

The Use of Egg Length, Diameter and Index as Selection Method for Improvement of Hatched Weight of the Fulani and Tiv Local Chickens of Nigeria

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ABSTRACT--- Egg length, diameter and index were measured on 800 eggs comprising 360 eggs of the Fulani hens and 440 eggs of the Tiv hens ecotype at Akpehe Poultry farm, Makurdi. The birds were housed singly in pens reared on deep litter and hand-mated. The birds were fed a 17% crude protein diet, vaccinated against prevalent diseases and routinely de-wormed. Eggs were collected in the morning and evening from individual pens and marked. Egg length and diameter were measured using a vernier caliper and weighed with a digital weighing balance. Egg index was calculated as a ratio of the length to the diameter. The data were subjected to regression and correlation analyses. The egg length, diameter and weight of the Tiv ecotype were significantly ($p < 0.05$) higher than that of the Fulani. While egg index of the Fulani hens was significantly higher than that of the Tiv hens. There were strong positive correlation between egg length, diameter and egg weight and hatched weights. Egg index was negatively correlated with egg weight, hatched weight and egg diameter. Thus, egg length and diameter could be used to select for egg weight; and hence hatched weight.

Keywords--- Correlation, Correlated-response, Egg-diameter, Egg-index, Egg-length, hatch-weight, selection.

1. INTRODUCTION

All over developing countries, the traditional sub-sector of poultry production has been practiced by local communities including all ethnic groups for many generations and this is likely to continue into the unforeseeable future (Gueye, 2005). The traditional poultry sub-sector consists of native indigenous chickens which have not been classified into breeds, although there are many ecotypes (Nthino, 2004) and is confined to rural areas, villages and peri-urban settlements where free ranging can be practiced. In Nigeria, the native chickens constitute about 80% of the 120 million birds in the country which are kept under traditional family based production system (Gueye, 2005). They contribute substantially to annual egg and meat production (up to 90%) for family consumption and for sale (Nwakpu *et al.*, 1999, Fayeeye *et al.*, 2005 and Gueye, 2005).

The indigenous chickens are also closely linked to the social and cultural lives of many communities in Nigeria. Their ownership in rural communities ensures varying degrees of sustainable farming and economic stability by minimizing risk (Schvannyana *et al.*, 2001)

Thus, the traditional sub-sector of poultry production can alleviate poverty, ensure food security, generate productive employment and promote the well being of the human population of developing countries (Gueye, 2003).

Also, the traditional village sub-sector of poultry production based on scavenging indigenous domestic fowl (*Gallus domesticus*) remain predominant in Nigeria and African villages despite the introduction of exotic and cross bred types (Adedokun and Sonaiya, 2001).

This sub-sector is very important for the livelihood of most developing nations as it is mainly found in rural areas where over 80% of the nation's population resides and is the major source of readily available protein as well as source of income (Sonaiya, 1997 and Mbuga, 1990).

Unfortunately, the huge potential of the traditional sub-sector has not been realized. Very limited information on these populations exists on correlation among egg traits and performance traits. Information on correlation among egg traits and performance would go a long way in enhancing selection at the rural level to exploit correlated response to selection. This conscious selection can accelerate rate of genetic gain and performance of the rural chickens. The aim of this study is to estimate the level of correlation between egg weight, length, diameter and index on Hatched weight and weight at week I.

2. MATERIALS AND METHOD

Data was obtained from the Fulani and the Tiv ecotypes in Akpehe poultry farm; Makurdi. Makurdi lies between Latitude 76° 44' N and Longitude 8° 54' E. seasonal variation, temperature and rainfall pattern has been reported by Agbidye *et al.* (2004). The birds were reared singly on deep litter, vaccinated against prevalent diseases and routinely dewormed.

They were fed 17% crude protein diet and hand-mated. Eggs were collected in the morning and evening from individual hens and marked. Egg length and diameter were measured using a vernier caliper and weighed with a digital weighing balance. Egg index was calculated as a ratio of the length to the diameter.

This set of data was subjected to regression and correlation analyses.

3. RESULTS

Table I: Mean \pm SE values of Egg weight, Length, Diameter, Index and Hatched and weight at week I of Fulani and the Tiv Ecotype chicken.

Parameters	Ecotype	
	Fulani	Tiv
Egg Weight (gm)	35.11 ^a \pm 3.95	39.3 ^b \pm 2.71
Egg Length (cm)	5.10 ^a \pm 0.45	5.69 ^b \pm 0.45
Egg Diameter (cm)	3.80 ^a \pm 0.41	4.40 ^b \pm 0.49
Index (No)	1.35 ^a \pm 0.09	1.30 ^b \pm 0.07
Hatched Weight (gm)	22.34 ^a \pm 2.10	27.38 ^b \pm 2.18
Weight at Week I (gm)	35.6 ^a \pm 5.09	39.57 ^a \pm 4.06

a, b = Figures with different superscripts across the group are significantly different at $P > 0.05$.

There were significant ($P > 0.05$) differences in the mean values for all the parameters between the ecotypes.

Table II: The correlation between egg weight, length, diameter and index of the Fulani and the Tiv Ecotype chickens.

