



THE NIGERIAN LOCAL CHICKEN HORMONAL FUNCTIONAL STATUS AS INFLUENCED BY AGE AND SEX FACTORS

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Abstract

A study was conducted to investigate the effect of age and sex on the hormonal status of the Nigerian Local Chicken raised in the Teaching and Research Farm of the Rivers State University Nkpolu-Oroworukwo, Port Harcourt. A total of forty (40) heterogeneous population of the Nigerian Local Chickens were used in a Completely Randomized Block Design (CRBD). Blood samples were collected from 10 males and 10 females from two different age groups (21 and 72 weeks). Hormonal assay was conducted to ascertain the values of some growth and reproductive hormones. These includes; thyroxin (T4), Triiodothyroxine (T3), Thyroid stimulating hormone (TSH). Prolactin (PRL), testosterone (TET), estrogen (E), luteinizing hormone (LH), follicle stimulating hormone (FSH) and progesterone (PROG). PRL, FSH, PROG and TET were significantly ($p < 0.05$) affected by age while others were not significant ($p < 0.05$). Prolactin had higher value for birds under the ages of 21 weeks than 72 weeks of age with a corresponding value of 28.35ng/ml and 8.64ng/ml respectively. Sex effect on hormones shown that, all hormones studied were significant except Tri-iodothyronine (T3). Testosterone as observed in this study was also influenced by age. Male birds unlike their female counterparts, 72 weeks of age recorded higher means value of 4.14 ± 0.52 than those of 21 weeks of age (1.11 ± 0.07). Therefore, the study was able to demonstrate the influence of age and sex on the status of hormones, particularly of those studied as present in the Nigerian Local Chicken investigated.

Keywords: *Local chicken, age, sex, growth hormones, reproductive hormons*

Introduction

Domestic fowl was found to have originated from the wild ancestor of jungle fowl *Gallus domesticus* from the Southeastern Asia around year (2000-3000 BC). During this period, four species of jungle fowl are found which includes red jungle fowl (*Gallus gallus*), Ceylonese Jungle fowl (*Gallus lafayetti*), gray jungle fowl (*Gallus sonnerati*) and the black or green jungle fowl (*Gallus varius*), and they are still in existence (Atteh, 2004). Adeleke *et al.*, 2011 reported that, the Nigerian local chicken is characterized phenotypically using their body structure (naked neck) plumage color (black, white etc.) and feathering pattern (normal, and frizzle feather). The Nigerian local chicken often possesses single comb and are usually self-reliant and capable of withstanding harsh environmental condition, minimal management and inadequate nutrition. They live largely on weed seeds, insects and feeds that would otherwise be a waste (Vetmeyer, 1991, Apuno and Ibrahim 2011). Also, the local male chicken (cockerels and cocks) are bigger in size than the hens (Ajayi and Agaviezor, 2009). The Nigerian local chicken is one of the major sources of protein to the Nigerian people even though it has been reported to be small in size and grows slowly but possesses good potential for egg and meat production (Omeje, 1983; 1985, Ogbonna *et al.*, 2002). Sex, age, nutrition, housing, stress and other environmental factors have been identified as factors culpable of affect the hematological and biochemical parameter of animal (Balikei, 2007, Peters *et al.*, 2011). However, the status of hormone and its effect and functionality on the performance and reproductive indices of the Nigerian local chicken in relationship with its exotic counterpart is still not detailed. Therefore, this study was aimed at investigating the



hormonal status of the local chicken with a view of establishing its functionality with growth and reproduction.

Materials and Methods

This study was carried out at the Poultry Breeding Unit of Teaching and Research Farm of the Department of Animal Science, Rivers State University, Nkpolu-Oroworukwo, Port Harcourt. Port Harcourt lies between latitude 7°00" and 7°53"N and longitude of 4°35" and 4°51" (Uko and Tamunoberwton-Ari, 2013). A total of forty heterogeneous Nigerian local chickens were used for the experiment, comprising of ten male and ten female each from two different treatment age groups of twenty-one (21) weeks of age and seventy-two (72) weeks of age. The birds were raised in the Poultry Breeding Unit of the Department of Animal Science under intensive system where feeding rations were provided from commercial dealer and both the feed as well as water were given *ad libitum*. Blood samples were collected from 10 males and 10 females each from age groups of twenty-one (21) weeks and seventy-two (72) weeks of age. Blood collected was harvested into heparinized plastic tubes and the tubes were labeled accordingly. Hormones assay was done for thyroxin (T4), triiodothyroxine (T3), thyroid stimulating hormone (TSH), prolactin (PRL). Others include; testosterone (TET), estrogen (E), luteinizing hormone (LH), follicle stimulating hormone (FSH), progesterone (PROG). These were determined by enzyme immunoassay method, using commercial kits Stratus (DADE International Incorporation in immune fluorescence apparatus BAXTER STRATUS II). The experiment was a complete randomized block design (CRBD) in a 2x2 factorial arrangement. All data obtained were subjected to Analysis of variance (ANOVA), using the multivariate analysis in General Linear Models (GLM) of SPSS version 18. 2002

Results and Discussion

The hormone values of the Nigerian Local Chicken as affected by age are presents in Table 1. The result showed that tri-iodothyronine (T3), thyroxin (T4), thyroid stimulating hormone (TSH) were not statistically significantly ($p>0.05$). Among the hormones studied, only prolactin (PRL) and follicle stimulating hormone (FSH) that were statistically significant ($p<0.05$). It was noted that prolactin value was higher for birds under the ages of 21 weeks of age than 72 weeks of age birds with corresponding values of 28.35 and 8.64 respectively. Also, the same trend was noticed for FST, 21 weeks of age birds had higher values than 72 weeks of age birds, with corresponding values of 15.09 and 8.51 respectively. Results from this study replicate the possible impact of age as a factor on the survival and general performance of the Nigerian local chicken especially its reproductive capacities. This study confirms with earlier investigation by Hall *et al.* (1985) on the normal range of prolactin hormones (10-40ng/ml).

