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ORIGINAL RESEARCH ARTICLE

Comparative Performance of Noiler, Isa Brown and Nera Black Strains of Chicken as Replacement Pullets

Mosobalaje, M. A.
Department of Animal Health and Production Technology,
Oyo State College of Agriculture and Technology, Igboora,
jamademosobalaje@gmail.com 08034780805; 08057340189

Abstract

Pullet quality is the foundation for optimum layer performance. This study was conducted to compare performance indices of Noiler chicken as replacement pullets to two commonly used laying strains of birds for egg production in Nigeria. There were three treatments consisting Noiler, Isa brown and Nera black. One hundred (100) day old chicks of each were purchased from two reputable commercial farms and the birds were brooded and raised till 2 weeks of age before they were allotted into three treatments with four replicates of 25 birds per replicate. The birds were fed commercial chick mash during chick stage that lasted eight weeks and grower feed from ten weeks old for another twelve (12) weeks. Parameter recorded were initial weight, weight gain, feed intake, feed conversion ratio, final weight, mortality and economy of production. While body weight at 18th week, age at first egg, weight of the first egg were the additional parameters recorded for the growers. Results obtained for chick phase showed that initial weight, final weight, weight gain, and feed intake were significantly affected (P<0.05). Noiler chicks recorded significantly (P<0.05) highest values for these parameters (205.00g/bird, 1013.04g/bird, 19.24g/bird/day and 57.57g/bird/day, respectively). There was no significant (P>0.05) differences in the values obtained for feed conversion ratio, mortality and economy of gain. The performance attributes of the growers revealed that the weight gain and feed intake values of Noiler (12.52g/bird/day and 85.68g/bird/day, respectively) were the highest and significant (P<0.05) to values recorded for Nera black (8.95g/bird/day and 63.73g/bird/day, respectively) and Isa brown (8.84g/bird/day and 61.09g/bird/day, respectively). The final weight was also affected by strain. Noiler had 2089.25g/bird which was significantly higher (P<0.05) than values recorded by Nera black (1531.25g/bird) and Isa brown (1493.33g/bird). The values obtained for Isa brown and Nera black were similar (P>0.05) for all the parameters. Noiler proved superior in growth performance compared to Isa brown and Nera black as replacement pullet.

Keywords: Chicks, Growers, Isa brown, Nera black, Noiler

Introduction

The introduction of new chicken genotypes in Nigeria has been one of the keys ways to improve the productivity of rural chickens. Crossbreeding or upgrading of indigenous chicken with commercial exotic chickens through cockerels or pullets exchange was a genetic intervention implemented in the past in several African countries. The intervention started in 1950s in Nigeria where indigenous chickens were crossed with Rhode Island Red, Light Sussex and Black Australorp chicken (Tiamiyu, 1999). Crossbreds demonstrated superiority in performance (Fayeye *et al*., 2005), but their survival rates were low and the intervention was categorized as unsuccessful (Magothe, 2012).

The Noiler strain which is also known as Kuroiler is a dual purpose developed by Kegg Farms in India (Harth, 2011). Kuroilers are derived from crossing either coloured broiler males with Rhode Island Red females, or White Leghorn males crossed with female Rhode Island Red (Sandilands and Hocking, 2012), however it contains high trait of Leghorn compared to Red Island Rhode. Noiler produces about 150 eggs per year with no distinct color. The matured male weigh about 3.5kg while female is 2.5kg, and it is highly resistant to disease due to its unique genetic feature (www.kuroiler.com.en/en). Kuroiler is a hardy strain, and its feeding pattern is almost like that of broiler and also the size does not allow housing of three or four birds into a cell like other strains. Noilers do not possess specific

plumage and is a breed that can survive anywhere including arid areas (www.kuroiler.com.en/en).

