



## Comparative study of egg morphology, components and chemical composition of some pheasant groups reared in Baghdad

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### Abstract

This study aimed to compare egg morphology, component and chemical composition of some pheasant groups (species) reared in Baghdad city. Three pheasant groups ring-necked pheasant (*Phasianus colchicus*) golden pheasant or Chinese pheasant (*Chrysolophus pictus*) and silver pheasant (*Lophura nycthemera*) were obtained in this study. A total of 30 eggs (10 eggs of each group) freshly laid were collected from pet markets in Baghdad city during the period from January 10<sup>th</sup> to November 5<sup>th</sup> of 2016.

Results revealed that significant differences ( $P < 0.05$ ) were appeared in egg morphology characteristics included egg breadth, egg length, egg weight, egg volume and egg specific gravity values due to pheasant species. Results also revealed that no significant differences were appeared in components percentages and the chemical composition of the eggs among studied pheasant groups.

Keywords: Pheasant groups, Egg morphology, Components, Chemical composition, Baghdad.

### Introduction

Pheasants are birds of many genera within the family Phasianidae in the order Galliformes. It is native to Asia and has been widely introduced elsewhere as a game bird. Pheasants are characterized by strong sexual dimorphism, males being highly decorated with bright colors and adornments such as wattles. Males are usually larger than females and have longer tails. Males play no part in rearing the young. Pheasants typically eat seeds and some insects (Beebe, 1918; Al-Obaidi *et al.*, 2013).

Ring-necked pheasant (*Phasianus colchicus*) is commonly bred and was introduced to many parts of the world, body weight can range from 0.5 to 3kg, with males averaging 1.2kg and females averaging 0.9kg (Cornell Lab of Ornithology, 2011).

The golden pheasant or Chinese pheasant (*Chrysolophus pictus*) It is native to forests in mountainous areas of western China. The adult male is 90–105cm (35–41in) in length, its tail accounting for two-thirds of the total length. It is unmistakable with its golden crest and rump and bright red body (BirdLife International, 2012).

Silver pheasant (*Lophura nycthemera*) was described by Linnaeus in 1758. The silver pheasant is closely related to the kalij pheasant and the two are known to hybridize (MacKinnon and Phillipps, 2000). Silver pheasant is a relatively large pheasant, males of the largest subspecies having a total length of 120 to 125cm (47 to 49in), including a tail of up to 75cm (30in), while the males of the smallest subspecies barely reach 70cm (28in) in total length, including a tail of about 30cm (12 in). The body mass of males can range from 1.13–2 kg (2.5–4.4 lb). Females of all subspecies are smaller than their respective males, with a size range of 55–90 cm (22–35 in) in total length, including a tail of 24–32 cm (9.4–12.6 in). The body mass of females can range from 1–1.3 kg (2.2–2.9 lb) (Dunning, 1992; McGowan, 1994).

In Iraq, pheasants are game or pet birds, it reared for enjoyment and to be taxidermy for sales. For recent years small farms begins to introduced and rearing some pheasant groups as domestic fowls and selling its egg (Al-Obaidi *et al.*, 2012). The aim of this study was to compare egg morphology, component and

chemical composition of some pheasant groups reared in Baghdad city.

**Materials and Methods**

Samples collection: Three pheasant groups ring-necked pheasant (*Phasianus colchicus*) golden pheasant or Chinese pheasant (*Chrysolophus pictus*) and silver pheasant

(*Lophura nycthemera*) were reared in Baghdad city were obtained in this study to comparison egg morphology, component and chemical composition. A total of 30 eggs (10 eggs of each group) freshly laid were collected from pet markets in Baghdad city during the period from January 10<sup>th</sup> to November 5<sup>th</sup> of 2016.

