Characteristics of reared game pheasant *(Phasianus colchicus)*'s egg

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ABSTRACT

Chemical and physical characteristics of game pheasant *(Phasianus colchicus)*'s egg were studied and compared with domestic fowl *(Gallus gallus domesticus)*'s egg. The birds were housed in individual cages in a environmentally controlled room (T=18÷20°C; 16L:8D) and fed *ad libitum* standard breeder diet. A sample of thirty eggs was analysed for each phase of the laying period (beginning, peak and end). The following chemico-physical parameters: egg, albumen, yolk and shell weight; yolk colour; egg and shell dry matter (DM); shell thickness (blunt end, pointed end and middle part) were measured. The protein, lipid, and cholesterol content was evaluated; the fatty acid (FA) profile analysed. We observed: egg weight average of 34.5g ; a high proportion of yolk (37%) in the whole egg (Y/E), consequently, a high lipid content of 13.9%; a protein content DM of 44.3%; the fatty acid composition was similar to that of chicken egg and the oleic acid (36.4%) was the major proportion of the total fatty acids, as in the domestic fowl. The rearing pheasant's egg has a high nutritive concentration, due to high ratio yolk/whole egg, with biological and nutritional characteristics similar to domestic fowl's egg.

Key words: Pheasant, Egg, Hen, Chemical composition, Fatty acid.

RIASSUNTO

CARATTERISTICHE DELL'UOVO DI FAGIANO *(PHASIANUS COLCHICUS)* ALLEVATO A SCOPO VENATORIO.

Lo scopo del presente lavoro è stato lo studio delle caratteristiche chimico-fisiche dell'uovo di fagiano (Phasianus colchicus) *allevato a scopo venatorio e la loro comparazione con le caratteristiche dell'uovo di gallina* (Gallus gallus domesticus). *Gli animali sono stati accasati in gabbie singole in uno stabulario sperimentale (T=18÷20°C; 16L:8D) ed alimentati ad libitum con una dieta standard per riproduttori. Un campione di 30 uova, per ciascuna fase del periodo di deposizione (inizio, picco e fine deposizione), è stato valutato per i seguenti parametri: peso dell'uovo, dell'albume, del tuorlo e del guscio; colore del tuorlo; sostanza secca dell'uovo e del guscio; spessore del guscio (polo acuto, polo ottuso ed equatore). È stato analizzato il contenuto di proteine, lipidi, colesterolo e la composizione in acidi grassi (FA). Si è osservato: un peso medio dell'uovo di 34.5g ; un rapporto tuorlo/uovo intero (Y/E) più elevato di quello dell'uovo di gallina, ed un conseguente alto contenuto di lipidi (13.9%); un valore proteico, calcolato sulla sostanza secca (DM), di 44.3%. Il profilo degli acidi grassi ha evidenziato una composizione simile all'uovo di gallina, con un elevato contenuto in acido oleico (C18:1n-9): 36.4 %. I risultati della ricerca evidenziano che l'uovo di fagiano possiede caratteristiche fisico-chimiche simili all'uovo di gallina con, in più, una maggiore concentrazione nutrizionale, dovuta ad un rapporto Y/E più elevato per l'uovo di fagiano. In condizioni di surplus di uova destinate all'incubazione, od in periodi della stagione riproduttiva (inizio e fine) caratterizzati da un numero di uova insufficiente per la pratica dell'incubazione, l'uovo di fagiano allevato potrebbe essere destinato, dopo opportuna modifica della legislazione vigente in Italia, al consumo alimentare.*

