



EVALUATION OF THE PERFORMANCE OF TWO LOCAL CHICKEN AND THE MAIN CROSS ECOTYPES REARED IN NSUKKA, ENUGU STATE, NIGERIA

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ABSTRACT

An investigation was carried out to compare the performance of local chickens in chicken breeding programme in Nigeria. The main objective of the experiment was to assess the differences in some economically important traits of two ecotypes of local chickens and the main cross. One hundred and thirty six, 58, and 60 chicks of light ecotype (LE), heavy ecotype (HE) and main cross (cross between heavy ecotype cocks mated to light ecotype hens) respectively were used in the investigation. The chicks were marked according to breeding groups and raised under a deep litter system of management from day-old to 20 weeks of age. Mean feed efficiency throughout the experimental period were obtained. There were however no significant ($p < 0.05$) differences in mean feed consumption, mean feed efficiency and mean feed conversion ratio between the 3 groups. Average body weights of the birds at day-old were 21.82g, 28.06g, 26.30g; at 4-weeks were 95.41 g, 143.68 g, 126.72 g; at 8 weeks were 349.89 g, 561.71 g, 458.57 g; 12 weeks were 568.14 g, 816.67g, 714.00g; at 16 weeks were 768.85g, 1066.67g, 811.54g; and at 20 weeks were 931.34 g, 1196.67g, 950.00g for light, heavy and main cross chickens respectively. There were however, highly significant differences ($p > 0.05$) in average body weights at all ages in all the 3 groups. Age and body weight at first egg were obtained as 145 days and 940g, 149 days and 1208.33g and 154 days and 1050g for the light, heavy and main cross chickens respectively. The average weights of first egg were obtained as 30.0g, 35.24g and 31.60g for the light, heavy and main cross respectively. The experiment indicates that the heavy local chickens and the main cross performed better in body weight, body weight at point of lay, and egg weight over the light local chickens.

KEY WORDS: light, heavy, and main cross local chicken

INTRODUCTION

The galloping population growth and low animal protein intake are some of the major problems facing Nigerians. Nigeria has the largest human population of any country in Africa. The present population may be in the order of 130million, and the growth rate is generally assumed to be about 2.5% per annum. It has been reported that an average Nigerian consume about 7.5g of animal protein as against 28 g consumed by an average Briton (Mmereole *et al.*, 2001).

In the mid- 1980s most developing countries suffered a slowdown in economy and this affected the import-dependent sectors such as commercial poultry as well as affected the intensive and semi-intensive production systems, which mushroomed in the 1970s. This led to a substantial increase in quantity of rural poultry meat in the market as a result of decreasing supply of commercial poultry (Suleiman, 1989). Although there is a general acceptability of poultry products in developing countries, this sector of the economy is plagued with a lot of problems, which most be resolved for any meaningful progress to be made (Ibrahim *et al.*, 2000).

The problem facing the Nigerian poultry industries today emanated from Nigeria's over dependence on foreign inputs, importation of breeding stock to commercial day-

old chicks and importation of grains (Adetayo and Babafunso, 2001). Importation of animals from one climatic zone to the other constitutes a major problem in breeding work, leading to a genotype X environment interaction, and subsequently to a reduction in fitness (Ndofor-Foleng *et al.*, 2006) it is important, therefore, that farm animals be improved under the conditions identical to those under which they will be subjected for production. There is also the problem of disease importation arising from the importation of exotic fowls, which, to reduce mortality among the exotic stocks from the endemic diseases, a lot of money has to be expended on health management schemes. If, however, the local chickens can be developed from the unselected group and they perform well with respect to traits as egg production and carcass weight, then, the path will be paved towards the solution of the problem created by heavy dependence of the poultry subsection on foreign sources. This is because the Nigerian fowl population has already shown relative resistance to some diseases (Oluyemi *et al.*, 1979).

