**APR -13**

## Albumen and Yolk Indices in Three Strains of Nigerian Indigenous Chicken

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**Abstract**
Albumen and yolk indices were studied in the three strains of Nigerian indigenous chicken to determine the strain that has the best performances in these traits. Eggs laid by each strain were used for this purpose overa period of 4 months starting from their first week of lay. Significant differences ($p<0.05$) were obtained from the results both in albumen and yolk indices. Shika Brown had the best of the result both in albumen and yolk indices (0.610± 0.022) and (0.389± 0.0044), respectively. Funnab Alpha Chickens had better performances of 0.588±0.021 and 0.378±0036 more than the local chicken in both albumen and yolk indices; local chickens had the least performances of 0.539± 0.020 and 0.371± 0.0049 in albumen and yolk indices, respectively.

**Keywords:** Albumen index, yolk index, Shikabrown, Funnab Alpha, native chicken

### Introduction

Egg consumption has been widely accepted as a major ingredient in a balanced human nutrition. Egg quality composed of those characteristics that affect its acceptability to consumers (Rath *et al.,* 2015). To maintain superiority in the overall quality of an egg, continuous genetic evaluation of different egg quality traits has become essential in today's production oriented market (Sreenivas *et al.,* 2013). Egg quality characteristics both the external and internal characteristics are important in consumer's acceptability. Of internal egg quality characteristics, thick albumen is quite an important measure for the freshness of an egg (Toussant and Latshaw, 1999). It has been reported that the external and internal quality traits of the eggs in hens significantly affects the hatchability of the incubated and fertile eggs, as well as the weight development of the laying chicks.

On the other hand, interior characteristics such as yolk index, Haugh unit and chemical composition are also important in egg product industry as the demand for liquid egg, frozen egg, egg powder and yolk oil increases (Silversides and Scott, 2011). Poultry production contributes substantially to annual egg and meat production for family consumption and for sale (Fayeye *et al.,* 2005). Egg and meat from indigenous chickens also contribute to the protein nutrition of various household, creates employment and promotes overall economic development (King'ori *et al.,* 2010).The objective of the study is therefore to compare the albumen and yolk indices in three of Nigerian indigenous chickens.

### Materials and Methods

The study was carried out at the Animal Science Laboratory of the Federal University of Technology Owerri. The strains of chicken used in this study were the Funnab Alpha layers, the Shika brown and the Nigerian local chicken. The birds were raised from day old to maturity in separate pens. Daily routine operations were carried out while vaccinations and medicare were given as at when due.

Eggs laid by each strain were randomly picked for this study and evaluation was carried out as soon as the eggs were laid in order to retain its freshness. The eggs were cleaned and carefully opened. The contents were gently poured into a tripod micrometer calibrated in mm to determine the yolk and albumen heights. The yolk index was calculated as the ratio of yolk height to yolk width, while the albumen index was calculated as the ratio of albumen height to albumen width. The study was a complete random design and the strain being the only source of variation was expressed in this form.

$$Yij = \mu + S_i + \Sigma ij$$

Where

$Yij$ = Observation on the i-th strain
$\mu$ = The overall mean
$S_i$ = The Strain effect
$\Sigma ij$ = The residual effect

### Result and Discussion

From the result obtained in this study and shown in table 1, on the albumen index, the Shika brown had the highest mean values of the albumen index in some weeks followed by the Funnab alpha and then thenative chicken although the Funnab Alpha outperformed the Shikabrownin some weeks too. In the overall mean, the Shikabrown had the highest mean of the albumen index though an interaction was observed between the mean values of the Shikabrown and the Funnab Alpha; and

between the mean values of the Funnab Alpha and the native chicken. But the statistical difference was observed between the mean values of the Shikabrown and the native chicken.

Table 1: Mean and standard error mean values of the albumen index of three strains of layer type chicken.

| Week | Funnab Alpha | Native | Shika Brown | Mean ± SEM |
|---|---|---|---|---|
| 1 | 0.045 ± 0.003 | 0.036 ± 0.037 | 0.055 ± 0.045 | 0.0453 ± 0.028 |
| 2 | 0.058 ± 0.041 | 0.036 ± 0.037 | 0.058 ± 0.061 | 0.0505 ± 0.037 |
| 3 | 0.048 ± 0.047 | 0.04 ± 0.019 | 0.058 ± 0.07 | 0.0487 ± 0.033 |
| 4 | 0.054 ± 0.054 | 0.05 ± 0.049 | 0.057 ± 0.074 | 0.0534 ± 0.033 |
| 5 | 0.039 ± 0.082 | 0.068 ± 0.086 | 0.062 ± 0.080 | 0.0560 ± 0.055 |
| 6 | 0.042 ± 0.116 | 0.05 ± 0.065 | 0.064 ± 0.072 | 0.0522 ± 0.053 |
| 7 | 0.079 ± 0.09 | 0.067 ± 0.098 | 0.057 ± 0.153 | 0.0677 ± 0.067 |
| 8 | 0.066 ± 0.059 | 0.061 ± 0.049 | 0.06 ± 0.072 | 0.0624 ± 0.035 |
| 9 | 0.064 ± 0.066 | 0.063 ± 0.010 | 0.072 ± 0.137 | 0.0664 ± 0.057 |
| 10 | 0.065 ± 0.062 | 0.062 ± 0.061 | 0.056 ± 0.042 | 0.0108 ± 0.031 |
| 11 | 0.065 ± 0.052 | 0.056 ± 0.093 | 0.053 ± 0.055 | 0.0578 ± 0.039 |
| 12 | 0.064 ± 0.07 | 0.057 ± 0.044 | 0.071 ± 0.072 | 0.0639 ± 0.037 |
| 13 | 0.067 ± 0.104 | 0.054 ± 0.044 | 0.060 ± 0.083 | 0.0604 ± 0.046 |
| 14 | 0.069 ± 0.082 | 0.055 ± 0.071 | 0.071 ± 0.11 | 0.0649 ± 0.051 |
| Mean ± SEM | $0.0589 \pm 0.022^{ab}$ | $0.0539 \pm 0.020^{b}$ | $0.0610 \pm 0.022^{a}$ | 0.0579 ± 0.013 |

