

Contents lists available at Sjournals



Journal homepage: [www.Sjournals.com](http://www.Sjournals.com)



**Original article**

## Evaluation of egg quality traits among different breeds/strains of chicken locally available in Pakistan

A. Ali<sup>a,\*</sup>, R. Anjum<sup>b</sup>

<sup>a</sup>Department of Livestock Production University of Veterinary and Animal Sciences Lahore, Pakistan.

<sup>b</sup>Department of Food and Nutrition, Lahore, Pakistan.

\*Corresponding author; Department of Livestock Production University of Veterinary and Animal Sciences Lahore, Pakistan.

### ARTICLE INFO

### ABSTRACT

*Article history:*

Received 03 January 2014

Accepted 19 January 2014

Available online 27 January 2014

*Keywords:*

Egg quality

Breeds/varieties

Physical traits

Appreciated for their versatile nutritive value and functional properties, eggs are considered as an important item in human diet. Eggs are one of the most common foods available worldwide as they play an important role in human diet by providing humans with protein, lipids, minerals and vitamins in an adequate amount. Chicken breeds differ in physical and biochemical contents in terms of eggs and meat yield. The objective of this study was to evaluate the egg quality traits among different breeds/varieties of chicken available in Pakistan. For this purpose a total of 105 eggs were collected from 7 different breeds/strains of poultry namely, Aseel Lakha, Aseel Mianwali, Aseel Peshawari, Naked neck (Ganji), Fayoumi, Rhode Island Red (RIR) and White Leg Horn (WLH) and used to evaluate the egg quality traits. Statistical analysis of data was carried out through one way ANOVA, and comparison of means with DMR test (SAS, 9.1). Analysis revealed significant differences among breeds in egg weight, egg width, albumen height, yolk height, and Haugh unit while non-significant differences in egg length and shape index at ( $P < 0.05$ ).

© 2014 Sjournals. All rights reserved.

## 1. Introduction

Poultry, especially chickens are the most widely reared species of livestock throughout the world and are found in greater numbers (Perry et al., 2002; Moreki et al., 2010). The hen's egg has been conventionally believed as a good source of nutrients for human beings. It is generally agreed that all characters of egg worth has a genetic base. Egg quality is considered today a set of characteristics of an egg that affect its acceptability to the consumers. Egg quality has been defined by Stadelman (1977) as the characteristics of an egg that affect its acceptability to the consumers. One of the important price contributing factors for table and fertile eggs is their quality. Consequently, the commercial success of a laying flock merely depends on the number of quality eggs produced. Currently, it is widely documented that eggs are more than a source of dietetic nutrients and a series of research studies have been conducted on categorizing and portraying their biologically active components (Mine and Kovacs-nolan, 2004). The egg size and the weight of its main components are affected by genetic and non-genetic factors (Suk and Park, 2001). Free range chicken production represents an important system for providing high quality protein and income to the growing human population especially for the women (Gueye, 2009). Due to increasing population pressure there is a demand of poultry and poultry products for good quality protein, increasing level of income and standards of living (FAO, 2002). The economic success of a laying flock solely depends upon total number of table eggs produced. Quality of eggs can be affected by many managerial factors like rearing, relative humidity, feeding, temperature and season (Parmar et al., 2006).

## 2. Materials and methods

The research was conducted at Indigenous Chicken Genetic Resource Center, Department of Poultry Production, University of Veterinary and Animal Sciences Lahore. Seven breeds/strains of chicken viz., Aseel Lakha, Aseel Mianwali, Aseel Peshawari, Naked Neck, Fayoumi, Rhode Island Red, and White Leghorn were used in this experiment. A total of 105 eggs from seven different breed/strains were randomly collected from different sources and subjected to quality analysis. Fifteen eggs from each strain/breed were used for this purpose.

Egg weight was determined by using an electronic scale to the nearest of 0.001 gram, while egg length and width were measured by using a digital vernier caliper. Albumen and yolk height were measured by using a tripod micrometer (Yakubu et al., 2008).

