GROWTH PERFORMANCE OF SIX TROPICALLY-ADAPTED CHICKEN BREEDS IN BACKYARD FLOCKS ACROSS KEBBI STATE, NIGERIA

Saidu Suleiman, Waheed Hassan and [1]Oladeji Bamidele

Department of Animal Science, Kebbi Sate University of Science and Technology, Aliero
[1]Department of Animal Science, Obafemi Awolowo University, Ile Ife

Abstract
On-farm growth assessment of six tropically-adapted breeds of chicken was conducted in six locations in Kebbi state, Nigeria. The birds were distributed by the African Chicken Genetic Gains (ACGG) project. The study was designed to generate baseline data that could be used in the chicken selection and improvement program in the study area. A semi-structured questionnaire and field observation were used for data collection. Data were collected from 208 households, each with one of the six chicken breeds randomly distributed in batches at six weeks of age covered growth of birds from week 7-18. General Linear Model (GLM) of the SPSS was used for analyzing the data. Mean body weight at 18 weeks was similar and higher for Noiler, Sasso, Kuroiler and Funaab alpha (1383g, 1374g, 1339g and 1303g) than that of Fulani (1116g) which is higher than that of ShikaBrown (817g) respectively across the locations ($P<0.05$). Expectedly, Cocks recorded higher mean live weight than the pullets (1338 versus 1104g) in all the breeds and across the locations ($P<0.05$). The significance of interaction between location and breed on the overall growth performance of the birds was underlined.

Keywords: Growth, On-farm, Chicken breed, Location, Sex Introduction
Chickens are regarded as the most important and widely spread avian species among poultry birds (Dutta *et al.*, 2013). They are said to be one of the important animal genetic resources used as weapons for fighting poverty and malnutrition, especially in rural areas of most developing countries, which results in the growing interest on the use of chicken as a tool for poverty alleviation in villages throughout the world (Dunya *et al.*, 2015). However, chicken growth and development is a complicated life process and is subject to a significant amount of control by genetic and non-genetic factors (Pourtorabi *et al.*, 2017; Zhenqiang *et al.*, 2013).

Chicken consumption in the rural areas of Nigeria is reserved for special occasions due to the low level productivity of free range birds (Adene, 2006). There is also no comprehensive list of the breeds and varieties of chickens kept by rural smallholders and their characterization becomes difficult due to cross-breeding with the exotic breeds and random mating within the flock (Sonaiya and Swan, 2004). Most performance evaluations of chicken stains were usually conducted under intensive system of management (Sonaiya and Swan, 2004), hence true reflection of their performance under extensive or backyard extensive systems is lacking. If production from family poultry is to remain sustainable, it must emphasize the use of adapted breeds, family labour, and better management of stock and local feed resources among other factors (Sonaiya and Swan, 2004). This

therefore suggests the need to study different chicken breeds with the aim of determining their appropriateness under the local environment and the prevailing production system.

Materials and methods Study area

The study was conducted in six villages: Alwasa and Lailaba in Argungu Local Government Area (LGA); Senchi and Kwendo in Zuru LGA and Jiga and Sabiyal in Aliero LGA. The three LGAs represent Kebbi North, Kebbi South and Kebbi Central Senatorial Districts of Kebbi State, Nigeria. Kebbi state experiences two alternating seasons: the short wet (rainy) season; which starts from May/June and ends in September/October, and the long dry season; which completes the remaining part of the year. The mean annual rainfall is about 841mm, mean temperature varies from 16.4^{o}C to 39.5^{o}C recorded in December and April respectively (Climate-Data.Org, 2017). The open Savanna vegetation pattern in the state provides opportunity for extensive livestock rearing and cultivation of short duration arable crops. Thus, most of the people in the state are agro-pastoralists: rearing livestock alongside arable crop production.

Sampling technique and birds' allocation

Multi-stage sampling procedure was employed for selecting respondents. At first stage, one LGA was selected from each senatorial district. In the second stage, purposive sampling was used to select two villages from each of the selected LGAs and the third stage involved random selection of 35 households in each village. Each household was randomly allocated one of the six chicken breeds (Kuroiler, Sasso, Fulani, Funaab alpha, Noiler and ShikaBrown) which makes 208 flocks.

