

Effect of Naked Neck Gene on Egg and Body Weight of Chickens on Free Range in Selected Nigerian Local Chicken Populations

Gwaza¹, D.S. And Nachi², E.D

*1*Department of Animal breeding and Physiology, University of Agriculture, Makurdi, Nigeria.

2 Department of Animal Production, University of Agriculture, Makurdi, Nigeria.

Abstract: *The study was conducted in four districts,(Township, Ikyurav-itiev, Tongov and Shitile) of Katsina-Ala local government area of Benue State, Nigeria. Data was collected on 1,867 naked neck birds. Parameters measured were frequency of the naked neck gene and body weight of laying , brooding , idle and incubating hens, cock, chicks, growers and weight of eggs. The data were subjected to descriptive statistics to estimates the means, variance and coefficient of variation as well as the frequency of the naked neck genes in the population. The frequency of the naked neck gene was low 10.1% indicating low scope of utilization of the naked neck gene at the rural level .The naked neck gene had significant effect on body weight of naked neck genotypes but expresses itself differently at different stages of the growth phase. The gene had the potential to influence egg size, however, common maternal effects like age and body weight at point of lay may limit this potential leading to low egg weight and consequently lower chick weight. Age and body weight at point of lay may be used to select superior naked neck birds in order to improve egg weight, hatch weight and subsequently growth rate.*

Keywords: *Body weight, genes and naked neck.*

I. Introduction

Certain major genes have been found to be relevant to the local ecotypes in their tropical production environment which is characterized by stress factor (Mathur and Horst 1990). The feather distribution gene (naked neck) is among the major genes of Nigerian local chicken. The naked neck genes are economically important in modern breeding system and for future use especially in the phase of the global climate change. These genes cause a reduction in tropical heat stress by improving body surface area for body heat convection. This results in improved feed intake, feed conversion efficiency and performance. Horst (1989) observed that the naked neck gene confers superiority in some production characters in the tropics.

Alvarez et al. (2002) reported that the homozygous and heterozygous naked neck had better growth rate than normal feathers under high ambient temperatures. In summer, Galal and Fathi. (2001) observed that the heterozygous naked neck were significantly heavier by about 18.5% compared to normal feathering on body weight gain in Egypt. Egg number, mass and weight were superior on birds with naked neck genes (Marthur and Horst 1990). Ibe (1993) noted that naked neck genes were associated with earlier sexual maturity in a tropical environment. Literature had stressed the advantage of the naked neck gene over the normal feathering under heat stress. The naked neck genotype had been identified as the most productive and adapted chicken for tropical environment. There is however needs to exploit the genetic diversity within the naked neck indigenous breeds so that productivity, including fitness and adaptation can be maximized without adversely affecting the environment while, at the same time maintaining the diversity for use in the unknown future.

Genetic uniqueness and diversity of indigenous breeds are found among the rural farming communities, breeding programs design for improving indigenous breeds must be integrated with the rural farming community and it success dictated strictly by the scope of rural farmer participation.

It is in view of the above that this work was designed to investigate the effect of the naked neck gene on egg and body weight of birds under the traditional free range management system.

The objectives of the study were to assess if there exist significant variation in body weight between individual birds within the naked genotype.

To assess the scope of rural farmer participation in the use of the naked neck genes by the rural farming communities.

II. Materials And Methods

Location

The study was conducted in four districts, Township, Tongov, Ikyurav-itiev 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° and 7° degree North and

longitude 9° and 10° 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°c to 38°c.

Animal Management:

Naked neck local 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.

Data Collection:

About Forty household were selected randomly in each district. The birds in each household were captured and their gene type identified and recorded. The weight of the birds were also taken using a 1kg weighing balance. A 500 gram weighing balance was used to weigh the chicks and growers. The body weights of the birds were partitioned into sex, physiological status, growers and chicks respectively.

Data Analysis

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

III. Results

Frequency and scope of farmer participation

The frequency of occurrence of the naked neck gene was 10.1 percent compared to 89.9 percent of the normal feathered chicken. The scope of utilization of the naked neck gene by the rural farming communities was very low.

Effect of naked neck gene on weight of flock components

There were no significant ($P>0.05$) difference in the body weight of idle hens and laying hens due to effect of naked neck genes (1.236 ± 0.035 and 1.303 ± 0.044) respectively. The weight of incubating hens 1.185 ± 0.079 however significantly ($P<0.05$) differed from that of idle and laying hens. There was significantly ($P<0.05$) effect of sex on body weight of the naked neck genotype. The cocks weighed significantly ($P<0.05$) heavier (1.615 ± 0.069) than the idle, laying and incubating hens (Table 1). The weight of brooding hens did not vary significantly ($P>0.05$) from those of idle and laying hens. Weight of growers and chicks were 0.0545 ± 0.033 and 0.083 ± 0.013 respectively (Table 1). The egg weight due to the effects of naked neck genes was 0.040 ± 0.006 .

