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Research Article

Egg Characteristics of Aseel Chickens in 3 Different Taluka's of Tando Allahyar, Sindh Pakistan

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Abstract

The present study aimed to analyze the characteristics of Aseel chicken eggs, specifically focusing on size, quality, and their impact on hatchability percentage. The study was conducted in Sindh, Pakistan, with a total of 114 eggs selected from three different talukas in district Tando Allahyar. Parameters such as egg weight, specific gravity, egg shell, and egg thickness were recorded and analyzed. The data was further examined using rank-Spearman analysis to determine the correlation between these parameters. The results indicated significant differences ($p < 0.05$) among the selected talukas, with Tando Allahyar and Jhando Mari talukas showing higher values for egg weight, eggshell thickness, and specific gravity. Additionally, a significant ($p < 0.05$) and moderate to positive correlation was observed among all parameters. These findings suggest that the variations in results across different areas may be attributed to management practices and genetic differences in Aseel chicken populations within the talukas.

Keywords: Aseel; Eggshell; Specific gravity; Tando Allahyar; Sindh

Introduction

Eggs are the basic and only method of chicken reproduction. Egg size as well as eggshell and quality are major factors to consider when considering the hatchability of a fertile egg. The egg weight is closely related to the hatching chick egg (Iqbal *et al.*, 2017; Kaleri *et al.*, 2023b). According to a study conducted by Chimezie *et al.* (2020), it was found that the weight of eggs has a direct impact on the development of chicks during the

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embryonic stage. Another research by Li *et al.* (2011) revealed that there is variability in egg size within a breed, which can be attributed to factors such as the average body weight and age of the parents, duration of egg laying, management practices, and feed intake. The successful hatching of eggs heavily relies on the quality of the eggshell. The eggshell acts as a protective barrier for the developing embryo, creating an optimal environment for its growth and development. This information was highlighted in a study conducted by (Anene *et al.*, 2020). Various factors, such as the weight of the egg and the age of the chickens, can influence the quality of the eggshells.

The strength of eggshells plays a major role representing the overall quality of egg (Ayeni *et al.*, 2018). To assess the strength of eggshells, a commonly used method is measuring their specific gravity, which provides insights into the internal structure and microstructure of the shell (Ketta and Tůmová, 2018). It is a well-known fact that the specific Aseel chicken, a breed of indigenous backyard poultry bird, possesses limited production potential.

However, these birds hold immense cultural and economic significance for both the country and individual households, contributing to food security (Kaleri *et al.*, 2023d), have highlighted that numerous indigenous poultry breeds have faced extinction primarily due to the lack of information regarding their physical traits and their ability to produce meat and eggs. The purpose of this study The objective of our investigation was to gather information on the distinctive features of Aseel chicken eggs across various regions, or talukas, in Tando Allahyar.

Methodology

Housing management

This study was conducted on 114 egg of Aseel chicken with 38 eggs were collected from each different taluka's Tando Allahyar, Chmbar and Jhando Mari of district Tando Allahyar, Pakistan.

Aseel chicken management

The eggs used for this study were obtained from chickens that were raised under a semi-intensive farming system. In this particular system, the chickens were confined to designated areas that were equipped with shelters to shield them from adverse weather conditions, and also provided a secure place for them to rest at night. The chicken owners provided additional nourishment to meet the nutritional requirements of the chickens, which included commercially produced feed, rice bran, and leftover household items. Farmers also provided extra protein sources like snails. The chicken owners implemented diverse measures to ensure the chickens' well-being. This included vaccinating the healthy chickens to protect them from diseases, and utilizing a combination of traditional and modern medicines to treat any sick chickens that may arise.

For this investigation, a total of 114 eggs, all younger than one week, were collected. In order to assess the level of freshness in the eggs, an official gauge specifically designed to measure the depth of the air pocket, known as the air-cell gauge, was employed. Only eggs that met the criteria of AA quality or possessed a depth of 1/8 inch (3.2 mm) were considered for inclusion in the sample. Additionally, any eggs that were found to be cracked were excluded from further measurements to ensure their integrity. Throughout the duration of the study, An egg tray was used for egg collection purpose. In order for weight measuring a digital weight balance machine was used to measure the egg weight,

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whereas the thickness of the eggshell was assessed utilizing a micrometer screw gauge. In order to compute the specific gravity of the eggs, a combination of a bucket, saltwater, and a hydrometer were employed.

