Global Journal of Animal Breeding and Genetics

ISSN: 2408-5502 Vol. 3(3), pp. 125-128, March, 2015. © Global Science Research Journals
http://www.globalscienceresearchjournals.org/

Full Length Research Paper

Comparative effect and frequencies of major genes on egg and body weight of Nigeria local chickens under free range in selected chicken populations in the guinea savannah region

Gwaza D.S[1*] and Nachi E. D[2]

[1]Department of Animal Breeding and Physiology .University of Agriculture, Makurdi, Benue State, Nigeria.
[2]Department of Animal Production. University of Agriculture Makurdi, Benue State, Nigeria.

Accepted 4 February, 2015

Abstract

The study was conducted in four districts of Kastsina-Ala Local Government Area of Benue State, Nigeria. Data were collected on four major genes, frizzling, normal feathered, naked neck and the dwarf chickens on body and egg weight of each flock component. A total of 1,988 and 420 records for body and egg weight were collected respectively. The predominant major gene was the normal feathered (84.10 percent), followed by the naked neck (9.46 percent).The dwarf gene had a frequency of 4.22 percent while the frizzle was least with a frequency of 2.16 percent. Body weight of the flock components varied in an irregular pattern across the major gene types. Body weight of growers varied significantly across the major genes except that between the naked neck and the frizzle. The same trend was observed on body weight of chicks. Egg weight varied significantly between the naked neck, normal feathering and the dwarf gene types. The frizzle and the dwarf genes are threatened and there is need to improve their management and conservation. The variation in weight of eggs of the naked neck and normal feathering was not consistent with their body weight indicating higher non- genetic influence on this trait. The inconsistency in the superiority of the major genes over one another in body weight is an indication of environmental influence. Under stressful condition, the frizzle and the naked neck genes were superior to the normal feathering. These genes can be incorporated to exploit their advantage over these non- genetic influences.

Keywords: Body-weight, frequency and major-genes.

INTRODUCTION

In the developing world, most of the populace resides in rural areas, reared small flocks of scavenging chickens which have important role in poverty alleviation and food security. These chickens aside natural and unconscious selection, have never gone through a designed selection and breeding program for genetic improvement. The flock sizes are small but important in providing meat and egg for family consumption, sale and also serve active social obligation (Dolberg et al., 1999). These chickens are also known for their adaptation and tolerance to harsh environmental conditions, endemic diseases and parasites (Nwakpu et al., 1999). The socioeconomic importance of the free range rural poultry production in the developing world can never be over emphasized (Mukiibi-muka et al., 2003). The potential of the traditional rural poultry production to provide gainful employment, support arable crop farming and provide cushion at times of crop failure cannot be overlooked (Sewanayana et al., 2003).

*Correspondence author. Email: gwazadeeve@yahoo.com

Table1: Frequency of the major genes

Major gene type	frequency	%frequency
Normal feathering(no)	1,673	84.16
Nak4ed neck	188	9.46
Frizzle feathered	48	2.16
Dwarf	84	4.22
Total	**1,988**	**100**

This potential cannot be assessed on less there is information on types of major genes in the rural poultry production, their frequencies, effects on egg and body weight as well as their adaption to prevailing environmental conditions under free range production. This information will provide tools for selection and breeding strategies to exploit the full genetic potential of the rural poultry industry. This will increase the scope of rural farmer participation and eventual growth of the industry. It is in view of the above that this study was designed to provide information on the frequency of major genes in the Nigeria rural poultry populations and their comparative effect on egg and body weight of the normal, frizzle feathered, naked neck and the dwarf dickens.

MATERIALS AND METHODS

The study was conducted in four districts, township, Tongov, Kyurav-tiev and Shitile of Katsina-Ala Local government area of Benue State, Nigeria. Katsina-Ala lies in the guinea savannah zone of Nigeria. Annual rainfall ranges between 159-180mm. The local Government lies between latitude 6^{o} and 7^{o} degrees North and longitude 9^{o} and 10^{o} degrees South (PKLGA 2003). There were two seasons, the rainy season which last from April to October, and the dry season (hot season) starting from November to March. The average annual temperature varied from 32^{o}c to 38^{o}c. Local chicken consisting of normal feathering, Naked Neck, frizzle and dwarf chickens were used for the study. The birds were reared by the free range traditional production system. The birds scavenge for their feed with occasional supplementation from household and kitchen waste. Thatched huts were provided for housing at Night. There was no designed arrangement for medication and health care. Incubation and brooding were all achieved through natural processes.

About forty households were selected randomly in each district. The birds in each household were captured and their gene type identified and recorded. Birds were weighed using a 1kg weighing balance. A 500 gram digital weighing balance was used to weigh the chicks and growers. The birds were grouped according to their physiological status, sex, growers and chicks respectively before their body weight were taken.

Data Analysis

Data were analyzed by descriptive statistics to estimate the mean body weight, variation in body weight within the gene type and the frequency of the gene type in the populations were also estimated.