Parole chiave: *Fagiano, Uovo, Gallina, Composizione chimica, Acido grasso.*

Introduction

The pheasant is the most common game bird in Italian countryside. It is mainly bred for hunting and reintroduction purposes. Usually the game bird pheasant is the *Phasianus colchicus* which has different sub-species. Nowadays, the pheasant population living in Italy is the result of different sub-species hybridization (Cocchi *et al.*, 2000). Pheasant breeder facilities are usually external aviaries with a sex ratio of 1 cock every 5-7 hens (Larbier and Leclercq, 1992). The pheasant is an omnivorous bird: its common diet consists of cereals, seeds, green shoots and insects (Beer and Noble, 1996), the adult bird's diet is mainly vegetarian. In the wild, the pheasant female displays a strong nesting behaviour hiding the nest in ground vegetation (Mussa *et al.*, 1986). In the captive state birds, reared in large open pens, lay their eggs directly on the ground so they must be quickly collected in order to avoid contamination. During the last decades, there was the introduction of new colony cages for 5-7 females and 1 male (Meriggi, 1992). The eggs are used for reproductive purposes and are artificially hatched. Fertility and hatchability parameters are respectively 80% and 60% (Gallazzi *et al.*, 1999); they are very low compared to values of the domestic fowl: from 90% to 95% and from 90% to 96%, data referred to the first 20 weeks of laying (Sauveur, 1988). In literature there are not many data on the biological characteristics of the pheasant's egg, and we think that an accurate study of its characteristics and the comparison with the hen's egg ones, could have a scientific and breeding management interest. This is the aim of our research.

Material and methods

Measurements, sampling and laboratory analyses

One hundred and twenty *Phasianus colchicus* hens were housed in single cages in an environmentally controlled room (T=18°÷20°C; 16L:8D).

They were fed *ad libitum* standard breeder feed (22% CP and 11.86 MJ ME Kg^{-1}; 3% lipid; fatty acid: 15% C16:0, 6% C18:0, 32% C18:1n-9, 40% C18:2n-6, 4% C18:3n-3). The eggs were collected daily during the laying period. For each laying phases (starting, peak, end), respectively at weeks age: 43^{th}, 48^{th}, 54^{th} we collected experimental eggs. Per each experimental week, the eggs (30) were randomly collected and individually analysed on the laying day. The following physicochemical parameters were measured:

egg, albumen, yolk and shell weight; yolk/whole egg ratio (Y/E); yolk colour (Roche Yolk Colour Fan); whole egg dry matter (DM) (%) and shell dry matter (%) were determined by oven drying (T = 110°C) overnight; the shell was weighed before and after drying and the egg shell mem-

Table 1. Means ± SE of physical parameters of pheasant's egg.

Week (age)		43^{rd}	48^{th}	54^{th}	average
Egg weight	g	34.4 ± 0.34	34.6 ± 0.33	34.5 ± 0.34	34.5
Shell weight	"	4.0 ± 0.04^{A}	3.7 ± 0.04^{B}	3.4 ± 0.04^{C}	3.7
Albumen weight	"	18.9 ± 0.22	19.3 ± 0.21	19.2 ± 0.23	19.1
Yolk weight	"	11.3 ± 0.15	11.5 ± 0.14	11.7 ± 0.16	11.5
Y/E	%	37.6 ± 0.28	37.5 ± 0.27	37.8 ± 0.29	37.6
Yolk colour[1]		8.3 ± 0.24	8.3 ± 0.23	8.5 ± 0.24	8.4
Egg shell thickness:					
Blunt end	mm	346 ± 4.6^{A}	328 ± 4.4^{Ba}	310 ± 4.6^{Bb}	328
Pointed end	"	346 ± 5.9^{Aa}	327 ± 5.7^{b}	313 ± 5.9^{Bb}	329
Middle part	"	340 ± 3.2^{Aa}	330 ± 3.1^{Ab}	304 ± 3.2^{B}	325

[1] *Roche Yolk Colour Fan.*

Different superscript letters correspond to significant difference : A,B,C= P< 0.01; a,b= P< 0.05.

branes were not removed; the shell thickness was measured by a calliper (SEB® 0.01mm) and an average value of three measurements was recorded for each different point of the shell: blunt end, pointed end, middle part; the protein content (DM; Kjeldhal method) and total lipids (whole egg), according to Folch *et al.* (1957), were analysed.

