Al-Qadisiyah Journal of Agriculture Sciences (QJAS)- Vol.8 NO.2 (2018)
ISSN Print ( 2077-5822) ISSN Online (2618-1479)

# The Effect of Pre-Incubation And Storage Period on Some hatching Traits for Broiler Breeder Eggs .

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**Submission Track**
**Received : 29/10/2017**
**Final Revision : 8/1/2018**
**Keywords**
**Pre-incubation,storage , period ,broiler,breeder and eggs.**
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Abstract
A total of 1800 broiler breeder , Ross 308 at 47 wks old , hatching eggs .Were used in the present study . Eggs were randomly distributed into 12 experimental treatments ,150 eggs pretreatment groups . The treatment groups were as follows :
T1 treatment without pre-incubation + 4 days eggs storage period
T2 treatment without pre-incubation + 8 days eggs storage period
T3 treatment without pre-incubation + 12 days eggs storage period
T4 treatment 4 hours pre-incubation + 4 days eggs storage period
T5 treatment 4 hours pre-incubation + 8 days eggs storage period
T6 treatment 4 hours pre-incubation + 12 days eggs storage period
T7 treatment 8 hours pre-incubation + 4 days eggs storage period
T8 treatment 8 hours pre-incubation + 8 days eggs storage period
T9 treatment 8 hours pre-incubation + 12 days eggs storage period
T10 treatment 12 hours pre-incubation + 4 days eggs storage period.
T11 treatment 12 hours pre-incubation +8 days eggs storage period
T12 treatment 12 hours pre-incubation + 12 days eggs storage period.
Experimental parameters measured included : Fertility , hatchability percentage from the total incubated eggs and from fertile eggs , hatching chicks length , weekly embryonic mortality ,piped eggs and quality evaluation of navel for hatching chicks .
The results of this study showed a significant increase ($P < 0.05$) in the rate of early embryonic mortality of the treatment which was pre- incubated for 8 hours and stored for 12 days compared to the treatment that was unpre-incubated and stored for 4 days, medium embryonic mortality increased to a treatment which was pre-incubated for 8 hours and stored for 12 days compared to the treatment that was pre-incubated for 8 hours and was stored for 4 days , the rate of piped eggs was significantly ($P<0.05$) increased to the treatment 4 hours pre-incubated x 12 days storage compared to most others treatments. The percentage of hatched chicks its have the navel type A significantly ($P<0.05$) increased for the treatment 4 hours × 4 days compared to the treatment 12 hour × 12 days , while significantly ($P<0.05$) decrease the percentage of hatched 4 days compared to the ×chicks type navel B for treatment 0 hour treatment 12 hour × 12 days , either quality type C It has 4 ×significantly ($P<0.05$) decreased for both treatments 4 hour 8 days compared to the treatment 12 hour × 12 ×days and 4 hour days

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ISSN Print ( 2077-5822) ISSN Online (2618-1479)

## Introduction

The basic rules and practical practices of industrial hatching have been known since ancient times by ancient Egyptians and Chinese who used different forms of thermal ovens to incubate eggs , their basic knowledge has been passed down from generation to generation (1). Due to the fact that broiler chicks spend about a one third of their lives in the hatchery, from the insertion of eggs to the incubator until marketing at about 42 days, this period has become a very important aspect of the poultry industry (2). Therefore, it seeks to find optimal techniques for egg incubation and circulation because of its significant economic impact in the poultry industry (3).Storage of hatching egg is a common practice in hatcheries to coordinate hatchery activities and anticipate demand (4),even though storage length and conditions may influence embryonic viability (5). However, there appears to be an optimum stage of embryonic development at lay where embryos can better withstand prolonged storage. If the developmental stage is before or after this optimum stage, embryos may die during storage (6).A number of methods have been investigated to improve hatchability of eggs which stored for more than seven days, one of them ispre –incubation , the method of pre-incubation of hatching eggs is defined as exposing the eggs to the temperature and humidity of the incubator with turning eggs (7) , It can be done before or during egg storage (8) .The pre-incubation of breeder eggs before storage were reported to result in more live chicks and in a lower level of embryonic mortality(9;10). Hatching eggs may contain a chick has booked up inside the egg and can not break the shell due to its weak strength and inability to break the shell this egg is called piped eggs (11).The navel quality were reflected thecondition of the hatching process, which depends mainly on the temperature and the weight lost from the eggs. The good quality navel is characterized by the fact that the navel is free of strings and is free of scabs. The navel represents the location of the entry of the yolk sac into the abdomen so that it is a small scar in the middle of the abdomen (11). The objectives of the present study were to study the effects of pre-incubation of hatching eggs for broiler breeder which stored for different periods on rate of weekly embryonic mortality , piped eggs and quality of navel for hatching chicks .

