

Effects of Different Storage Durations of Japanese Quails (*Coturnix coturnix japonica*) Eggs on Their Hatching Chick Rates and Live Weight Gains

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Abstract: This study has been conducted to examine hatching performance, fertility rate and hatching chick rate of the quail eggs which have been stored in different durations. Moreover, live weight gains of obtained chicks from the quail eggs have also been examined. Eggs to be hatched have been stored for durations of 1, 4, 7 and 10 days. The difference of 10 day-stored eggs were found statistically significant ($p < 0.05$) compared to other egg groups stored for different durations in relation to their hatching performance, fertility rate, hatching chick rate and live weight gain increases. Best results were obtained from the 7 days stored eggs. The hatching performance of this egg group was 74%, fertility rate was 82%, hatching chick rate was 90% and live weight increase was 44.40 g.

Key words: Quail, storage duration, fertility, hatching performance, live weight gain

INTRODUCTION

Stud farms store eggs to be hatched for a period of time in suitable conditions before they are placed in the incubator. Inseminated eggs to be hatched are needed to be stored in appropriate environmental conditions in order to prevent embryonic growth which starts when the eggs are in uterus phase, during the storage. Otherwise, ongoing embryonic growth affects incubation results negatively (Senkoylu, 2001).

It is stated in several studies in the literature that when periods of storage for the eggs to be hatched are increased then hatching performance, fertility and hatching chick rates decrease (Uddin *et al.*, 1994; Camci, 1995; Saylam, 1999; Ozbey and Ekmen, 2002; Petek *et al.*, 2003; Khurshid *et al.*, 2004; Seker *et al.*, 2005; Garip and Dere, 2006; Toplu *et al.*, 2007).

Fifth week hatching performance of the Japanese quail was given as 83% in Camci (1995)'s study, 63.46% in Saylam (1999), 55% in Ozbey and Ekmen (2002), 86.7% in Petek *et al.* (2003), 69.04% in Seker *et al.* (2005), 83.4% in Garip and Dere (2006) and 77.46% in Toplu *et al.* (2007). Fifth week fertility rate was given as 83.24% in Uddin *et al.* (1994), 88.40% in Saylam (1999), 86.71% in Petek *et al.* (2003), 80.86% in Khurshid *et al.* (2004) and 84.51% in Toplu *et al.* (2007). Fifth week hatching chick rate was given as 75.52% in Uddin *et al.* (1994), 88.74 in Seker *et al.* (2005) and 91.67 in Toplu *et al.* (2007). Research on the hatching performance, fertility rate and the hatching chick rate of the Japanese quail demonstrate that best results are obtained from the eggs which are stored for 7 days.

The research also demonstrates that longer periods of storage cause low levels of hatching chick rates. Homogenic growth of newborn chicks bear importance and several parameters such as live weight, live weight gains and feed consumption need to be monitored in certain periods of time in order to follow growth and growth of the chicks.

Fifth week live weight of the Japanese quail chicks was given as 160.2 g, live weight gain was given as 21.25 g and feed consumption was give as 134.05 g in Okan and Uluocak (1992)'s study. Live weight gain was noted as 23.70 g and cumulative feed consumption as 446.90 g in Arslan *et al.* (2000). Kirmizibayrak and Altinel (2001) stated in their study that they found live weight gains as 26.27 g and feed consumption as 21.6 g. Moreover, Yalcin *et al.* (2002) found live weight gain as 164.0 g and cumulative feed consumption for the first 0-5 weeks as 480.76 g. Guclu (2003) noted weekly average live weight gains as 13.88 g and cumulative feed consumption as 534.21 g and Guclu and Iscan (2004) stated live weight gains as 143.27 g and feed consumption as 506.86 g. This study aims to examine hatching performance, fertility and hatching chick rates as well as live weight gains of the quail eggs which have been stored for different periods.