The cholesterol was determined by enzymatic method (Allain et al., 1974; Luhman et al.,1990).

The fatty acid composition, after transmethylation (Sukija and Palmquist, 1988) , was analysed by gas-liquid chromatography using a capillary column (SupelcoSP™ 2380, 30 m x 0.25 mm, film thickness 0.25 _m; Supelco Inc., Bellefonte, PA, USA) in a GC6000 instrument (Carlo Erba, Milan, Italy) connected to C-R3A Shimadzu integrator (Shimadzu scientific instruments Inc., Columbia, Maryland, USA).

Analysis conditions were: oven temperature: 150÷200°C with a rate of 2°C min^{-1}, final isotherm held for 10 min; injector and detector (FID) temperature: 220 and 230°C; helium (He) as carrier gas. For each sample, a volume (1mL in hexane) was injected and the identification of the peaks was verified by comparison with the retention times of external standard fatty acid methyl esters (Sigma Chemical Co. St. Louis, MO, U.S.A.).

Statistical analysis

Recorded data were subjected to analysis of variance with the method of least

square by GLM procedure of SAS® (SAS Inst., 1996) according to the following model:

$$Y_{ijk}=m_{ijk}+A_i+P_j+e_{ijk}$$

where:

Y_{ijk} = dependent variable,

m_{ijk} = overall mean of the population,

A_i = is the systematic effect of the i-th animal (i=1,30),

P_j = is the systematic effect of the j-th period (j=1,3),

e_{ijk} = the unexplained residual element.

The independent variable x = T/E was added to the model to analyse the variable fatty acids. Non - orthogonal comparisons among least-squares means were performed. Correlation coefficients among different physical-chemical parameters of the egg were calculated for every laying period.

Results

Physical parameters of the eggs are showed in the table 1: there is no statistical difference among the laying phases on the average weight of the egg, while egg shell weight decreases significantly during the laying period; this is confirmed by the thickness egg value trend (table 1). The whole egg (yolk and albumen) weight increases, although there is no a statistical significance, during the laying period; we find the same trend for the yolk / whole egg ratio in the experimental weeks. The egg pigmentation is not different in the first and second week, there is a slight increase at the 54th week. In the table 2, the results of the chemical parameters are listed: the shell DM increases significantly in the second and in the last phase of the laying compared to first phase; the protein content is significantly higher at the 48th week than 43rd week protein content, while the lipid and cholesterol content does not show significant dif-

Table 2. Means ± SE of chemical parameters of pheasant's egg.

Week (age)		43rd	48th	54th	average
Shell DM	%	83.3 ± 0.69^{B}	85.8 ± 0.67^{A}	86.6 ± 0.69^{A}	85.2
Whole egg DM	"	28.0 ± 0.19^{b}	28.6 ± 0.18^{a}	28.0 ± 0.19^{b}	28.2
Protein (% whole egg DM)		43.9 ± 0.26^{B}	44.9 ± 0.25^{A}	44.2 ± 0.28	44.3
Lipid (% whole egg)		13.9 ± 0.13	13.8 ± 0.12	13.9 ± 0.13	13.9
Cholesterol (mg/100g whole egg)		532.0 ± 0.08	525.0 ± 0.08	541.2 ± 0.08	532.7

Different superscript letters correspond to significant difference: A,B= P< 0.01; a,b= P< 0.05.