## 3. Results

The present study was conducted to evaluate the comparative study of egg quality traits (physical and biochemical) of seven different breeds of chicken viz., Aseel Lakha, Aseel Mianwali, Aseel Peshawari, Naked Neck, Fayoumi, Rhode Island Red and White leghorn (WLH). Means  $\pm$  SE of egg quality traits are given in the Table 1.

### 3.1. Egg weight (g)

Data summarized in the Table 1 showed that egg weight was lowest in Aseel Mianwali ( $47.50 \pm 0.59$  g) closely followed by Aseel Lakha ( $47.63 \pm 0.59$ ). The highest egg weight was observed in White leghorns ( $63.39 \pm 0.57$ g). Among the four local strains, Naked Neck had the highest average of  $52.15 \pm 0.57$ gm followed by Aseel Peshawari ( $51.50 \pm 0.77$ ) slightly better than the two less exotic strains (Fayoumi and Rhode Island Red). Significant differences at ( $P < 0.05$ ) were observed between means of seven breeds of chicken in egg weight. Graphical representation is given in Fig. 1.

Mathivanan and Selvaraj (2003) reported higher egg weight (60.23 g) in White leghorn layers. Monira et al. (2003) also reported 58.38g egg weight in White leghorn layer. Strain differences have also been reported by many workers. Moula et al. (2009) for example, reported that egg weight of Lohmann strain as 62.86g. Rajkumar et al. (2009) reported mean egg weight in naked neck chicken as 56.41g and full feathered chicken as 40.5g which is lower as compared to the present study. Yakubu et al. (2008) reported lower egg weight (43.04g) in naked neck chicken. Fayeye et al. (2005) reported the mean egg weight of the eggs from Fulani-ecotype chicken eggs as 40.73g which is lower than the present study. Islam and Dutta (2010) reported the mean values for egg weight in five strains of chicken (IND, COB 500, FAY, RIR and SON) as 40.04g, 46.80g, 39.83, 56.50g and 43.80g respectively. These values are lower than the present conducted study. Khan et al. (2004) reported the range of egg weight 42-55g in RIR, Fayoumi, Sonali and Nera breeds.

**Table 1**

Egg quality characteristics of seven different breeds commonly found in Pakistan.

<b>Parameters</b>	<b>Egg weight (g)</b>	<b>Egg length (cm)</b>	<b>Egg width (cm)</b>	<b>Albumen height (mm)</b>	<b>Yolk height (mm)</b>	<b>Shape index (%)</b>	<b>Haugh unit</b>
<b>Breed/Strain</b>	<b>(Mean±SE)</b>	<b>(Mean±SE)</b>	<b>(Mean±SE)</b>	<b>(Mean ±SE)</b>	<b>(Mean±SE)</b>	<b>(Mean ± SE)</b>	<b>(Mean±SE)</b>
Aseel Lakha	47.63± 0.59 <sup>d</sup>	4.93± 0.11 <sup>b</sup>	3.65± 0.09 <sup>c</sup>	5.07± 0.05 <sup>f</sup>	15.19± 0.04 <sup>d</sup>	74.26± 3.54	74.37± 0.59 <sup>d</sup>
Aseel Mianwali	47.50± 0.59 <sup>d</sup>	5.00± 0.14 <sup>b</sup>	3.79± 0.10 <sup>bc</sup>	5.74± 0.06 <sup>d</sup>	15.88± 0.07 <sup>b</sup>	75.99 ± 3.80	79.35± 0.20 <sup>c</sup>
Aseel Peshawari	51.50± 0.77 <sup>b</sup>	5.14± 0.03 <sup>b</sup>	3.87± 0.05 <sup>bc</sup>	6.61± 0.06 <sup>b</sup>	14.56± 0.60 <sup>e</sup>	75.37± 1.40	83.70± 0.15 <sup>a</sup>
Naked Neck	52.15± 0.57 <sup>b</sup>	5.01± 0.12 <sup>b</sup>	3.88± 0.06 <sup>bc</sup>	5.40± 0.20 <sup>e</sup>	14.64± 0.04 <sup>e</sup>	77.51 ± 1.80	74.99± 1.36 <sup>d</sup>
Fayoumi	50.51± 0.57 <sup>bc</sup>	5.16± 0.04 <sup>b</sup>	3.90± 0.05 <sup>b</sup>	6.10± 0.01 <sup>c</sup>	15.45± 0.03 <sup>c</sup>	75.60 ± 1.53	80.67± 0.16 <sup>bc</sup>
RIR	49.07± 0.60 <sup>cd</sup>	5.16± 0.09 <sup>b</sup>	3.77± 0.06 <sup>bc</sup>	5.35± 0.03 <sup>e</sup>	15.84± 0.03 <sup>b</sup>	73.08± 2.26	75.92± 0.30 <sup>d</sup>
WLH	63.39± 0.57 <sup>a</sup>	5.52 ± 0.10 <sup>a</sup>	4.23± 0.06 <sup>a</sup>	6.96± 0.04 <sup>a</sup>	17.14± 0.03 <sup>a</sup>	76.66± 2.49	82.81± 0.14 <sup>ab</sup>

