COMPARISON OF EGG QUALITY CHARACTERISTICS OF INDIGENOUS AND BROILER PARENT LINE CROSSED WITH INDIGENOUS CHICKEN

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ABSTRACT

A comparative Study on egg characteristics of four type of indigenous chicken based on plumage pattern and a crossbred, (PB-2 x indigenous) was carried out . In the present study a total of 75 eggs, 15 eggs from each group were included. Out of five egg qualities, egg weight , shape index shell thickness ,yolk index and albumen index, except shape index, four characteristics were found significantly higher in group V(PB-2 x indigenous eggs); only shape index value of indigenous chicken groups were higher than the group V. The results of the present study indicated that the egg quality characteristic for crossed chicken (broiler parent line X indigenous chicken) is superior to indigenous chickens. Among indigenous chicken groups, group II (black with brown hackle) plumage colour pattern eggs were found to be higher for egg quality characteristics parameters.

KEY WORDS : Indigenous chicken, Plumage colour pattern, Broiler parent line, Internal egg quality, External egg quality

INTRODUCTION

Indigenous poultry birds are well adapted to harsh environment of free range and they produce eggs and meat at least possible cost (Parmar *et al.*, 2006). Evaluation of the external and internal quality of chicken eggs is important because of consumer preferences for better quality eggs. The knowledge and information on the structure of egg and its various parameters are essential for an understanding of egg quality, fertility, embryo development and diseases of the poultry (Islam et al., 2010). Egg weight is one of the important phenotypic traits which influence egg quality and reproductive fitness of the chicken parents (Islam *et a*l. 2001 and Farooq *et al*. 2001). Egg quality is the more important price contributing factor in table and hatching eggs. Therefore, the economic success of a laying flock solely depends on the total number of quality eggs produced. This work was designed to study the comparison of egg quality characteristics of indigenous and broiler parent line crossed with Indigenous chicken in deep litter system of rearing.

MATERIALS AND METHODS

For the present study, eggs of five different groups based on plumage color namely group I (black), group II (black with brown hackle), group III (brown) and group IV (barred) and group V (Indigenous X broiler parent line) were included . The broiler parent line chosen was PB-2, (Punjab broiler-2) a synthetic broiler parent line developed by Directorate of Poultry Research, Rajendranagar, Hyderabad, Telangana, India. The birds were reared in deep litter system of rearing in the experimental sheds of All India Co-ordinated Research Project on Poultry Breeding, Directorate of Research (vety), Assam Agricultural University, Khanapara, Guwahati-Assam, India. A total of 75 eggs, 15 eggs from each group were taken for the study. The external and the internal characters of eggs like the egg weights (g), shape index were measured at 40^{th} week of age. After measuring the external characters, the eggs were broken for measuring their internal qualities. The height of the thick albumen and yolk were measured using an Ames tripod stand micrometer. The length

and width of the thick white albumen and yolk were measured using a dial calliper and the mean diameters were calculated. Thereafter, the yolk was gently separated from the albumen, adherent albumen was removed by rolling the yolks over a filter paper and the yolk height was recorded. The shell membrane and the adhered albumen were removed and washed for determining the egg shell thickness. An analytical digital balance of 0.01 g accuracy was taken for weighing the eggs. Experiment was conducted as per the guidelines of Institutional Animal Ethics Committee. The data obtained were analyzed according to the methods given by Snedecor and Cochran (1994). Significant differences between the groups for various traits were tested by one way-ANOVA.

The various indices of egg quality traits were calculated by using following formulae as described by Singh (1985).

$$\textbf{Shape index} = \frac{\text{Breadth at the middle of the egg X 100}}{\text{Length of the egg}}$$

$$\textbf{Yolk index} = \frac{\text{Height of yolk (mm)}}{\text{Breadth of the yolk (mm)}}$$

$$\textbf{Albumen index} = \frac{\text{Height of thick albumen (mm)}}{\text{Breadth of the thick albumen (mm)}}$$

RESULTS AND DISCUSSION

External egg qualities

Comparative egg quality characteristics presented in Table 1 reveals that out of two external egg qualities , egg weight and shape index; a significantly ($P \leq 0.05$) higher egg weight (g) was recorded for group V (PB-2 Xindigenous) chicken among the groups at the end of the 40th week of age. Among indigenous groups, no significant difference was recorded with a higher egg weight (g) for group II followed by groups I, III and IV at end of 40th weeks of age.

