INCUBATION WEIGHT LOSS, FERTILITY AND HATCHABILITY OF JAPANESE QUAIL (*Coturnixcoturnixjaponica*) EGGS AT DIFFERENT AGES IN LAY

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ABSTRACT
This study was conducted to determine the effect of age on the Incubation weight loss, fertility and hatching characteristics of Japanese quail eggs. One hundred and fifty (150) Japanese quails comprising of one hundred (100) females and fifty (50) males were selected from 5 weeks old quail flock on the farm. Eggs were collected from the birds in triplicate for incubation at different ages i.e. the 9th, 13th and 17th weeks of age of the birds. Data were collected on incubation weight loss, fertility, hatching traits and subjected to One-way Analysis of variance. Age of Japanese quail did not significantly (P>0.05) affect fertility. Hatchability was better at 13(74.64%) and 17(70.09%) weeks of age. The highest (P<0.05) embryonic mortality was recorded at the 9th week of age and chick weight varied consistently with egg weight. Based on the result obtained in this study, it could be concluded that age did not influence incubation weight loss, fertility and hatch weight. Hence, eggs for hatching should be selected after four weeks in lay.
Keywords: Fertility, Hatchability, Incubation and Embryonic mortality, Age

INTRODUCTION
One of the important factors such sex ratio, period and condition of egg storage, breeding system and the parental life weight that will have effect on fertility and hatchability of eggs is the age of the laying quails (Narahari *et al.*, 1988). Researchers reported that the fertility (Kling and Soares 1982 and Narahari *et al*., 1988) and hatchability of incubated eggs reduced depending on the older the age of the laying quail (Narahari *et al*., 1988 and Elibol *et al*., 2002) and also embryonic mortality increased in eggs of older laying birds compared to younger ones (Novo *et al.*, 1997). Sahan and Ipek (2000) considered eggs obtained from very young and very old laying quails inappropriate for incubation. Hence, this study sought to investigate the effect of age of laying quail on the laying performance, fertility, hatchability, incubation weight loss and the embryonic mortality in early and late periods.

MATERIALS AND METHODS
Experimental Site: The rearing of the birds was carried out at the poultry unit of the University Farms, Federal University of Agriculture, Abeokuta while egg incubation took place at Obasanjo Hatchery, Owiwi, Abeokuta.
Source and Management of Experimental Birds: One hundred and fifty (150) Japanese quails comprising of one hundred (100) females and fifty (50) males were selected from 5 weeks old quail flock on the University farm and raised in cages. The male to female ratio was 1:2 i.e. 50 females to 25 males. Birds were fed diet containing 20.2% crude protein and 2976.48Kcal/kg Metabolisable Energy. Eggs were picked twice daily (morning and evening).
Experimental Design: Eggs were collected from the birds for incubation at different ages i.e. the 9th, 13th and 17th week of age of the birds. Eggs for incubation were collected within 3days of stipulated weeks and stored in refrigerator (7°C) in order to get sufficient number of eggs. The eggs (180) collected per each week in lay was in triplicate i.e was randomly grouped into three (3) replicates (60 eggs each).
Egg Management: Potassium tetraoxomanganate VII ($KMnO_4$) and formaldehyde (HCHO) at ratio 1:2 was used as fumigant for the eggs. The treatment lasted for 20 minute in a closed chamber. The eggs were set in egg trays with broad end upward to prevent rupture of air cell. Each egg tray was labelled according to the replicate and individual eggs were numbered prior to setting to facilitate data collection. Eggs were set in Petersime incubator (B-9870 model). Temperature (37.5°C) and humidity were automatically regulated. Egg turning was automatic on hourly basis.

