Journal of Animal and Veterinary Advances 8 (11): 2150-2152, 2009
ISSN: 1680-5593

Correlations Among Chick Hatching Weight, Egg Weight and Egg Weight Loss During Preincubation Storage Period in Japanese Quail (*Coturnix coturnix japonica*)

Suleyman Dere, Tamer Caglayan, Mustafa Garip and Seref Inal
Department of Animal Science, Faculty of Veterinary Medicine, University of Selcuk, Konya, Turkey

Abstract: This study was carried out to investigate, the relationships among chick hatching weight, egg weight and egg weight loss during preincubation storage period in Japanese quail. Correlation coefficients between chick hatching weight and egg weight, egg weight loss during 4 days preincubation period were determined as 0.47 ($p<0.01$) and 0.36 ($p<0.01$). Highly positive correlations among egg weight loss groups were determined ($p<0.01$).

Key words: Chick weight, correlation, regression, egg weight loss, quail

INTRODUCTION

Influence of the traits related with egg on hatchery practice is considerably important issue (Inal *et al*., 1996; Erensayin, 2000). Egg weight range in Japanese quails was reported to be between 8.31 and 13.00 g (Ariturk *et al*., 1980; Havenstein *et al*., 1988). Shanawany (1987) determined that quail chick weight was 66.9% of the egg weight and existence of positive correlation 0.994, between chick hatching weight and egg weight. Altan *et al*. (1995) reported positive correlation between chick hatching weight and egg weight ranging from 0.57-0.80.

Egg weight loss in heavy eggs of average 11.20 g in preincubation and incubation period was higher than that of lighter eggs of average 9.54 g (Peebles and Marks, 1991).

Both preincubation and incubation period egg weight losses have been resulting in a decrease in hatchability percentage and an increase in problems related with hatchery and chick quality.

The aim of this study was to investigate, the relationships among chick hatching weight, egg weight and egg weight losses during storage period in Japanese quail.

MATERIALS AND METHODS

In this study, 160 chicks obtained from 160 fertile eggs have been used. Eggs collected were maintained at 14-15°C storage room condition. Eggs were weighed daily for 10 days for determining egg weight losses. Chicks were weighed at the hatching time. Besides computing correlation coefficient among traits, a regression equation was fitted using chick hatching weight as dependent variable and preincubation period egg weight losses and hatching egg weight as explanatory variable by using stepwise regression procedure. SPSS 15.0 (2006) packet program was used for statistical analysis.

RESULTS AND DISCUSSION

Hatching egg weight, chick hatching weight and egg weight loss was given in Table 1. Relationships among hatching egg weight, chick hatching weight and egg weight loss were given in Table 2. Regression and determination coefficients to be used for predicting chick hatching weight were given in Table 3 and 4.

Results of present study indicating average hatching egg weight of 11.29 g was higher than the values observed by Nestor and Bacon (1982), Darden and Marks (1988), Marks (1991) and similar to findings of Peebles and Marks (1991) and Vilchez *et al*. (1991).

Table 1: Chick Hatching Weight (CHW), Hatching Egg Weight (HEW), Preincubation period Egg Weight Loss (EWL) average (g) and standard error (mean±SE) (n = 160)

Variables	Mean±SE
CHW	7.81±0.06
HEW	11.29±0.08
EWL 1 day	0.04±0.01
EWL 2 day	0.06±0.01
EWL 3 day	0.08±0.01
EWL 4 day	0.07±0.00
EWL 5 day	0.11±0.01
EWL 6 day	0.14±0.01
EWL 7 day	0.17±0.01
EWL 8 day	0.19±0.01
EWL 9 day	0.27±0.06

Corresponding Author: Suleyman Dere, Department of Animal Science, Faculty of Veterinary Medicine, Selcuk University, 42075, Konya, Turkey

Table 2: Correlation coefficients and their level of significance among Chick Hatching Weight (CHW), Hatching Egg Weight (HEW), preincubation period Egg Weight Loss (EWL)

			EWL (days)								
Variables	CHW	HEW	1	2	3	4	5	6	7	8	9
CHW	1.0000										
HEW	0.4671**	1.0000									
EWL 1 day	-0.1406	-0.0786	1.0000								
EWL 2 day	-0.1229	-0.0703	0.9835**	1.0000							
EWL 3 day	-0.1248	-0.0594	0.9835**	0.9978**	1.0000						
EWL 4 day	0.3640**	0.1403	-0.1320	-0.1167	-0.1189	1.0000					
EWL 5 day	-0.1027	-0.0498	0.9804**	.9950**	.9966**	-0.0883	1.0000				
EWL 6 day	-0.0483	-0.0469	0.9698**	0.9864**	0.9871**	-0.0248	0.9939**	1.0000			
EWL 7 day	-0.0062	-0.0442	0.9541**	0.9720**	0.9715**	0.0204	0.9829**	0.9946**	1.0000		
EWL 8 day	0.0177	-0.0406	0.9407**	0.9604**	0.9598**	0.0461	0.9737**	0.9890**	0.9973**	1.0000	
EWL 9 day	0.0580	-0.7056**	0.1129	0.1095	0.1049	-0.0269	0.1088	0.1196	0.1245	0.1248	1.0000