MATERIALS AND METHODS

The research has been conducted by using 200 eggs which were obtained from 75 Japanese quail (*Coturnix coturnix japonica*) in the quail breeding unit of Canakkale Onsekiz Mart University, Technological and Agricultural

Research Center (TETAM). Eggs to be hatched were collected in different days period of 1, 4, 7 and 10 days. Then the eggs were grouped in 4 and each group had 50 eggs. Eggs to be hatched were stored in a room which had 15°C temperature and 70-80% humidity rate. Collected eggs were put into the incubator at the same time and during the 17 days of incubation, appropriate conditions for incubation such as temperature, humidity, ventilation and rotation of the eggs were controlled in order to eliminate any problems. At the end of hatching performance, fertility, hatching chick rate, late embryonic and deaths under shell were identified.

Chicks were examined in groups of 4 in which each group had 25 quails for 5 weeks starting from their hatch. Live weight and feed consumption controls of the quails were measured during the 5 weeks period. Quails were watered by using drinkers suitable for birds and the feeds were given by using little feeders. Chicks were exposed to 23 h of light and 1 h of dark during their first week after hatch and then 18 h of light and 6 h of dark in the last 4 weeks. Quails were fed by using quail feed which included 28% raw protein 2800 kcal kg⁻¹ ME during the first 3 weeks and then 24% raw protein 2600 kcal kg⁻¹ ME energy starting from the 3-5th week.

Statistical comparison of the groups was conducted by using ANOVA test and TUKEY test was used in order to identify differences among the groups.

RESULTS AND DISCUSSION

The study examined hatchability results such as hatching performance, fertility, hatching chick rate and deaths under shell of the quail eggs which were stored for different periods (Table 1). When the groups of eggs which were stored for different periods (1, 4, 7 and 10 days) were compared to each other about the hatching performance, a statistically significant difference was found ($p < 0.05$) between 10 days group and the others. The difference among the rest of other groups were found statistically insignificant ($p > 0.05$).

So while, the number of the chicks obtained from the egg-groups which were stored for 7 days were quite close to each other and at high levels, 10 days stored egg group had very few numbers of chicks. Moreover, while the

hatching performance rate of the 7th day stored eggs in this study (74%) was realized higher than the findings of Saylam (1999) which was 63.46%, Ozbey and Ekmen (2002) which was 55% and Seker *et al.* (2005) which was 6.04%; the hatching performance rate was found lower than the findings of the Camci (1995) which was 83%, Petek *et al.* (2003) which was 86.7%, Garip and Dere (2006) which was 83.4% and Toplu *et al.* (2007) which was 77.46%.

According to different durations of storage, fertility rates were found as 85, 83, 82 and 74% by order of storage. Hatching chick rates were found as 92, 92, 90 and 40% by order of storage. Fertility and hatching chick rates of egg group which was stored for 10 days was found statistically significant ($p < 0.05$) compared to rest of other 3 groups. The difference among fertility and hatching chick rates of eggs which were stored for 1, 4 and 7 days were found statistically insignificant ($p > 0.05$). Here, it was seen that eggs which were stored between 1-7 days before they were put into the incubator had the highest rates of hatching performance and hatching chick rates. Moreover, it was also seen that the hatching chick rates of the eggs decreased to a great extent when they were stored > 7 days.

While 7 days stored eggs' fertility rate of 82% in this study was close to the fertility rates found in the studies of Uddin *et al.* (1994) which was 83.24%, Khurshid *et al.* (2004) which was 80.86% and Toplu *et al.* (2007) which was 84.51%.

Whereas, it was lower than the rates found in the studies of Saylam (1999) which was 88.40% and Petek *et al.* (2003) which was 86.71%. Here, it was clearly seen that hatching performance, fertility and hatching chick rate of the eggs to be hatched decreased when the periods of storage increased.

Besides hatching performance, fertility and hatching chick rates, late embryonic and deaths under shell were also identified in this study. While no death incidents were seen in the eggs which were stored for 1, 4 and 7 days; 3 late embryonic death incidents were seen in the eggs which were stored for 10 days. Moreover, while 1 death under shell incident in 1 day stored eggs, 2 death under shell incidents in 7 days stored eggs and 9 death under shell incidents were seen; no death under shell was seen in 4 days stored eggs.