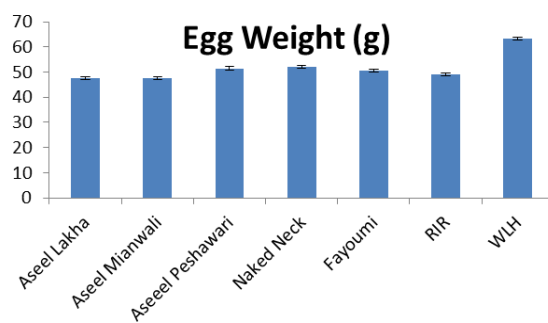


Fig. 1. Means of seven breeds of chicken in egg weight.

### 3.2. Egg length (cm)

Data summarized in the Table 1 showed that egg length of Aseel Lakha was the lowest ( $4.93 \pm 0.11$  cm) while highest value was observed for White leghorn eggs ( $5.52 \pm 0.10$  cm). The average mean egg length for White leghorn was higher, whereas average mean egg length of Aseel Peshawari was highest among Aseels ( $5.14 \pm 0.03$  cm). Non-significant differences at ( $P < 0.05$ ) were observed between means of seven breeds of chicken in egg length. Graphical representation is given in Fig. 2.

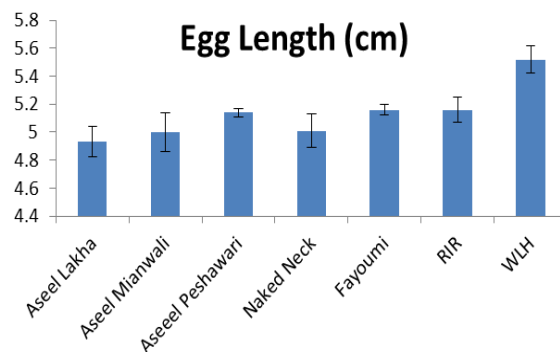


Fig. 2. Means of seven breeds of chicken in egg length.

Monira et al. (2003) found egg length of 5.91 cm in White leghorn. Fayeye et al. (2005) reported mean egg length of the eggs from Fulani-ecotype chicken eggs as 34.91mm, which is lower than the present study. Islam and Dutta (2010) reported the mean values for egg length in five strains of chicken (IND, COB 500, FAY, RIR and SON) as 4.83cm, 5.69cm, 4.77cm, 5.78cm and 5.46cm respectively. These values are supporting the present conducted study.

### 3.3. Egg width (cm)

Data summarized in the table 1 showed that egg width of Aseel Lakha and Rhode Island Red is lowest and had means  $\pm$  SE as ( $3.65 \pm 0.09$ ) and ( $3.77 \pm 0.06$ ) respectively while highest in White leghorn and had mean  $\pm$  SE as  $4.23 \pm 0.06$ . The mean  $\pm$  SE of other breeds of chicken are mentioned in the Table 1.