Parameters	Ecotype	
	Fulani	Tiv
Egg Weight and Egg Length	0.846	0.867
Egg Weight and Egg Diameter	0.630	0.206
Egg Index and Egg Length	0.305	0.955
Egg Index and Egg Diameter	-0.977	-0.397

Table III: Correlation between egg weight, hatched weight, and weight at week I, egg index, hatched and weight at week I of the Fulani and the Tiv Ecotype chickens.

Parameters	Ecotype	
	Fulani Ecotype	Tiv Ecotype
Correlation between		
Egg Weight and hatch weight	0.968	0.924
Egg Weight and weight at week I	0.930	0.947
Egg Index and hatched weight	-0.133	-0.628
Egg Index and hatched weight at week I	-0.054	-0.333

There were strong positive correlation between egg weight and egg length, egg weight and egg diameter, egg index and egg length, while egg index was negatively correlated to egg diameter (Table II).

There were strong positive correlation between egg weight and hatched weight, egg weight and weight at week I (Table III). There was also a positive correlation though low between egg index and hatched weight (Table III).

Egg index and weight at week I a weak but positive correlation in the Fulani ecotype and negative correlation among the Tiv ecotype (Table III).

4. DISCUSSION

Variation in external egg characteristics of ecotypes; The significant ($P > 0.05$) different egg weight between the ecotypes could be attributed to genetic differences as reported by Pandey *et al.* (1986); and Fayeye *et al.* (2005). The egg length of the Tiv ecotype also differs from that of the Fulani ecotype. This might be due to the higher weight of the egg of the Tiv ecotype; as higher weight result to increased egg length. Abanikannda *et al.* (2005) reported similar observation. Variation in egg diameter could be a function of age of bird as well as differences in additive genetic variance for the trait. This was reported by Abanikannda *et al.* (2006).

Index of the Tiv ecotype differs significantly from those of the Fulani ecotype. Again, this is expected since egg length and diameter of the Tiv ecotype is different from the Fulani; their index value will differ as observed. Fayeye *et al.* (2005) made similar observations.

Hatched weight of the Tiv ecotype varies significantly from that of the Fulani. This may be due to differences in their egg weight, as egg weight greatly influenced hatched weight as reported by Narushin *et al.* (2002).

5. CORRELATION BETWEEN EGG WEIGHT, LENGTH, DIAMETER AND INDEX

The strong positive correlation between egg weight indicates that the longer the length of the egg, the higher the weight. This was also reported by Malago and Baitilwaken (2009). Egg length had been reported to significantly affect egg weight (Momira *et al.*, 2003, Anderson *et al.*, 2004). Egg weight was also positively correlated with egg Diameter. Thus AbaniKannda *et al.* (2009) reported that egg length and diameter were good predictors of egg weight. Egg index and length have low but positive correlation while egg index and diameter are negatively correlated. The smaller the index, the larger the diameter and hence the egg weight. This view was reported by Fayeye *et al.* (2005). Egg weight and hatched weight were positively correlated. A higher egg weight would give higher hatched weight and vice versa. The report of Pinchasov, (1991) Wilson, (1991), and Narushin *et al.* (2002C) support this observation. Egg weight and weight at week I had a strong positive correlation. Thus, the advantage of initially higher weight attributable to large eggs though diminishes after hatching (Whatt *et al.*, 1985 and Senapati *et al.*, 1996), the chicks grow faster and attain higher weight at week I (Hagger *et al.*, 1985, Narushin and Romanov, 2002A and 2002B).

The correlation between egg index and hatched weight was negative while that between egg index and weight at week I was also negative. This is understandable since, low index value would indicate higher diameter, higher weight and hatched weight (Tables II and III). Thus the observed negative correlation. Abanikannda *et al.* (2006) reported similar observations. Egg length, diameter and index as selection indices for hatched weight. Egg length and diameter are strongly correlated to egg weight (Malago and Baitilwaken, 2009, Anderson *et al.*, 2004). Egg weight is also strongly correlated to hatched weight (Wilson, 1991, Pinchasov, 1991 and Narushin *et al.*, 2002C). Hence selecting for egg length and diameter will invariably select eggs with higher weight. This in turn will produce chicks with higher hatched weight.

Egg index is negatively correlated to egg weight and hatched weight (Fayeye *et al.*, 2005). Thus selecting eggs with low index value will mean selecting eggs with higher hatched weight (Fayeye *et al.*, 2005).

The advantages of the use of egg length, diameter and index are numerous. One may not require a high level of literacy to be able to measure these parameters. These measurements do not require the use of complex equipment to be accurate. They can be carried out by the rural farmers at rural communities and villages using local measuring devices like the tailor's tape, thread, etc.

6. CONCLUSION AND RECOMMENDATION

Egg length and diameter are strongly, positively correlated to egg weight, while egg index has a negative correlation to egg weight and hatched weight. Selection for medium egg length and diameter would invariably select for high egg weight which will in turn give higher hatched weight

It is recommended that at rural levels where egg weight can not be measured easily, medium egg length, diameter and low index should be employed as selection criteria to improve hatched weight and weight at week I of the local chickens.

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