THE FRIZZLING AND NAKED NECK GENES: KEY TO DEVELOPING INDIGENOUS LAYER TYPE CHICKENS IN THE SAVANNA REGION OF NIGERIA

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ABSTRACT
Three indigenous breeds of local chickens were evaluated for egg laying performance in the savanna region of Nigeria. The traits of interest were age at first egg (AFE), body weight at first egg (BWFE) and weight of first egg (WFE). For all the traits evaluated, the crossbred genotypes exhibited significant advantage ($p<0.05$) over their respective straight bred genetic groups. Thus, the introgression of either the frizzling or the naked neck gene into the normal feathered birds resulted in significant improvement in BWFE and WFE in the F_1 over the straight bred fully feathered genotype. It is therefore safe to recommend the usage of frizzled and/or naked neck males in hybrid cross with the fully feathered females in the F_1as a plausible way for developing layer type chickens for the savanna region of Nigeria.
KEYWORDS: Frizzling, naked-neck layer-type, savanna

INTRODUCTION

The native chickens of Nigeria have attracted the attention of researchers in recent times. These birds are found in pockets of small populations dispersed throughout the agro-ecologies of the country where the play important roles of meeting the protein needs of both the rural and urban settlers. Traditionally, they are managed extensively with little or no provision of feed, medication and/or housing. The Guinea savanna of Nigeria poses no serious threat to the survival of these native birds due to the abundance of scavengeable feed resources from cereals and cereal leftovers after harvest. The fully feathered, the frizzle feathered and naked neck are common phenotypes in the guinea savanna region of Nigeria. In terms of relative abundance, the fully feathered phenotype is the most populous and most widely distributed in the savanna agro-ecology of Nigeria. Despite being widely spread, Egahi, *et al*. (2018) reported that the fully feathered birds are more susceptible to the limiting environmental factors that impinge on growth and productivity when compared to the other two phenotypic groups (frizzled and naked neck) in the savanna region of Nigeria. This, the authors attributed to the high plumage density which interferes with the efficiency of heat dissipation under high ambient temperatures characteristic of this agro ecology. In general, these native birds have been rated to be low in productivity in terms of meat and egg output when compared to the exotics. However, Besbes (2009) noted that the genetic improvement of these indigenous breeds, though challenging, is not an impossible task. Egahi *et al*. (2018) reported that outcrossing the fully feathered, frizzle feathered and naked neck birds in the savanna region of Nigeria significantly improved body weight in the out-crossed genotypes. Results of crossbreeding between exotic chickens and exotic x locals for both growth and egg traits have been widely reported elsewhere. However, there is a dearth of information on the result of out-crossing the various phenotypes of the native chickens of Nigeria for age at first egg (AFE), body weight at first egg (BWFE) and weight of first egg (WFE) which are important indices in measuring the productivity of a laying bird. The current study was therefore aimed at bridging this gap by providing baseline information on these important layer birds' evaluation indexes for rural poultry farmers in the savanna region of Nigeria.

MATERIALS AND METHODS

The study was carried out in Makurdi-Nigeria. The coordinates, rainfall pattern, humidity and temperature variations in Makurdi have been reported by Dzungwe, (1991).The experimental birds were F_1 birds generated from the straight bred, normal and reciprocal crosses of the fully feathered, frizzle feathered and naked neck phenotypes. The straight bred, normal and reciprocal crosses were treated as a unit population of native chickens. The resulting F_1 chicks were artificially brooded and reared intensively under deep litter according to their pedigree lines. There was no restriction to water and feed intake throughout the brooding and rearing periods. Conventional poultry management practices and vaccination schedule for layer birds in the agro-ecology were followed. Laying nests were introduced into the pens when the birds attained twenty weeks of age. Daily monitoring of lay was carried out thereafter. Age at egg (AFE), body weight at egg (BWFE) and weight of first egg (WFE) were taken for each pedigreed line.

RESULTS AND DISCUSSION

Age at firs egg (AFE)

Variation amongst the chicken phenotypes for AFE is presented in Table 1. Mean AFE ranged from 161.05 ± 0.72 in fully feathered straight crossed birds to 180.05 ± 1.36 days in straight cross naked neck birds. Looking at the three phenotypic expressions, the best age at point of lay was attained by the fully feathered birds (161.05 ± 0.72) while interse mating naked neck birds significantly increased the AFE over the other two phenotypic expressions. There was no significant difference ($p>0.05$) in AFE between the fully feathered self crossed birds (161.05 ± 0.72) and the fully feathered and naked neck reciprocal crosses (163.90±0.83). Similarly, AFE in the normal crosses between the fully feathered and naked neck birds (166.90±1.91) were not significantly different ($p<0.05$) from that between the fully feathered and frizzled birds (167.05±1.42). Thus, normal and reciprocal crosses involving the fully feathered and naked neck birds (166.90±1.91 and 163.90±0.83 respectively) and normal crosses between fully feathered and frizzled birds had significant ($p<0.05$) advantage in AFE over both the straight bred frizzled (167.60±1.02) and naked neck (180.05±1.36) birds. Consequently, it can there be inferred that the introgression of either the frizzle feathered or naked neck gene into fully feathered birds significantly improved AFE in the crosses over the respective straight bred birds.