The selected eggs went through a process of purification with the help of warm water, followed by the application of distinctive identification numbers by using the pen. Following that, the eggs were carefully measured in terms of weight and subsequently placed inside a container to calculate their specific gravities (SGs). Ultimately, the eggs were immersed in various substances to facilitate additional analysis and investigation. To calculate the specific gravity (SG) of a sample, a range of salt solutions varying from 1.075 to 1.100 were prepared. The experiment commenced by immersing the eggs in the experiment, the eggs were subjected to a series of salt solutions, starting from the least concentrated solution (1.075) and progressing to solutions with higher salt concentrations. Eggs with less substantial shells tended to float in the solutions that were less concentrated. Afterwards, the eggs were delicately cracked open to assess the thickness of their shells. The information derived from examining the eggshell and estimating correlations was processed utilizing SPSS student package.

Results

The results for egg weight and external characteristics in Aseel chicken showed in Table 1. The result revealed that 41.575±2.271 and 44.167±1.195 (g) with coefficient of variation 4.91, 8.67 (%). The result revealed significant difference between egg weight and in different taluka's.

Table 1. Egg weight and external characteristics in Aseel chicken.

Variable	Study areas			
	Tando Allahyar	Chambar	Jhndo Mari	*P*- Value
Egg weight				
Average (g)	41.575±2.271	44.167±1.195	43.731±3.365	0.029*
Maximum (g)	51.31	49.43	47.76	
Minimum (g)	36.26	40.17	39.81	
Coefficient of variation %	7.87	4.91	8.67	
Specific gravity				
Average	1.071±0.003	1.071±0.003	1.083±0.005	
Maximum	1.085	1.085	1.085	0.029*
Minimum	1.061	1.067	1.073	
Coefficient of variation %	0.49	0.49	0.61	
Eggshell				
Average (mm)	0.263±0.017	0.259±0.019	0.339±0.021	
Maximum (mm)	0.23	0.23	0.27	0.029*
Minimum (mm)	0.19	0.20	0.23	
Coefficient of variation %	7.91	9.43	4.32	

Table 2 presents the results of the correlation analysis conducted on egg weight and specific gravity. The findings revealed that the maximum egg weight was observed in the Chmbar taluka, while the lowest was found in Jhando Mari. Interestingly, our study

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found that all eggs had lower weights compared to the average egg weight of 52.50 g suggested by (Exwal *et al.*, 2020). It is therefore suggested that Aseel chicken have ability to produce heavy egg weight as well as chicks.

Table 2. The results for correlation estimate Aseel chicken weight of egg, gravity and eggshell.

Variables	Weight of egg	Specific gravity	Eggshell
Estimation of correlation	0.90	0.227*	0.247**
Sig. 2 tailed	-	0.09	0.005
N	113	113	113
Estimation of correlation	0.223*	1.009	0.491**
Sig. 2 tailed	0.011	-	0.000
N	115	115	115
Estimation of correlation	0,231**	0.498**	1.000
Sig. 2 tailed	0.005	0.000	-
N	113	113	113

*Indicate the estimation correlation at 0.05 at level of 0.05

**Indicate the estimation correlation at 0.01 at level of 0.01

Ayeni *et al.* (2018) and Chimezie *et al.* (2020), revealed positive and moderate results for correlation estimates among egg and chick weight. The primary factor influencing egg weight was identified as albumen, which is the white part of the egg. Eggs with greater weight tend to have a higher proportion of albumen and water. This is because albumen serves key water source in egg. It is worth noting that domestic fowl eggs typically consist of approximately 10.5% protein and 88.5% water. Additionally, the quantity of protein present in albumen plays a crucial role in the development of embryonic tissue. Therefore, variations in the amount of albumen can significantly affect the growth and development of both embryos. The specific gravity of egg depend on the diet on birds on which were raised.

The fluctuations in egg weights witnessed during this investigation are most likely attributed to variances in the management systems, specifically the feeding techniques employed. It is widely held that the intake of feed, its composition, and nutritional value can significantly impact the overall performance of chickens, thereby influencing the weight of their eggs. The study found that a reduction in the consumption of food leads to a decline in the weights of both eggs and albumen, as observed in a study conducted by Li *et al.* (2011). On the contrary, augmenting the diet energy percenatge of 282 (kcl) metabolizable energy per gram of lysine leads to a boost in egg weight, as demonstrated in a study conducted by. Furthermore, a decrease in dietary lysine intake may cause a decrease in albumen weight (Novak *et al.*, 2004). On the other hand, an increase in the diet's methionine content has been found to enhance the weight of egg (Novak *et al.*, 2004). The essential amino acids such as lysine and methionine must be added in poultry feed during feed formulation. Based on the current findings, it is suggested that the poultry feed utilized in taluka Chambar containing sufficient in both quantity and nutritional requirements to achieve optimal egg weight for the Aseel breed. The variation among the egg weight and eggshell thickness was observed higher values in taluka Chmabar as compared with Jhando Mari and Tando Allahyar. The mentioned difference

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might be due to breed difference, chicken diet, healthy birds and heavey weight breed. It is real fact that birds hatched with healthy and heavey body wight produce more heavey weight egg as compared with unhealthy and lethal birds. The breed is main difference among these parameters heavey weight breed female lay egg with higher weight and more eggshell thickness as compared with less body weight female.