Local chickens are more widely distributed in rural Africa than the other livestock species. In the United Republic of Tanzania, a survey of 6, 00 households in 20 villages showed that chickens were the only form of livestock found in most households (Collier *et al.*, 1986). Similar

observations have been reported in, Cameroon (Ngou Ngoupayou, 1995), Niger (Abdou and Bell, 1992) and in Nigeria (Adetayo and Babafunso, 2001). There is then the need to improve local fowls, within our environmental condition, for optimum productivity (Njue *et al.*, 2002). In recognition of the above-mentioned problems, there is need for a systematic and methodological approach for the improvement of the large population of local chickens resources of different ecotypes of local chickens for future breeding plans, designed to improve their productivity and adaptability to tropical production system.

Therefore the objectives of the study are:

✓ To measure and determine the feed consumption, feed efficiency, and feed conversion ratio of the light, heavy and main cross chickens from day-old to 20 weeks.

✓ To measure body weight from day-old to 20 weeks in the 3 groups and assess the suitability of their involvement in future breeding programmes.

✓ To note age, body weight at first egg and weight of first egg.

MATERIALS AND METHODS

Study location

The experiment was carried out at the poultry unit, University of Nigeria, Teaching and Research Farm Nsukka. The farm is situated within the equatorial

rainforest belt of the tropics and falls specifically within the derived savanna vegetation zone. It has well- defined rainy season (April- October) and dry season (November – March). The genotype that were used for the investigation were the Light ecotype of local chickens purchase from villages in South Eastern Nigeria and the heavy ecotype of local chickens purchased from Benue State and Obudu, a montane region of South Eastern Nigeria.

Experimental animals

The base population for the selection experiment was obtained from random-bred local chicken population maintained at poultry research unit of the Department of Animals Science University of Nigeria, Nsukka farm. The birds which for the purpose of this work have been classified as Light Chicken Ecotypes were obtained from the swampy, rainforest and Derived guinea savanna ecological zones of southeastern Nigeria. Eighty-eight non-pedigreed, unimproved and unselected males and females formed the base population for light ecotype while 55 males and females formed the base population for the heavy ecotype. The breeding procedure was arranged as shown on Table 1, with a mating ratio of 1 sire to 10 dams. Eggs were collected, marked and incubated.

Table 1: Breeding procedure

Group	Breeding group	Number of breeders		Mating ratio	Number of pens
		Males	Females		
1	LE Males X LE Females	8	80	1: 10	8
2	HE Males X HE Females	5	50	1: 10	5
3	HE Males X LE Females	5	50	1: 10	5

On the day of hatching all chicks were marked according to the breeding groups, chicks were brooded up to 4 weeks and transferred to the rearing pens and reared up to 20 weeks of age. Management were the same for all the groups. Three commercial diets were used in feeding the birds. The diet comprises- chick mash fed up to 8 weeks, growers' mash fed until 18 weeks and layers mash fed up to 20 weeks. These feeds were analyzed for proximate composition. Birds were weighed individually, and then the mean for each group computed. Age, body weight of 1st egg and weight of first egg was recorded.

Statistical Analysis

The statistical model used was

$$X_{ij} = U + S_i + e_{ij}$$

Where:

X_{ij} = the record of the j^{th} progeny of the i^{th} sire

U = the overall mean

S_i = Effect of the i^{th} sire

e_{ij} = the uncontrollable environmental and genetic deviations attributable to the individuals. All effects are random, normal and independent with expectations equal to zero.

Body weight data of the 3 ecotypes offsprings were compared at day-old and during subsequent age period to obtain differences between ecotypes. This was done by

means of a One-way ANOVA in a completely randomized design (CRD) involving unequal subclass numbers. Duncan's New Multiple Range Test was used to separate the means

RESULTS AND DISCUSSION

Statistically, there were no significant differences ($p > 0.05$) in the mean feed consume and feed efficiency for the three groups of bird. It was observed that the mean feed efficiency through out the experimental period was 0.29 ± 0.04 , 0.35 ± 0.08 , 0.31 ± 0.08 for light, heavy and main cross chickens respectively. The mean feed conversion ratio of 3.79 ± 0.66 , 3.63 ± 1.002 and 4.69 ± 1.48 are obtained for the light, heavy and main cross respectively. These results were not different from the result obtained by Obioha, (1992).