While the differences between the chicks obtained from 10 days stored eggs and the chicks obtained from the rest of other groups which were stored for 1, 4 and 7 days were found statistically significant ($p < 0.05$) in terms of live weight gains; no statistical difference ($p > 0.05$) was seen among the chicks obtained from 1, 4 and 7 days stored eggs. Fifth week live weight gains of the groups

Table 1: Hatchability results of the quail eggs stored for different periods

Storage duration (day)	Hatching (%) performance	Fertility (%)	Hatching chick rate (%)
1 (Group 1)	77 ^a	85 ^a	92 ^a
4 (Group 2)	76 ^a	83 ^a	92 ^a
7 (Group 3)	74 ^a	82 ^a	90 ^a
10 (Group 4)	30 ^b	74 ^b	40 ^b

The difference between the means highlighted by different letters in the same lines is statistically significant ($p < 0.05$)

Table 2: Weekly average live weight gains (g), 5th week live weight (g), average feed consumption (g) and standard errors

Weeks	Group 1	Group 2	Group 3	Group 4
1	18.68±0.60 ^a	17.72±0.74 ^a	19.12±0.66 ^a	16.42±0.92 ^b
2	32.72±0.99 ^a	32.28±0.93 ^a	33.10±0.96 ^a	28.92±1.08 ^b
3	23.74±1.42 ^a	22.88±1.56 ^a	24.54±1.52 ^a	20.86±1.86 ^b
4	42.12±1.98 ^a	41.96±2.02 ^a	42.26±2.00 ^a	39.78±2.14 ^b
5	44.96±3.03 ^a	44.89±2.64 ^a	44.90±2.83 ^a	41.98±2.98 ^b
1-5	162.22±1.82 ^a	159.72±2.04 ^a	163.92±1.90 ^a	146.96±3.12 ^b
Feed consumption (g)	554.79±4.08 ^a	568.60±2.66 ^b	554.05±3.81 ^{ab}	607.36±4.76 ^c

The difference between the means highlighted by different letters in the same lines is statistically significant ($p < 0.05$)

were in the ranges of 41.98-44.96 g, total live weight gains were in the ranges of 146.96-163.92 g and cumulative feed consumptions were in the ranges of 554.05-607.36 g in the study (Table 2). While the live weight results in this study demonstrate similarities with the studies of Okan and Uluocak (1992), Arslan *et al.* (2000), Kirmizibayrak and Altinel (2001), Yalçın *et al.* (2002) and Guclu (2003); it was also seen the results given in this study was higher than the result stated in the study of Guclu and Iscan (2004). Likewise, values of live weight gains and total feed consumptions were higher than the values in the recent literature. In terms of feed consumption, the difference between the quails in the 4th group and the rest of the other 3 groups was found statistically significant ($p < 0.05$). The comparison result of the other 3 groups put forward a statistically significant relationship ($p < 0.05$) between 1st and the 2nd group. Moreover, no statistically significant results were seen in the comparison of 1st and the 3rd group and 2nd and the 3rd group ($p > 0.05$).

In the study, it was seen that the live weight gains of the quails obtained from the eggs which were stored for different periods changed according to the durations of their storage. Particularly, it was seen that while live weight and live weight gains of the chicks obtained from the eggs which were stored >7 days were lower; their food consumption values were higher.

The difference among other groups was not found statistically significant. However, there were great similarities in terms of live weight, live weight gains and food consumption values between the quails in the 1st group and the quails in the 3rd group. So similar weight gains and food consumption values were seen among quails which were hatched from the 1 day stored eggs and those which were hatched from the 7 days stored eggs. Moreover, the quails which were obtained from the 7 days stored eggs reached 5th week live weight by consuming lower amounts of feed.

CONCLUSION

The results of this study put forward that when the storage duration of the eggs to be hatched are increased then the hatching performance, fertility rate and hatching

chick rate as well as the live weight gains of the chicks decrease. Besides, best results have been obtained from the eggs which were stored for 7 days.

In this case, 7 days group should be preferred by the quail breeders since it is more economical and requires less labor.

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