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Short Communication

EXTERNAL EGG CHARACTERISTICS OF INDIGENOUS CHICKEN OF POONCH DISTRICT OF JAMMU AND KASHMIR, INDIA

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SUMMARY

A total of 96 eggs were collected for the present study from the farmers rearing indigenous chickens at the natural breeding tract of the birds in Poonch district. The external egg traits studied in the present investigation were Egg Weight (EW) (g), Egg length (EL) (cm), Egg Width (ED) (cm), Egg Shape Index (ESI), Egg Volume (EV) (cm^3), Specific Gravity (SG) (g/cm^3), Shell Weight (SW) (g), Shell Thickness (ST) (mm) and Egg shell colour. The data were analyzed by suitable statistical analysis. The light brown egg shell colour was most prevalent in the population. The overall means for the EW,EL, ED, ESI, EV, SG, SW and ST were 51.71±0.70 g, 5.33±0.03 cm, 4.05±0.02 cm, 76.10±0.49, 48.66±0.51 cm^3, 1.06±0.01 g/cm^3, 5.91±0.10 g and 0.32±0.004 mm. respectively. The co-efficient of variations for all the traits were very low. All the correlation values between different external egg traits were significant barring few exceptions. It can be concluded from the present study that external egg qualities are very much distinct and different from other breeds/populations and these are the characteristics of the indigenous chicken population.

Keywords: Correlations, Egg Shape Index, Egg weight, India, Indigenous chicken

Poultry industry plays an important socio-economic role in developing countries. Commercial strains dictate the production of meat and eggs, while local indigenous breeds/populations are restricted to the hobby sector in developing countries. However, these indigenous chickens are one of the major sources of protein in forms of eggs and meat for the rural populace but are poor in productivity, slow growing and low in egg production. The low productivity of the indigenous chickens is manifested in terms of very high mortality, low growth rate, small mature weights and low egg production (Ndegwa *et al.*, 1998). Due to lack of consideration to egg quality traits in selection programs, a soaring prevalence of downgraded eggs occurs, causing economic loss for the egg industry. Also it has a paramount significance for scheming and implementing environment friendly and community based holistic genetic and performance improvement strategies. Therefore, the objective of this study is to evaluate the external quality of chicken eggs to know the population characteristics and egg quality.

Egg sample collection and evaluation: A total of fresh 96 eggs were procured from the farmers rearing local chicken in Poonch district of Jammu and Kashmir. The parameters for external egg quality traits include Egg Weight (EW) (gm), Egg length (EL) (cm), Egg Width (ED) (cm), Egg Shape Index (ESI), Egg Volume (EV) (cm^3), Specific Gravity (SG) (gm/cm^3), Shell Weight (SW) (gm), Shell Thickness (ST) (mm) and Egg shell colour. The experiment was conducted at the laboratory of the Department of Livestock Product and Technology, Faculty of Veterinary Sciences, SKUAST- Jammu (Jammu and Kashmir).

Data collection: External egg quality traits such as egg weight was measured using digital balance (gm) and shell thickness using a micrometer screw gauge calibrated in mm. Length and breadth of eggs were measured using digital Vernier calipers (least count 0.01mm). Egg shape index was calculated as the ratio of egg width to egg length multiplied by 100. The specific gravity was determined by Stadelman *et al.* (1995) method.

Data management and analysis: The data were entered and means, standard deviations, standard errors and correlations were calculated. Co-efficient of variation (CV) (%) was calculated as (Mean/Standard eviation) x 100 (Snedecor and Cochran, 1994).

Means, standard errors, standard deviation and coefficient of variations of different external egg traits have been presented in Table 1.

Egg weight (EW) (gm): The average egg weight of native chicken of Poonch was estimated as 51.71±0.70 gm (Table 1). Higher estimates of EW were reported by Dukic-Stojcic *et al.* (2016) in Montenergo domestic chicken and Kosovo Longcrower chicken. On the other hand, lower estimates of EW were reported in Harringhata Black chicken (Vij *et al.*, 2015), Native chicken populations of Odisha (Singh *et al.*, 2016), Indigenous Tswana chicken of Botswana (Derek *et al.*, 2017) and Indigenous chicken of Kenya (Wambui *et al.*, 2018).

Egg weight is largely affected by environmental factors, food restriction and parental average body weight and the variation in egg weight within and between indigenous chickens in different countries could be attributed to these factors. Moreover, genetic involvement including breed or strain within breed could also explain the observed variations.

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Egg length (EL) (cm): The average EL was found to be 5.33±0.03 cm in the present study. Higher EL were reported in indigenous Tswana chickens (Derek *et al.*, 2017) and indigenous chickens of Kenya (Wambui *et al.*, 2018). On the other hand, lower estimates for egg length were reported in Tellicherry chickens (Kumar *et al.*, 2013). This variation could be as a result of the differences in the breeds studied.

Egg Width (ED) (cm): The average ED was estimated in the local bird population as 4.05±0.02 cm. Similar value was reported in indigenous chicken of Kenya (Wambui *et al.*, 2018). The higher estimate for ED was reported in indigenous Tswana chicken (Derek *et al.*, 2017). On contrary to the present findings, lower estimates for ED were reported in Tellicherry chicken (Kumar *et al.*, 2013).

Egg width increases with increasing age of hen and it peaked at about a year old before it declines. This may be due to the fact that, during the process of egg formation, as the content of the egg travels down the oviduct it becomes encased by the shell and forced out through the vent. In pullets, the oviduct tends to be narrower such that only a small width of shell can be forced along with the egg content thereby resulting in slimmer egg width. Also egg weight is positively correlated with egg width and egg length, the ones with high egg weight is expected to have high egg length and egg width (Gongolo and Tanganyika, 2018).

