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## Effect of storage temperature and duration on fertility of Kuroiler breed of chicken

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### Abstract

The present investigation was carried out to investigate the fertility of eggs of Kuroiler breed of chicken at poultry farm SKN College of Agriculture, Jobner (Rajasthan). For study total 180 fresh eggs of Kuroiler chicken of 25-38 week age were collected and stored for 0, 5 and 7 days at two different temperatures i.e.  $30 \pm 2$  °C and  $20 \pm 2$  °C as per treatment i.e. T<sub>1</sub>(30 °C+0d), T<sub>2</sub>(30 °C+5d), T<sub>3</sub>(30 °C+7d), T<sub>4</sub>(20 °C+0d), T<sub>5</sub>(20 °C+5d) and T<sub>6</sub>(20 °C+7d). For determine fertility treated eggs are placed in automated incubator. Result shows that fertility was found maximum (95.56%) in T<sub>5</sub> at storage temperature 20 °C and minimum (84.44%) in T<sub>3</sub> under temperature of 30 °C. It is concluded that under 30 °C storage temperature fertility was start decline after 5 days storage as compared at 20 °C storage temperature it is well maintain up to 7 days. In present investigation percentage embryonic mortality was found maximum (23.08%) in eggs of T<sub>1</sub> group and lower (09.30%) in T<sub>5</sub> group, which was stored for 5 days under cold temperature (20 °C) with fumigation. Result shows that fertility declines when storage duration is beyond 5 days and also decline in eggs stored at 30 °C temperature. Fertility of eggs significantly ( $P \leq 0.05$ ) affected by duration of storage and temperature. It concluded that for best fertility results eggs are not stored for more than 5 days at both temperatures. In present investigation fertility was found higher at 20 °C storage temperature as compared to 30 °C storage temperature it indicates that 20 °C storage temperature is optimum for best fertility results.

**Keywords:** Fertility, kuroiler breed, embryonic mortality, storage duration, storage temperature

### Introduction

Poultry is one of the fastest growing segments of the agricultural sector in India with around eight percent growth rate per annum. The poultry sector in India shifted from a mere backyard activity into a major commercial agricultural based industry over a period of four decades. India ranks 3<sup>rd</sup> in egg production and 5<sup>th</sup> in chicken meat production in the world. The Kuroiler is one of the important chicken breed developed in India. Kuroiler is a dual-purpose breed producing meat and eggs (150-200 eggs per year). Pre-incubation period of hatching eggs is important as it affects the hatching egg quality. In general Commercial hatcheries set eggs in incubator after storage of 3 to 5 days but in some situation it needs to increase above 7 days. Egg storage period above 7 days is Cause with a delay in embryo development, altered metabolic rate and decline in fertility (Petek and Dikmen, 2006 and Yassin *et al.*, 2008) [7, 12]. For most bird species, the critical temperature for the initiation of embryonic development appears to be about 25 to 27 °C (Drent, 1975) [3]. Relative humidity should be maintained between 70 and 80% to minimize egg water loss. Previous studies reported that long storage periods increase the weight loss of table and hatching egg (Samli *et al.* 2005) [10].

### Materials and Methods

The experiments were conducted at the poultry farm, S.K.N. College of Agriculture, Jobner. District- Jaipur (Rajasthan). The area falls in agro-climatic zone III-A (semi-arid eastern plain zone of Rajasthan). The climate of this region is a typically semi-arid, characterized by extremes of temperature during both summer and winters. All the layer birds for research were maintained under deep litter system with 3 sq. feet floor space / bird. The experimental birds belonged to same age group (28- 35 weeks) and the sex ratio or female to male ratio (10:1) is maintained. The study was conducted during December 2018 to May 2019.

A total of 180 numbers of eggs were selected in three batches the first batch of the eggs were picked up on the first day of the seven days, and stored for 7 days. The second batch was collected two days later and stored for 5 days and third batch of eggs was collected five days

after collecting the second batch. Third batch of eggs were not stored (only stored for 6 hours of day) was considered as fresh eggs. After collection and weighing, the eggs were stored under hot temperature (30 °C) and under cold room temperature (20 °C).

**Table 1:** Distribution of eggs according to treatments

Treatments Interaction	Symbols
Hot temp. (30±2 °C) + fresh egg.	T <sub>1</sub>
Hot temp. (30±2 °C) + 5 days stored eggs.	T <sub>2</sub>
Hot temp. (30±2 °C) + 7 days stored eggs.	T <sub>3</sub>
Cold temp. (20±2 °C) + fresh egg.	T <sub>4</sub>
Cold temp. (20±2 °C) + 5 days stored eggs.	T <sub>5</sub>
Cold temp. (20±2 °C) + 7 days stored eggs.	T <sub>6</sub>

### Incubation process

All experimental eggs were incubated with setter trays with the large end up in an automated electrical incubator at 37.50° F to 37.70° F and 60-65% relative humidity with turning hourly. After 18<sup>th</sup> days alive embryos were transferred to the hatcher. On 22<sup>nd</sup> day of incubation chicks were taken out from hatcher and percentage hatchability was recorded.