ferences. The fatty acid profile (table 3) points out the fatty acids more represented: oleic acid (C18:1cis-9), palmitic acid (C16:0), linoleic acid (C18:2n-6), stearic acid (C18:0), palmitoleic acid (C16:1n-7); the fatty acid profile is similar to that of domestic fowl egg (table 5). The oleic acid shows a significant increase between the first and third period, while palmitic acid has an opposite trend. Unsaturated/saturated acids ratio increases, but not significantly, during the last week. The correlation coefficients (tables 6, 7, 8) point out the negative correlation between palmitic and oleic acid at the three experimental weeks (-0.839***, -0.734***, -0.466**); a negative correlation between oleic and linoleic acid at the 48th and 54th week (-0.520**, -0.560**) and a negative correlation between oleic and _-linolenic (C18:3n-3) acid (-0.515**) at the 48th week; while there is a positive correlation between linoleic and _-linolenic during the trial (0.468**, 0.873***, 0.417*), and between linoleic and arachidonic (C20:4n-6) acid at the 48th and 54th week

Table 3. Means ± SE of fatty acid composition (% w/w total FA).

Week (age)	43rd	48th	54th	average
C 14:0	0.6 ± 0.02[A]	0.5 ± 0.02[B]	0.5 ± 0.02[B]	0.5
C 16:0	30.0 ± 0.29[A]	29.5 ± 0.28[A]	28.5 ± 0.30[B]	29.3
C 16:1 n-7	7.1 ± 0.31	7.3 ± 0.30[a]	6.2 ± 0.33[b]	6.9
C 18:0	7.1 ± 0.12[C]	7.6 ± 0.11[B]	8.3 ± 0.12[A]	7.7
C 18:1 n-9	35.9 ± 0.27[b]	36.4 ± 0.26	36.9 ± 0.28[a]	36.4
C 18:1 n-7	3.4 ± 0.11[B]	3.9 ± 0.11[A]	4.0 ± 0.11[A]	3.8
C 18:1 (n-9+n-7)	39.2 ± 0.32[B]	40.4 ± 0.31[A]	40.8 ± 0.34[A]	40.1
C 18:2 n-6	15.1 ± 0.41[a]	13.7 ± 0.40[b]	14.1 ± 0.43	14.3
C 18:3 n-3	0.35 ± 0.03	0.28 ± 0.03	0.26 ± 0.03	0.30
C 20:4 n-6	1.50 ± 0.04[b]	1.42 ± 0.04[B]	1.65 ± 0.04[Aa]	1.52
U/S[1]	1.68 ± 0.02	1.68 ± 0.02	1.70 ± 0.02	1.69

[1] U/S = ∑ unsaturated fatty acids / ∑ saturated fatty acids.
Different superscript letters correspond to significant difference: A,B,C = P< 0.01; a,b = P< 0.05.

Table 4. Egg composition of *Gallus gallus domesticus*.

		Sauveur (1988)	Mantovani *et al.* (1994)	Meluzzi *et al.* (1993)
Egg weight	g	60	62.52-62.90	57.7-67.33
Shell weight	"		7.02-6.84	
Albumen	"	35-37	39.66-40.28	
Yolk	"	17-18.5	16.17-15.81	14.1-18.41
Yolk colour[1]			12.95-13.34	
Shell DM[2]	%		88.69-88.36	
Egg DM	"	24.5-26	23.48-23.22	
Protein	% DM	48.98-49.23	52.87-50.81	
Lipid	% egg	11.8-12.3	9.81-9.57	
Cholesterol	mg/100g	470-500	356.79-322.58	335.68-357.03

[1]Roche Yolk Colour Fan; [2]DM = dry matter

(0.413*, 0.493**). We find a similar trend in the fatty acid profile of hen's egg according to Meluzzi *et al.*(1993). The cholesterol content and arachidonic proportion show a positive correlation at first and second period (0.479**, 0.479*).