RESULTS

Frequency of the Major Genes

The normal feathered genes were most common with a frequency of 84.16 percent. The frequencies of the naked neck, dwarf and the frizzle feathered chickens were low (9.46, 422 and 2.16) percent respectively (Table 1).

Effect of Major Genes on Egg Weight

There was significant ($p<0.05$) difference between the egg weight of the normal feathered and the naked neck hens (0.0353± 0.002 and 0.0400±0.033). There was no significant ($p>0.005$) difference between the egg weight of normal and the dwarf hens (Table 2).

Effect of Major Genes on Chick Weight

Body weight of chicks of the normal feathered hens were significantly ($p<0.05$) higher than all the other major genes (Table 2). The least chick weight was observed on the dwarf genotype (0.040 ± 0.001). Chick weight of the naked neck and the frizzle feathered birds were also significantly ($p<0.05$) different (Table 2).

Effect of Major Genes on Body Weight of Glowers

There were significant differences ($p<0.05$) in body weight of growers across the major gene types. The

Table 2: Comparative effect of major genes on egg and body weight of flock components

Body weight of flock components (kg)	NF Mean ± SE	NN Mean ± SE	DW Mean ± SE	FF Mean ± SE
Idle hens (kg)	1.318[a] ± 0.010	1.236[b]±0.035	0.769[c]±0.017	1.129[b]±0.051
Brooding hens (kg)	1.256[a] ± 0.030	1.257[b]±0.106	0.850[c]±0.011	1.350[b]±0.032
Laying hens (kg)	1.403[a]±0.026	1.303[b]±0.044	0.810[c]±0.010	-
Incubating hens (kg)	1.190[a]±0.042	1.185[a]±0.079	-	-
Cocks (kg)	1.622[a]±0.021	1.615[a]±0.69	-	1.707[b]±0.10
Growers(gm)	0.525[a]±0.011	0.545[b]±0.033	0.503[c]±0.20	0.495[c]±0.69
Chicks (gm)	0.305[a]±0.051	0.083[b]±0.013	0.040[c]±0.001	-
eggs (gm)	0.0353[a]±0.002	0.040[b]±0.006	0.035[c]±0.015	0.060[d]±0.12

a, b, c & d figures with different superscript across the rows are significantly different at (p<0.05) ,SE. = standard error of mean.
NF=Normal feathering, NN=Naked neck, DW=Dwarf and FF=Frizzle feathering.

highest weight of growers was recorded on the naked neck genotype. This was closely followed by that of the normal feathering and the dwarf chicken while the frizzle chicken was least (Table 2).

Effect of Major Genes on Body Weight of Cocks

There was sexual dimorphism on body weight across the major genes genotypes. The males significantly (p<0.05) differed from the female in body weight. The cocks of the normal feathering and naked neck were statistically similar (P>0.05) (table 2). The body weight of the cocks of the frizzle feathered genotype was highest and significantly (P<0.05) different from those of the normal feathered and the naked neck cocks.

Effect of Major Genes on Incubating Hens

Body weight of incubating hens was not significant (p>0.05) between the normal feathering and the naked neck major gene types (Table 2).

Effect of major genes on body weight of idle, brooding and laying hens

Body weight of idle hens of the normal feathered birds were higher and significantly (p<0.05) different from those of naked neck, frizzle and the dwarf chickens. There was no significant (p>0.05) difference between the body weight of idle hens of the naked neck and the frizzle feathered hens. Body weight of brooding hens was not significant (P>0.05) between naked neck and frizzled hens. The body weight of normal feathered hens was significantly (P<0.05) different from the dwarf, naked neck and the frizzed hens. The body weight of laying hens was significantly (P<0.05) higher in the normal feathered chickens compared to the naked neck (Table 2). While that of the dwarf was least (Table 2).

DISCUSSION

Frequency of Major Genes in Nigerian local Chicken population

The high frequency of the normal feathered gene in the population indicated the high scope of rural farmer participation in the utilization of the normal feathered chickens. While the reverse is true for the naked neck, frizzle feathered and the dwarf chickens. The rural farmers may not be aware of the superiority of the naked neck and the frizzle genes under heat stress conditions. There is need to create awareness to sensitized the rural farmers on the potentials of the naked neck, the frizzle, and the dwarf chickens. These genes are endangered and urgent steps need to be taken to conserved and improved their management.

Effect of Major Genes on Egg and Chick Weight

The higher weight of eggs of the naked neck chicken may be due to higher weight of the naked neck hens. This observation was reported by Okoh et al. (2010). The lower weight of the frizzle and the dwarf eggs were also related to their body sizes and weight. Zein El Dien et al. (1984) also reported lower egg weight of the dwarf chicken due to reduced body weight and size.