**p<0.01

Table 3: Regression coefficients, standard errors and significance level of explanatory variables for predicting chick hatching weight

Explanatory variables	b	SE of b	Significance
HEW	0.712777	0.042575	0.0000
EWL 2 day	11.594196	3.021000	0.0002
EWL 5 day	-25.913663	3.604352	0.0000
EWL 8 day	14.119506	1.272917	0.0000
EWL 9 day	0.702400	0.056198	0.0000
(Constant = a)	-0.838177	0.473226	0.0784

Table 4: Determination coefficients (R^2) and standard error

Coefficients	SE
Multiple R^2	0.85896
R^2	0.73781
Adjusted R^2	0.72961
SE	0.38939

Proportion of chick weight to egg weight, 66.9%, agrees with result of Shanawany (1987). Although, Shanawany (1987) and Altan *et al.* (1995) reported positive linear correlation between hatching egg weight and chick hatching weight to be 0.994 and 0.57-0.80, respectively, in this study it was estimated as 0.47 ($p<0.01$). In the present study, significant positive linear correlation between chick hatching weight and egg weight loss resulted from 4 day storage of eggs was found as 0.36 ($p<0.01$) and positive high degree correlations among egg weight loss except for 4 and 8 days egg weight loss group was statistically significant ($p<0.01$) (Table 2).

Executing stepwise regression procedure, a regression equation of 0.86 R^2 for predicting chick hatching weight was fitted by using egg weight loss and hatching egg weight as explanatory variable.

Regression equation was given:

> Chick hatching weight = -0.84 + 0.71×Hatching egg weight + 11.59×egg weight loss resulting from 2 days preincubation storage (EWL2) - 25.91×egg weight loss resulting from 5 day preincubation storage (EWL5) + 14.12×egg weight loss resulting from 8 days preincubation storage (EWL8) + 0.70×egg weight loss resulting from 9 days preincubation storage (EWL9)

REFERENCES

Altan, O., I. Oguz and P. Settar, 1995. Japon bildircinlarinda yumurta agirligi ile ozgul agirliginin kulucka ozelliklerine etkileri. Turk. J. Agric. For., 19: 219-222. http://mistug.tubitak.gov.tr/bdyim/say-ilar.php?dergi=tar.

Ariturk, E., F.T. Aksoy and E. Sengor, 1980. Bildircinlarda (*Coturnix coturnix japonica*) kalitim dereceleri ve cesitli korrelasyonlarin saptanmasinda cevre sartlarinin etkisi. AU Vet. Fak. Derg., 27 (3-4): 528-539. http://dergiler.ankara.edu.tr/dergiler/11/571/7217.pdf.

Darden, J.R. and H.L. Marks, 1988. Divergent selection for growth in Japanese quail under split and complete nutritional environments. 1. Genetic and correlated responses to selection. Poult. Sci., 67: 519-529. PMID: 3405929.

Erensayin, C., 2000. Bilimsel teknik pratik tavukculuk. Cilt 1. Nobel Yayin Dagitim Ltd. Sti., Ankara, Turkey, pp: 231. ISBN: 975-591-162-6.

Havenstein, G.B., K.E. Nestor and W.L. Bacon, 1988. Comparison of pedigreed and nonpedigreed randombred control systems for use with artificial selection in the Japanese quail. Poult. Sci., 67 (3): 357-366. PMID: 3405913.

Inal, S., S. Dere, K. Kirikci and C. Tepeli, 1996. The effects of selection for body weight of Japanese quail on egg production, egg weight, fertility, hatchability and survivability. Vet. Bil. Derg., 12 (2): 5-14. http://veteriner.selcuk.edu.tr/detay.php?id=70#.

Marks, H.L., 1991. Divergent selection for growth in Japanese quail under split and complete nutritional environments. 4. Genetic and correlated responses from generations 12-20. Poult. Sci., 70: 453-462. PMID: 2047338.

Nestor, K.E. and W.L. Bacon, 1982. Divergent selection for body weight and yolk precursor in *Coturnix coturnix japonica*. 3. Correlated responses in mortality, reproduction traits and adult body weight. Poult. Sci., 61: 2137-2142. PMID: 7163098.

Peebles, E.D. and H.L. Marks, 1991. Effects of selection for growth and selection diet on eggshell quality and embryonic development in Japanese quail. Poult. Sci., 70: 1474-1480. PMID: 1886856.

Shanawany, M.M., 1987. Hatching weight in relation to egg weight in domestic birds. World's Poult. Sci. J., 43 (2): 107-115. http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=618184&fulltextType=RA&fileId=S0043933987000035.

SPSS 15.0., 2006. SPSS for Windows. SPSS Inc., Chicago, IL, USA.

Vilchez, C., S.P. Touchburn, E.R. Chavez and C.W. Chan, 1991. Effect of feeding palmitic, oleic and linoleic acids to Japanese quail hens (*Coturnix coturnix japonica*). 1. Reproductive performance and tissue fatty acids. Poult. Sci., 70: 2484-2493. PMID: 1784570.