Generally, the heavy ecotype chickens had the highest mean body weight followed by the main cross chickens and the least, the light chickens at all ages. Data (Table 2) reveals that body weight in the three groups were significantly ($P < 0.05$) different at all ages but at the 20th week, there was a significant difference between heavy and the other two groups but no significant difference ($p > 0.05$) between the main cross and the light chickens.

Table 2: Analysis of Variance of body weight from day-old to 20 weeks for light, heavy and main cross chickens

Age	Light ecotype	Heavy ecotype	Main cross chickens
Day-old ecotype mean (g)	21.82 ^c	28.06 ^a	26.30 ^b
4 weeks ecotype mean (g)	95.41 ^c	143.63 ^a	126.72 ^b
8 weeks ecotype mean (g)	349.89 ^c	561.71 ^a	458.57 ^b
12 weeks ecotype mean (g)	568.14 ^c	816.67 ^a	714.00 ^b
16 weeks ecotype mean (g)	768.85 ^c	1066.67 ^a	811.54 ^b
20 weeks ecotype mean (g)	931.34 ^b	1196.67 ^a	950.00 ^b

a, b, c..... means of a parameter followed by different letter is significantly different at 5 % level.

Work done by Omeje and Nwosu (1984) showed that the Gold-Link parents weighed heavier than the local chickens. The mean body weight of the two crossbred groups was about equal to the Gold-Link but heavier than the local chickens. On the other hand, the heavy ecotypes chicken in this work performed better than the main cross

and the light. The main cross of this experiment were significantly ($p < 0.01$) inferior to the heavy ecotype due partially to the hybrid effect of crossing inherently low yielding genotypes in the main cross, and due mainly to the mother's influence. The ages at first egg are presented on Table 3.

Table 3: Age, body weight at first egg and weight of first egg

	Light ecotype	Heavy ecotype	Main cross chicken
Age (days) at first egg	145	149	154
Mean body weight at first egg (g)	940	1208.33	1050
Weight of first egg (g)	30.60	35.24	31.60

The 147 days for the light chicken falls within the range reported by Akinokum and Dettmers, (1977). The difference in the age at first egg between the three groups could be significant in poultry breeding programmes involving the different ecotypes of local chickens. The average body weights at first egg were 940g, 1208.33g and 1050g for the light, heavy and main cross chickens respectively. The average body weight at first egg for the local chickens was in agreement with the range (0.9-1.8 kg) reported by Okpeku, (2003). The average egg weights at first egg were 30.6g, 35.24g and 31.60g for the light, heavy and main cross respectively. Egg weight is highly heritable, and therefore could be manipulated easily by genetic selection. Equally, the genetic control of egg weight is highly correlated to body weight, so that selection for egg weight tends to produce larger hen and vice versa.

CONCLUSION

From this study, it could be concluded that crossing the heavy ecotype chickens with the light chicken was effective in bridging the gap in body weight between the light and heavy ecotype chickens. When the mean body weight of the Gold-Link at day-old, 4-, 8-, 12-, 16-, 20-week of age (30.97g, 108.73g, 292.65g, 660.00g, 1041.00g, and 1195.42g respectively) are compared with the heavy ecotype chickens at day-old, 4-, 8-, 12-, 16-, 20-week of age (28.06g, 146.68g, 561.7g, 714.00g, 1066.67g, and 1196.67g respectively), it could be concluded that the heavy local chickens showed superiority at 4-, 8-, 12-, 16-, 20- week of age, and as such should be used for breeding programmes rather than importing exotic chickens which may require huge financial expenses, and involved genotype X environment interactions and disease (bird flu) importation .

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