The most common commercial layer strains in Nigeria are Isa Brown and Nera black. Some other strains are Hyline, Harco, Yaafa, Kabir (Obioha, 1992) and Lohman. Genetic variation in egg production between breeds, strains and lines has been reported (Hocking *et al.*, 2003). The production potential of a good layer strain is better assessed based on the number and size of eggs produced during its lifetime and its final weight as spent-hen. Although management and feeding practices are the key determining factors of egg production, the breed of laying hen affects egg production. There is strong evidence that there are genetic differences in growth rates between strains or breed of chickens (Deeb and Lamont, 2002). Significant differences in body weights due to differences in strains has been reported with the black and brown plumage (feather colour) layer strains varied in their productive capability and livability in this hot climate. Olawumi (2007) reported that parents of black layer strain had lower mortality rate and more adaptable to hot weather than parents of brown layer strain. In this study, growth attributes of Noiler, Isa brown and Nera black as replacement pullets were evaluated.

Materials and methods

A total of 100 (a day old) pullet chicks of each of Noiler, Isa brown and Nera black strains were purchased from two reputable commercial hatcheries. The birds were brooded and raised till two weeks of age before they were allotted into three different treatments consisting of the three strains with four replicates of 25 birds each by random selection, arranged in a Complete Randomized Design (CRD). The birds were fed a proprietary commercial pullet chick mash for eight weeks. The nutrient composition of the commercial chick mash is presented in Table 1. The same experimental arrangement was retained during the grower's phase, however, the birds were fed commercial grower mash (Table 2) for twelve weeks. Data collected included initial body weight, body weight gain, feed intake, feed conversion ratio, body weight at 18th week, age at first egg, weight of the first egg, mortality and economy of production. Data obtained from the study were subjected to Analysis of Variance (ANOVA) and where difference exists between means, Duncan Multiple Range Test was used to separate the means at 5% probability level.

Table 1: nutrients composition of the proprietary chick diet used

Nutrients	%
Crude protein (min)	18.5
Crude Fat (min)	4
Crude Fiber (max)	3
Metabolizable energy Kcal/kg (min)	2800
Calcium	1
Phosphorus (min)	0.44
Lysine (min)	1
Methionine (min)	0.4

Table 2: Nutrients composition of the proprietary chick diet used

Nutrients	%
Crude protein (min)	15
Fat (min)	4
Fiber (max)	6
Metabolizable energy (min) Kcal/kg	2600
Calcium (min)	1.1
Phosphorus (min)	0.38
Lysine (min)	0.7
Methionine (min)	0.33

Results and Discussion

Chick phase

Results of the performance of the three different strains are presented in table 3. The values recorded for initial weight (2 weeks old) of birds showed significant ($P<0.05$) difference across the treatments. The highest value (205.00g/bird) was obtained for Noiler, while the lowest value (114.20g/bird)) was observed in Isa brown, however similar to value recorded by Nera black (123.23g/bird). It was observed that value recorded for final live weight were significantly ($P<0.05$) different. The highest value (1013.04g/bird) of final live weight was noticed in Noiler, while the lowest value (574.81g/bird) was recorded in Isa brown. Black Nera (605.25g/bird) and Isa brown recorded similar ($P>0.05$) values. Similarly, there were significant ($P<0.05$) differences in the values obtained for average weight gain and followed the same trend as final weight with 19.24g/bird/day, 11.48g/bird/day and 10.97g/bird/day for Noiler, Nera black and Isa brown, respectively. Daily feed intake also

showed significant (P<0.05) differences, with the highest value (57.57g/bird/day) obtained in Noiler while the lowest value (35.49g/bird/day) was noticed in Isa brown. There were no significant (P>0.05) differences in the values obtained for feed conversion ratio, percentage mortality and economy of gain. The best feed conversion ratio (2.99) and economy of gain (₦430.20/kg weight gain) were recorded for Noilers, while the poorest feed conversion ratio and economy of gain (3.25 and ₦468.36/kg weight gain, respectively) were obtained in Nera black. However, values for Isa brown were 2.96 and ₦468.36, respectively.

Table 3: The performance and economy of production of Noiler, Isa Brown and Nera black chickens

Parameters	Isa black	Nera black	Noiler	SEM
Initial body weight (g/bird)	114.20[b]	123.23[b]	205.00[a]	1.74
Final body weight (g/bird)	574.81[b]	605.25[b]	1013.04[a]	17.28
Weight gain (g/bird/day)	10.97[b]	11.48[b]	19.24[a]	0.41
Feed intake (2 - 8 weeks) (g/bird/day)	35.49[b]	37.30[b]	57.57[a]	1.28
Feed conversion ratio	3.13	3.25	2.99	0.30
Mortality (%)	0.94	2.96	2.00	1.98
Economy of gain (₦/kg weight gain)	450.36	468.36	430.20	13.56

[ab]: means with differently subscripts along the same row are significantly different (P<0.05).

