Research Article

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The Effect of Egg Shape (egg Quality Traits) Parameters on The Characteristics of Hatched Chicks by Local Chicken

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Abstract:

The current study was done in the hatchery unit/ animal production department/ directorate of agricultural research in Sulaimani province from 28 March – 7 May 2022. Three hundred (300) eggs were used to study the effect of egg shape parameters on the characteristics of hatched chicks. Immediately after collecting the eggs, the eggs were weighted by using electronic balance (0.01 g) sensitive, and the length and Breadth for each egg was measured by using digital caliper vernier with (0.01 mm) sensitive. Our result indicates that the chick color was affected by the egg weight and the egg breadth ($P<0.05$) but another studied traits was not significantly affected on the characteristics of hatched chicks.

Keywords: egg, weight, length, breadth, shape index.

Introduction

The internal and external traits of eggs in poultry have important indications as to what eggs were chosen for hatching (1). The weight of eggs is an important trait in the initial assessment of selection for hatching eggs. The weight of eggs in chickens ranges between (45-80) grams, depending on the genetic (2-5), and environmental influences surrounding the bird, represented by nutrition (6), age (7, 8), temperature (9-11), health status, oviposition time (12, 13), and the color

of the hen (14, 15). Egg shape index, which is affected by the length and width of the egg (16), is another main factor affecting the selection of eggs by breeders (17) which has a major role in the hatching process (18) and also affects the growth of chicks and their health status. Note that the width of the eggs is one of the traits that are associated with the breed of the bird (19).

The aim of this experiment is to study the effect of egg weight, length, breadth, and egg shape index on the characteristic's traits and health status of hatched chicks.

Materials and Methods:

The current experiment was conducted on the hatchery unit/ animal production department/ directorate of agricultural research in Sulaimani province from 28 March – 7 May 2022. Three hundred (300) eggs were used from different genetic lines, which are provided from animal production department farm. Immediately after collecting the eggs, the eggs were weighted by using electronic balance (0.01 g) sensitive, and the length and Breadth for each egg was measured by using digital caliper vernier with (0.01 mm) sensitive. The egg shape index was calculated by using the equation below (16).

Shape Index = (Breadth/Length)/100

After getting the external eggs measurements, the eggs were input on to the hatchery machine (Biltek Makina, esde incubation system, Turkey), until the hatching time finished (21 days). The fertility was measured by calculate the fertilized and non-fertilized eggs in the end of the experiment. Form the fertilized eggs the mortality ratio was measured by calculate the number of the hatched chicks and died chicks. The health of chicks was evaluated by eye if it is healthy or weak. The gender and the chicks color were recorded when the chicks hatched.

The data was analyzed by using general linear model (GLM) with SPSS v18 program to find the effect of egg external measurements on the studied traits. Duncan multiple range test was used to test the differences between means (20).

Result and Discussion:

The number and the percentage of four egg weight class and their effect of the fertility, mortality, health status, gender, and chick color are shown in table 1. As it shown the egg weight class did not affect each of fertility, mortality, health status, and gender and no significant ($P \geq 0.05$) differences were found (0.479, 0.44, 0.949, and 0.457) respectively. Chick color was significantly ($P \leq 0.05$) differing between the egg weight classes (0.029). Our results disagree with (21) who found that the medium egg weight has the better hatching rate. May be due to the local eggs, which differ with his experiment.