The average mean egg width for White leghorn was higher, whereas average mean egg width of Naked Neck was highest among local breeds. Significant differences at ( $P < 0.05$ ) were observed between means of seven breeds of chicken in egg width. Graphical representation is given in Fig. 3.

Monira et al. (2003) found egg width of 4.21 cm in White leghorn. This finding is showing that reported egg width of White leghorn is near to recorded value of present study. Fayeye et al. (2005) reported the mean egg width of the eggs from Fulani-ecotype chicken eggs as 23.59mm (2.359cm) which is lower than the present study. Islam and Dutta (2010) reported the mean values for egg width in five strains of chicken (IND, COB 500, FAY, RIR

and SON) as 3.71cm, 4.22cm, 3.72cm, 4.43cm and 4.12cm respectively. These values are supporting the present conducted study.

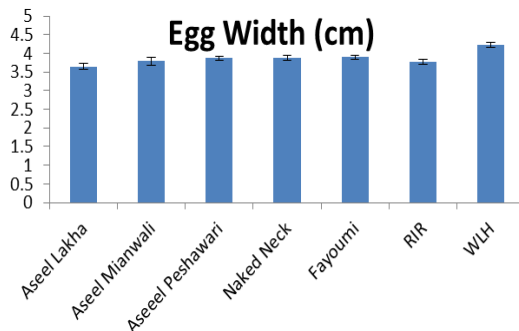


Fig. 3. Means of seven breeds of chicken in egg width.

### 3.4. Albumen height (mm)

Data summarized in Table 1 Showed that albumen height in case of White leghorn had higher mean  $\pm$  SE as  $6.96 \pm 0.04$  while lowest in Aseel Lakha as  $5.07 \pm 0.05$ . Statistically there were significant difference at ( $P < 0.05$ ) among means of seven different breeds of chicken. Graphical representation is given in Fig. 4.

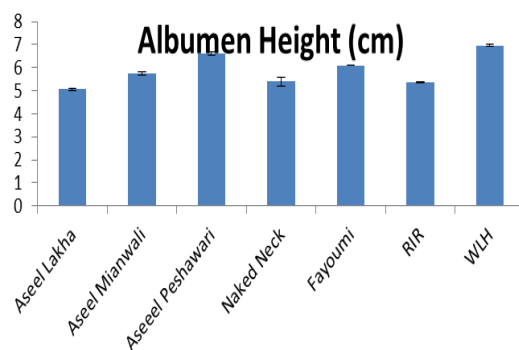


Fig. 4. Means of seven different breeds of chicken in albumen height (cm).

Yakubu et al. (2008) reported that the albumen height in naked neck and normal feathered laying hens are 4.65mm and 4.29mm respectively. Rajkumar et al. (2009) reported higher albumen height of 6.65mm in naked neck chicken as compared to the present study. Niranjan et al. (2008) reported the value for albumen height as 6.65mm in naked neck chicken. Fayeye et al. (2005) reported the average albumen height value 4.92mm in Fulani-ecotype chicken eggs which is lower than the present study. Khan et al. (2004) reported the mean value for albumen height as 7.38mm which is higher in case of Nera birds and is higher in value as compared with the present study.

### 3.5. Yolk Height (mm)

It was found that the mean  $\pm$  SE of height of yolk of Aseel Mianwali ( $15.88 \pm 0.07$ ) was highest among all the four local breeds. While highest mean  $\pm$  SE of yolk height was found in White leghorn as  $17.14 \pm 0.03$ . Statistically there were significant differences in height of yolk among the mentioned breeds of chicken. Graphical representation is given in Fig. 5. Yakubu et al. (2008) reported that the yolk height in naked neck and normal feathered laying hens are 16.95mm and 16.05mm respectively. Fayeye et al. (2005) reported the average albumen height value 14.27mm in Fulani-ecotype chicken eggs which is lower than the present study. Islam and Dutta (2010) reported the mean values for yolk weight in five strains of chicken (IND, COB 500, FAY, RIR and SON) as 14.65g, 9.60g, 14.88g, 11.20g and 16.40g respectively. Obaidi et al. (2011) reported that the mean value for yolk height is  $16.50 \pm 0.44$ .