Variation in body weight within naked neck genotype

The variance in body weight for all the flock components were very low; and below 1. The standard errors of the means for all the flock components were also very low (Table 1). The coefficient of variation was equally low. High coefficient of variation values were recorded for weight of chicks (73.2%) and weight of growers (33.37%). Weight of brooding hens and cocks also recorded 22.24 and 21.38 percent coefficient of variation. Weight of laying hens and incubating hen were less varied (8.32 and 13.32 percent) respectively. While the coefficient of variation for idle hens was 21.12 percent (Table 1).

Variation in egg weight due to naked neck gene

Even through the standard error and variance for egg weight were low, the coefficient of variation for egg weight was high 45.07 percent (Table 1).

Table 1: Effect of naked neck gene on egg and body weight of flock components.

Flock components	Mean	Variance	Coe var.
Weight of idle hens(kg)	$1.236^a\pm 0.035$	0.068	21.12
Weight of laying hens(kg)	$1.303^a\pm 0.044$	0.012	8.32
Weight of incubating hens(kg)	$1.185^b\pm 0.079$	0.025	13.32
Weight of cocks(kg)	$1.615^c\pm 0.069$	0.119	21.38
Weight of eggs(gms)	0.040 ± 0.006	0.003	45.07
Weight of growers(gms)	0.545 ± 0.033	0.033	33.37
Weight of brooding hen(kg)	$1.257^c\pm 0.011$	0.078	22.24
Weight of chicks(gms)	$0.083^c\pm 0.013$	0.004	73.22

A, b, c figures with different super scripts down the groups are significantly ($P<0.05$) different. Coe var. = coefficient of variation.

IV. Discussion

Frequency: the low frequency of the naked neck genes in the populations indicated the low scope of rural farmer participation in the utilization of the naked neck gene. This may be due to waning interest of the farmers in the naked neck. It is also unlikely that most rural farmers are aware of the superiority of the naked neck gene under heat stress, hence the reduce scope of rural farmer participation.

Effect of naked neck gene on body weight

The significant effect of sexual dimorphism of the naked neck genotype, where male birds were significantly higher in body weight than their female counterparts may be due to higher vigor of the males, their aggressiveness in feeding and differential hormonal profile.

Within the female naked neck hens the non significant effect of the naked neck gene on body weight of idle and laying hens was due to the same physiological state of the birds. The idle hen may just like the laying hen be in a preparatory state to go into lay and have built body reserve like the birds inlay. The brooding hen coming out of incubation will become aggressive in feeding in order to replenish lost energy. This aggression may increase feed intake and body weight as observed in the study. This may indicate genetic uniqueness of the naked neck gene in this trait with less variability.

The significant lower body weight of incubating hens as observed compared to body weight of laying and idle hens was also due to the physiological condition of incubation. At incubation, the birds limits its movement, search for feed sources and feed intakes are glossily restricted. The bird utilizes its body reserves for body maintenance and other physiological activities, and may run out occasionally to feed as a supplement for the body reserve which forms the basic energy source, hence the lower body weight observed.

Effect of naked neck gene on body weight of chicks

The weight of chicks and growers observed here are in-line with previous reports. It is however expected that, the weight of the naked neck chick will have a positive correlation with the body weight and size of the naked neck hens.

Effect naked neck gene on weight of eggs

The values reported here are:

It had been reported that the naked neck gene had positive effects on egg number per clutch, egg size and rate of lay parameters which determine egg weight. Selecting heavier birds within the naked neck line may improve egg weight and rate of lay.

Variation in body weight between birds

The low variance and coefficient of variation indicated less variability in body weight of the flock components. This may implied the uniqueness of the naked neck gene, its covariance with the environment, high environmental tolerance and less variability in expressing its potentials in this trait.

The high coefficient of variation for weight of chicks 73.2 and 33.32 percent for weight of growers were understandable. The naked neck gene had been reported to affect body weight (Deep and cahaner, 2001) and egg size (Galal, 2003). Chicks weights were expected to vary due to the extent of egg size, egg weight, the influence of the additive genetic effect on body weight gain at successive ages and environmental variance. Ohagenyi et al. (2011) also reported similar observation. The high coefficient of variation for body weight of growers was also expected. This was because various genes expressed themselves differently at different ages of the chicken's growth as reported earlier by Adeleke et al. (2011) and Ohagenyi et al. (2011).

Variation in egg weight between birds

The high coefficient of variation observed on egg weight may have been influenced by differences in the ages and body weight of hens that laid the eggs. Pullets coming into lay will lay eggs of lower weight compare to hens that had lays for two or more successive times. Thus the high coefficient of variation observed here were due to common non genetic factors affecting egg size and weight. Thus paying attention to age and body weight of the naked neck chicken at point of lay will improve egg weight.

V. Conclusion And Recommendation

Conclusion: Scope of participation in utilization of the naked neck gene by the rural farmer communities was low, even though the gene had significant effect on body weight under the traditional production system. The naked neck gene while enhancing body weight expresses itself differently at different ages in the growth phase of the chicken. Non genetic maternal factors like age and body weight of the hen at point of lay will limit the expression of the naked neck gene on egg size; and lower hatch weight.

Recommendations: There is need for extension workers to enlighten rural farmers on the potentials of the naked neck bird to increase the scope of rural farmer participation.

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