## Material and methods

The present study carried out in one of the private sector hatcheries located in AL-Mahawel district Babil Governorate for the period from10/11/2015to 3/12/2015. Was collected and selected 1800 hatching eggs from the flock of commercial breeders of broiler (Ross308) at the age of 47 weeks has an appearance specifications suitable for hatching , good eggs were sorted for hatching after isolation of large and small sizes also the damaged, deformed, and dirty eggs were excluded, the average weight of the eggs was 62.5g .After that the eggs was fumigated by paraformaldehyde gas(11) through the interaction of 35ml formalin ,17.5grams of potassium permanganate and 50 ml of warm water per cubic meter of the volume of evaporation room for 30 minutes then it was ventilated chamber by fresh air through the operation the air fan and opening the windows for about an hour to get rid of the residues of paraformaldehyde gas .Before applying the experiment, the eggs were gradually warmed by hot air from an electric heater for a short period of time to reach temperature of eggs (26ºc) to avoid the heat shock of the embryo and prevent the condensation of the water on the surface of the shell(11).Eggs were randomly distributed to12 experimental treatments according to long of pre-incubation and storage period as shown in table 1.Each treatment consisted of 150 eggs placed in incubator trays .Pre-incubation of hatching eggs was done by exposing the eggs to the normal incubator temperature (37.8C°)and relative humidity (55%)according to the time period for each treatment after the pre-incubation process was completed the eggs graduallyentered to the storage room at 16 C° (to prevent embryonic growth) ,relative humidity 65% and stored according to length of experimental treatments (table 1) . After removing the eggs from storage roomin the form of batches, 4 days separated between a batche and another batche depending on the length of storage of eggs , it was gradually warmed by air then entered to the sitter to stay

for 18 days after that it was transferred to the hatcher and stayed 3 days . Type of incubator was a multi-stage petersime Dutch origin andthe eggs are automatically turned 24 times during the day except for the last three days.The conditions of the incubator are controlled with the presence of alarms in case of any defect in the incubator.

Table (1) Distribution of experimental treatments

| Treatment | Pre-incubation period (hours) | Storage period (day) |
|---|---|---|
| 1 | 0 | 4 |
| 2 | 0 | 8 |
| 3 | 0 | 12 |
| 4 | 4 | 4 |
| 5 | 4 | 8 |
| 6 | 4 | 12 |
| 7 | 8 | 4 |
| 8 | 8 | 8 |
| 9 | 8 | 12 |
| 10 | 12 | 4 |
| 11 | 12 | 8 |
| 12 | 12 | 12 |

Characters Studied

Embryonic mortality:At 7 and 14 days of incubation all eggs were candled and all clear eggs were removed from the trays. At the end of 18 day of incubation, all eggswere candled again and those with evidence of living embryos were transferred from the setter trays to the hatcher trays.

The embryonic mortality was divided into three stages, according (9)

- Early embryonic mortality, which occurred during 1 to 7 days of incubation period.
- Medium embryonic mortality , included the mortality which occurred from 8 to 14 days of incubation period .
- Late embryonic mortalitywhich occurred from 15 to 21 days of incubation period.