Collection and analysis of data

Monthly body weight data on all the ACGG birds in each household were recorded according to breed and location. The data were collected using a semi-structured questionnaire designed to collect information on birds' performance and management practices in each household. The collected data were subjected to the GLM of SPSS (2013) for analysis. Means were compared using Duncan's Multiple Range Test (DMRT). The following general linear model was used:

$$Yijk = \mu + Bi + Gj + Tk + eijk$$

Where, Yijk= Dependent variable BW@WK 6… MBW@WK 18)

μ = Overall population mean for a given variable;

Bi = Fixed effect of i^{th} sex (1, 2);

Gj = Fixed effect of j^{th} location (1, 6) Tk = Fixed effect of k^{th} breed (1, 6) eijk = Random residual error associated with Yijk observation.

Results and discussion Growth performance of the birds

The mean final body weights of all the birds according to breed, location and sex are presented in Table 1. Significant differences were observed for mean body weight at 18 weeks across the study villages (P<0.05). The respective mean final body weight (1383g, 1374g, 1339g and 1303g) of Noiler, Sasso, Kuroiler and Funaab-alpha were statistically similar, but higher than that of Fulani (1116g) which was higher than 817g of ShikaBrown.

Similarly, location had significant effect on the overall growth performance of the breeds (P<0.05). Aggregate mean final body weight of the birds was highest in Lailaba (1674g), followed by Alwasa with 1309g, which was higher than 1192g and1166g recorded in Jiga and Kwendo, respectively. The aggregate mean final body weights recorded in Jiga and Kwendo were similar (P>0.05), Kwendo and Senchi in Zuru LGA recorded no significant difference in the aggregate mean final body weight (1166g versus 1099g; P>0.05). The least performance was recorded in Sabiyal with 857g.

Table 1: Mean values for final body weight of birds according to breed, location and sex

Breed		Sex/Breed		Location		Sex	
Noiler	1383.10[a]	M 1500.58[a] F 1290.53[b]		Lailaba	1673.72[a]	M	1904.57[a]
						F	1456.44[b]
Sasso	1374.30[a]	M	1491.34[a]	Alwasa	1308.56[b]	M	1491.23[a]
		F	1254.10[b]			F	1151.08[b]
Kuroiler	1339.27[a]	M	1509.98[a]	Jiga	1192.46[bc]	M	1251.19[a]
		F	1172.82[b]			F	1141.82[b]
F-alpha	1302.98[a]	M	1511.83[a]	Kwendo	1166.11[c]	M	1246.90[a]
		F	1122.60[b]			F	1087.84[b]
Fulani	1115.88[b]	M	1172.55[a]	Senchi	1098.64[c]	M	1214.11[a]
		F	1062.35[b]			F	989.76[b]
S-Brown	816.59[c]	M	862.69[a]	Sabiyal	857.43[d]	M	900.05[a]
		F	774.12[b]			F	816.27[b]

The Growth Curve

The average monthly body weight performance of all the breeds is shown in figure 1. The growth pattern from the age of introduction (6weeks) was steady during the first month of the study. The growth continues at an increasing rate with Noiler having recorded the highest mean body weight all through which sharply declined from 14 to 18 weeks. This change in normal growth pattern could be due to the interaction of genetic (breed) and non-genetic factors (farm, season, feeding systems, flock management, housing, vaccination etc) affecting growth (Hossen, 2010; Desha et al., 2016). Sasso breed appeared to have outweighed Kuroiler and F-alpha at 18 weeks of age and almost attained the same weight with Noiler. The growth of Funaab alpha and Kuroiler followed a similar pattern, one (Kuroiler) slightly higher than the other (F-alpha). The growth of Fulani and Shikabrown is less than the rest of the breeds due to the disparity in their genotype. The Fulani

being natives of the research locations with no selection records, exhibited a more stable growth pattern and grew faster than ShikaBrown.