The initial body weight (two weeks old) of the three strains were affected by the strain, the result showed that Noiler had the highest value which was significantly higher than the other two strains. Noiler showed the stronger trait between genotype among the three strains. The final weight of Isa brown and Nera black confirmed the work of Ajayi and Agaviezor (2009) for pullet chicken. Moreover, the weight of the Noiler was higher than those of the other two strains as it proved superior weight gain trait among the three strains. The result of this study contradicted the finding of Tadesse *et al.* (2013) who reported that body weight of chicken is affected by non-genetic factor like supplementary feeding, watering and health care. Feed intake of Noiler was the highest and this was as a result of its large body size. Feed intake values of the three strains confirmed the work of Rose (1997) who reported that poultry eats approximately 5% of their body weight. Thus, Noiler proved superior between genotype among the three strains as they ate more. The values recorded for feed intake could be linked with the values of weight gain obtained in this study and agreed with the study of Chatterjee *et al.* (2007) who reported that the reduction in body weight gain is believed to be a direct result of reduced calorie intake. Also, Noiler had the best value of feed conversion ratio however, similar to the other two strains. The feed conversion ratio obtained for the Noiler showed that Noiler was very good in converting feed consumed into flesh which is positive trait for Noiler strain and this attribute confirmed Noiler strains as a dual-purpose strain (Harth, 2011). The value of conversion ratio confirmed the finding of Farooq *et al*. (2002) who reported that, layers are slow growing and have high feed conversion efficiency to produce more egg rather than meat. The value obtained for Nera black in mortality supported the work of Olawumi *et al.* (2006) and this study also proved that the survivability of Noiler was also high.

Grower phase

Performance characteristics and economy of gain of three strains of growing pullets were presented in table 4. Initial weight, final weight, weight gain, and feed intake were affected by strain and the values obtained were significantly different (P<0.05). The initial weight of Noiler was the highest (1213.04g/bird) and was significantly higher (P<0.05) than those of Isa brown and Nera black. The final weight was also affected by strain.

Noiler had 2089.25g/bird which was significantly higher (P<0.05) than values recorded by Nera black (1531.25g/bird) and Isa brown (1493.33g/bird).

The weight gains and feed intake values of Noiler (12.52g/bird/day and 85.68g/bird/day, respectively) were the highest and significant (P<0.05) to values recorded for Nera black (8.95g/bird/day and 63.73g/bird/day, respectively) and Isa brown (8.84g/bird/day and 61.09g/bird/day, respectively). The values obtained for Isa brown and Nera black were similar (P>0.05) for all the above parameters. However, the feed conversion ratio, mortality and economy of gain were not significantly (P>0.05) affected by strain. The values ranged respectively as follows 6.87 - 7.23; 0.00 – 1.00% and ₦687.44 - ₦723.72. For age at 20% hen-day production, Noiler recorded the highest value (156 days), Isa brown was 146days, while Nera black was 143 days. However, they were not significantly different when subjected to statistical analysis. Weight of first egg for Isa brown was the highest value (43.43g), while Nera black was 41.52g and Noiler recorded the lowest value of 40.43g. These values were not significantly (P>0.05) different.

Table 4: Performance characteristics and economy of gain result of Noiler, Isa Brown and Nera black chickens

Parameters	Isa black	Nera black	Noiler	SEM
Initial weight (g/bird)	574.81[b]	605.25[b]	1013.04[a]	17.28
Average feed intake (10 – 18 wks) (g/bird/day)	61.09[b]	63.73[b]	85.86[a]	1.86
Weight at 18th week (g/bird)	1493.33[b]	1531.25[b]	2189.25[a]	48.58
Feed Conversion Ratio	7.10	7.23	6.87	0.60
Weight gain (g/bird/day)	8.84[b]	8.95[b]	12.52[a]	0.71
Age at first egg (days)	144.25	145.00	136.25	3.68
Weight of first egg (g)	43.43	41.52	40.43	3.23
Age at 20% hen-day production (%)	155.00[b]	153.75[b]	160.75[a]	1.92
Mortality (%)	1.00	0.00	1.00	1.16
Economy of gain (#)	700.45	723.72	687.44	59.99

[ab] means differently subscripted along the same row are significantly different (P<0.05).