Table 1:Variation in age at first egg (AFE) in the straight and crossbred phenotypic groups

♂/♀	♀/♂		
	Fully feathered	Frizzled	Naked neck
Fully feathered	**161.05±0.72[a]**	167.05±1.42[cb]	166.90±1.91[b]
Frizzled	173.60±1.76[d]	**167.60±1.02[c]**	170.95±1.84[d]
Naked neck	163.90±0.83[ab]	172.56±1.36[d]	**180.05±1.36[e]**

Straight bred crosses (self-crossing) – diagonals, Normal crosses - Above the diagonals, Reciprocal crosses - Below the diagonals

Body weight at first egg (BWFE)

The results showing the BWFE is presented in Table 2. Body weight at first egg in the straight bred phenotypic crosses varied significantly ($p<0.05$) with the fully feathered birds having lower BWFE. However, hybrid combinations involving both the fully feathered and frizzle feathered, and the fully feathered and naked neck birds significantly improved the BWFE in the crosses over the straight bred fully feathered birds. In the current study, offsprings from the reciprocal cross between the naked neck and frizzle feathered had a significantly higher BWFE over the respective straight bred phenotypes. The infusion of the frizzling and naked neck genes into the fully feathered. birds gave the crossbreds significant advantage in BWFE over the fully feathered birds. The frizzling and naked neck genes are therefore relevant in improving BWFE in native chickens of the guinea savanna of Nigeria.

Table 2: Variation in body weight at first egg (BWFE) in the straight and crossbred phenotypic groups

♂/♀	♀/♂		
	Fully feathered	Frizzled	Naked neck
Fully feathered	**947.81±6.08[f]**	1093.31±0.25[d]	1165.90±6.16[b]
Frizzled	993.43±8.57[e]	**1163.84±0.19[b]**	1078.79±17.78[d]
Naked neck	1158.47±21.35[c]	1218.33±14.09[a]	**1114.77±0.29[b]**

Straight bred crosses (self crossing) – diagonals, Normal crosses - Above the diagonals, Reciprocal crosses - Below the diagonals

Weight of first egg (WFE)

The mean weight of first egg laid by each phenotypic group is shown in Table 3. Mean egg weight ranged from 28.21 ± 0.47g in the fully feathered phenotype to 31.73 ± 0.19g in the reciprocal cross between the frizzled x naked neck phenotypes. The fully feathered birds had the least (28.21±0.47g) weight of first egg. However, both normal and reciprocal crosses involving the fully feathered and the frizzled and naked neck birds significantly improved the WFE in the crosses over the straight bred fully feathered birds. Females from the reciprocal cross between the frizzled and naked neck birds recorded the highest (31.73 ± 0.19g) mean weight of first egg in the population of Nigerian local chicken studied.

Table 3: Variation in weight of first egg (WFE) in the straight and crossbred phenotypic groups

♂/♀	♀/♂		
	Fully feathered	Frizzled	Naked neck

Fully feathered	**28.21±0.47^{e}**	30.15±0.58^{c}	30.92±0.29^{b}
Frizzled	29.08±0.55^{d}	**30.45±0.25^{b}**	29.99±0.14^{c}
Naked neck	30.42±0.35^{cb}	31.73±0.19^{a}	**30.40±0.27^{cb}**

Straight bred crosses (self crossing) – diagonals, Normal crosses - Above the diagonals, Reciprocal crosses - Below the diagonals

CONCLUSION

It is concluded that the introgression of either the frizzling or the naked neck gene into the normal feathered birds resulted in significant improvement in BWFE and WFE in the F_1.Consequently, it is recommended that the frizzled and/or naked neck males be used in hybrid cross with the fully feathered females and the F_1 be selected for development into egg type chickens for the savanna region of Nigeria.

REFERENCES

Besbes B. (2009). Genotype evaluation and breeding of poultry for performance under suboptimalvillage conditions. *World's Poultry Science Journal,*Vol. 65,

Dzungwe, T.A. (1991). The search for a viable Benue State. Benue State Gazette. pp.13-13.

Egahi, J. O., Momoh, O. M. and Abang, F. B. P. (2018): Heterosis for hatch weight and body weight gain in outcrossed native chickens of Nigeria under savanna. *Nig. J.Anim.Prod.*, 45(2): 16-20