The findings in the present study in case of group V were found to be higher which might be due to higher body weight attributed by PB-2 resulting in production of heavier eggs. Body weight and egg production are positively correlated traits (Alewi *et al*., 2012). Poggenpoel and Duckitt (1988) and Bekele *et al*. (2010) have reported that the genetic background of chickens would influence egg weight. Pathak *et al*. (2015) reported a higher body weight of PB-2 X indigenous chicken and black with brown hackle plumage coloured indigenous chickens. It was noticed that the shape index value of indigenous chicken groups were higher than the group V eggs. In general, long and narrow egg of any size would have a low index and a short and broad egg (whether large or small) would have a high index.

The higher shape index value of indigenous chicken might be due to broad and short size and shape of the eggs. In the present study eggs of group V were found to be round contributing to lower shape index. The present findings were in line with the findings reported by Kalita *et al*. (2011) and Gonmei (2012). Group II eggs were recorded higher egg shape index among the indigenous group which was similar to the findings reported by Baishya *et al.* (2008). The values for shape index of indigenous chicken were in accordance to the findings reported by Iqbal and Pampori

Table 1 External and Internal characteristics (mean ± SE) of different groups at 40 weeks of age

Experimental Groups	Egg weight (g)				
	Egg Shell thickness (mm)	Yolk Index	Albumen Index	Egg weight (g) At the end of 40th week	Shape index
Group I	0.395^{a}±0.005	0.475^{a}±0.011	0.090^{a}±0.005	37.61^{a}±0.11	76.64^{a}±0.17
Group II	0.399^{a}±0.004	0.480^{a}±0.009	0.096^{a}±0.002	38.19^{a}±0.26	77.40^{a}±0.99
Group III	0.373^{a}±0.006	0.470^{a}±0.007	0.087^{a}±0.004	37.00^{a}±0.09	75.14^{a}±0.30
Group IV	0.380^{a}±0.005	0.460^{a}±0.008	0.083^{a}±0.006	37.39^{a}±0.07	75.54^{a}±0.29
Group V	0.430^{b}±0.007	0.510^{b}±0.007	0.129^{b}±0.006	46.86^{b}±0.63	69.87^{b}±0.34

Note : Means having same superscript within a column do not differ significantly.

(2008); Haunshi *et al*. (2010) and Haunshi and Doley (2011).

Internal egg qualities

All the three internal egg qualities i.e. egg shell thickness, yolk index and albumen index were found significantly ($P \leq 0.05$) higher in group V as compared to other groups. The higher value for group V could be due to higher percentage contribution to the egg weight (Sreenivas et al., 2013). The present finding is in line with the findings of Momoh *et al*. (2010) and Kalita *et al*. (2011).

The egg shell thickness values for Indigenous groups were comparable to those reported by many workers (Baishya *et al.*, 2008; Iqbal and Pampori, 2008 and Haunshi and Doley, 2011). Among the indigenous groups, no significant difference was recorded although group II showed the highest egg shell thickness (mm) followed by groups I, IV and III.

The yolk index value for group V was significantly ($P \leq 0.05$) higher than other groups which might be due to higher egg weight. The variation might be attributed to the composition of feeding regimes,

feed quality differences in management and environmental effects. According to the works of Kalita *et al*. (2011) and Gonmei (2012) a yolk index value ranging from 0.45–0.48 was obtained for indigenous chicken under intensive system of management, which is similar to the present findings for indigenous chicken. Parmar *et al.* (2006) reported yolk index values ranging from 0.35 to 0.38 for indigenous Kadaknath (an indigenous chicken of India), which were much lower than those values of the present study. A non-significant difference in the values of yolk indices was seen among the indigenous group with Group II showing higher yolk index followed by group I, IV and III.

The variation might be due to the difference in egg weight which have a positive correlation with the yolk index (Sekeroìlu and Altunta, 2009) and the influence of genetic group on the yolk index values (Rajkumar *et al.*, 2009; Momoh *et al.*, 2010). Among indigenous groups, Group II was found to have higher yolk index value which may be contributed by comparably higher egg weight.

The albumen index varied significantly ($P \leq 0.05$) in between crossed chicken (group V) and the rest four groups in which the former found to have higher albumen index. The reason for this might be attributed to the difference in egg weight which has a positive correlation with the albumen index (Sekeroìlu and Altunta, 2009). The average albumen index value reported by Kalita et al., (2011) and Gonmei (2012) for indigenous chicken is comparable to those of group II found in the current study.

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