Discussion

In the present study, our data the egg average weight of pheasant measured agrees with our previous results (Mantovani *et. al.*, 1993); higher than the data reported by other Authors (29.7 g) (Petitjean *et al.*, 1986) 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. During the experimental period, weight egg trend is very different and does not increase gradually with ageing as it occurs for layer hen (Hunton, 1995). The shell thickness value (table 1) matches the values reported in literature (330µm to 380µm) (Hinkson *et.al.*,1970), higher than data observed on *Phasianus colchicus* torquatus (249µm to 280µm) by Hulet *et. al.* (1985), and higher than the shell thickness of the hen (280µm to 310µm) (Fraser *et. al.*,1999). The weight and thickness of the shell, during the reproductive period, decrease as in the domestic fowl. The whole egg DM (table 2) shows higher values compared with DM of hen's whole egg (Sauveur, 1988; Cook and Briggs, 1990; Mantovani *et. al.*, 1994); this is due to a high yolk proportion, 37%, on whole egg (table 1) vs. 28% and 33%, of the hen's egg, values obtained by data shown in table 4. For this reason the percentage of lipid: 13.9% vs. 9.81% and 12.3% (table 4) is higher. This data could justify a higher cholesterol content in comparison with the values found in the hen's egg as reported by Mantovani *et al.* (1994) and Meluzzi *et al.* (1993) (table 4). Yolk colour measurements (table 1) show the Roche fan numbers lower than hen's yolk colour (table 4); this is due to added pigment in the layer diets, that increases the intensity of colour, as market requirements. The protein content (table 2) is lower compared to protein content of the domestic fowl's egg reported by Mantovani et al. (1994) (table 4). Nowadays, the knowledge on the fatty acid profile of the egg regards mainly the hen's egg investigations (Noble, 1986; Kuksis, 1992); many studies underline the importance of polyunsaturated fatty acid (PUFAs) (Farkas *et.al.*, 1996; Maldjian *et.al.*, 1996; Noble and Cocchi, 1990) in the human nutrition and the important role of the lipid on the embryo development. In the table 3 we can note the fatty acids mainly presented in the pheasant's egg ; the data confirm previous research results (Speake *et.al.*, 1999). The comparison with hen's egg points out an analogy, despite having the oleic acid percentage lower (table 3, 5); the ratio U/S (table 3) is slightly lower than U/S hen's egg, considered favourable from nutritional point of view (Meluzzi and Franchini, 2000); it rises at the end of reproduction season according to Meluzzi *et.al.* (1993)'s studies on domestic fowl; the increase of U/S ratio improves the nutritional quality of the egg at the last laying period. Some Authors found a big difference in fatty acid yolk composition between wild and captive birds; in particular, they reported a higher content of _-linolenic acid in the wild pheasant's egg (Speake *et.al.*, 1999). The same results were observed in the goose and in the ostrich, birds that in the wild consume grasses and green shoots rich in this fatty acid (Klasing, 1998). In housed birds' egg yolk, a higher percentage of linoleic acid (18:2n-6) is due to a higher content of it in the commercial diet. These remarks on wild

Table 5. Fatty acid composition egg (%) of *Gallus gallus domesticus*.

	Meluzzi *et al.* (1993)	Mantovani *et al.* (1994)
C 14:0		0.50
C 16:0	22.60-23.12	26.68-29.04
C 16:1 n-7	2.61-2.65	2.65-4.62
C 18:0	7.64-7.45	7.50-7.99
C 18:1 n-9	41.43-42.62	42.10-40.82
C 18:1 n-7		1.54-2.09
C 18:1 (n-9+n-7)		43.64-42.91
C 18:2 n-6	16.69-14.77	16.63-12.65
C 18:3 n-3	0.88-0.53	0.54-0.46
C 20:4 n-6		1.86-1.83
U/S[1]	2.04-1.98	1.89-1.67

[1] *U/S = Σ unsaturated fatty acids / Σ saturated fatty acids.*

Table 6. Correlation coefficients among different physico-chemical parameters of the egg at the first laying period (43rd week).