Table 1: The effect of egg weight on the chick characteristics and health

		> 42.50	42.50 - 50.00	50.00 - 57.50	57.50 <	Total	Sig.
Fertility	F	5 (1.67) %	105 (35.00) %	122 (40.67) %	17 (5.67) %	249 (83.00) %	0.479
	UF	2 (0.67) %	18 (6.00) %	25 (8.33) %	6 (2.00) %	51 (17.00) %	
	Total	7 (2.33) %	123 (41.00) %	147 (49.00) %	23 (7.67) %	300 (100.00) %	
Mortality	L	3 (1.21) %	93 (37.65) %	106 (42.91) %	13 (5.26) %	215 (87.04) %	0.44
	D	1 (0.40) %	11 (4.45) %	16 (6.48) %	4 (1.62) %	32 (12.96) %	
	Total	4 (1.62) %	104 (42.11) %	122 (49.39) %	17 (6.88) %	247 (100.00) %	
Health Status	H	4 (1.85) %	89 (41.20) %	99 (45.83) %	12 (5.56) %	204 (94.44) %	0.949
	UH	0 (0.00) %	5 (2.31) %	6 (2.78) %	1 (0.46) %	12 (5.5) %	
	Total	4 (1.85) %	94 (43.52) %	105 (48.61) %	13 (6.0 2)	216 (100.00) %	
Gender	Ma	1 (0.46) %	58 (26.73) %	63 (29.03) %	9 (4.15) %	131 (60.37) %	0.457
	Fe	3 (1.38) %	36 (16.59) %	43 (19.82) %	4 (1.84) %	86 (39.63) %	
	Total	4 (1.84) %	94 (43.32) %	106 (48.85) %	13 (5.99) %	217 (10.00) %	
Chick color	Bl	0 (0.00) %	22 (10.14) %	50 (23.04) %	4 (1.84) %	76 (35.02) %	0.029
	Br	0 (0.00) %	18 (8.29) %	9 (4.15) %	2 (0.92) %	29 (13.36) %	
	Gr	0 (0.00) %	3 (1.38) %	1 (0.46) %	0 (0.00) %	4 (1.84) %	
	Ye	4 (1.84) %	50 (23.04) %	43 (19.82) %	6 (2.76) %	103 (47.47) %	
	Sp	0 (0.00) %	1 (0.46) %	3 (1.38) %	1 (0.46) %	5 (2.30) %	
	Total	4 (1.84) %	94 (43.32) %	106 (48.85) %	13 (5.99) %	217 (100.00) %	

F=Fertilized egg; UF=Unfertilized egg; L=Live chick; D=Dead chick; H=Healthy chick; UH=Unhealthy chick; Ma=Male; Fe=Female; Bl=Black, Br=Brown; Gr=Gray; Ye=Yellow; Sp=Spoty; Sig.=Significant

The number and the percentage of four-egg length class and their effect of the fertility, mortality, health status, gender, and chick color are shown in table 2. The egg length did not show any significant ($P \geq 0.05$) differences among the studied traits. The number and the percentage of four-egg breadth class and their effect of the fertility, mortality, health status, gender, and chick color are shown in table 3. As it shown the egg breadth class did not affect each of fertility, mortality, health status, gender and no significant differences were found (0.748, 0.734, 0.774, and 0.708) respectively. But there was a significant difference between the four-egg breadth classes in chick color (0.022). The result agreed with (22), who find there are no significant differences between mean

shapes eggs and the embryos die, and also the hatching results. The number and the percentage of four-egg shape index class and their effect of the fertility, mortality, health status, gender, and chick color are shown in table 4. The egg shape index did not show any significant differences (P≥0.05) among the studied traits. Our results agreed with (23) results that explain that hatchability of eggs depend on the egg physical hatchability.

Table 2: The effect of egg length on the chick characteristics and health

		> 49.50	**49.50 – 54.00**	**54.00 – 58.50**	**58.50 <**	**Total**	**Sig.**
Fertility	F	3 (1.00)%	129 (43.00)%	104 (34.67)%	13 (4.33) %	249 (83.00)%	0.951
	UF	1 (0.33)%	26 (8.67)%	22 (7.33)%	2 (0.67) %	51 (17.00)%	
	Total	4 (1.33)%	155 (51.67)%	126 (42.00)%	15 (5.00) %	300 (100.00)%	
Mortality	L	2 (0.81)%	112 (45.34)%	91 (36.84)%	10 (4.05) %	215 (87.04)%	0.488
	D	1 (0.40)%	15 (6.07)%	13 (5.26)%	3 (1.21) %	32 (12.96)%	
	Total	3 (1.21)%	127 (51.42)%	104 (42.11)%	13 (5.26) %	247 (100.00)%	
Health Status	H	2 (0.93)%	107 (49.54)%	65 (30.09)%	10 (4.63) %	204 (94.44)%	0.857
	UH	0 (0.00)%	7 (3.24)%	5 (2.31)%	0 (0.00) %	12 (5.56)%	
	Total	2 (0.93)%	114 (52.78)%	90 (41.67)%	10 (4.63) %	216 (100.00)%	