Piped eggs: The formula referenced by (6). was applied in determining the rate of Piped eggs :

$$\text{Rate of Piped eggs \%} = \frac{\text{Number of piped eggs}}{\text{Number of fertilized eggs}} \times 100$$

Navel quality : All hatched chicks were examined to score them for navel quality ,the length of the navel vent was measured by a measuring ruler .Class of A was given to the chicks whichhas the navel was completely closed and clean; class B if the navel was discolored (color different from skin color) or opened to a maximum of 2mm or both , and class C was given if the navel was discolored or opened more than 2 mmor both (12) . Then the percentage of each class were calculated .

Statistical analysis :Program of (13) used to statistical analysis of the data according to a factorial experiment (4 × 3) applied in a complete randomized design (CRD) to study the effect of pre-incubation and length of storage of eggs and their interference in different qualities. The differences between the averages were compared by (14).

## Results and discussion

Early embryonic mortality : The data in Table (2) shows the effect of interference between pre-incubation and egg storage was significant ($P<0.05$) in the rate of early embryonic mortality. This ratio significantly increased for the treatment that was pre-incubated for 8 hours and stored for 12 days (32.70%). While the lowest rate of early mortality of treatment that was unpre-incubated and stored for 4 days (14.14%) ,it is also noted that the treatment that was pre- incubated for 4 hours and stored for 8 days (20.64%) was not significantly different with the treatment that was unpre-incubated and stored for 4 days. In general, the early embryonic mortality result from the accumulation of the biological products in the egg such as ammonia and lactic acid. It also

produces an imbalance in the breathing and feeding of the embryo due to the delayed development and development of the blood network on the yolk which is considered the embryo blood system or because of the adhesion of the embryos on the internal surface of the shell or egg albumen because the Amnion membrane is not surrounded the embryo completely because of an imbalance in the formation of the nervous system and skeleton (15). In this study, the cause ofincrease the rate of early embryonic mortality with increased the length of storage may be due to the drought of the embryoswhich resulted of increased moisture evaporation of egg contents during the storage of eggs and degradation of the albumin and the deterioration of its quality causing the movement of the plastoderm near the outer shell of the eggthus increasing the probability of embryo death (16) or may be an increase in the length of the pre-incubation process, which led embryonic development to the stage of the formation of the primitive streak , which is characterized by being active in the differentiation and division of cells and it migration, and this phase is also characterized by its inability to withstand long storage conditions (12 ). This result was agreed with results of (10) who observed that the interference between pre-incubation and storage of hatching eggs had a significant effect on early embryonic mortality, the highest rate for the treatments stored for 14 days regardless of the length of pre-incubation period .And did not agree with (17) who observed that the effect of interference between pre-incubation (0, 6, 7, 12 and 14) hours and storage (4 and 14) days of turkey eggs was not significant in the rate of early embryonic mortality.

Medium embryonic mortality : The effect of interference between pre-incubation and storage of hatching eggs in the rate of embryonic mortality during the medium period of incbation was significant (P <0.5). Table 2 shows that the highest rate of mortality was for the treatment that was incubated for 8 hours and stored for 12 days (4.51% ). (5) noted the cause of this occurs embryonic mortality during this period is often due to a lack of nutrients in the egg resulting from feeding breeder on poor diets and may also be due to slow embryonic vital activities during this stage,while (18) attributed this to a defect in the process of hatchery such as not regulating incubator conditions of heat , humidity , ventilation and turning eggs.This result was agreed with the results of (10) who observed significant differences in the rate of embryonic mortality during the medium period of incubation of hatching eggs of broiler breeder due to the interference between pre-incubation and eggs storage. While this result differed with (18)there were significant differences between the rate of medium mortality due to the interference between pre-incubation and storage of hatching eggs.

Late embryonic mortality : Table( 2) shows the interference between pre-incubation and storage of hatching eggs of broiler breeder in the rate of late embryonic mortality was not significant. This finding was consistent with the results of (19) in that there was no significant effect of pre-incubation and storage of quail eggs in the rate of late embryonic mortality. This finding did not agree with (10) that the rate of delayed late embryonic mortality was significantly affected by the interference between pre-incubation and storage of hatching eggs.

