

CORRELATIONS AMONG FERTILITY AND HATCHABILITY OF LOCAL CHICKEN GENOTYPES IN THE HUMID TROPICAL ENVIRONMENT

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ABSTRACT

A study was conducted to determine the effect of genotype on fertility and hatchability of local chicken in the humid tropical environment. The genotypes were Frizzle, Naked neck and Normal feathered local chickens. A total of ninety-nine (99) adult local chickens were selected for the experiment comprising of three genotypes with a total number of (90) hens, and (9) cocks (33 Frizzle, 33 Naked neck and 33 Normal feathered). The experiment was divided into 3 treatments; a genotypic group was treatment and was replicated three times with 11 birds per replicate. The mating procedure was random mating. The following were the mating system: Frizzle x Frizzle (F x F), Naked neck x Naked neck (Na x Na) and Normal feathered x Normal feathered (Nf x Nf). The hatching eggs were collected twice a day for eight (8) weeks and marked with indelible pen for proper identification. The fertility and hatchability of egg traits studied were: Average egg weight, Fertility, Hatchability on fertile eggs, Hatchability on set eggs, Dead in germ, Dead in shell, Normal chicks, Abnormal chicks, chicks weight. The relationships among the hatchability traits were determined using Pearson's product-moment correlation coefficient (r). Correlations between AEWT and CWT and between DIG and DIS were positive and significant ($p < 0.05$). There was negative and significant ($p < 0.01$) correlation between normal chicks and abnormal normal frizzle feathered local chicks respectively. Correlations between AEWT and CWT was positive and significant ($p < 0.05$). There were negative and significant ($p < 0.05$) and ($p < 0.01$) correlations between dead in shell and Dead in germ, and between Normal chicks and abnormal normal feathered respectively. This study shows that naked neck is an important variety of local chicken with excellent fertility and hatchability traits. The present findings could assist in the design of long-term genetic improvement programme for local chicken production in Nigeria.

Key words: local chicken, genotype, fertility, hatchability.

Introduction

The domestic chicken (*Gallus domesticus*) is one of the species of poultry which has assumed worldwide importance (Smith, 1990). Indigenous chickens in Africa are in general hardy, adaptive to rural environments (Ikeobi, 2003) and survive on little or no inputs and adjust to fluctuations in feed availability. Currently, total poultry population in Nigeria is estimated to be about 172 million out of which chicken is estimated at 160 million, guinea fowl (8.3 million), ducks (1.7 million) and local turkeys (1.05 million) (FAOSTAT, 2011). They are self reliant and hardy birds with the capacity to withstand harsh weather condition and adaptation to adverse environment. Their outputs (egg and meat) are readily available to villagers and people in urban semi urban areas thus serves as a good source of protein in their diet, in the same vein, they serve as good source of income. Nonetheless, through selection, the domestic chicken has continued to evolve, resulting in individuals of diverse strains, varieties and genotypes. In spite of all these attributes, local chickens have poor growth performance, low egg and low egg fertility. According to Ibe (1993), naked neck and the frizzed genes are associated with earlier sexual maturity in a tropical environment. Fertile eggs

from indigenous chickens in Nigeria are comparable in fertility and hatchability with indigenous chickens from other regions of the world under local conditions. The reproduction rates of local chicken are considerably low than those of the commercial chicken. This is a problem in commercial or large scale production. Most traits in farm animals are found to relate with one another such that the improvement of one may lead to the improvement or otherwise of the other (Nosike, *et al.*, 2013). Also, the fertility and hatchability of local chicken and their associated traits have not been vigorously established. The exploitation of indigenous poultry genetic resources for improving economic traits such as reproductive performance, fertility and hatchability amongst others is one of the most important breeding goals.

The objective of this study was to determine the relationship among fertility and hatchability of the three local chicken genotypes.

Materials and Methods

The study was conducted at the Poultry Unit of the Teaching and Research Farm of the Michael Okpara University of Agriculture, Umudike, Abia State. Ninety-nine (99) adult local chickens were

selected for the experiment comprising of three genotypes with a total number of (90) hens, and (9) cocks (33 Frizzle, 33 Naked neck and 33 Normal feathered). The experiment was divided into 3 treatments; a genotypic group was treatment and was replicated three times with 11 birds per replicate. The birds were housed in pen, open-sided concrete house and covered with wood shaving as a litter material. The birds were exposed to natural day light of 12 hours/day. All the birds were fed *ad libitum* on commercial feed. The birds were also provided with fresh water on daily basis. The experiment would last for ten (10) weeks with 2 weeks of adaptation period. The mating procedure was random mating. The following were the mating system: Frizzle x Frizzle (F x F), Naked neck x Naked neck (Na x Na) and Normal feathered x Normal feathered (Nf x Nf). The mating ratio to use was 1 male to 10 females, i.e. 1:10 in each replicate per genotype. The hatching eggs were collected twice a day for eight (8) weeks and marked with indelible pen for proper identification. Eggs were stored at a temperature of 17°C and 75% relative humidity with large end up in batches and be taken to a modern hatchery for production of chicks.

Parameters measured includes: Average Egg Weight (g), Fertility (%), Hatchability on fertile eggs (%), Dead in germ (%), Dead in shell (%), Normal chicks (%), Abnormal chicks (%) and Chick Weight (%).

Correlations among the traits for the different

genotype was used to determined using Pearson's Product-Moment Correlation Coefficient (r) using SPSS, (2011).