Gender	Ma	1 (0.46)%	67 (30.88)%	59 (27.19)%	4 (1.84) %	131 (60.37)%	0.444
	Fe	1 (0.46)%	47 (21.66)%	32 (14.75)%	6 (2.76) %	86 (39.63)%	
	Total	2 (0.92)%	114 (52.53)%	91 (41.94)%	10 (4.61) %	217 (100.00)%	
Chick color	Bl	0 (0.00)%	36 (16.59)%	35 (16.13)%	5 (2.30) %	76 (35.02)%	0.485
	Br	0 (0.00)%	20 (9.22)%	8 (3.69)%	1 (0.46) %	29 (13.36)%	
	Gr	0 (0.00)%	2 (0.92)%	2 (0.92)%	0 (0.00) %	4 (1.84)%	
	Ye	2 (0.92)%	55 (25.35)%	42 (19.35)%	4 (1.84) %	103 (47.47)%	
	Sp	0 (0.00)%	1 (0.46)%	4 (1.84)%	0 (0.00) %	5 (2.30)%	
	Total	2 (0.92)%	114 (52.53)%	91 (41.94)%	10 (4.61) %	217 (100.00)%	

F=Fertilized egg; UF=Unfertilized egg; L=Live chick; D=Dead chick; H=Healthy chick; UH=Unhealthy chick; Ma=Male; Fe=Female; Bl=Black, Br=Brown; Gr=Gray; Ye=Yellow; Sp=Spoty; Sig.=Significant

Table 3: The effect of egg breadth on the chick characteristics and health

		> 37.30	**37.30 – 39.60**	**39.60 – 41.90**	**41.90 <**	**Total**	**Sig.**
Fertility	F	4 (1.33)%	37 (12.33)%	150 (50.00)%	58 (19.33)%	249 (83.00)%	0.748
	UF	0 (0.00)%	6 (2.00)%	32 (10.67)%	13 (4.33)%	51 (17.00)%	

	Total	4 (1.33)%	43 (14.33)%	182 (60.67)%	71 (23.67)%	300 (100.00)%	
Mortality	L	3 (1.21)%	32 (12.96)%	129 (52.23)%	51 (20.65)%	215 (87.04)%	0.734
	D	1 (0.40)%	3 (1.21)%	21 (8.50)%	7 (2.83)%	32 (12.96)%	
	Total	4 (1.62)%	35 (14.17)%	150 (60.73)%	58 (23.48)%	247 (100.00)%	
Health Status	H	3 (1.39)%	33 (15.28)%	121 (56.02)%	47 (21.76)%	204 (94.44)%	0.774
	UH	0 (0.00)%	1 (0.46)%	7 (3.24)%	4 (1.85)%	12 (5.56)%	
	Total	3 (1.39)%	34 (15.28)	128 (59.26)%	51 (23.61)%	216 (100.00)%	
Gender	Ma	2 (0.92)%	23 (10.60)%	74 (34.10)%	32 (14.75)%	131 (60.37)%	0.708
	Fe	1 (0.46)%	11 (5.07)%	55 (25.35)%	19 (8.76)%	86 (39.63)%	
	Total	3 (1.38)%	34 (15.67)%	129 (59.45)%	51 (23.50)%	217 (100.00)%	
	Bl	0 (0.00)%	7 (3.23)%	46 (21.20)%	23 (10.60)%	76 (35.02)%	
	Br	0 (0.00)%	3 (1.38)%	20 (9.22)%	6 (2.76)%	29 (13.36)%	
Chick color	Gr	0 (0.00)%	0 (0.00)%	4 (1.84)%	0 (0.00)%	4 (1.84)%	0.022
	Ye	3 (1.38)%	23 (10.60)%	57 (26.27)%	20 (9.22)%	103 (47.47)%	
	Sp	0 (0.00)%	1 (0.46)%	2 (0.92)%	2 (0.92)%	5 (2.30)%	
	Total	3 (1.38)%	34 (15.67)%	129 (59.45)%	51 (23.50)%	217 (100.00)%	