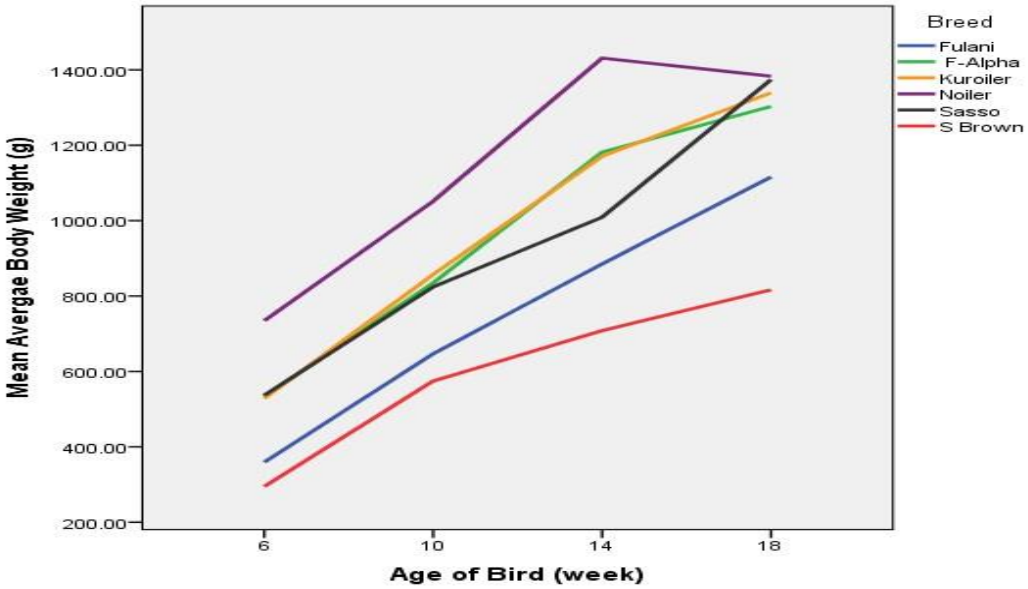


Figure 1: Growth curve of six tropically-adapted chicken breeds

Genotype × Environment Interaction on Growth of Chickens

Lailaba village proved to be the most favourable environment for almost all the breeds. The farmers in Lailaba had wider range of choice of chicken breeds, since all the breeds performed relatively better when compared with the other villages. Similarly, Alwasa supported a relatively good growth performance, similar to Jiga. There was no significant difference ($P<0.05$) between the overall growth performance of the breeds in Jiga and Kwendo and Senchi. The lowest overall growth performance was recorded in Sabiyal.

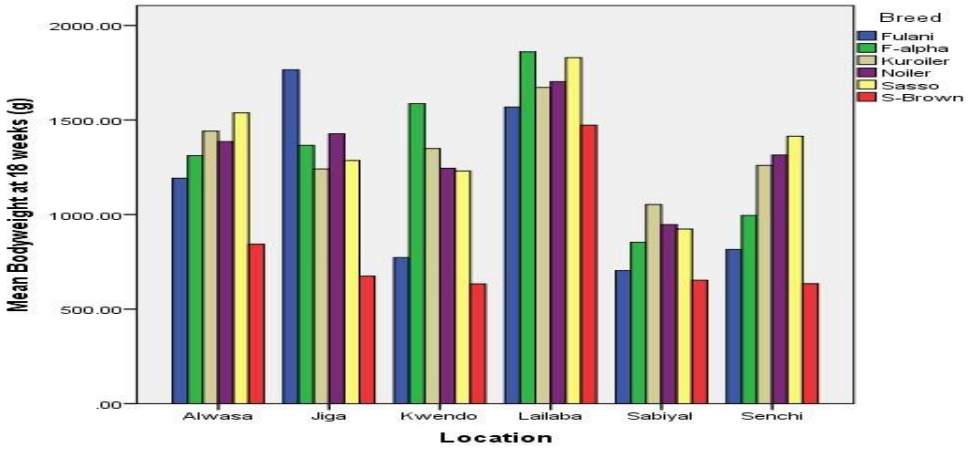
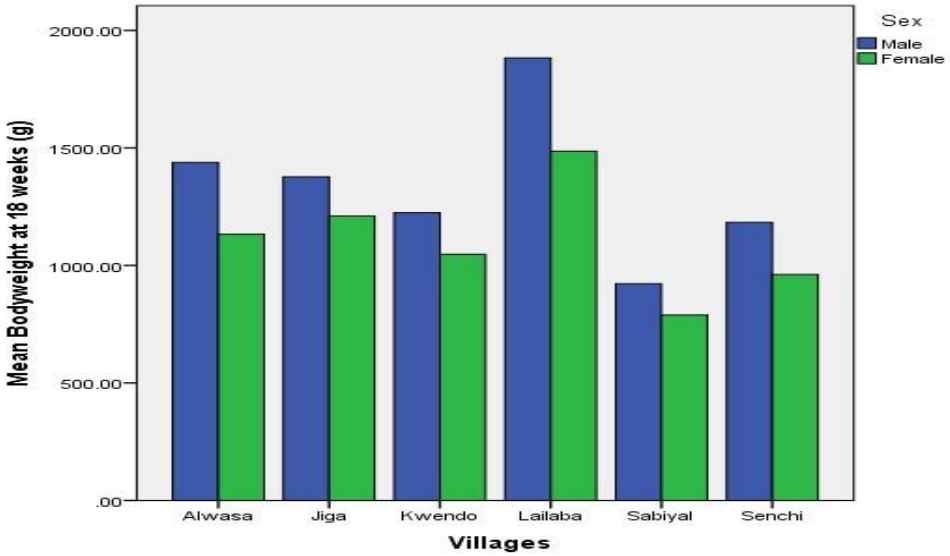