Pipedeggs : It is noticed from Table (2) that the effect of the interference between pre-incubation and egg storage was significant ($P<0.05$) in the rate of piped eggs .It is noted that this rate is higher for the pre-incubated treatment for 4 hours and stored for 12 days (2.52%), as well as for the treatments 0 hours x 12 days (1.20%) and 12 hours x 12 days (1.35%).The increase in egg piped in the 12-day storage treatment may be due to the stress of embryos caused by the long storage period of the eggs, which makes the chicks do not have the enough energy which needed to break the eggshell , (20) observed that storing eggs of hatching broilers for a long period of (14 days) led to anemia, with a reduction in red blood cell concentration compared with eggs stored for 7 days, indicating that embryos were exposed to stress during the storage period .This result it agreed with (7) he noting that the interference between pre-incubation and storage of hatching eggs was significant in the rate of piped eggs and that the highest values

Al-Qadisiyah Journal of Agriculture Sciences (QJAS)- Vol.8 NO.2 (2018)
ISSN Print ( 2077-5822) ISSN Online (2618-1479)

of the piped eggs were found in treatments which stored for long time (12 and 14 days) .

Table (2) Effect of pre-incubation and storage of broiler breeder hatching eggs (Rose 308) in the rate of embryonic mortality and piped eggs during the eggs incubation period ( mean±standard error) .

| Treatments | | Characters studied | | | |
|---|---|---|---|---|---|
| | | Early mortality % | Medium mortality % | Late mortality % | Piped eggs % |
| Pre-incubation (hr) | 0 | 2.03±20.47 b | 0.35±3.52 a | 0.73±10.15 a | 0.29±0.70 a |
| | 4 | 1.56±21.58 ab | 0.36±3.25 a | 0.95±9.88 a | 0.40±1.01 a |
| | 8 | 2.78±25.31 a | 0.41±3.18 a | 0.90±9.57 a | 0.27±0.75 a |
| | 12 | 1.87±25.50 a | 0.33±3.41 a | 1.07±11.56 a | 0.32±0.78 a |
| Significant level | | ** | N.S | N.S | N.S |
| Storage(day) | 4 | 1.03±17.78 c | 0.33±2.95 b | 0.56±10.61 a | 0.11±0.22 b |
| | 8 | 1.13±22.19 b | 0.23±3.08 b | 0.88±9.12 a | 0.24±0.71 b |
| | 12 | 1.48±29.66 a | 0.27±4.00 a | 0.85±11.14 a | 0.29±1.50 a |
| Significant level | | * | * | N.S | * |
| Pre-incubation x storage | 0 × 4 | 0.95±14.14 f | 0.74±2.93 abcd | 0.19±11.79 a | 0.00±0.00 b |
| | 0 × 8 | 1.38±19.72 cdef | 0.60±3.33 abcd | 0.94±8.18 a | 0.53±0.91 b |
| | 0 × 12 | 1.19±27.54 abc | 0.24±4.31 abc | 1.51±10.48 a | 0.60±1.20 ab |
| | 4 × 4 | 1.95±17.28 ef | 0.52±2.69 cd | 0.79±8.97 a | 0.27±0.27 b |
| | 4 × 8 | 1.07±20.61 cdef | 0.41±2.64 cd | 1.57±7.92 | 0.26±0.26 b |
| | 4 ×12 | 0.93±26.85 abcd | 0.34±4.42 ab | 1.18±12.74 a | 0.30±2.52 a |
| | 8 × 4 | 2.50±19.08 efd | 0.73±2.32 d | 1.30±9.32 a | 0.29±0.29 b |
| | 8 × 8 | 2.68±24.15 ced | 0.35±2.70 bcd | 1.93±9.09 a | 0.61±1.00 b |
| | 8 × 12 | 5.69±32.70 a | 0.16±4.51 a | 1.98±10.31 a | 0.53±0.69 b |
| | 12 × 4 | 0.94±20.64 cdef | 0.63±3.85 abcd | 0.56±12.38 a | 0.33±0.33 b |
| | 12 × 8 | 3.06±24.31 bced | 0.39±3.64 abcd | 2.55±11.28 a | 0.66±0.66 b |
| | 12 × 12 | 1.05±31.57 ab | 0.64±2.75 bcd | 2.56±11.03 a | 0.67±1.35 ab |
| Significant level | | * | * | N.S | * |

The existence of different characters (a, b, c ..) indicates the existence of significant differences between the transactions within one column, the absence of different characters means that there are no significant differences between the transactions within one column. ** means that there are significant differences in the level of probability 0.0.1. * Mean significant differences at the 0.0.5 probability level. N.S means no significant differences.