F=Fertilized egg; UF=Unfertilized egg; L=Live chick; D=Dead chick; H=Healthy chick; UH=Unhealthy chick; Ma=Male; Fe=Female; Bl=Black, Br=Brown; Gr=Gray; Ye=Yellow; Sp=Spoty; Sig.=Significant

Table 4: The effect of egg shape index on the chick characteristics and health

		> 68.40	68.40 – 73.80	73.80 – 79.20	79.20 <	Total	Sig.
Fertility	F	9 (3.00)%	63 (21.00)%	133 (44.33)%	44 (14.67)%	249 (83.00)%	0.584
	UF	1 (0.33)%	9 (3.00)%	30 (10.00)%	11 (3.67)%	51 (17.00)%	
	Total	10 (3.33)%	72 (24.00)%	163 (54.33)%	55 (18.33)%	300 (100.00)%	
Mortality	L	6 (2.43)%	57 (23.08)%	114 (46.15)%	38 (15.38)%	215 (87.04)%	0.197
	D	3 (1.21)%	5 (2.02)%	18 (7.29)%	6 (2.43)%	32 (12.96)%	
	Total	9 (3.64)%	62 (25.10)%	132 (53.44)%	44 (17.81)%	247 (100.00)%	
Health Status	H	6 (2.78)%	53 (24.54)%	109 (50.46)%	36 (16.67)%	204 (94.44)%	0.895
	UH	0 (0.00)%	4 (1.85)%	6 (2.78)%	2 (0.93)%	12 (5.56)%	
	Total	6 (2.78)%	57 (26.39)%	115 (53.24)%	38 (17.59)%	216 (100.00)%	
Gender	Ma	2 (0.92)%	38 (17.51)%	69 (31.80)%	22 (10.14)%	131 (60.37)%	0.466
	Fe	4 (1.84)%	20 (9.22)%	46 (21.20)%	16 (7.37)%	86 (39.63)%	
	Total	6 (2.76)%	58 (26.73)%	115 (53.00)%	38 (17.51)%	217 (100.00)%	
Chick color	Bl	2 (0.92)%	17 (7.83)%	44 (20.28)%	13 (5.99)%	76 (35.02)%	0.201
	Br	2 (0.92)%	3 (1.38)%	18 (8.29)%	6 (2.76)%	29 (13.36)%	
	Gr	0 (0.00)%	2 (0.92)%	1 (0.46)%	1 (0.46)%	4 (1.84)%	
	Ye	2 (0.92)%	34 (15.67)%	50 (23.04)%	17 (7.83)%	103 (47.47)%	
	Sp	0 (0.00)%	2 (0.92)%	2 (0.92)%	1 (0.46)%	5 (2.30)%	
	Total	6 (2.76)%	58 (26.73)%	115 (53.00)%	38 (17.51)%	217 (100.00)%	

F=Fertilized egg; UF=Unfertilized egg; L=Live chick; D=Dead chick; H=Healthy chick; UH=Unhealthy chick; Ma=Male; Fe=Female; Bl=Black, Br=Brown; Gr=Gray; Ye=Yellow; Sp=Spoty; Sig.=Significant

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تأثير معامل شكل البيضة (صفات جودة البيض) على مواصفات الافراخ الفاقسة من الدجاج المحلي

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أجريت الدراسة الحالية في وحدة التفقيس / قسم الإنتاج الحيواني / مديرية البحوث الزراعية بمحافظة السليمانية في الفترة من 28 مارس إلى 7 مايو 2022. تم استخدام ثلاثمائة (300) بيضة لدراسة تأثير متغيرات شكل البيض على خصائص الافراخ الفقسه. مباشرة بعد جمع البيض تم وزن البيض باستخدام ميزان الكتروني حساس (0.01 جم) وتم قياس الطول والعرض لكل بيضة باستخدام جهاز القدمة الرقمي ذو حساسة (0.01 مم). تشير نتيجتنا إلى أن لون الافراخ قد تأثر بوزن البيضة وعرضها ($P < 0.05$) ولكن الصفات المدروسة الأخرى لم تتأثر معنويا بخصائص الافراخ المفقسة.