The resultant lower weight of the chicks of naked neck may be due to added energy needed to maintain constant body temperature due to poor body insulation compared to chicks of the normal feathering that had better body insulation. At the chick stage the challenge is to maintain constant body temperature. The more the surface area available for heat dissipation, the more feed energy will be diverted for regulation of body temperature,

and less the energy available for tissue formation. In the normal feathering however, even with the initial lower weight, little energy may be required for regulation of body temperature, the higher balance (compared to the naked neck and frizzle) will be channeled to tissue building giving rise to higher weight of the chick of the normal feathering as observed. Again the superiority of the feather genes is in their efficiency of thermoregulation. Under non -heat stress condition, they are not superior to the normal feathering. Ibe (1993) also reported similar observation.

Effect of Major Genes on body Weight of Growers

At the chick stage the emphasis is on conserving body temperature since all the physiological apparatus for temperature regulation are at their rudimentary stage. At the grower phase however, the challenge is to eliminate excess heat to maintain constant body temperature. The bird with better surface area for eliminating excess body heat will be less heat stressed, it will therefore consumed more feed and had higher weight as observed with the naked neck genotype. On the other hand the birds with inferior avenues for heat dissipation through convection will reduce it energy requirement through reduced feed intake. It will divert body reserves and little energy intake from feed for thermoregulation and body maintenance. This may cause a reduction in body weight especially under extreme temperature conditions .This explained why despite the higher weight of the chicks of normal feathered compared to the naked neck, the weight of naked neck in the glower phase became significantly higher than that of normal feathering birds.

Effect of Major Genes on Body Weight of Idle, Brooding, Incubating and Laying Hens

The superior body weight of the brooding frizzle and naked neck hens compared to normal feathering hens may be due to their efficiency in thermoregulation. This thermoregulatory efficiency may also have been responsible for the superior body weight of the frizzle cocks.

There were however inconsistencies between the superiority of the normal feathering in body weight of laying and incubating hens over the naked neck and the frizzle genotypes. These inconsistencies indicated the influence of a non genetic factor on body weight of rural chickens. As this non genetic factor changes in one direction, some major genes are more favored while the reverses equally place them at a disadvantage. It is worthy to note that under stressful ambient temperature, the naked neck, the frizzled feathered and the dwarf chickens were favored to the detriment of the normal feathering. At low ambient temperature however, the normal feathering would be favored while placing naked neck and the frizzle at disadvantage. Ibe (1993) also reported that any advantage the naked neck and frizzle birds would have over the normal feathering might have been a consequence of their direct effects in efficiency of thermoregulation in hot environments.

It is also possible that the interaction between the normal feathering genotypes and the environment through behaviours by seeking for shades under tree crops, thick shrubs covers and huts shades during heat stress may have improved their efficiency in thermoregulation. The rejection of plumage colors that will otherwise absorb heat by forces of nature is another way that may have also improved the thermoregulatory efficiency of the normal feathered birds leading to the inconsistencies observed.

CONCLUSION AND RECOMMENDATION

Conclusion

Major genes had significant effect on body weight. The naked neck, frizzle feather and the dwarf gene causes a reduction in tropical heat stress by improving the breeds ability for heat dissipation through convection. These major genes also improve feed intake, feed conversion and performance. There is also increased fitness and adaptation to tropical conditions.

Recommendation

Major genes should be exploited to improved thermoregulation efficiency and overall performance of the rural chicken production industry. There is also need to sensitized rural famers of the potential of the major genes in rural poultry production in order to increase the scope of participation of rural farmers utilizing these major genes.

REFERENCES

Dolberg F and Peterson PH (1999). Poultry as a Tool in Poverty Eradication and Promotion of Gender Equality. Proceedings of a Workshop, March 22 – 26, 1999, Tune Land Boskole, Denmark.

Ibe SN (1993). Growth performance of normal, frizzle and naked neck chicken in a tropical environment. Nig. J. Anim. Prod. 20. 25 – 31.

Mukkibi – Muka G, Nahamya F and Kasadha T (2003). Proceedings of Livestock Research Programme (LSRP) Annual Science Workshop in Collaboration with DANIDA's Agricultural Sector Research Organization (NARO).

Nwakpu PEB, Odo SI, Omeje M, Akpa and CC Edoga (1999). Hatching performance of three strains of layer – type chickens and their Lines. Proceedings of the 26th Annual Conference, NSAP. 21 – 25 March 1999. Ilorin.

PKLGA (2003). Katsina – Ala. Wikipedia, the Free Encyclopedia.

Sewanyana E, AO Onyait, Ogwal J, Mukasa B, Nsamba P and Masaba J (2003). Characteristics of rural chicken in Apac and Kumi district of Uganda. Uganda J. Agric. Sci. 8:159 – 164.

Zein El Dein, Merat P and Bordas A (1984). Competition Corporelle de Poults. (Cou nu) normalement Emplumes Setent le tauz Proteique de la ratio Genet. Sel Vol. 16 (4), 491 – 502