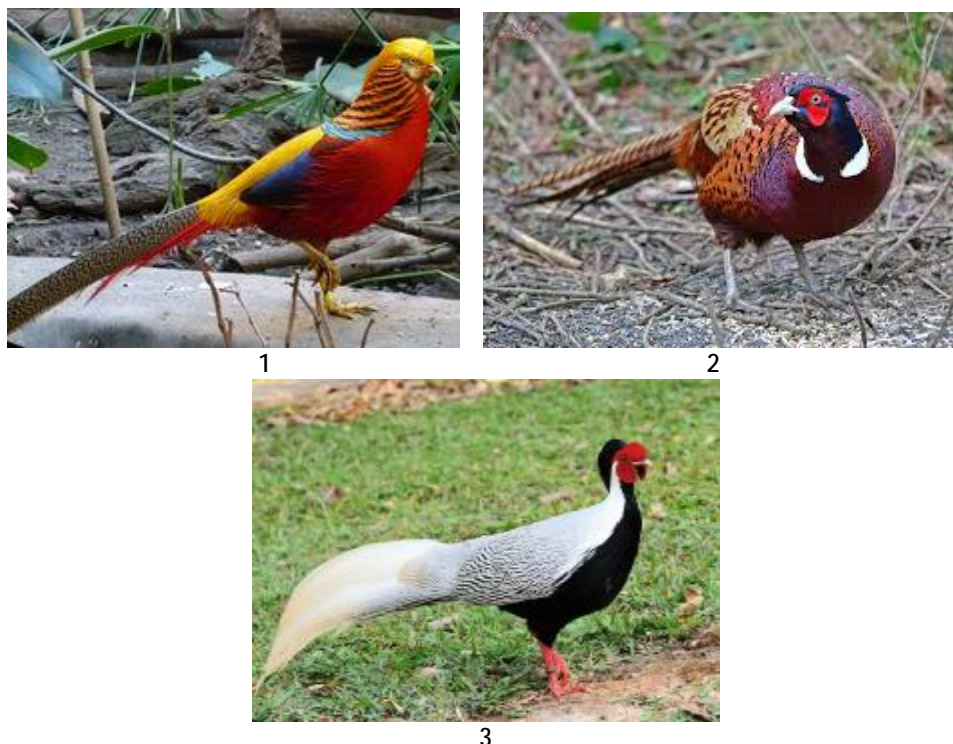


Figure (1): 1: Ring-necked pheasant, 2: Golden pheasant, 3: Silver pheasant.

Egg morphology: Egg shape were determined according to the description and sketches made by Romanoff and Romanoff (1949) and Al-Obaidi

(2010). Egg shape index determined using the micrometer according to Stadelman and Cotterill (1995) using the equation:

$$\text{Egg shape index} = \frac{\text{egg breadth (short circumference) mm}}{\text{egg length (long circumference) mm}} \times 100$$

Egg weight determined using a very sensitive digital Sartorius balance according to Stadelman and Cotterill (1995).

Egg volume determined according to Al-Obaidi (2010) using the equation:

$$\text{Egg volume cm}^3 = 0.51 \text{ LB}^2, \text{ L: egg length, B: egg breadth.}$$

Egg specific gravity determined according to Stadelman and Cotterill (1995) using the equation:

$$\text{Egg specific gravity (gm/cm}^3\text{)} = \frac{\text{egg weight (gm)}}{\text{egg volume (cm}^3\text{)}}$$

Chemical analyses: The yolk and the white both were distributed into three replicates of glass

beakers. protein, lipid a contents in albumen and yolk were carried out according to AOAC

(1980), all these measurements were done in triplicates. Ash determined by ashing samples using muffle furnace oven at 600°C for 6hrs. Lipids analysis was conducted on all samples using mixture of chloroform: methanol (1:1) and stirred for 20min using magnetic stirrer for several rinsing times. Protein determined by the method of semi-microkjeldal determination of N% and the values obtained multiplied with 6.25 to calculate protein%.

Statistical analysis: Data were analysed by using the General Linear Model Procedure of SAS (2001). Means were compared by the Duncan's Multiple Range test at 5% probability (Steel and Torrie, 1980).

### Results and Discussion

Pheasant groups; ring-necked pheasant, golden pheasant and silver pheasant were differ significant ( $P < 0.05$ ) in their egg breadth and egg length, the average values were  $16.20 \pm 0.35$ ,  $15.63 \pm 0.31$  and  $16.25 \pm 0.35$ mm for egg breadth respectively and were  $22.35 \pm 0.46$ ,  $21.57 \pm 0.44$  and  $22.46 \pm 0.46$ mm for egg length respectively. No differences were appeared in egg shape among them (Table 1). Pheasant eggs just like most domestic poultry egg have an oval shape (value near 72%), with one end rounded and the other more pointed. This shape results from the egg being forced through the oviduct. Muscles contract the oviduct behind the egg, pushing it

forward (Sturkie, 1986; Stadelman and Cotterill, 1995).

Table (2) shows that ring-necked pheasant have an egg weight or egg size value 33.42gm which significant ( $P < 0.05$ ) heavier than golden pheasant (27.89gm) and silver pheasant (31.12gm), its volume ranged from 2.68 to 3.02  $\text{cm}^3$  with significant differences. Also, ring-necked pheasant have an egg specific gravity  $11.18\text{gm}/\text{cm}^3$  which significant ( $P < 0.05$ ) higher than golden pheasant ( $10.4118\text{gm}/\text{cm}^3$ ) and silver pheasant ( $10.30\text{gm}/\text{cm}^3$ ).

