QUALITY INDICES CHARACTERISTICS OF EGGS FROM COMMERCIAL PULLETS AS INFLUENCED BY FOUR DIETARY PROPRIETARY FEEDS IN IBADAN, NIGERIA

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Abstract

Effects of feeding four different proprietary feeds on external and internal characteristics of sampled eggs from pullets housed in battery cages was investigated at week 35 of laying in Ibadan, Nigeria. Ninety-six Bovan Nera layers at week 27 of life were allocated to four different dietary treatments each in triplicates of eight birds per replicate. Proprietary feeds and water were given to the experimental bird's ad-libitum. Egg weight, length and width were significantly different ($P<0.05$) at week 35. Albumen diameter (cm) were (70.93, 81.20, 68.43 and 74.83 for eggs collected from layers fed Feed 1, 2, 3 and 4 respectively) also, significantly different ($p<0.05$). In conclusion, external and internal egg quality parameters were influenced by the different proprietary feeds fed to layers in Ibadan, Nigeria.

Keywords: Proprietary feeds, Haugh unit, Battery cage housing, Egg quality indices

Introduction

Quality of a food item is the sum of characteristics of a given food item which influences acceptability or preference for that food by the consumer (Kramer, 1951). Egg quality is known to be the characteristics of egg that affect its acceptability to the consumer, as the appearance of an egg builds consumer confidence in the product and its consumption (Stadelman, 1977). It is therefore an economically important index in the production of commercial eggs (Oluyemi and Roberts, 2000; Parmar *et al.*, 2006) and consumer preferences for better quality eggs (Kul and Seker, 2004).

Egg quality could be discussed under two broad categories namely; external and internal quality (Monira *et al.*, 2003). The external quality of egg is determined by features such as the size and shape of the egg as well as structure, thickness and strength of shell (Bain, 2005). The internal quality is measured on the basis of quality of the albumen as indicated by Haugh unit (HU), the relative size of various internal components, and the integrity of the shell membrane.

The place of feed is important for the production of good quality eggs as feed given to laying hens may influence the quality of eggs produced. A number of commercial layers feed are available to poultry farmers which could be a dilemma to poultry farmers who have to choose among the different available feeds. Such poultry farmers could therefore be best advised based on empirical research outcome. This study was aimed at investigating the effect of four different proprietary layers mash on some eggs external and internal quality characteristics in Ibadan, Nigeria.

Materials and method

Experimental Location

This experiment was carried out at the Poultry Unit of the Teaching and Research farm University of Ibadan, Ibadan, Oyo state, Nigeria. The study area lies between latitude 3° 50°E at an altitude of 200m above sea level. The study was conducted for eight weeks.

Experimental Birds and Management

A total of ninety-six Bovan Nera black layers (chicken) aged twenty seven weeks were randomly allotted to four treatments of three replicates with eight birds per replicate. The birds were fed four different commercial feeds. The individual commercial feeds represented each treatment. Feed and water were offered to birds' *ad-libitum*.

Data collection

At the end of each week, three eggs per replicate were collected, for egg quality characteristics: albumen weight (g), yolk weight (g), shell weight (g) and egg weight (g) were measured using a sensitive digital scale; albumen height (mm), albumen diameter (mm), egg length (cm) and egg width (mm), yolk diameter, yolk height were measured using Vernier caliper according to Al shami *et al.* (2011); shell thickness was measured with a micrometer screw gauge; albumen percent and yolk percent were calculated from the ratio of albumen and yolk weights to that of the egg weight, yolk colour was measured using the DSM yolk colour fan while Haugh unit was as described (Haugh, 1937).

Data analysis

Data were subjected to Analysis of Variance (ANOVA) using the general linear model (GLM) of SAS (2006) while means were separated using Duncan procedure of the same software.