The results obtained on performance of growing pullets revealed that initial weight, final weight, weight gain and feed intake were significantly affected by the strain. The initial body weight values of the three strains were affected by strain. The result showed that Noiler had the highest value and the other two strains had similar values. The final weight of Isa brown and Nera black was higher than the mean mature body weight value presented by Ajayi and Agaviezor (2009) for Nigerian local chicken. These two strains values contradicted the study of Ayorinde and Oke (2009) who presented the weight of 1449.6±17.24g in Nera black and 1445.45g in 20-week commercial laying hen respectively.

Meanwhile, the final weight attained by Noiler goes in line with the study of Lozhkina (1987) who presented the weight of 1.8kg in 20-week white leghorn. The mean feed intake of Noiler was significant to those of Nera black and Isa brown. Feed consumption of Nera black was higher than that of Isa brown and this confirmed the work of Imouokhome (2012) and Yakubu *et al*., (2007) who stated that Bovan Nera consumed more feed. The feed conversion ratio of Isa brown and Nera black contradicted the value presented by Imouokhome (2012). The values were higher to that of Noiler despite the higher feed consumption. Noiler pullets were the most efficient in feed conversion to body weight, and thus cost less to produce the weight. However, feed conversion ratio increased with age at different growing period for the different strain but with Noiler having the largest increase on average. Noiler also had the least value for economy of gain and this is as a result of the high rate of conversion of feed to weight. This indicated that Noiler required less unit of feed to gain unit of weight, this could be attributed to the fact that Noiler was bred from heavy breed (Harth, 2011) and broiler are known

to be higher feed converter (Leeson and Summer, 2005).

It was indicated in this study that regardless of strain, a positive association between body weight and sexually maturity was established (Leeson and Summer, 2005) as Noiler with the highest body weight at 18th week laid the first egg. However, result of egg weight of the first egg disagreed with finding of Oluyemi and Robert (2000) and Leeson and Summer (2005) that first egg was progressively heavier with delayed maturity, as Isa brown that started before Nera black recorded heavier egg. This however confirmed the fact that Isa brown are known for big eggs (Kassandra, 2015). Noiler that recorded the first egg was however attained 20% HDP at age significantly higher than age of Nera and Isa at 20% HDP. The result of the mortality showed that Nera black are more rugged than Noiler and Isa brown and this confirmed the conclusion of Olawumi (2009) who reported that parent of black layer strain had lower mortality rate and more adaptable to the hot weather than parents of brown layer strain.

Conclusion

Noiler being a dual-purpose strain recorded significantly higher values of final weight, weight gain, feed intake and comparably, better feed conversion ratio and economy of gain. If these better growth performances could be translated to good laying performance, Noiler strain will be good layers.

Conflict of Interest

There is no personal, financial or other conflict of interest as regard the products or of organization mentioned in this paper. This research did not receive any specific grant from funding agencies in the public, commercial or non-profit sector. Strains of the layers used are not specific to any public, commercial or non-profit organization and the name of proprietary feed used is not mentioned.

References

Ajayi, F. O. and. Agaviezor B.O. 2009. Phenotypic characteristics of indigenous chicken in selected local government areas in Bayelsa state, Nigeria. Proceedings of the 3rd Nigeria International Poultry Summit, Feb. 22-26, Abeokuta, pp: 75–78.

Ayorinde K. L and Oke, U. K. 2009. The influence of juvenile body weight and two feeding regimes during the growing phase on growth performance and early lay characteristics of pullets. *Nigerian J Anim Prod, 22: 101-107.*

Chatterjee, R. N., Rai, R. B., Kundu, A., Senani, S. and Sundar, J. 2007. Egg quality traits in indigenous breeds of chicken of Andaman. *Indian Vet. J*. 84: 206-208.

Deeb, N. and S. J. Lamont, 2002. Genetic architecture of growth and body composition in unique chicken populations. *J. Heredity*, 93: 107-118.