Table 1. Least square means \pm SEM for hormones as affected by Age in the Nigerian local Chicken

PARAMETERS (nmol/l)	AGE		\pm SEM	SL
	21 weeks	72 weeks		
Tri-iodothyronine (T3)	0.56	0.64	0.04	NS
Thyroxin (T4)	1.11	1.15	0.02	NS
Thyroid Stimulating Hormone TSH)	18.08	16.13	2.62	NS
Prolactin (PRL)	28.35 ^a	8.64 ^b	6.38	*
Follicle Stimulating Hormone FSH)	15.09 ^a	8.51 ^b	0.97	***
Luteinizing Hormone (LH)	17.12	18.01	4.54	NS

Means in the row having different superscript are significantly different ($p<0.05$) NS = Non-significant; * $P<0.05$; *** $P<0.001$

The hormone values of the Nigerian Local Chicken as affected by sex as presents in Table 2 revealed that, all hormones studied were significant ($p<0.05$) except for tri-iodothyronine (T3). From the means analyses table, thyroxin (T4) was observed to be significant ($p<0.05$) whereas prolactin (PRL) was highly significant ($p<0.01$). Very highly significant ($p<0.001$) was observed for thyroid stimulating hormone (TSH), follicle stimulating hormone (FSH) and luteinizing hormone. The result also recorded male birds having higher values than their female as showed in the table below. The categories of hormones studied (growth and reproductive hormones), male birds which were steadfastly noticed with higher values across the hormones studied, speaks no doubt about the possibly gender factors attributed



to governing differential physiological activities and status in higher animals. This result agreed with several authors reports on haematological indices and assay of the indigenous local chicken Chineke *et al.*, (2006), and Adass *et al.*, (2012). Kral and Suchy (2004), attributed male's higher values to gonadal and spermatogenetic development which occur during the period of sexual maturation and at the onset of reproductive activity in breeder cocks.

Table 2. Least square means for hormones as affected by Sex in the Nigerian local chicken associated by both male and female

Parameters	SEX		±SEM	SL
	MALE	FEMALE		
Tri-iodothyronine (T3)	0.65	0.542	0.04	NS
Thyroxin (T4)	1.17 ^a	1.09 ^b	0.02	*
Thyroid Stimulating Hormone (TSH)	25.3 ^a	8.89 ^b	2.62	***
Prolactin (PRL)	30.48 ^a	6.50 ^b	6.38	**
Follicle Stimulating Hormone (FSH)	17.06 ^a	6.55 ^b	0.97	***
Luteinizing Hormone	32.82 ^a	2.32 ^b	4.54	***

Means in the column having different superscript are significantly different (p<0.05)

NS = Non-significant; *P <0.05; **P<0.01

The results of effect of age on the female sex hormone values of the Nigerian local chicken as presented on table 3. revealed that, progesterone was highly significant (p<0.01). Progesterone value was noted to be higher (0.34) in 21 weeks of age birds than those of 72 weeks of age (0.29). Estrogen, though the values were noted to be higher with birds of 72 weeks than those of 21 weeks of age but statistically not significant (p>0.05). The results of effect of age on the male sex hormone (testosterone) value of the Nigerian Local Chicken presented also in table 3. revealed that, testosterone was very highly significant (p<0.001). Male birds of 72 weeks recorded higher means value of 4.14 ± 0.52 than those of 21 weeks of age (1.11 ± 0.07). The effects of age on female reproductive hormone (progesterone and oestrogen) has also established that, birds of the early age (21week of age) expresses greater values than those of 72 weeks of age for progesterone hormones in the Nigerian Local chickens as observed. The result was in tandem with other authors (Onagbesan *et al.*, 1999; Onagbesan *et al.*, 2006; Tonderai *et al.*, 2018). These authors noted that, birds that are attaining puberty and early stage of sexual maturity tend to have high reproductive hormones following the onset of follicular development and laying period, older bird on the other hand, hormone production decreases following reduced reproductive activities.

Table 3. Least square means ± SEM for Female hormones as affected by Age in the Nigerian indigenous chicken

Parameters	AGE		SL
	21 Weeks of age	72 weeks of age	
PROG	0.34 ± 0.01 ^a	0.29 ± 0.01 ^b	**
Estrogen	33.44 ± 4.30	49.86 ± 8.22	SN
Testosterone	1.11 ± 0.07 ^b	4.14 ± 0.52 ^a	***

Means in the column having different superscript are significantly different (p<0.05)

NS = Non-significant; **P<0.01

Conclusion and Recommendations

From this investigation, it can be concluded that the production potential of domestic fowl is controlled by several parameters, including those related to their reproductive potential. Production of table and hatching eggs is crucial for poultry producers. The process in which egg number and egg components are formed, the rate of lay, egg fertility and hatchability are dependent on a multitude of synchronized metabolic and physiological processes. The study therefore was able to demonstrate the influence of



age and sex on the status of hormones particularly those studied in the Nigerian Local Chicken investigated. However, more hormonal research should be conducted in wider scope, probably in the molecular architectural levels.

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