Results and discussion

In Table 1, the effect of four different proprietary feeds on external characteristics of eggs collected from commercial pullets in battery cage at week 35 is shown. Egg weight, width and length were significantly influenced ($P<0.05$) as values obtained for egg weight and width from hens fed Treatments 1, 3 and 4 were similar ($p>0.05$) while those on T2, T3 and T4 were also statistically same for egg length. Egg weight of samples from hens on T4 was significantly higher ($P<0.05$) when compared with those collected from hens on other treatments. However, egg weight range (49.60 to 56.60) conformed to values reported by Oluyemi and Roberts (2000) which further posited that egg is generally heavier than 58g in the temperate but lower in the tropics. This observation was however, contrary to that of Reddy *et al.* (2004) that mature egg weight ranged from 55-58g.

The internal quality characteristics of eggs collected from pullets fed four different proprietary diets at weeks 35 of laying is shown in Table 2. Internal egg quality is influenced by factors such as age, strain of hen, nutrition and environmental conditions (Leandro *et al.*, 2005) and this depends partly on the presence and stability of the dense layer of albumen which is given by the protein ovomucin (Mountney, 1976). Albumen weight, height and percentage; yolk weight diameter and height as well as Haugh unit were not significantly different ($P>0.05$) for the eggs from hens on different feeds. Albumen diameter (cm) of eggs from hens on T2 (81.20) was significantly higher ($P<0.05$) when compared to those fed T3 (68.43), T4 (74.83) and T1 (70.93). Eggs yolk colour values which were 8.00, 6.67, 2.00 and 6.00 for eggs collected from hen fed T1, T2, T3 and T4, respectively also differed significantly ($P<0.05$) with the type of feed, although, yolk weight was not affected significantly ($P>0.05$). Egg yolk colouration depends on the nutrition of the chickens and is a function of the carotene content of maize in the feed. The values obtained in this study for yolk colour were not consistent with the reported range (7-8) by Lesson and Summers (1997) as the generally acceptable preference colour for eggs. Values obtained for yolk height conformed to the findings of Reem (2013) and Santos-Ricalde *et al.* (2013).

Conclusion

Proprietary feeds influenced egg weight, length and width at week 35. So also were albumen diameter, yolk colour and yolk percent. More research should be undertaken to ascertain the long term effects of using different feeds on external and internal egg quality characteristics.

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Table 1: Effect of four different proprietary feeds on egg external characteristics of 35 weeks old commercial pullets

Parameters	1	2	3	4	SEM
Egg weight (g)	55.13^{a}	49.50^{b}	55.87^{a}	56.60^{a}	0.69
Egg width (mm)	42.47^{a}	40.43^{b}	42.57^{a}	43.30^{a}	0.53
Egg length (mm)	54.17^{a}	52.33^{b}	52.90^{ab}	52.43^{b}	0.34
Shell weight (g)	5.30	4.97	5.07	5.73	0.20
Shell thickness (mm)	40.00	37.43	36.97	40.27	1.39

Means with the same superscript on the same row are not significantly different (P> 0.05)

Table 2: Internal egg quali ty characteristics of eggs from pullets fed four proprietary feeds at week 35

Parameters	T1	T2	T3	T4	SEM
Albumen weight (g)	32.47	32.53	34.10	32.67	1.02
Albumen height (cm)	6.10	6.20	6.90	6.30	0.24
Albumen diameter (cm)	70.93^{bc}	81.20^{a}	68.43^{c}	74.83^{b}	0.71
Albumen percent (%)	59.13	66.33	60.97	57.73	1.45
Yolk weight (g)	13.37	13.13	13.13	13.67	0.16
Yolk colour	8.00^{a}	6.67^{b}	2.00^{d}	6.00^{c}	0.08
Yolk diameter (cm)	37.00	36.83	38.13	39.37	0.46
Yolk height (cm)	11.73	12.63	12.73	13.17	0.19
Yolk percent (%)	24.23^{b}	26.53^{a}	23.53^{b}	24.13^{b}	0.17
Haugh unit	81.13	82.92	85.90	83.54	1.37

Means with different superscript along the same row are significantly different (P<0.05)