### Candling

Candling was done only at the time of transfer in hatcher on the 18<sup>th</sup> day of incubation. Candling of eggs was carried out to select fertile eggs and infertile eggs, fertile eggs were transferred into the hatcher and infertile eggs removed from hatching process.

### Fertility

Number of eggs that were seen to be opaque (when white light passed through them) after 18<sup>th</sup> days of incubation, was considered as fertile eggs (living embryo) for hatching. And the eggs with transparent light passing are consider as unfertile eggs and they were discarded to incubation process. The percentage of fertility was calculated by the following formula:-

$$\text{Fertility (\%)} = \frac{\text{Number of fertile eggs}}{\text{Total number of eggs incubated}} \times 100$$

### Embryonic mortality

Embryonic mortality was observed by the un-hatched egg (out of fertile) after the incubation of 21 days.

### Statistical Analysis

The experimental data were statistically analyzed using standard statistical methods as per Snedecor and Cochran (1994) [11] using Completely Randomized Design (CRD) with factorial structure. All the data were subjected to analysis of variance. Consequently, a level of (P≤0.05) was used as the criterion for statistical significance.

### Results and Discussion

#### Fertility of eggs of Kuroiler breed

Fertility in a breed mainly depends on age of hens, season of breeding and management of birds under rearing system. At 20 °C storage temperature fertility was found to be higher (95.56%) in 5 days stored eggs as compared to 7 days (91.11%) storage and at 30 °C storage temperature fertility was reported higher (93.33) in 5 days stored eggs as compared to 0 days (86.67%) and 7 days (84.44%). It was

more likely that this loss of fertility at 7 days storage was due to increasing number of blastodermal deaths rather than actual infertility problems. When eggs were stored under cold room temperature (20 °C), the fertility was not affected by increasing storage duration but at higher temperature (30°C) some decrease was found due to increase in storage duration. The fertility of Kuroiler eggs are presented in (table-2).

**Table 2:** Mean value of fertility for different treatment group of eggs of Kuroiler breed of chicken

Treatments	Fertility % (mean + SEM)
T <sub>1</sub> (30 °C x 0 day)	86.67 ±0.092
T <sub>2</sub> (30 °C x 5 days)	93.33 ±0.060
T <sub>3</sub> (30 °C x 7 days)	84.44 ±0.210
T <sub>4</sub> (20 °C x 0 day)	88.89 ±0.049
T <sub>5</sub> (20 °C x 5 days)	95.56 ±0.111
T <sub>6</sub> (20 °C x 7 days)	91.11 ±0.223
P- value	
Duration	0.001*
Temperature	0.010*
Temp. x duration	0.685

\* P≤0.05 (significant at 5% level)

According to statistical analysis storage duration and storage temperature significantly (P≤0.05) affect the fertility of the eggs. But the interaction of temperature and duration had no significant affect on fertility. These results were corroborated with Addo *et al.* (2018) [11] reported that the percentage of fertile eggs in naked neck chicken at ambient temperature was lower (58.70%) as compared to the eggs kept at cold room temperature (92.00%). The fertility and hatchability were found to be decreased as storage duration increased. Petek *et al.* (2005) [6] reported fertility of quail eggs at 1, 3, 5 and 7 days were 89.52, 92.93, 89.34 and 86.71, respectively, that show a decrease in fertility of eggs with long storage. The results of present findings are similar to these findings.

### Embryonic mortality

Embryonic mortality in present investigation was found lower in T<sub>5</sub> (9.30%) which were stored for 5 days at cold temperature. Embryonic mortality affected by storage temperature it found higher at 30 °C than 20 °C. According to statistical analysis, embryonic mortality was significantly (P≤0.05) affected by the storage duration and storage temperature. Embryonic mortality was found higher in 7 days stored eggs at 30 °C temperature. Embryonic mortality increased with increase in storage duration and storage temperature.

