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Effects of storage period on the hatchability performance of Japanese Quail Eggs

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Abstract

Study on the effects of storage period on the hatchability performance of Japanese quail (coturnix coturnix iaponica) eggs was conducted at National Veterinary Research Institute (NVRI) Hatchery Unit Vom. Three hundred and sixty (360) fertile quail eggs of normal weight (8 – 10 g) from 4-month-old flock were divided into four groups (A, B, C and D). The first group (A) of ninety eggs were set immediately after collection (less than 24 hours), while groups B, C and D (90 eggs each) 7, 14 and 21 days respectively before incubation. Automatic cabinet electric incubator (Western^R) was used in incubating the eggs for 16-17 days at temperature of 99.7°F and relative humidity (RH) of 65%. All normal incubatory practices were observed. Average daily meteorological data was taken during the period of storage. Results showed that eggs incubated immediately after collection (group A) had the highest hatchability of 62%, followed by 23% in those eggs incubated after 7 days of storage (group B). Eggs incubated after 14 and 21 days of storage (group C and D) had zero hatchability. Significant differences($P < 0.001$) exist between group A and groups B,C,D. The highest percentage (76%) of dead embryo in shell was observed in group D (21 days) followed by group C and B (14 and 7 days) with 75% and 66%, respectively. Group A had 36% dead in shell. The highest percentage of infertilility was observed in those eggs in group D (21 days) and group C (14 days) with 23.3% and 11.1% respectively, while the least (6.7%) were in those eggs in group A. It was concluded that as in chicken eggs, Japanese quail eggs should not be stored for long periods.

Keywords: Quail eggs, Hatchability, Storage period

Introduction

Quail are birds that are smaller than the domestic chicken but they have high potential for production because of their short generation interval and disease resistance. They can therefore serve as a source of fast and cheap animal protein for both rural and urban dwellers. Encouraging quail production in Nigeria will not only augment the present deficient animal protein intake but will deepen our understanding of these birds that are gaining popularity among Nigerian farmers and in various laboratories. Quail was introduced to Nigeria in 1992 by National Veterinary Research Institute (NVRI), Vom (Haruna *et al.*, 1997). Domesticated quail do not have the tendency for broodiness and hence eggs must be incubated under broody hen or by artificial incubation. However, because of their short generation interval and an average production of 250 – 280 eggs per bird per year artificial incubation is the surest choice for a commercial farmer. Egg storage is an essential aspect of egg handling. Storage period and climate are known to affect the hatchability performance of quail (Andrabi and Ahmed, 1989). In Nigeria and most tropical African countries there are varying extremes in climatic conditions as season of heavy rainfall and high humidity

contrasting with period of little or no rainfall, low humidity and varying hours of day length.

Hatchability of quail eggs incubated in different positions at NVRI, Vom was studied by Musa *et al*; (2000). The present study investigated the effect of storage period on the hatchability performance of Japanese quail eggs.

Materials and Methods

Egg collection and setting

Five hundred and eighty quail eggs were collected during morning collection from 4 months old flock of 1900 quail (Male1: 3 Female). The quail were maintained on deep litter. Three hundred and sixty eggs of normal weight (10 grams) and uniform size were selected and divided into four groups of 90 eggs each and stored as follows: - Group A (No storage i.e. set immediately after collection), Group B (stored for 7 days), Group C (stored for 14 days) and Group D (stored for 21days). Group B. C. and D were placed on egg trays and stored at room temperature. Meteorological data were obtained from National Roots Crop Research Institute (NRCRI) Vom. Eggs in all groups before incubation were fumigated using formaldehyde and potassium permanganate at a ratio of 3mls to 1gm respectively.

Eggs Incubation and candling

Automatic turning cabinet electric incubator (western^{R}) was used in incubating the eggs. The incubator has both hatcher and setter. The temperature of the incubator was maintained at 99.7°F to 100° F and relative humidity of 60 to 65% during the incubation and hatching of eggs in all groups.

Candling for the infertile eggs and embryonic mortality was done only once at 14th day of incubation. Immediately after candling, eggs were transferred into the hatcher. Hatched chicks were taken out on the 17th day of incubation and late embryonic death was recorded on complete hatching.

Results of hatchability and dead embryo were subjected to analysis of variance (ANOVA) as described by Steel and Torrie (1980).