Farooq, M; Gul. N; Chand, N; Durrani, F.R.; Khurshid, A; Ahmed, J.; Asghar, A; and Zahir-ud-Din. 2002. Production performance of backyard chicken under the care of women in Charsadda Pakistan. *Livestock Research for Rural Development.* Vol.14 No1.

Fayeye, T. R., Adeshiyan, A. B. and Olugbami, A. A. 2005. Egg trait, hatchability and early growth performance of the Fulani-ecotype chichen. *Livestock Research for Rural Development.* Volume 17, Art #94. Retrieve August 11, 2021, from http://www.lrrd.org/lrrd17/8/faye17094.htm

Harth R. 2011**.** A new breed, highly productive chicken helps raise Ugandans for poverty. The bio design Institute. http://asunews.asu.edu/node/21034.

Hocking P. M., Bain M, Channing C. E., Fleming R., Wilson S. 2003. Genetic Variation for Egg Production, Egg Quality and Bone Strength in Selected and Traditional Breeds of Laying Fowl. *British Poultry Science* 44:365-373.

Hockings, D. M. 1987. Nutritional interactions and reproduction in bird. Proc. of the Nutrition Society. 46: 217-225.

Imouokhome, S. L. 2012. Effects of ascorbic acid and baobab fruit pulp meal supplementation as source of ascorbic acid in layer diets. A Ph.D. dissertation (unpublished) submitted to the Department of Animal Science, Ahmadu Bello University, Zaria, Pp 96-98.

Kassandra, S. 2015. Isa brown: A comprehensive guide. Backyard chicken Coop. www.backysrdchickencoop.com.au. retrieved on June 28, 2019.

Leeson, S. and Summer, J. D. 2005. *Commercial poultry nutrition.* 3nd Edition, University Books, Ontario Canada. ISBN 978-1904761-78-5.

Lozhkina, T. 1987. Increasing the production of eggs for incubation. Ptitsevodstvo. Number 6. Pages 22 – 24. In: Animal breeding CAB Abstract. Volume 56. Number 12. 1988.

Magothe T. M. 2012. Genetic analysis of body weights of indigenous chicken in Kenya. M.Sc. Egerton University.

Obioha, F. C. 1992. *A Guide to Poultry Production in the Tropics*. Acena Publishers. Enugu, Nigeria. pp 153-155

Olawumi S. O. 2007. Genotype and season interaction effects on reproductive performance of two breeds of layers in humid zone in Nigeria. *Appl Tropical Agric Vol 12, pp:78-82.*

Olawumi, S. O., J. T. Ogunlade, S. O. Oseni and J. O. Akinokun, 2006. Egg quality characteristics of two breeds of layer breeders in South West, Nigeria. Proc. 11 Ann. Conference of Animal science of Nigeria (ASAN). Sept. 18-21, 2006. Institute of Agricultural Research and Training, Ibadan, Nigeria. pp: 249-250.

Oluyemi, J. A. and Robert, F. A. 2000. *Poultry Production in warm wet climate*, Spectrum Books. pages 18-33.

Rose, S. P. 1997. Principles of Poultry Science. Domesticated Poultry. Growth. Female reproduction Storage. CAB International Wallington Ford, U.K. Sciences Department, 3300 Litton Reaves Hall, VA Tech, Blacksburg, VA.

Sandilands, V. and Hocking, P. M. 2012. Alternative Systems for Poultry*: Health, Welfare and Productivity, CABI*, p. 119.ISBN 9781-78064-009-9

Tadesse, A. 2014. Production and Reproduction Performance of Rural Poultry in Lowland and Midland Agro-Ecological Zones of Central Tigray, Northern Ethiopia. *British Journal of Poultry Science,* 3: 6-14.

Tiamiyu A. 1999. Morphological features of Fulani ecotype chickens. Proceeding 26th Annual Conference of Nigeria Society of Animal Production. 21 – 25 March. Ilorin. Kwara State Nigeria

www.kuroiler.com.en/en Kuroiler. Retrieved August 11, 2021, from Wikipedia.org

Yakubu, A., Kuje, D. and Okpeku, M. 2009. Principal components as measure of size and shape in Nigerian indigenous chickens. *Thai Journal of Agricultural Science* pp 42