**Table 3:** Mean value of embryonic mortality of different treatment group of eggs of kuroiler breed of chicken

Treatments	Embryonic mortality (%) (mean + SEM)
T <sub>1</sub> (30 °C x 0 day)	23.08 (13.34) ±0.097
T <sub>2</sub> (30 °C x 5 days)	16.67 (09.59) ±0.072
T <sub>3</sub> (30 °C x 7 days)	18.42 (10.62) ±0.067
T <sub>4</sub> (20 °C x 0 day)	22.50 (13.00) ±0.093
T <sub>5</sub> (20 °C x 5 days)	09.30 (05.34) ±0.065
T <sub>6</sub> (20 °C x 7 days)	14.63 (08.41) ±0.089
P- value	
Duration	0.000*
Temperature	0.005*
Temp. x duration	0.185

\* P≤0.05 (significant at 5% level)

Embryonic mortality also found high in fresh eggs which may be due to some internal factors of eggs. According to Hamidu

*et al.* (2010) [4] who reported higher embryonic mortality in fresh eggs which was due to smaller air space than normal air space to facilitate hatching. These findings were in agreement with the report of Alsobayel *et al.* (2017) [2] embryonic mortality of Baladi eggs stored at 5, 10 and 15 days were 16.40%, 30.40% and 33.87%, respectively. Reijrink *et al.* (2009) [8] and Khan *et al.* (2014) [5] recorded the embryonic mortality increase with increase in storage duration. Sahan *et al.* (2003) [9] reported the embryonic mortality at 16, 21 and 25 °C were 28.6%, 32.0% and 42.9% respectively.

### Conclusion

On the basis of present investigation, it may be concluded that the Fertility was higher (95.56%) in 5 days stored eggs as compared to eggs stored for 7 days (91.11%) and 0 day (88.89%) at 20 °C storage temperature. Fertility in a breed mainly depends on age of hens, season of breeding and management of birds under rearing system. When eggs were stored under cold room temperature (20 °C) fertility was not affected by increasing storage duration but at higher temperature (30 °C) some decrease was found in fertility due to increase in storage duration. Fertility was significantly ( $P \leq 0.05$ ) affected by storage duration and storage temperature. Embryonic mortality was found lower (9.30%) in 5 days storage at 20 °C embryonic mortality also found higher at 30 °C as compared to 20 °C storage temperature. Statistical analysis shows that embryonic mortality was significantly ( $P \leq 0.01$ ) affected by the storage temperature. In present investigation fertility of eggs was found higher up to 5 days storage and it start to decline if increase in storage duration, Long storage of eggs shown decline in fertility. It is suggested that for higher fertility of Kuroiler eggs were not stored for more than 5 days.

### References

1. Addo A, Hamidu JA, Ansah AY, Adomako K. Impact of egg storage duration and temperature on egg quality, fertility, hatchability and chick quality in Naked Neck chickens. *International Journal of Poultry Science* 2018;17(4):175-183.
2. Alsobayel AA. Effect of age and sex ratio on fertility and hatchability of baladi and leghorn laying hens. *Journal of Animal and Plant Sciences* 2017;22:15-19.
3. Drent RH. Incubation in Avian biology. Eds. Farner DS, and King JR, Academic Press, London 1975;5:333-420.
4. Hamidu JA, Rieger AM, Fassenko GM, Barreda DR. Dissociation of chicken blastoderm for examination of apoptosis and necrosis by flow cytometry. *Poultry Science* 2010;89:901-909.
5. Khan MJA, Khan SH, Bukhsh A, Amin M. The effect of storage time on egg quality and hatchability characteristics of Rhode Island Red (RIR) hens. *Veterinarski Arhiv* 2014;84(3):291-303.
6. Petek M, Bappinar H, Ouan M, Balci F. Effects of egg weight and length of storage period on hatchability and subsequent laying performance of Quail. *Turkey Journal of Vet and Animal Science* 2005;29:537-542.
7. Petek M, Dikmen S. The effect of prestorage incubation and length of storage of broiler breeder eggs on hatchability and subsequent growth performance of progeny. *Czech Journal of Animal Science* 2006;51:73-77.
8. Reijrink IAM, Meijerhof R, Kemp B, Graat EAM, Van den Brand H. Influence of prestorage incubation on

embryonic development, hatchability and chick quality. *Poultry Science* 2009;88(12):2649-2660.

9. Sahan U, Ipek A, Yilmaz B. The effects of storage temperature and position on embryonic mortality of ostrich (*Struthio camelus*) eggs. *South African Journal of Animal Science* 2003;33(1):38-42.
10. Samli HE, Agma A, Senkoylu N. Effects of storage time and temperature on egg quality in old laying hens. *Journal of Applied Poultry Research* 2005;14:548-553.
11. Snedecor GW, Cochran WG. *Statistical method* 8<sup>th</sup> edition. Oxford and IBG Publication Co., New Delhi, India 1994.
12. Yassin H, Velthuis AGJ, Boerjan M, Vanriel J, Huirne RBM. Field study on broiler eggs hatchability. *Poultry Science* 2008;87:2408-2417.