Results and Discussion

Data on the hatchability performance are presented in Tables I and 2. The present study of hatchability of quail eggs stored at different period showed an interesting observation. Eggs incubated immediately after collection had the hatchability of 62% while eggs incubated after 7 days of storage had 23% hatchability. Zero hatchability was observed in those eggs incubated after 14 and 21 days of storage. Highly significant ($P<0.001$) differences also exist between the groups(A,B,C and D) in terms of percentage of dead embryo (Table 2). A similar observation was made by Srinivasan (1986) that prolonged storage results in continued declined in hatchability and also an increased incubation period of quail eggs. Oluyemi and Roberts (1980) also reported that hatchable eggs should not be stored for more than six days and further days in storage reduced the hatchability by 4% for each extra storage day.

The highest percentage (93.3%) of fertile eggs was obtained from those eggs incubated immediately after collection and those incubated after 7 days, followed by those stored for 14 days with 90% and lastly 76.7% from those incubated after 21 days of pre incubation storage. These findings are in agreement with those of Wilson *et al.* (1961) who observed that fertility and hatchability decreased and embryonic mortality increased with increasing length of pre-incubation storage. Those changes were significantly greater, when the eggs were stored

Table 1 Pre-incubation storage period and hatchability performance of quail eggs

Group	No of eggs set	Storage period (days)	Storage Temp (°C)	Relative Humidity (RH) (%)	Average wt of egg (gm)	No of fertile eggs	No of infertile eggs	No of dead embryo	No of eggs hatched	% Fertile	% Infertile	%Dead embryo	% of Hatched eggs
A	90	-	26	58	10.0	84	6	33	45	93.3	6.7	36	62
B	90	-	25.8	56	9.0	83	7	60	21	92	7.7	66	23
C	90	14	25.6	53	8.7	80	10	68	Nil	88.8	11.1	75	0.000
D	90	21	24.7	52	8.3	69	21	69	Nil	76.7	23.3	76	0.000
Total	360					316	44	230	76	87.8	12.2	63.3	21.3

for more than 4 days. However, in contrast with those observations were those of Sharma and Vohra (1980) who found that fertility and hatchability were not influenced by storage of 9 days. Wilson *et al.* (1981) also reported that there is an indication that Bobwhite quail eggs could be stored up to 21 days with only minor reduction in hatchability. A deduction was also made by Woodard and Morzenti , (1975) that pre-incubation storage of 7, 8, and 9 days respectively did not affect hatchability.

Table 2 Influence of different storage periods on hatchability and dead in shell of incubated Japanese quail eggs.

Storage Period	Hatchability	S.E.M.	Dead Embryo	S.E.M.
0	62	±1.528[a]	36	±1.1547[a]
7	23	±1.732[b]	66	±1.1547[b]
14	0.000	±0.000[c]	75	±1.1547[c]
21	0.000	±0.000[c]	76	±1.1547[c]

a,b,c, Common superscript letters within the same column are not significant.

Infertile eggs were more in those eggs stored for 21 days (Table 1) followed by those eggs stored for 14 days before incubation. The least was observed in those eggs incubated immediately after collection and those stored for 7 days. Fertility and hatchability of quail eggs stored at room temperature were earlier reported to decrease with increased period of storage (Wilson *et al.*, 1961). However, it was reported by Becker *et al.* (1963) that when the hatchable quail eggs were stored at room temperature for one week before setting, early embryonic mortality and fall in apparent fertility and hatchability could be reduced by packing in polythene bags. However, such sealing was ineffective in reducing embryonic mortality and improving the apparent fertility and hatchability of quail eggs stored at controlled temperature (162°C) (Magbool *et al.*, 1983). As observed in this study the storage temperature ranged between 24.7°C to 26°C (Table1), which is far above the recommended storage temperature of 13°C to 15°C for not more than 7 days reported by Trevor and Ruth (1987), for maximum hatchability. It is usually assumed that the number of days that fertile eggs need to be incubated before hatching occurs is fixed for specific conditions of temperature and humidity of the incubation (Landauver, 1961). Though, eggs intended for incubation must be kept not more than a week since their capacity to develop falls rapidly (Andrabi and Ahmed, 1989). It was therefore concluded in this study that because of different climatic conditions of Nigeria, quail eggs should be set immediately after collection. Further studies will be of interest to know the pre-incubation storage period of quail eggs in different ecological zones of Nigeria where the quails are adapted.

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