Egg Shape Index (ESI): In the present study, the ESI value was higher than 76.10±0.49 (round shape). The similar value for ESI was reported in Brown layer strain of ATAK (GXSX) of Turkey reared in free range (Sekeroglu *et al.*, 2010). Lower estimates of ESI were reported in Tellicherry chicken (Kumar *et al.*, 2013), and in indigenous chickens of Kenya (Wambui *et al.*, 2018).

The consistent decrease in shape index with increasing hen age revealed that the shape index of the eggs decreased with age because shape index is directly proportional to egg width and it is inversely related to egg length, which implies that with increasing age, the rate at which eggs becomes longer is faster than rate of being wider.

Egg Volume (EV) (cm^3): The egg volume was estimated as 48.66±0.51 cm^3 (Table 1). The egg volume was presented in Table 1 as 48.66±0.51 cm^3. Lower EV were reported in indigenous chicken of Malawi (Gongolo and Tanganyika, 2018).

Specific Gravity (SG) (gm/cm^3): In the present study specific gravity was estimated as 1.06±0.01 gm/cm^3. Higher specific gravity was reported by Salehinasab *et al.* (2014) in Iranian native fowl.

Shell Weight (SW) (gm): The egg shell weight was estimated as 5.91±0.10 gm (Table 1). Higher SW was reported in Indigenous Tswana chicken of Botswana (Derek *et al.*, 2017), whereas, lower estimates were reported in Tellicherry of India (Kumar *et al.*, 2013), and Indigenous chicken of Kenya (Wambui *et al.*, 2018).

Shell thickness (ST) (mm): In the present study, the recorded shell thickness was 0.32±0.004 mm. Lower shell

Table 1

External Egg Traits of Indigenous Chicken of Poonch District (J&K)

S. No.	Traits	Mean±S.E	S.D	C.V
1.	Egg Weight (gm)	51.71±0.70	6.87	13.28
2.	Egg length (cm)	5.33±0.03	0.32	6.08
3.	Egg Width (cm)	4.05±0.02	0.22	5.54
4.	Egg Shape Index	76.10±0.49	4.76	6.26
5.	Egg Volume (cm^3)	48.66±0.51	5.03	10.34
6.	Specific Gravity (gm/cm^3)	1.06±0.01	0.08	7.66
7.	Shell Weight (gm)	5.91±0.10	1.00	16.86
8.	Shell thickness (mm)	0.32±0.004	0.04	13.03

Table 2

Correlations between different external egg traits of Indigenous Chicken of Poonch District (J&K)

	EW	EL	ED	ESI	EV	SG	SW	ST
EW	-	0.83**	0.44**	-0.40**	0.81**	0.62**	0.60**	0.09
EL		-	0.42**	-0.58**	0.70	0.46	0.53**	-0.03
ED			-	0.49**	0.38**	0.22*	0.24*	0.14
ESI				-	-0.33**	-0.25*	-0.30**	0.16
EV					-	0.04	0.41**	0.05
SG						-	0.47**	0.07
SW							-	0.19
ST								-

*indicates significant at 5% level ($p<0.05$); ** indicates significant at 1% level ($p<0.01$); *$p<0.05$ **$p<0.01$

thickness was reported in Rural indigenous chicken of Gorogutu of Ethopia (Abdurehman and Urge, 2016). But, higher ST estimates were reported in Indigenous chicken of Tellicherry breed (Kumar *et al.*, 2013), Harringhata Black chicken (Vij *et al.*, 2015) and Indigenous chicken of Kenya (Wambui *et al.*, 2018). The thickness of the egg shell is an important trait for hatchability. For best result of hatchability, egg shell thickness should be between 0.33 and 0.35 mm (Khan *et al.*, 2004).

Egg Shell colour : The egg shell is mainly brownish colour in the indigenous chicken of Poonch district. The light brown colour was more prevalent (71.88%) than the dark brown colour (28.12%). As the native chicken of Poonch district are mainly reared as backyard system and are maintained by poultry farmers over a long back due to acceptance of the colour among the consumers, the brownish sheds get fixed and may be the hens possess genes responsible for brownish eggs.

The co-efficient of variations (CV) for all the external egg traits were very low in the population (Table 1). The highest CV was recorded for shell weight. The low variability of the traits indicates that the variability of these traits is not by any genetic influence. The differences in weight, colour, egg length etc. recorded in eggs from the farmers might be due to the fact that these traits are usually related to the strain or genetic makeup, management, poor storage and other environmental factors.

Correlations between different traits: Correlations between different traits considered in the present study have been presented in Table 2. The values ranged from -0.58 (EL & ESI) to 0.83 (EL & EW). All the correlation values were significant barring few exceptions. ST had non-significant correlations with all the traits under study. ESI had negative correlations with all the traits under study except for ED, where positive and significant ($p<0.01$) correlation was obtained. Similar trend was observed in indigenous chickens of Western Kenya (Wambui *et al.*, 2018). In contrary to the present findings,Yakubu *et al.* (2008) reported positive correlations between EW & ESI and higher correlation with EW & ST in Naked Neck and normal feathered indigenous chickens.

CONCLUSION

Egg characteristics are influenced by the breed/ strain population of poultry. The highly significant positive correlations of EL, ED, EV, SG and SW with EW indicate that selection on the basis of external traits will improve the egg weight also. The low variability of external egg traits across the population and the egg traits are population characteristics of the native chicken population.

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