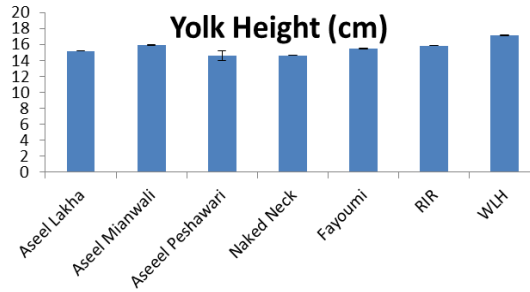


Fig. 5. Means of seven different breeds of chicken in yolk height (cm).

### 3.6. Shape index (%)

When we studied the shape index of all breeds then we found that the shape index of Naked Neck ( $77.51 \pm 1.80$ ) was highest among all the local breeds while the white Leg Horn scored the highest value ( $76.66 \pm 2.49$ ) of shape index and lowest by Rhode Island Red ( $73.08 \pm 2.26$ ). Statistically there were non-significant differences among the mentioned breeds of chicken. Graphical representation is given in Fig. 6. Enaiat et al. (2009) reported a significant differences between strains on shell thickness and non-significant differences on egg shape index and shell percentage.

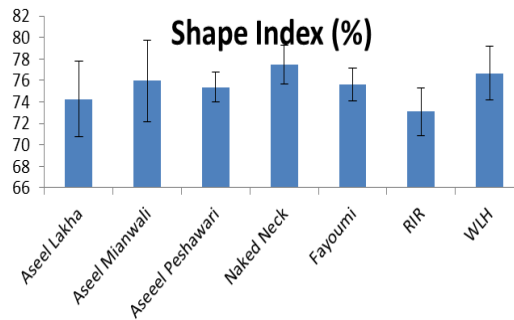


Fig. 6. Means of seven different breeds of chicken in shape index (%).

### 3.7. Haugh unit

While comparing the Haugh unit value of all breeds it was found that the Aseel Peshawari has the highest value ( $83.70 \pm 0.15$ ) which is followed by White Leg Horn ( $82.81 \pm 0.14$ ), Fayoumi ( $80.67 \pm 0.16$ ), Aseel Mianwali ( $79.35 \pm 0.20$ ), Rhode Island Red ( $75.92 \pm 0.30$ ), Naked Neck ( $74.99 \pm 1.36$ ) and lowest in Aseel Lakha ( $74.37 \pm 0.59$ ). Statistically there were significant differences among the mentioned breeds of chicken. Graphical representation is given in Figure. 7.

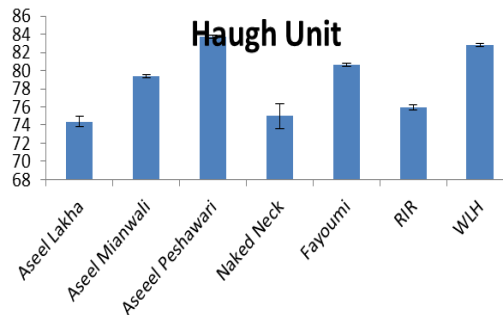


Fig. 7. Means of seven different breeds of chicken in Haugh unit.

Sakunthaladevi and Reddy (2005) reported Haugh unit 73 and 74 in White Leghorn and crossbred chicken respectively, these values are quite close to the results reported in the present study.

#### 4. Conclusion

Breed differences exist in physical egg quality traits such as egg weight, egg length, egg width albumen height and yolk height among the seven breeds/strains of chicken studied. Rizk et al. (2008) has also stated that the differences between chicken strains could be due to the differences in egg quality traits.

#### Acknowledgements

The author of this article gratefully would like to acknowledge the efforts of “fist of sand” for the provision of skillful technical and moral support.