Data Collection
Determination of Incubation Weight Loss: The eggs were weighed before setting and on the 15th day. Incubation weight loss was determined using the formula below;
Weight loss (g) = Initial weight – Final weight Weight loss (%) = $\frac{Weight\ Loss\ (g)}{Initial\ \ Weight\ (g)}\ X\ 100$

Percent Fertility: This was determined using the formula stated below;

$$\text{Fertility (\%)} = \frac{Number\ \ of\ fertile\ \ eggs}{Total\ \ number\ \ of\ eggs\ set\ in\ the\ incubator}\ X\ 100$$

Percent Hatchability: This was determined using the formula stated below;

$$\text{Hatchability (\%)} = \frac{Number\ \ of\ chicks\ \ hatched}{Total\ \ number\ \ of\ \ fertile\ \ eggs}\ X\ 100$$

Percent Embryonic Mortality: This was determined using the formula stated below;

$$\text{Embryonic mortality (\%)} = \frac{Number\ \ of\ unhatched\ fertile\ \ eggs}{Total\ \ number\ \ of\ \ fertile\ \ eggs}\ X\ 100$$

Hatch Weight: This was determined using the formula below;

$$\text{Hatch weight} = \frac{Total\ \ Weight\ of\ chicks\ \ hatched}{Total\ \ number\ \ of\ chicks\ \ hatched}$$

Statistical Analysis: Data collected were subjected to One-way Analysis of variance using SAS (1999) while significant means was compared using Duncan's Multiple Range Test (Duncan, 1995) in the package.

RESULTS

Effect of Age on Incubation Weight Loss an hatching Characteristics of Japanese Quail eggs

The incubation egg weight loss and hatching traits of Japanese quails at different ages is shown in Table 1. Percent egg weight loss were similar (P>0.05) at the 9th and 17th week of age, but higher at the 13th week (14.98%) of age. The fertility percentage of the eggs was similar (P>0.05) at all stages of lay considered. Percentage hatchability of eggs collected at the 9th week (58.23%) of age was significantly (P<0.05) lower while the hatchability was similar (P>0.05) at the 13th week (74.64%) and 17th week (70.09%) of age. The total embryonic mortality was highest (p<0.05) in eggs collected at the 9th week (41.77%) of age but was similar (P>0.05) at the 13th (25.36%) and 17th (29.91%) week of age.

DISCUSSION

The observed significance in incubation weight loss across the ages in this study did not give a clear picture of effect of age as there was no definite trend. According to Romanoff (1967), most of the water of the egg is initially in the albumen which declines continuously during incubation as a result of water loss to the ambient air and movement to the compartments.

The result of fertility is in consonance with Islam *et al.* (2002) who reported that age did not influence percent fertility and hatchability but rather by factors such as genetic, physiology, social and environmental factors. However, the result is at variance with Elibol (2002) who reported that fertility decreases as parental age increases. Similarity in fertility among the eggs selected for incubation at various week of age could be as a result of short interval between weeks of collection.

The percent hatchability obtained in this study is in agreement with Insco *et al.* (1971), who stated that a gradual increase was noted regarding the hatchability of incubated eggs of the Japanese quails up to the age of 12-14 weeks then a gradual decrease occurred in the age period of 15-19 weeks. The percent hatchability obtained in this study is also in correlation with the report of Sahan and Ipek (2000) who reported that eggs obtained from very young and very old laying quails are not considered as appropriate for the hatching activities. However, similarity observed between 13th and 17th week of age might be due to short interval (4 weeks interval) between the ages.

Table 1: Effect of Age on Incubation Weight Loss and Hatching Traits of Japanese Quails

	Age of quail hens (Weeks)		
Parameters	9	13	17
Egg weight loss			
Initial egg weight (g)	$9.48^{c} \pm 0.03$	$10.02^{a} \pm 0.60$	$9.67^{b} \pm 0.04$
Final egg weight (g)	$8.22^{c} \pm 0.10$	$8.57^{a} \pm 0.05$	$8.41^{b} \pm 0.05$
Weight loss (g)	$1.26^{b} \pm 0.07$	$1.45^{a} \pm 0.06$	$1.26^{b} \pm 0.10$
Weightloss (%)	$13.29^{b} \pm 0.40$	$14.98^{a} \pm 0.20$	$13.03^{b} \pm 0.38$
Hatching traits	$9.48^{c} \pm 0.03$	$10.02^{a} \pm 0.60$	$9.67^{b} \pm 0.04$
Fertility (%)	96.34 ± 0.42	96.34 ± 2.04	94.34 ± 1.36
Hatchability (%)	$58.23^{b} \pm 3.18$	$74.64^{a} \pm 1.15$	$70.09^{a} \pm 1.78$
Embryonic mortality (%)	$41.77^{a} \pm 3.18$	$25.36^{b} \pm 1.15$	$29.91^{b} \pm 1.78$
Hatch weight (g)	$5.69^{c} \pm 0.06$	$6.54^{a} \pm 0.19$	$5.99^{b} \pm 0.02$

