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Comparative study on productive performance, egg quality, egg geometry and hatching traits of three age groups of indigenous Peshawari Aseel chickens

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ABSTRACT

The aim of study was to compare three production cycles of different age groups of indigenous Peshawari Aseel chicken at Indigenous Chicken Genetic Resource Center (ICGRC), UVAS Ravi Campus Pattoki for the duration of 4 weeks. For this Purpose 24 birds of 3 different production cycles (1, 2 and 3 at the age of 35, 65 and 95) were used. Eight birds in each category comprising 7 females and 1 male were placed in each replicate. The data was collected regarding production performance, egg quality and egg geometry and analyzed through Completely Randomized Design (CRD) using analysis of variance (ANOVA) techniques. Means were compared using Fisher's LSD (Least significant Difference) Test by the help of SAS (Statistical Analysis System). Non-significant differences ($P > 0.05$) were observed in cumulative feed intake at the start of experiment week 1, week 3 and week 4. The birds in 2nd production cycle remained the highest feed consumer throughout the experimental period followed by 1st and 3rd production cycles along with same trend in calories, protein, Ca, P, Lysine and Methionine intake throughout the experimental period. The birds in 2nd production cycle remained significantly higher egg producer along with production of higher egg mass and better FCR. Non-significant differences ($P > 0.05$) were observed in the egg shell % of 1st, 2nd and 3rd production cycles. The birds of 3rd production cycle remained the highest in the Haugh unit score and yolk index throughout the experimental period followed by 1st and 2nd production cycle. Non-significant differences ($P > 0.05$) were observed in shape index, egg

surface area and egg volume in all the three production cycles. The birds of 3rd production cycle remained significantly higher in shape index throughout the experimental period followed by the 1st and 2nd production cycle.

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1. Introduction

In Pakistan four different varieties of Aseel are very popular named as Lakha, Mushki, Mianwali and Peshawari depending upon their tropical regions but the information about their productive and reproductive performance is not satisfactory and there is a dire need to explore this horizon. Peshawari Aseel which may also known as Peela Aseel is very popular in Pakistan, as the name indicates it is the home variety of Pakistan's city Peshawar and its surrounding areas. As far as its phenotypic characterization is concerned it has shiny yellowish brown plumage with, red ear lobe and pea comb while wattles are absent and have yellow shanks. Adult male attains body up to 2500 (g) whereas female attains 1700(g) at sexual maturity. Egg production of Peshawari Aseel is 53 eggs per year while its average egg weight is 42 (g). Production performance, egg quality, egg geometry and hatching traits are such parameters which are very important in reviving indigenous breeds. Age is the main factor which affects these parameters. Different authors reported that egg's external and internal quality, embryogenesis and hatchability is affected by age (Latour *et al.*, 1996; Latour *et al.*, 1998; Silversides and Scott, 2001) while Islam *et al.*, (2001) found that the external and internal egg quality traits of the breeds affect the future generations and their production performance. Eggs from early production breed flocks tend to have thicker egg shells and affect other egg quality traits (Brake *et al.*, 1997) but there is not any clear information about the productive and reproductive performance regarding age groups in native chicken (Peshawari Aseel).

Keeping above in view the present project has been planned with the following objectives:

- To get baseline information about the laying characteristics of a native variety of Peshawari Aseel.
- To compare feed efficiency, laying characteristics of three different age groups of Peshawari Aseel.
- To compare the egg quality and egg geometry of three different age groups of Peshawari Aseel.

2. Materials and methods

The experiment was conducted on 21 Peshawari Aseel hens at laying stage maintained at Indigenous Chicken Genetic Resource Center (ICGRC), Department of Poultry Production, University of Veterinary and Animal Sciences (UVAS) Lahore, Ravi Campus Pattoki. The birds were kept in three-tiered laying cages with slopping wire floors and dropping trays to facilitate egg collection and removal of droppings. The body weight of the individual bird was taken at the start of the experiment and then on weekly basis by using electrical weighing balance capable of measuring up to 1 g. In laying characteristics egg number, egg weight, egg mass, feed per dozen egg and feed per kg egg mass were studied whereas in egg quality, shell weight, shell thickness, albumen height, albumen weight, Haugh unit score, yolk index were scientifically calculated at the end of the experiment. In egg geometry shape Index (cm), surface Area (cm²), and volume (cm³) is calculated. Experiment was conducted according to completely randomized design (CRD). The data were analyzed using SAS statistical analysis package (Littell *et al.*, 1991) by applying Analysis of Variance techniques (Steel *et al.*, 1997). Means were compared using Fisher's LSD (Least Significant Difference) Test as described by Sokal and Rohlf (1995).