Figure 2: Genotype × Environment Interaction on Growth of Chickens

Sex ×location effect on growth of chickens

Figure 3 shows mean body weight of cocks been higher than that of the pullets (P<0.05) which proves that, regardless of breed and location cocks attain heavier body weight than pullets. A similar finding was reported by Desha *et al*. (2016).



Conclusion and recommendation

From the results of this study, it can be deduced that on-farm growth performance of chicken is affected by genetic factors peculiar to breed(s). Non-genetic factors which include sex, age, location and varying flock management practices in different locations exert great influence on growth. Farmers in the study locations ought to choose breed(s) suitable to their location and give preference to cocks for better growth performance.

References

Adene, D. F. (2006). Poultry sector review: Nigeria. FAO Animal Production and Health Division. p 1-87.

Climate-Data.Org. (2017). Climate Jega: Temperature, Climograph, Climate table for Jega - ClimateData.org. Retrieved November 22, 2017, from https://en.climate-data.org/location/377009/

Desha N., M. Bhuiyan, H. Bhuiyan and F. Islam (2016). Non-genetic factors affecting growth performance of indigenous chicken in rural villages. *J. of Tropical Resources and Sustainable Science* vol 4. P. 122-127.

Dunya, A. M., Mamza, A. O., & Yusuf, S. Z. (2015). Local chicken management in rural Borno state,

Nigeria. *J. of Biology, Agriculture and Healthcare*, *5*(4), 113–120. Retrieved from http://www.iiste.org/Journals/index.php/JBAH/article/view/20225/20700%0Ahttp://ovidsp.ovid.c

om/ovidweb.cgi?T=JS&CSC=Y&NEWS=N&PAGE=fulltext&D=caba6&AN=20153148256

Dutta, R. K., Islam, M. S., & Kabir, M. A. (2013). Production performance of indigenous chicken (Gallus domesticus l .) in some selected areas of Rajshahi , Bangladesh. *American J. of Experimental Agriculture*, *3*(2), 308–323.

Hossen, M.J. (2010). Effect of management intervention on the productivity and profitability of indigenous chickens under rural condition in Bangladesh. LRRD, 22(10).

Pourtorabi E., N. Farzin & A. Seraj (2017). Effects of genetic and non-genetic factors on body weight and carcass-related Traits in two strains of Japanese quails *Poultry Science J., 5 (1): 17-24.*

Sonaiya, E. B, & Swan, S. (2004). Small scale poultry production: Technical Guide. *Vasa*, 1–60.

Retrieved from

http://medcontent.metapress.com/index/A65RM03P4874243N.pdf%5Cnhttp://scholar.google.com/scholar?hl=en&btnG=Search&q=intitle:Small-Scale+Poultry+Production+Technical+guide#0

Zhenqiang X., N. Qinghua, and Z. Xiquan (2013). Overview of Genomic Insights into Chicken

Growth Traits Based on Genome-Wide Association Study and microRNA Regulation. *Current Genomics, 14: 137-146. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3637678/pdf/CG-14-137.pdf on 02/10/2018.*

ACKNOWLEDGEMENT

The authors remain grateful to ACGG-NIGERIA for sponsoring this study.