Egg weight or egg size mainly influenced by body size, feed or the amount of available food, evolutionary status, climate and some other factors, also there are enormous range in egg size among different species and within the species between individuals. The size of the eggs laid by one individual may differ widely from those laid by another of the same species and breed (Stadelman and Cotterill, 1995; Downing and Taylor, 2010). In general Ipek and Dikmen (2007) demonstrated that pheasant egg weight classified as light (27.8-29.7g), medium (29.8-31.7g), heavy (31.8- 33.7g), this agree with our finding.

Table (3) shows egg components of Pheasant groups, statistical analysis revealed that no significant differences were appeared in components percentage.

Table (1): Egg breadth, length and shape of some pheasant groups

pheasant groups	Egg breadth (mm)	Egg length (mm)	Egg shape index (%)
Ring-necked pheasant	$16.20 \pm 0.35$ a	$22.35 \pm 0.46$ a	$72.48 \pm 0.64$
Golden pheasant	$15.63 \pm 0.31$ b	$21.57 \pm 0.44$ b	$72.46 \pm 0.67$
Silver pheasant	$16.25 \pm 0.35$ a	$22.46 \pm 0.46$ a	$72.35 \pm 0.64$
Significant	*	*	N.S.

\*Significant ( $p < 0.05$ ), N.S. not significant.

Table (2): Egg weight (gm), volume ( $\text{cm}^3$ ) and specific gravity ( $\text{gm}/\text{cm}^3$ ) of some pheasant groups

pheasant groups	Egg weight (gm)	Egg volume ( $\text{cm}^3$ )	Egg specific gravity ( $\text{gm}/\text{cm}^3$ )
Ring-necked pheasant	$33.42 \pm 0.32$ a	$2.99 \pm 0.28$ a	$11.18 \pm 0.38$ a
Golden pheasant	$27.89 \pm 0.30$ c	$2.68 \pm 0.28$ b	$10.41 \pm 0.34$ b
Silver pheasant	$31.12 \pm 0.33$ b	$3.02 \pm 0.27$ a	$10.30 \pm 0.35$ b
Significant	*	*	*

\*Significant ( $p < 0.05$ )

Table (3): Egg components (%) of some pheasant groups

pheasant groups	Egg shell (%)	Egg yolk (%)	Eggwhite (%)
Ring-necked pheasant	10.16 ±0.22	31.07 ±0.25	58.77 ±0.29
Golden pheasant	9.89 ±0.22	31.27 ±0.24	58.84 ±0.33
Silver pheasant	10.12 ±0.22	31.10 ±0.24	58.78 ±0.32
Significant	N.S.	N.S.	N.S.

N.S. not significant.

Table (4): Egg protein (%), lipids (%) and ash (%) of some pheasant groups

pheasant groups	Protein (%)	Lipids (%)	Ash (%)
Egg white			
Ring-necked pheasant	11.18±0.33	-	0.92±0.10
Golden pheasant	11.23±0.36	-	0.98±0.10
Silver pheasant	11.22±0.34	-	0.93±0.10
Significant	N.S.	N.S.	N.S.
Egg yolk			
Ring-necked pheasant	16.32±0.26	32.83±0.42	1.12±0.12
Golden pheasant	16.33±0.30	33.19±0.44	1.12±0.10
Silver pheasant	16.37±0.31	32.95 ±0.41	1.14±0.10
Significant	N.S.	N.S.	N.S.

N.S. not significant.

Table (4) shows no differences in chemical composition of the edible portions (albumen and yolk) of the egg.

Egg white is a viscous colorless liquid consists of 88% water, 10-12% protein and some minerals. The amount of lipid in the egg white is trace (0.02%) compared with the amount present in the yolk. The yolk comprises 48% water, 15-17% protein, 32-34% fat and some minerals and vitamins.

In the present study, our data the egg average weight of pheasant measured agrees with previous results (Mantovani *et al.*, 1993); higher than the data reported by other Authors (29.7 g) and higher than the value of the wild pheasant's eggs (27.9 g) collect from ground nests (Petitjean *et al.*, 1986); and lower than hen's eggs. Yolk has the greatest nutritional values, it contains a mixture of proteins, fats, carbohydrates and vitamins in a watery medium (Marshall, 1960), the relatively large yolk materials assures a fairly advanced stage of development in the young at hatching, the newly hatched chicks are fully capable of eating, drinking and walking (Al-Obaidi *et al.*, 2012).

## Conclusions

Pheasant groups; ring-necked pheasant, golden pheasant and silver pheasant were differ in many characters of egg morphology, but similar in components and chemical composition percentage.

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