3. Results and discussion

3.1. Body weight

Significant differences ($P < 0.05$) were observed in body weights in the start of experiment (week 0), week 2, and week 3. The bird in cycle 3 remained the heaviest throughout the experimental period followed by the birds in cycle 2 and cycle 1. Similarly, higher body weight at different ages in Aseel breed has also been reported in another study (Haunshi *et al.*, 2011).

3.2. Feed intake

Non-significant differences ($P > 0.05$) were observed in cumulative feed intake. The birds in 2nd production cycle remained the highest in cumulative feed intake throughout the experimental period followed by the birds in 3rd and 1st production cycle (455 ± 50 , 515.71 ± 47.11 , 429.29 ± 66.68) these values are comparable with the results of Gupta *et al.*, (2000) who found that feed intake in the Aseel chicken increases with age until 21 weeks of age, weekly feed intake per bird in 1, 2, 3, 4 and 5 months old Aseel was 124, 300, 540, 650 and 750 grams respectively.

3.3. Nutrient intake

Non-significant differences ($P > 0.05$) were observed in cumulative calories; protein, and calcium, phosphorus, lysine and methionine intake, 2nd production cycle remained the highest in cumulative calories, protein, and Ca, P, lysine and methionine intake throughout the experimental period followed by the birds in 3rd and 1st production cycle.

3.4. Egg number & egg mass

Non-significant differences ($P > 0.05$) were observed in cumulative egg number and cumulative egg mass. The birds in 2nd production cycle remained the highest in cumulative egg number and egg mass production throughout the experimental period followed by the birds in 3rd and 1st production cycle. Results showed that on an average Peshawari Aseel may produce 53 eggs per year, quite close to this estimates (50-55 eggs per year) have been reported in Aseel chicken of Bangladesh (Yoshimura *et al.*, 1997).

3.5. Feed per dozen eggs and per kg egg mass

Non-significant differences ($P > 0.05$) in feed per dozen eggs and per Kg egg mass were observed in 1st, 2nd and 3rd production cycles. The birds of 1st production cycle remained the highest in terms of feed per dozen eggs and per Kg egg mass throughout the experimental period followed by the birds in 2nd and 3rd production cycle.

3.6. Egg quality

Present study demonstrates non-significant differences ($P > 0.05$) in the shell thickness of eggs from hens in the 1st, 2nd and 3rd production cycles. The birds of 3rd production cycle had the thicker egg shell throughout the experimental period followed by the birds in 1st and 2nd production cycle. However, decrease in egg shell thickness is noticed by Butcher *et al.*, (1991). In the present study, non-significant differences ($P > 0.05$) were observed in the albumin height of eggs from hens in the 1st, 2nd and 3rd production cycles. The birds of 3rd production cycle remained the highest in albumin height throughout the experimental period followed by the birds in 1st and 2nd production cycle. However, decrease in albumen height is also noticed by (Hill and Hall, 1980; Silversides, 1994, Singh *et al.*, 2009). Also non-significant differences ($P > 0.05$) were observed in the yolk index of eggs from hens in the 1st, 2nd and 3rd production cycles. The birds of 1st production cycle remained the highest in the yolk index throughout the experimental period followed by the birds in 2nd and 3rd production cycle. However, higher yolk index at different ages in Aseel breed has also been reported in another study (Haunshi *et al.*, 2011). The average haugh unit scores were found to be (71.93 ± 5.49 , 81.99 ± 2.89 and 84.95 ± 2.18). These values are comparable with the results of Niranjan *et al.*, (2008) who found that the Aseel has Haugh unit scores between 74.64 ± 0.40 and 79.42 ± 0.30 .

3.7. Egg geometry

Non-significant differences ($P > 0.05$) were observed in shape index of 1st, 2nd and 3rd production cycle birds. The birds of 3rd production cycle remained highest in shape index throughout the experimental period followed by the birds in 1st and 2nd production cycle whereas the birds of 2nd production cycle remained highest in egg volume and surface area throughout the experimental period followed by the birds in 1st and 3rd production cycle. The average shape indexes were found to be 77.25 ± 1.57 , 76.28 ± 2.57 and 83.87 ± 3.95 cm, this finding was very close to the (Narushin and Romanov, 2002b; Narushin *et al.*, 2004, Narushin, 2005) who found that the egg shape index ranges between 57 and 92 cm.