Mean values with different superscripts are statistically different ($p<0.05$)

On the yolk index result, the Shikabrown recorded the highest mean value in most of the weeks, followed by the Funnab Alpha which recorded higher mean values than the native chicken although the native chicken outperformed the two strains in the three weeks of the study. In the overall mean, the Shikabrown had the highest mean value of the yolk index which differed statistically from the other two strains. Statistical difference was not observed between the mean values of the Funnab Alpha and the native chicken.

Table 2: Mean and standard error mean values of the yolk index of three strains of layer type chicken

| Week | Funnab Alpha | Native | Shika Brown | Mean ± SEM |
|---|---|---|---|---|
| 1 | 0.381± 0.004 | 0.423± 0.0202 | 0.368± 0.0055 | $0.390\pm 0.0091^{ab}$ |
| 2 | 0.395± 0.0057 | 0.385± 0.0041 | 0.392± 0.0194 | $0.391\pm 0.0065^{ab}$ |
| 3 | 0.390± 0.0169 | 0.371± 0.003 | 0.390± 0.026 | $0.384\pm 0.0099^{ab}$ |
| 4 | 0.386± 0.098 | 0.407± 0.0148 | 0.368± 0.0127 | $0.387\pm 0.008^{ab}$ |
| 5 | 0.371± 0.0135 | 0.416± 0.02 | 0.399± 0.0143 | $0.396\pm 0.01^{a}$ |
| 6 | 0.384± 0.0184 | 0.353± 0.0137 | 0.434± 0.0103 | $0.390\pm 0.0119^{ab}$ |
| 7 | 0.376± 0.0066 | 0.369± 0.0051 | 0.397± 0.0264 | $0.380\pm 0.0091^{abc}$ |
| 8 | 0.374± 0.0169 | 0.375± 0.0172 | 0.396± 0.0076 | $0.381\pm 0.0083^{ab}$ |
| 9 | 0.404± 0.0161 | 0.374± 0.0101 | 0.414± 0.0160 | $0.397\pm 0.0089^{a}$ |
| 10 | 0.348± 0.0163 | 0.332± 0.0137 | 0.363± 0.0164 | $0.347\pm 0.0089^{d}$ |
| 11 | 0.380± 0.0109 | 0.342± 0.0238 | 0.399± 0.0109 | $0.374\pm 0.0108^{abc}$ |
| 12 | 0.378± 0.0139 | 0.333± 0.0213 | 0.381± 0.0118 | $0.364\pm 0.0104^{bcd}$ |
| 13 | 0.369± 0.0103 | 0.359± 0.013 | 0.383± 0.0108 | $0.370\pm 0.0067^{abcd}$ |
| 14 | 0.353± 0.0135 | 0.349± 0.0046 | 0.362± 0.0145 | $0.355\pm 0.0065^{cd}$ |
| Mean ± SEM | $0.378 \pm 0.0036^{b}$ | $0.371 \pm 0.0049^{b}$ | $0.389 \pm 0.0044^{a}$ | 0.379 ± 0.0026 |

Mean values with different superscripts are statistically different ($p<0.05$)

This study demonstrated that eggs with larger size have higher albumen and yolk. The Shikabrown with highest egg weight recorded highest mean values of the albumen and yolk indices. The mean value obtained in this study is (0.371 – 0.389) is similar with that reported by Haunshi *et al.* (2011) on yolk index (0.367 – 0.395), and lower than the reports of Fayeye *et al.* (2005) on the yolk index (0.58± 0.10). Haunshi *et al.* (2011) also reported the mean value of albumen index 0.072 – 0.076 in Aseel and Kadaknath breeds of Indian chicken which is also closer to the mean value obtained in this study.

**Conclusion**

Shikabrown proved superiority than the other two local ecotypes used for this study. The larger albumen and yolk indices obtained in this study demonstrate the bigger egg size of the Shika brown chicken more than the other two strains.

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