Results and discussion

Correlations between AEWT and CWT was positive and significant ($p < 0.05$), which implies that increase average egg weight will lead to increase in naked neck chicks weight. There were negative and significant ($p < 0.05$) and ($p < 0.01$) correlations between Hatchability on fertile eggs and Dead in germ, and between Normal chicks and abnormal naked neck chicks respectively. These correlations are given in Table 1.

The non-significant correlations between Fertility and Hatchability on set eggs and all other parameters imply that increase in any the FER and HSE will not lead to significant increase decrease in any other egg hatching traits.

Table 3 showed that correlations between AEWT and CWT was positive and significant ($p < 0.05$), which implies that increase average egg weight will lead to increase chicks weight and in normal feathered local chicken. There were negative and significant ($p < 0.05$) and ($p < 0.01$) correlations between dead in shell and Dead in germ, and between Normal chicks and abnormal normal feathered chicks respectively. All other correlations were non-significant and may not lead to significant increase decrease in any other egg hatching traits. This result is similar to the report that egg weight correlate strongly with other traits (Ayorinde *et al.*, 1988).

Table 1: Phenotypic Correlations of Egg Hatching Traits in Naked neck local chicken

PARAMETERS	AEWT	FER	HFE	HSE	DIG	DIS	NC	AC	CWT
AEWT	1								
FER	-0.63	1							
HFE	-0.19	0.11 ^{NS}	1						
HSE	-0.47	0.52 ^{NS}	0.90	1					
DIG	0.19	-0.12 ^{NS}	-0.88*	-0.65 ^{NS}	1				
DIS	-0.58	-0.68 ^{NS}	-0.21	-0.57 ^{NS}	0.98*	1			
NC	-0.41	-0.23 ^{NS}	0.30	0.42 ^{NS}	0.06	0.54	1		
AC	-0.65	0.58 ^{NS}	0.53	0.45 ^{NS}	-0.23	-0.38	-1.00**	1	
CWT	0.60*	-0.54 ^{NS}	0.62	-0.53 ^{NS}	-0.31	-0.64	-0.67	-0.34	1

NS = Not Significant

*Correlation is significant ($p < 0.05$)

** Correlation is significant ($p < 0.01$)

*AEWT = Average egg weight, FER = Fertility, HFE = Hatchability on fertile eggs, HSE = Hatchability on set eggs, DIG = Dead in germ, DIS = Dead in shell, NC = Normal chicks, AC = Abnormal chicks, CWT = Chicks weight.

Table 2: Phenotypic Correlations of Egg Hatching Traits in Frizzle feathered local chicken

PARAMETERS	AEWT	FER	HFE	HSE	DIG	DIS	NC	AC	CWT
AEWT	1								
FER	-0.67	1							
HFE	-0.25	0.54	1						
HSE	-0.57	0.32	0.81	1					
DIG	0.43	-0.24	-0.55	-0.65	1				
DIS	-0.32	-0.45	-0.52	-0.48	0.92*	1			
NC	-0.53	-0.11	0.32	0.25	0.14	0.32	1		
AC	-0.68	0.53	0.41	0.51	-0.32	-0.56	-0.99**	1	
CWT	0.75*	-0.68	0.71	-0.67	-0.41	-0.63	-0.53	-0.47	1

NS = Not Significant

*Correlation is significant ($p < 0.05$)

Correlation is significant ($p < 0.01$)

*Meaning of abbreviations is as in Table 1.

There was negative and significant ($p < 0.01$) correlation between normal chicks and abnormal normal frizzle feathered local chicks respectively. These correlations are given in Table 2. Also correlation between DIG and DIS was significant ($p < 0.05$). All other correlations were non-significant and not lead to significant increase decrease in any other egg hatching traits.

Table 3: Phenotypic Correlations of Egg Hatching Traits in Normal feathered local chicken

PARAMETERS	AEWT	FER	HFE	HSE	DIG	DIS	NC	AC	CWT
AEWT	1								
FER	-0.72	1							
HFE	-0.32	0.20	1						
HSE	-0.65	0.45	0.92	1					
DIG	0.24	-0.34	-0.65*	-0.65	1				
DIS	-0.43	-0.43	-0.32	-0.48	0.92*	1			
NC	-0.53	-0.62	0.21	0.52	0.08	0.48	1		
AC	-0.62	0.49	0.32	0.56	-0.31	-0.49	-1.00**	1	
CWT	0.63*	-0.34	0.50	-0.43	-0.28	-0.68	-0.67	-0.42	1

NS = Not Significant

*Correlation is significant ($p < 0.05$)

** Correlation is significant ($p < 0.01$)

*Meaning of abbreviations is as in Table 1.

conclusion

The study has shown that phenotypic correlation between the AEWt and CWT was positive and significant ($p < 0.05$), which implies that increase average egg weight will lead to increase in naked neck chicks weight. between AEWt and CWT and between DIG and DIS were positive and significant ($p < 0.05$), which implies that increase average egg weight and dead in germ will lead to increase chicks weight and dead in shell respectively in normal feathered local chicken. Also there was negative and significant correlation between normal chicks and abnormal normal frizzle feathered local chicks respectively. However, there were negative and significant and correlations between Hatchability on fertile eggs and Dead in germ, and between Normal chicks and abnormal naked neck chicks respectively. However, a meaningful indirect selection can be achieved by improving the fertility and hatchability of local chickens due to significant

correlation established between the two. It is recommended that, any local chicken variety with high average egg weight should be selected for heavy chick weight.

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