	C14:0	C16:0	C16:1	C18:0	C18:1n-9	C18:1n-7	C18:1	C18:2	C18:3	C20:4	U/S[1]	Chol.[2]	Y.w.[3]	E.w.[4]	Y/E
C14:0	1.000														
C16:0	**0.496****	1.000													
C16:1	**0.544****	**0.320****	1.000												
C18:0	**-0.488****	-0.244	**-0.794*****	1.000											
C18:1n-9	**-0.397***	**-0.839*****	-0.277	0.051	1.000										
C18:1n-7	-0.265	-0.277	**0.714*****	-0.566	0.256	1.000									
C18:1	-0.292	**-0.830*****	-0.071	0.612	**0.970*****	0.483	1.000								
C18:2	-0.242	-0.043	**-0.672*****	**0.528****	-0.123	**-0.722*****	-0.293	1.000							
C18:3	0.228	0.021	0.108	-0.055	0.010	0.027	0.015	**0.468****	1.000						
C20:4	-0.309	-0.292	**-0.560****	**0.609*****	0.082	**-0.392***	-0.024	0.315	-0.290	1.000					
U/S	-0.170	**-0.797*****	0.184	-0.332	**0.773*****	**0.577*****	**0.845*****	-0.158	0.252	-0.117	1.000				
Chol.	-0.017	-0.151	-0.312	0.167	0.152	-0.194	0.089	0.323	0.123	**0.479****	0.085	1.000			
Y.w.	-0.298	-0.169	-0.254	0.012	**0.368***	-0.216	0.279	0.128	0.016	0.011	0.160	0.190	1.000		
E.w.	-0.144	-0.209	-0.132	-0.083	0.314	-0.033	0.276	0.017	-0.052	-0.115	0.220	0.175	**0.714*****	1.000	
Y/E	-0.155	0.114	-0.100	0.088	-0.019	-0.203	-0.068	0.117	0.042	0.159	-0.120	-0.064	0.184	**-0.550****	1.000

[1] U/S = ∑ Unsaturated fatty acids / ∑ Saturated fatty acids. [2] Chol. = cholesterol.

[3] Y.w. = Yolk weight. [4] E.w. = Whole egg weight. [5] Y/E = Yolk / Whole egg.

****P<0.001; **P<0.01;*P<0.05.*

Table 7. Correlation coefficients among different physico-chemical parameters of the egg at the second laying period (48th week).

	C14:0	C16:0	C16:1	C18:0	C18:1n-9	C18:1n-7	C18:1	C18:2	C18:3	C20:4	U/S[1]	Chol.[2]	Y.w.[3]	E.w.[4]	Y/E
C14:0	1.000														
C16:0	**0.669*****	1.000													
C16:1	**0.371***	0.258	1.000												
C18:0	-0.291	-0.169	**-0.789*****	1.000											
C18:1n-9	-0.702	**-0.734*****	-0.344	0.369	1.000										
C18:1n-7	-0.214	**-0.508****	**0.532****	**-0.413***	**0.437***	1.000									
C18:1	**-0.662*****		**-0.762*****	0.170	**0.976*****	**0.976*****	0.623	1.000							
C18:2	0.129	0.064	**-0.453***	0.090	**-0.520****	**-0.631*****	-0.605	1.000							
C18:3	0.242	0.124	-0.304	-0.079	**-0.515****	**-0.529****	**-0.577*****	**0.873*****	1.000						
C20:4	0.061	-0.140	-0.155	-0.012	-0.178	-0.143	-0.190	**0.413***	0.131	1.000					
U/S	-0.521	**-0.879*****	0.135	-0.316	**0.530****	**0.686*****	**0.628****	-0.108	-0.089	-0.117	1.000				
Chol.	0.158	0.130	0.179	-0.181	-0.173	0.070	-0.134	0.001	-0.202	**0.479***	-0.027	1.000			
Y.w.	-0.063	0.055	-0.171	0.020	0.009	-0.164	-0.032	0.116	0.149	0.011	-0.078	0.100	1.000		
E.w.	-0.112	0.089	-0.039	-0.089	0.042	-0.125	0.006	-0.019	0.148	-0.115	-0.058	-0.272	**0.822*****	1.000	
Y/E	-0.056	-0.060	-0.245	0.167	-0.030	-0.097	-0.050	0.233	0.035	0.159	-0.026	0.583	0.478	-0.105	1.000

[1] U/S = ∑ Unsaturated fatty acids / ∑ Saturated fatty acids. [2] Chol. = cholesterol.