Results of the present study, it is apparent that Aseel chickens tend to have a higher weight compared to chickens from other regions, particularly in Chmbar. The weight of hens directly affects the weight of the eggs they produce, as mentioned by Ullah *et al.* (2019) and Edeh *et al.* (2020). As a result, the weight of hens indirectly indicates the genetic diversity of the Aseel breed, as variations in egg weight can indicate the diversity within Aseel hens. It is believed that unregulated crossbreeding practices have predominantly occurred in Chambar. Numerous studies have reported that when Aseel chickens are crossed with other local breeds, their offspring are lighter in weight (Iskandar *et al.*, 2002) and produce smaller eggs (Depison, 2009). Furthermore, hybrid rooster Aseel chickens were found to be incapable of exhibiting the distinct characteristics of their purebred parents, particularly in terms of vocalization (Daryono *et al.*, 2020). Author suggested differences in traits among chickens can also contribute to variations in their physical appearance (Melesse and Negesse, 2011; Kaleri *et al.*, 2023c).

Significant variations in the specific gravity of eggs are evident across different research areas, as shown in Table-1. Among these areas, Chmbar taluka stands out with the highest egg-specific gravity. Moving on to Table-2, it becomes apparent that there is a significant but weak positive relationship between the weight of eggs and their specific gravity. This implies that as the weight of eggs increases, their specific gravity also tends to increase. Interestingly, our study's findings contradict the earlier with findings of (Akbar *et al.*, 2020), (Kaleri *et al.*, 2023) and (Silva *et al.*, 2017), who suggested that egg having higher weight will have less specific gravity level.

Table-1 also showcases notable disparities eggshell harndess between different domains of studies. Furthermore, results presented in Tabel 2 are evidence of a considerably feeble positive association between the weight of eggs and the width of their eggshells. It is worth noting that as the weight of eggs increases, the eggshells tend to become thicker. This finding aligns with the conclusions drawn by Kaleri *et al.* (2023a), who suggested that higher egg weight is associated with greater shell weight.

Moreover, according to Table 2, it is indicated that there exists a notable and moderate upward relationship between the gravity of Aseel chicken egg and thickness of their eggshells. This finding provides further evidence to support the assertions made by Iqbal *et al.* (2017), claimed results and reported that results for gravity showed strong high positive correlation estimates among hardness of eggshell. Furthermore, it is noteworthy that the the egg gravity indirectly contributes to the formation and affects the strength and composition of the shell, as emphasized.

Conclusion

The present study uncovers a wide range of variations in the characteristics of Aseel chicken eggs within the designated research areas. The variation in egg weight suggests Aseel chicken in various parts of exhibit variation in the form of body size as well as the way they are reared, especially in relation to their feeding techniques. Additionally, the

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weight of the eggs may also indicate a diverse genetic composition among the Aseel birds. Analysis of the data related to the density with eggshell harndess showed female Aseel chicken ability found in the designated investigation regions might due to varying phases of their reproductive cycle and age. In order to obtain a more thorough comprehension of the rearing management systems, encompassing feeding, breeding techniques, and more, it is imperative to delve further into the subject. composition of flocks, further investigations should be conducted in the future. It is important to note that different regions may employ distinct approaches and technical systems to ensure the sustainability of the Aseel chicken population.

Conflict of Interest

The authors have not declared any conflict of interest.

Authors Contributions

All the authors contributed equally in the manuscript.

References

Anene, D. O., Y. Akter, P. C. Thomson, P. Groves and C. J. O'Shea. 2020. Variation and association of hen performance and egg quality traits in individual early-laying ISA Brown Hens. Animals, 10: 1601.

Ayeni, A., J. Agbede, F. Igbasan, G. Onibi and M. Adegbenro. 2018. Effect of egg sizes on egg qualities, hatchability and initial weight of the hatched-chicks. International Journal of Environment, Agriculture and Biotechnology, 3: 987-93.

Chimezie, V., A. Ademola, O. Alli, A. Jubril and B. Josiah. 2020. Relationship between egg weight, hatching weight and subsequent body weight in the Japanese quail. Nigerian Journal of Animal Production, 47: 19-23.