^{abc} means with different superscript differs significantly ($p<0.05$)

Highest total embryo mortality observed at 9th week of age support the result of Ritsareva (1991), who noted that hatching of first laid quail eggs was not satisfactorily successful. Similarity observed between the 13th and 17th week of age is in agreement with Othman *et al*. (2014), who concluded that there was no significant difference between the effects of age of hens on embryo mortality rate of eggs. Variation in chick weight observed in this study could not be attributed to differences in age but due to differences in the weight of eggs incubated as variation were consistent between both. A positive correlation was observed between the egg weight and the chick weight in a related study by Farooq *et al.* (2001).

CONCLUSION

This study concludes that fertility was not influenced by age of quail, however hatchability of eggs collected at the 9th week of age was poorest. Variation in hatch weight of chicks was a result of concomitant variation in egg weight and not the age of quail hens.

RECOMMENDATION

It is recommended that quail eggs for hatching should be selected after 4 weeks in lay for better hatchabillty.

REFERENCES

Elibol, O. and Brake, J. 2004. Identification of critical periods for turning broiler hatching eggs during incubation. *British Poultry Science*, 45(5): 631-637.

Farooq,M., K. Aneela, F.R. Durrani, A.K. Muqarrab, N.Chandand A. Khurshid, 2001. Egg and shell weight, hatching and production performance of Japanese broiler quails. *Sarhad J. Agri.*, 17: 289-293.

Insco, W. M., D. W. Mac Laura, J. J. Jr. Begin and T. H. Johnson, 1971. The relationship on egg weight to hatchability of coturnix eggs. *Poultry Science*, 50: 297- 298.

Islam,M. S.,Howlinder,M. A. R.Kabir, F.andAlam, J.2002. Comparative assessment of fertility and hatchabilityBarredPlymouthRock,WhiteLeghorn, RhodeIslandRedandWhiteRockHen.*International Journal of Poultry Science*., 1: 85-90

Kling, K. and J. H. Soares, 1982 Vitamin E deficiency in Japanese quail. *Poultry Science* 8: 2:55.

Narahari, D., K. A. Mujeer, A. Thangavel, N. Ramamurthy, S. Viswanathan, B. Mohan, B. Burunganandan and V. Sundararasu, 1988. V. traits influencing the hatching performance of japanese quail eggs. *British Poultry Science*, 29: 1:101-112.

Novo, R. P., L. T. Gama and M. C. Soares, 1997. Effects of oviposition time, hen age and extra dietary calcium on egg characteristics and hatchability. *J. Appl.Poult. Res.,* 6: 335-343.

Othman, R. A, Amin, M. R. and Rahman, S. 2014. Effect of egg size, age of hen and storage period on fertility, hatchability, embryo mortality and chick malformations in eggs of Japanese quail (*Coturnixcoturnixjaponica*). *Journal of Agriculture and Veterinary Science*. 7 (1): 101- 106

Ritsareva, A. 1991. Incubation of quail eggs. *Poultry Breeding*, 3: 15-17.

Romanoff, A.J. 1967. Biochemistry of the Avian Embryo. John Wiley and Sons: New York, NY

Sahan, U. and A. Ipek, 2000. Effects of breeder age and incubation humidity on hatching characteristics of broiler breeder eggs. *Journal Poultry Researh*, 2(2):11-14.