#### References

- Enaiat, M., El anwar, Salem amina, A., Abou-eilla eman, M., Al-Kotait, A., 2009. Comparative study between two local strains under cage and floor housing systems. *Egypt. Poult. Sci.* 29, 439-464.
- FAO, 2002. *World agriculture towards 2030*. Rome, Italy, 2015-2030.
- Fayeye, T., Adeshiyan, A., Olugbami, A., 2005. Egg traits, hatchability and early growth performance of the Fulai-ecotype chicken.
- Gueye, E., 2009. The role of networks in information dissemination to family poultry farmers. *World's Poult. Sci. J.* 65, 115-123.
- Islam, M., Dutta, R., 2010. Egg quality traits of indigenous, exotic and crossbred chickens (*Gallus domesticus* L.) in rajshahi, Bangladesh. *J. Life. Earth. Sci.* 5, 63-67.
- Khan, M., Khatun, M., Kibria, A., 2004. Study the quality of eggs of different genotypes of chicken under semi-scavenging system at Bangladesh. *Pak. J. Bio. Sci.* 7, 2163-2166.
- Mathivanan, R., Selvaraj, P., 2003. Influence of dietary chromium on egg production and quality parameters in layers. *Indian J. Poult. Sci.* 38, 51-115.
- Mine, Y., Kovacs-nolan, J., 2004. Biologically active hen egg components in human health and disease. *J. Poult. Sci.* 41, 1-29.
- Monira, K., Salahuddin, M., Miah, G., 2003. Effect of breed and holding period on egg quality characteristics of chicken. *Int. J. Poult. Sci.* 2, 261-263.
- Moreki, J., Dikeme, Poroga, B., 2010. The role of village poultry in food security and HIV/AIDS mitigation in Chobe district of Botswana. *Livest. Res. Rural. Dev.* 22.
- Moula, N., Moussiaux, N., Farnir, F., Leroy, P., 2009. Comparison of egg composition and conservation ability in two Belgian local breeds and one commercial strain. *Intl. J. Poult. Sci.* 8, 768-774.
- Niranjan, M., Sharma, R., Rajkumar, U., Chatterjee, R., Reddy, B., Battacharya, T., 2008. Egg quality traits in chicken varieties developed for backyard poultry farming in India. *Livestock Research for Rural Development* 20.
- Obaidi, F., Shaheed, S., Dalawi, R., 2011. Quality, chemical and microbial characteristics of table eggs at retail stores in Baghdad. *Intl. J. Poult. Sci.* 10, 381-385.
- Parmar, S., Thakur, M., Tomar, S., Pillai, P., 2006. Evaluation of egg quality traits in indigenous Kadaknath breed of poultry. *Livest. Res. Rural. Dev.* 18.
- Perry, B., Randolph, T., Mcdermott, J., Thornton, P., 2002. Investing in animal health research to alleviate poverty. ILRI. Nairobi, Kenya., 148.
- Rajkumar, U., Sharma, R., Rajaravindra, K., Niranjan, M., 2009. Effect of genotype and age on egg quality traits in naked neck chicken under tropical climate from India. *Int. J. Poult. Sci.* 8, 1151-1155.
- Rizk, R., Nadia, A., El-sayed, Shahein, E., Hedaia, M., Shalan, 2008. Relationship between eggshell, eggshell membranes and embryonic development through different egg production periods in two developed chicken strains. *Egypt. Poult. Sci.* 28, 535-551.
- Sakunthaladevi, K., Reddy, P., 2005. Genetic studies on certain economic traits in White Leghorn and crossbred chicken. *Indian. J. Poult. Sci.* 40, 56-58.
- Stadelman, W., 1977. *Quality identification of shell eggs science and technology*. W. J. Stadelman and D. J. Cotterill. AVI Publishing company Inc. Westport, Connecticut.
- Suk, Y., Park, C., 2001. Effect of breed and age of hens on the yolk to albumen ratio in two different genetic stocks. *Poult. Sci.* 80, 855-858.

Yakubu, A., Ogah, D., Brade, R., 2008. Productivity and egg quality characteristics of free range Naked Neck and normal feathered Nigerian indigenous chickens. *Int. J. Poult. Sci.* 7, 579-585.