2	1	1
8	4	4	3	4	3	3
12	6	5	5	6	7	5

Figures on the same horizontal line differently superscripted are significantly different at 5% level

Table 3: Body mass and mortality of the birds transferred to 160g/kg crude protein

Trait	Treatments											
	LL		LE		LB		LB		LE		LB	
Level CP (g/kg)	240*	200*	240	200	240	200	240	200	240	200	240	200
16th week live mass (g)	701[d]	704[d]	748	730	789[d]	801[ed]	701[d]	717[d]	1009[c]	968[c]	1301[a]	1109[b]
Mortality (dead birds)	0	2	5	2	8	4	5	2	9	6	7	3

Figures on the same horizontal line differently superscripted are significantly different at 5% level . *Initial dietary crude protein

necessarily influence the body mass of local birds even at 12 weeks of age which is in agreement with Bitgood (1993) and Mullen and Swatland (1979) who stated that irrespective of any optimal nutrient provision a genetically poor material may not excel in performance beyond it potentials. However, a dietary superiority was obtained in the 12 weeks body mass of the local X medium in favour of the 240g/kg crude protein diets.

These observations tended to negate the concept of compensatory growth for the local, which could have obliterated the initial inferior body mass difference as birds advanced in age. Rather, dietary effect on body mass appeared to be positively influenced by the high growth potentials of the improved birds, so that, the local was consistently lower in even feed consumption. The result contradicted the idea that improved breeds often consume the quantity of feed that generally exceed their requirement for nutrients when fed *ad libitum* (Fisher and Boorman, 1986) and that the excess was always deposited as abdominal fat, hepatic lipid and excess ovarian development, especially among the broiler stock (Cole and Haresign, 1989). The performance of the local X medium was found to be intermediate throughout the study.

Although feed conversion rate tended to be similar in all the bird groups, diets and of the same age, the observed differences in other commercial traits may be accountable to the improved genetic potential. The mortality pattern appeared unrelated to the genotype or the dietary regime of the crossbreeds as evidenced in superior results of the measured parameters. This was probably due, in part, to the better utilization of the dietary nutrients compared to the local fowl. The data of the birds transferred to 160g/kg crude protein was to stimulate initial rearing of the birds and to determine the effect of the age of transfer of these birds to lower protein level that usually exist under scavenging and free range management system conditions. Under such rural poultry conditions, interest is always more on the large body mass and low mortality as portrayed in the study. At 16 weeks of age, there was evident superiority of rearing the birds to 8 weeks and on 240g/kg crude protein for the crossbreds with the broilers genotype before the transfer.

Transferring the birds from their initial dietary crude protein to 160g/kg crude protein at 4 weeks of age tended to obliterate the initial advantages of the higher crude protein diet. The Local did not show the advantages of the initial higher dietary crude protein regardless of the time of change. Mortality was higher for the crossbreeds than for the Local when transfer occurred at 4 weeks of age without evidence of dietary regime, but the genotype pattern was probably favoured. This was perhaps, a genetic competence in adjustment to local or tropical environment for the Nigerian domestic fowl, which agrees with Adebambo *et al.* (1999).

Conclusion: It is concluded from the study that the Nigerian local fowl performs slower than their crossbreeds and growth rate was not positively influenced by dietary manipulations. The crossbreeds showed more benefit from the higher dietary crude protein with age to the extent of their growth potentials. The local birds crossed with broiler type initially on 240g/kg followed by 200g/kg and transferred at 8 weeks of age to 160g/kg crude protein showed positive effect. This is of great impetus to the rural poultry farmers who substantially contributes to poultry meat production using the local fowl.

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References
Adebambo, O., C.O.N. Ikeobi, M.O. Ozoje, J.A. Adenowo, and O.A. Osinowo, 1999. Colour variations and performance characteristics of the indigenous chicken of South Western Nigeria. Nig. J. Anim. Prod., 26: 16-22.

Akinwumi, A.J., A.J. Adegeye, A.E. Ikpi and S.O. Olaiyede, 1979. Economics analysis of the Nigeria Poultry Industry. Commissioned study by the Federal Livestock Dept. (FLD) Lagos, Nigeria.

Bitgood, J.J., 1993. The Genetic Map of the Chicken and availability of genetically diverse stocks, In: manipulation of avian Genome. Edited by Etches, R.J. and. Verrinder Gibbins, A.M. CRC Press, Bata Raton, Florida, pp: 61-79.

Brillard, J.P., 1993. Sperm Storage and transport following mating and artificial insemination Poult. Sci., 72: 9223-928.

Chaudhuri, D. and P.E. Lake, 1988. A new diluents and method of holding fowl for up to 17 hours at high temperature In: Processing of XVIII World's Poultry Congress. Nagoya, Japan.

Cole, D.J.A. and W. Haresign, 1989. Recent Development in Poultry Nutrition. Butterworths, London.

Etches, R.J., 1996. Reproduction in Poultry. Elsevier, Hudderfield, UK.

Fisher, C. and K.N. Boorman, 1986. Nutrient requirements of poultry and nutritional research. Br. Poult. Sci. Symp., 19, Butherworths, London.

Mullen, K. and H.J. Swatland, 1979. Linear Skeletal growth in male and female turkeys. Growth, 43: 151-159.

Nwosu, C.C. and S.S. Omeje, 1985. Short-term egg production parameters of local chicken and it Fl Cross with Gold-link under two different housing types. East Afric. Forestry J., 51: 59-63.

Olori, V.E., 1992. An evaluation of two ecotypes of the Nigerian indigenous chicken. Unpublished M. Sc. Thesis. Obafemi Awolowo University, Ile-Ife-Nigeria.

Oluyemi, J.A., 1976. Crossbreeding and up-grading of the indigenous fowl of Nigeria with improved breed. Zeablieacaein vetri. Med., A27: 300-370.

Oluyemi, J.A., 1979. Selection of the Nigeria indigenous fowl for 12 weeks body weight. Nig. J. Anim. Prod., 6: 15-20.

Oluyemi, J.A., G.O. Longe and T. Songu, 1982. Requirement of the Nigerian indigenous fowl for protein and Amino-acids. Ife J. Agri. 4: 105-110.

Oluyemi, J.A. and F.A. Roberts, 2001. Poultry Production in Warm-Wet Climates. (2nd Ed.). Spectrum Books Ltd, Ibadan, Ngeria.

Steel, R.D.G. and J.H. Torrie, 1980. Principles and Procedures of Statistics. A biometrical approach. (Students Ed.) McGraw-Hill Int.Book Co., London.