Table 1

Comparison of production performance in three age groups of Peshawari Aseel.

Parameter	Production Performance		
	Cycle 1	Cycle 2	Cycle 3
Body weight (g)	1534.43 ± 30.22 ^b	1607.71 ± 43.88 ^b	1819.43 ± 31.34 ^a
Cumulative Feed Intake (g)	1963 ± 87.58	2321.86 ± 194.04	2188.57 ± 170.96
Calories intake (g)	5396.84 ± 241.51	6385.93 ± 533.95	6017.56 ± 470.16
Protein intake (g)	282.70 ± 12.65	334.51 ± 27.97	315.22 ± 24.63
Calcium intake (g)	60.7 ± 2.71	71.55 ± 5.98	67.42 ± 5.27
Phosphorus intake (g)	7.46 ± 0.33	8.83 ± 0.74	8.32 ± 0.65
Lysine intake (g)	12.17 ± 0.54	14.40 ± 1.20	13.57 ± 1.06
Methionine intake (g)	5.69 ± 0.25	6.74 ± 0.56	6.35 ± 0.50
Cumulative egg number / hen	5 ± 2.08	5 ± 0	5.67 ± 0.33
Cumulative egg Mass/hen	215.57 ± 86.24	203.5 ± 23.94	252.87 ± 28.84
FCR / dozen eggs	4.48 ± 3.31	9.31 ± 5.21	3.62 ± 0.96
FCR/ kg egg mass	18.13 ± 10.93	10.17 ± 1.10	10.01 ± 0.24
Egg weight (g)	45.53 ± 2.15	44.13 ± 2.03	42.67 ± 2.82

Table 2

Comparison of egg quality traits in three age groups of Peshawari Aseel.

Parameter	Egg Quality		
	Cycle 1	Cycle 2	Cycle 3
Long circumference	5.14 ± 0.14 ^a	5.20 ± 0.06 ^a	4.64 ± 0.15 ^b
Short circumference	3.97 ± 0.04	3.97 ± 0.15	3.88 ± 0.06
Shell thickness	0.34 ± 0.02	0.33 ± 0.02	0.37 ± 0.03
Shell weight	5.83 ± 0.29	6.13 ± 0.33	6.13 ± 0.43
Albumen height	0.47 ± 0.05 ^b	0.59 ± 0.05 ^{ab}	0.63 ± 0.03 ^a
Albumen weight	21.97 ± 0.89	20.53 ± 1.75	21.77 ± 1.71
Yolk height	1.55 ± 0.07	1.55 ± 0.09	1.53 ± 0.05
Yolk weight	14.80 ± 1.50	14.77 ± 0.58	13.60 ± 1.48
Yolk width	3.85 ± 0.20	4.20 ± 0.06	3.80 ± 0.20
Yolk index	0.41 ± 0.04	0.37 ± 0.03	0.40 ± 0.02
Haugh unit score	71.93 ± 5.49	82 ± 2.89	84.96 ± 2.18

Table 3

Comparison of egg geometry in three age groups of Peshawari Aseel.

Parameter	Egg Geometry		
	Cycle 1	Cycle 2	Cycle 3
Shape Index	77.25 ± 1.57	76.28 ± 2.57	83.87 ± 3.95
Egg Surface Area	306.74 ± 14.43	311 ± 24.41	264.32 ± 5.59
Egg Volume	39.37 ± 1.85	39.91 ± 3.13	33.92 ± 0.72

Table 4

Comparison of hatching traits in three age groups of Peshawari Aseel.

Parameter	Hatching Traits		
	Cycle 1	Cycle 2	Cycle 3
Hatchability	53.02 ± 0.88 ^a	15.96 ± 0.19 ^c	43.18 ± 0.62 ^b
Hatch of fertile	84.20 ± 0.87 ^a	39.56 ± 0.63 ^c	58.20 ± 0.61 ^b
Infertile eggs	5.36 ± 0.58 ^b	49.50 ± 0.29 ^a	25.47 ± 0.49 ^c
Dead in shell	0 ± 0 ^b	19.18 ± 0.22 ^a	0 ± 0 ^b
Dead germ	9.57 ± 0.28 ^b	9.07 ± 0.18 ^b	30.02 ± 0.90 ^a
Fertility	64.61 ± 0.56 ^b	41.58 ± 0.55 ^c	74.54 ± 0.49 ^a

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