Daryono, B., M. Mushlih and A. Perdamaian. 2020. Vocalization characters and forkhead box P2 (FoxP2) polymorphism in Indonesian crowing-type chicken (*Gallus gallus* domesticus). Iranian Journal of Applied Animal Science, 10: 131-40.

Depison, D. 2009. Karakteristik kuantitatif dan kualitatif hasil persilangan beberapa ayam lokal. Jurnal Ilmiah Ilmu-Ilmu Peternakan, 12: 7-13.

Edeh, H., C. Osita, C. Nwoga, A. Ani and J. Okwor. 2020. The effect of bodyweight variation on laying performances of Shaver brown hen in humid tropical environment. Nigerian Journal of Animal Science, 22: 83-90.

Exwal, R., B. Utomo, S. Andaruisworo, A. Tanjungsari and E. Yuniati. 2020. Stage fertility profile of three types of local chickens in indonesia (Pelung chicken, Kampung chicken and Cemani chicken). STAGE FERTILITY PROFILE OF THREE TYPES OF LOCAL CHICKENS IN INDONESIA (PELUNG CHICKEN, KAMPUNG CHICKEN AND CEMANI CHICKEN), 9: 6953-62.

Iqbal, J., N. Mukhtar, Z. U. Rehman, S. H. Khan, T. Ahmad, M. S. Anjum, R. H. Pasha and S. Umar. 2017. Effects of egg weight on the egg quality, chick quality, and broiler performance at the later stages of production (week 60) in broiler breeders. Journal of Applied Poultry Research, 26: 183-91.

https://doi.org/10.55627/Javs.03.1.0503

Iskandar, S., T. Pasaribu and H. Resnawati. 2002. Growth and carcass responses of three lines of local chickens and its crossing to dietary lysine and methionine. International Seminar on Tropical Animal Production (ISTAP).

Kaleri, R., H. Kaleri, N. Kalhoro, R. Mangi, G. Solangi, D. Bhuptani and S. Dari. 2023a. Phenotypic characterization of indigenous backyard poultry birds in Tando Allahayar, Pakistan. Pakistan Journal of Agricultural Research, 36: 135-41.

Kaleri, R. R., H. A. Kaleri, R. A. Mangi, G. M. Solangi, Z. A. Khoso, A. A. Channa, M. A. Soomro, M. A. Memon, S. Bakhash and I. H. Solangi. 2023b. Phenotypic diversity of Aseel Chicken in District Tando Allahyar, Sindh, Pakistan. Pure and Applied Biology (PAB), 12: 1541-47.

Kaleri, R. R., H. A. Kaleri, G. M. Solangi, R. A. Mangi, A. W. Solangi, Z. A. Mangrio, F. A. Khushk, M. A. Memon, M. A. Soomro and D. K. Bhuptani. 2023c. Population Density of Grey Francolin (*Franclinus Pondicrianus* L.) in District Tando Allahyar, Sindh, Pakistan. Journal of Bioresource Management, 10: 1.

Kaleri, R. R., Z. A. Khoso, R. A. Mangi, G. M. Solangi, I. Ahmed, M. A. Memon, M. A. Soomro, F. A. Khushk, A. Anwar and L. Kumar. 2023d. Economic Importance of Backyard Poultry in Taluka Jhando Mari, District Tando Allahyar, Sindh: Importance of Backyard Poultry in Taluka Jhando Mari. MARKHOR (The Journal of Zoology): 74-79.

Ketta, M. and E. Tůmová. 2018. Relationship between eggshell thickness and other eggshell measurements in eggs from litter and cages. Italian Journal of Animal Science, 17: 234-39.

Li, F., L. Xu, A. Shan, J. Hu, Y. Zhang and Y. Li. 2011. Effect of daily feed intake in laying period on laying performance, egg quality and egg composition of genetically fat and lean lines of chickens. British Poultry Science, 52: 163-68.

Melesse, A. and T. Negesse. 2011. Phenotypic and morphological characterization of indigenous chicken populations in southern region of Ethiopia. Animal Genetic Resources/Resources génétiques animales/Recursos genéticos animales, 49: 19-31.

Novak, C., H. Yakout and S. Scheideler. 2004. The combined effects of dietary lysine and total sulfur amino acid level on egg production parameters and egg components in Dekalb Delta laying hens. Poultry Science, 83: 977-84.

Ullah, M., G. M. Marri, Q. Jogi, M. Rasheed, H. R. Rizawana, R. R. Kaleri, J. P. Goil, Z. A. Khoso, A. Shahab and A. Kabir. 2019. Dietary effect of autolysed yeast on broilers (Levabon®, Biomin Austria) on broiler growth. Pure and Applied Biology (PAB), 8: 1223-27.

https://doi.org/10.55627/Javs.03.1.0503