A Comparative Study of Production Performance and Egg Quality Parameters of Naked-Neck and Indigenous Aseel Chicken of Pakistan

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Abstract: The present study was conducted to evaluate production performance and egg quality of four different varieties of native Aseel chicken in comparison with naked neck. A total of 105 adult chickens, 21 birds from each of four varieties of Aseel namely Lakha, Mushki, Peshawari and Mianwali, and 21 birds from naked neck, were maintained separately. The data of daily egg production, daily egg weight and weekly egg quality were calculated for up to ten weeks and analyzed under Completely Randomized Design (CRD) through SAS 9.1 software. Comparison among treatment means were made through Duncan's Multiple Range (DMR) test. The results showed that egg production of Naked-neck (47.42) was significantly higher (P<0.05) than that of Mushki (34.08), Lakha (31.43), Mianwali (29.59) and Pesahwari (28.7). However,egg weight of Naked-neck (57.52) and Peshwari (55.65) was significantly greater (P<0.05) compared with lakha (54.03), Mushki (53.7) and Mianwali (51.62). Regarding egg quality traits, shell % of Peshawari (13.57) and Nakedneck (13.16) was significantly higher (P<0.05) than that of Lakha (11.89), Mushki (10.19) and Mianwali (9.36). Similarly, Haugh Unit Score of Naked-neck (82.76) and Peshawari (81.95) was significantly greater (P<0.05) than other varieties of Aseel. Albumen % was significantly higher in Mushki (61.83) variety (P<0.05) while yolk % was significantly higher in Mianwali (59.36) variety of Aseel (P<0.05) whereas yolk index showed non-significant (P>0.05) difference in Naked-neck and all varieties of Aseel.

Keywords: Production performance, Egg quality, Genetic potential, Naked-neck, Aseel.

INTRODUCTION

In developing countries including Pakistan, poultry production is mainly dependent upon traditional extensive production system using native breeds, [1]. Indigenous breeds are used to overcome the nutritional deficiencies in certain countries [2] and additionally have better adaptability to local climatic conditions [3] in comparison with exotic breeds.

In Pakistan, Aseel, Naked_neck, Desi and Fayoumi are reared as backyard chickens mainly for the source of protein and income. Among these breeds, Naked-neck, originated from Hungary [4], is getting popularity in Pakistan due to its better egg production and better thermo-tolerance which make it suitable for tropical and sub-tropical countries.

However, Aseel breed is indigenous to Pakistan and close to extinction. They have greater robustness, disease resistance and well adaptability to local environment and also popular for its higher body weight, vigor, alertness and fighting behavior [5, 6]. Despite these things, there rearing is getting less popularity due to its poor egg production though it can be improved through better housing and proper nutrition [7, 8]. Therefore, the present study was conducted to evaluate the potential of our indigenous breeds in terms of production performance and egg quality compared with the Naked-neck in order to make rural poultry viable for commercial point of view.

MATERIALS AND METHODS

The present study was conducted at Indigenous Chicken Genetic Resource Centre (ICGRC) of Department of Poultry Production, University of Veterinary and Animal Sciences (UVAS) Lahore, Pakistan. A total of one hundred and five mature birds, twenty one birds from each of four varieties of Aseel, namely Lakha, Mianwali, Mushki and Peshawari and twenty one birds from Naked-neck having an age of about 70 weeks were reared for up to ten weeks. Birds were maintained in three tiered laying cages with sloping wire floor to facilitate egg collection in an independent open-side poultry house. There was the provision of removable trough feeder and automatic nipples lines for drinking water and 1.5 sq. feet floor space/bird. The data for egg production and egg weight were recorded on daily basis while the egg quality traits were measured on weekly basis. A total of 1050 eggs, 10 eggs from each female were used for calculating egg quality traits.

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ISSN: 1814-8085 / E-ISSN: 1927-5129/14

Data Collection

Egg Production

Egg collection frequency was thrice a day, early in the morning, early afternoon and late afternoon. The pen and bird number was being mentioned on individual egg as well as kept on the record.

Egg Weight (gm)

Each and every egg was weighed using electronic balance capable of measuring up to 0.1 g. and egg weight was also mentioned on the eggs individually?

Shell, Yolk and Albumen Percent

After breaking, egg shell, yolk and albumen was being weighed separately

Shell percentage (%) = (weight of shell/ weight of whole egg) x 100

Albumen percent = (weight of albumen/weight of whole egg) x 100

Yolk percent = (weight of yolk/ weight of whole egg) x 100

Haugh Unit (HU) Score

Haugh unit score of individual egg was determined by using egg weight and albumen height (Doyon *et al*., 1986). Albumen height was measured using Vernier caliper. The Haugh unit values were calculated for individual egg using the following formula:

$$HU = 100 \log (H - 1.7w^{0.37} + 7.6)$$

Where,

H = observed height of the albumen in millimeters

W = weight of egg in grams

Yolk Index

The measure of yolk quality "the yolk index" was recorded using the formula

Yolk Index = yolk height / yolk width

Statistical Analysis

Experiment was conducted according to Completely Randomized Design (CRD). The data were analyzed using SAS (Statistical Analysis System) version 9.1. One-way ANOVA single factor was conducted along with Post hoc analysis using Duncan's Multiple Range (DMR) test.

RESULTS AND DISCUSSION

Egg production and egg quality parameters of four different varieties of Aseel and Naked-neck chicken are presented in Table **1**.