[3] Y.w. = Yolk weight. [4] E.w. = Whole egg weight. [5] Y/E = Yolk / Whole egg.

****P<0.001; **P<0.01;*P<0.05.*

Table 8. Correlation cefficients among different physico-chemical parameters of the egg at the third laying period (54th week).

	C14:0	C16:0	C16:1	C18:0	C18:1n-9	C18:1n-7	C18:1	C18:2	C18:3	C20:4	U/S[1]	Chol.[2]	Y.w.[3]	E.w.[4]	Y/E
C14:0	1.000														
C16:0	0.607***	1.000													
C16:1	0.527**	0.345	1.000												
C18:0	-0.640***	-0.334	-0.796***	1.000											
C18:1n-9	-0.098	-0.466**	-0.126	0.098	1.000										
C18:1n-7	0.189	-0.275	0.602***	-0.508	0.333	1.000									
C18:1	-0.027	-0.483**	-0.071	-0.067	0.960***	0.483	1.000								
C18:2	-0.424*	-0.206	-0.636***	0.391*	-0.560**	-0.722**	-0.657***	1.000							
C18:3	-0.046	-0.122	-0.320	0.110	-0.156	0.027	-0.192	0.417*	1.000						
C20:4	-0.566**	-0.379*	-0.308	0.487**	-0.340	-0.392*	-0.358	0.493**	0.049	1.000					
U/S	-0.184	-0.748***	0.245	-0.372*	0.385*	0.577***	0.524**	-0.092	0.024	0.058	1.000				
Chol.	0.059	-0.040	-0.003	0.060	0.043	-0.194	0.055	-0.060	-0.131	-0.077	-0.015	1.000			
Y.w.	0.100	-0.075	0.092	-0.028	0.173	-0.216	0.203	-0.187	-0.058	-0.001	0.103	-0.181	1.000		
E.w.	0.208	0.013	0.191	-0.195	0.074	-0.033	0.131	-0.168	0.145	-0.095	0.140	-0.581**	0.790***	1.000	
Y/E	-0.186	-0.159	-0.158	0.285	0.182	-0.203	0.144	-0.053	-0.295	0.157	-0.054	0.566*	0.421*	-0.221	1.000

[1] U/S = ∑ Unsaturated fatty acids / ∑ Saturated fatty acids. [2] Chol. = cholesterol.
[3] Y.w. = Yolk weight. [4] E.w. = Whole egg weight. [5] Y/E = Yolk / Whole egg.
***P<0.001; **P<0.01;*P<0.05.

animals and animals maintained in captivity, confirm the diet influence on fatty acid profile (Speake *et.al.*, 1996). The egg weight is lower than the hen's egg weight because this parameter is positively correlated with the adult bird and chick pheasant weight, whose values are lower than hen and chick ones. Concerning this, it is important to consider that, during the time, the pheasant's natural selection was directed only to increase the embryo survival, while, nowadays, the laying hen's egg is the result of high selective pressure directed to increase the production and weight eggs; besides, as a result of genetic selection on layer's egg compared to pheasant's egg we have: a lower concentration of the nutritive element due to albumen increase (%) and yolk decrease (%) as confirmed by this research, and a lower shell thickness due Ca++ turn over and the difficulty to increase its level.

Conclusions

The results of this study show a rearing pheasant's egg with a major nutritive concentration, but with biological and nutritional characteristics similar to domestic fowl's egg. In case of egg over-production or when the number of eggs is economically insufficient for hatching, i.e. at the beginning and at the end of the reproduction season, the reared game pheasant's egg could be used for human nutrition after the modification of the Italian law about egg marketing.

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