Egg Production

In the present study, Naked-neck breed showed significantly higher egg production followed by Mushki, Lakha, Mianwali and Peshawari varieties of Aseel (Table **1**) which might be due to some genetic variations between the Aseel and Naked-neck chicken. It is worth mentioning that the egg production of Naked-neck is reported up to 138 eggs in 52 weeks of production cycle [4] whereas for Aseel chicken it is reported up to 92 eggs per annum by the Central Avian Research Institute [9]; showing a great variation in the egg production of these two breeds. This comparative difference in the egg production of these breeds might be attributed to the difference in body weight of these breeds, as the egg production and body weight have negative correlation with each other and the body weight of Aseel (2-2.5 kg of pullets) is remarkably

Table 1: Showing the Egg Production and Egg Quality Parameters, Shell Percentage, Albumin Percentage, Yolk Percentage, Haugh Unit and Yolk Index of four Different Varieties of Aseel and Nakedneck Chicken

Breeds & Varieties	Egg production %	Egg weight (g)	Shell %	Albumen %	Yolk %	Haugh Unit	Yolk Index
Naked-neck	47.42±0.78^{a}	57.52±0.5^{a}	13.16±0.41^{ab}	58.29±0.62^{bc}	28.55±0.4^{b}	82.76±0.95^{a}	0.47±0.005
Lakha	31.43±0.76^{c}	54.03±0.7^{b}	11.89±0.47^{b}	60.76±0.58^{ab}	27.38±0.58^{b}	78.45±0.14^{b}	0.44±0.004
Mianwali	29.59±0.75^{cd}	51.62±0.53^{c}	9.36±0.51^{c}	59.36±0.58^{b}	31.28±0.7^{a}	77.36±0.99^{b}	0.46±0.008
Mushki	34.08±0.73^{b}	53.7±0.96^{b}	10.19±0.59^{c}	61.83±0.49^{a}	28.07±0.55^{b}	76.86±0.95^{b}	0.46±0.008
Peshawari	28.70±0.58^{d}	55.65±0.55^{ab}	13.57±0.53^{a}	57.93±0.55^{c}	28.45±0.48^{b}	81.95±1.12^{a}	0.46±0.003
P-value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.2173

Note: Different superscripts on different values represent significant differences among their means (P≤0.05).

higher than that of Naked-neck (1.5 kg for pullets) as reported by CARI [9] and [4] respectively. Moreover, it has also been explained by [10] who observe that different modern strains has higher egg production than the older breeds concluding that different breeds have different egg production. Similarly, the difference in egg production between varieties of Aseel has been explained by Usman, Ahmad [11] who observed the egg production of different varieties of Aseel and reported that the egg production of Mushki variety of Aseel is significantly higher than the other varieties of Aseel; and those results are in agreement with the findings of the present study However, in another study, [12] reported that different breeds behave differently in terms of their egg production after moulting treatment.

Egg Weight

Present study also showed significantly (P<0.05) higher egg weight of Naked-neck followed by Peshawari, Lakha, Mushki and Mianwali varieties of Aseel (Table **1**) which might be due to the genetic potential of Naked-neck breed. On the basis of our findings and available literature it could be suggested that breeds might be distinguished from each other on the basis of their egg weight [13]. Some previous studies also elaborated this difference in egg weight between Naked-neck and Aseel breeds and reported that average egg weight of Naked neck vary between 55 g [4] to 57 g [14] and the egg weight of Aseel is 50 g [9]. This showed the differences in these two breeds in terms of egg weight which might be due to the different genetic potential of these two breeds. The difference in egg weight of different varieties of Aseel has also been observed by Usman, Ahmad [11] who reported the higher egg weight of Mushki variety than other varieties of Aseel.

Egg Quality

The egg quality parameters are under the influence of a number of factors and major one of which is the breed or variety of the observed chicken. The internal quality of egg is very important from the consumers view point but it cannot be assessed without breaking the egg. In the present study it has been observed that Peshawari variety has significantly (P<0.05) higher shell % and haugh unit score than that of other varieties of Aseel and Naked-neck (Table **1**). The difference in haugh unit scores might be attributed to the differences in albumen height of observed birds which is in agreement with the results of [15] who reported different albumen heights for different breeds. These results are also in agreement with the [16] and Monira, Salahuddin [15] who also observed different Haugh unit scores of different breeds. However, higher shell % of Mushki variety of Aseel has been observed by [17] whose observations are in contradiction with our study.

In this study, Mianwali variety of Aseel showed significantly higher yolk % than other varieties of Aseel and Naked-neck whereas yolk index showed non-significant differences in all varieties of Aseel and Naked-neck (Table **1**). Similar findings has also been reported by Haunshi, Niranjan [18] who observed non-significant differences in haugh unit score among Vanaraja and White Leghorn breeds of chickens. However [17] also reported higher yolk index of Mianwali and Peshawari varieties than other varieties of Aseel. This contradiction might be due to the performance of Aseel birds in different habitats as Aseel is famous for its better adaptability to local environmental conditions and the performance efficiency of birds might be influenced by different living conditions. Gupta and Singh [19] and Haunshi, Niranjan [18] also observed significant differences in the yolk index of different close-bred stocks and different breeds of chickens. Regarding albumen %, Mushki variety showed significantly higher albumen % followed by Lakha, Mianwali, Peshawari, and Naked-neck chicken. Similar findings have also been reported by Shafiq, Usman [17] who reported lowest albumen % of Peshawari variety than other varieties of Aseel.

CONCLUSION

From the present study, it can be concluded that the Naked-neck and Mushki variety of Aseel is better in terms of their egg production and egg weight compared with other varieties of Aseel. However,Naked-neck and Peshawari variety of Aseel chicken showed higher Haugh unit score. Additionally, Mushki variety expressed higher shell % than other discussed varieties whereas there was no difference in yolk index value of Naked neck and all varieties of Aseel.

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Received on 16-12-2013 Accepted on 10-02-2014 Published on 21-04-2014

http://dx.doi.org/10.6000/1927-5129.2014.10.21