The navel quality of hatched chicks : The results of the statistical analysis in Table (3) show that the effect of interference between pre-incubation and storage of hatching eggs resulted in highly significant(P<0.01) differences among the treatments in navel quality ,the pre-incubation treatment for 4 hours and 4 days was the highest in type A (97.43%) compared to the rest of the treatments ,followed by the treatment that was pre- incubated for 4 hours and stored for 8 days (96.87%), which did not differ significantly from the treatment that unpre-incubate and stored for a period of 4 days (96.23%)while the treatment 12 hours of pre-incubation × 12 days of storage were recorded the lowest rate in the quality of the chicks have navel type A.The rate of chicks have B-type significantly(P <0.01) differed among the treatments because the effect of pre-incubation and storage of hatching eggs ,there is a significant increase in the rateof these chicks in the treatment of 12 hours of pre-incubation x 12 days storage (% 10.66 ) the lowest rate was to the treatment that was unpre-incubated and stored for 4 days ( 2.75%) .And the effect of interference was significant (P <0.05) in the rate of chicks which have the navel type C where the treatment the 12 hours pre-incubation × 12 days storage was recorded lowest rate (5.34%) compared to the rest of the treatments ,while the rate was zero for each of the treatments 4 hours pre-incubation x 4 days storage and 4 hours pre-incubation x 8 days storage .The production of large numbers of poor quality is not only attributable to hatching of long-term eggs or poor flocks breeder, but there may also be major factors that have not yet had an impact on the quality of the eggs (21). In general, it was observed that all the traits of hatching studied were negatively affected by the length of storage of eggs. Pre-incubation of hatching eggs it was an important role in reducing these negative effects on hatching traits.We conclude from this study that there is no negative effect of the pre-incubation process of incubation eggs for the eggs which stored for 4 days , and that pre-incubation for 4 hours has improved the traits of hatching eggs .

Table (3) Effect of pre-incubation and storage of hatching eggs of broiler breeder (Rose 308) in the navel quality of hatched chicks ( mean±standard error)

| Treatments | | The quality of hatched chicks % | | |
|---|---|---|---|---|
| | | A | B | C |
| Pre-incubation (hr) | 0 | 1.12±92.84 a | 0.64±4.69 c | 0.49±2.46 c |
| | 4 | 1.30±94.54 a | 0.21 ±4.76 c | 0.45±0.89 d |
| | 8 | 1.52±90.51 ab | 0.89±6.14 b | 0.65±3.33 b |
| | 12 | 1.16±88.15 b | 0.72±8.12 a | 0.44±3.72 a |
| Significant level | | * | * | ** |
| Storage(day) | 4 | 0.60±95.12 a | 0.37±3.79 c | 0.24±1.07 c |
| | 8 | 0.91±92.75 b | 0.65±4.99 b | 0.43±2.25 b |
| | 12 | 0.73±86.66 c | 0.42±8.87 a | 0.35±4.46 a |

| Significant level | | * | * | ** |
|---|---|---|---|---|
| Pre-incubation x storage | 0×4 | 0.03±96.23 b | 0.07±2.75 j | 0.02±1.00 f |
| | 0×8 | 0.02±93.68 d | 0.14±4.21 h | 0.36±2.10 e |
| | 0×12 | 0.04±88.60 fg | 0.06±7.12 e | 0.02±4.27 b |
| | 4× 4 | 0.05±97.43 a | 0.09±2.57 j | 0.00±0.00 g |
| | 4× 8 | 0.13±96.87 ab | 0.07±3.12 i | 0.00±0.00 g |
| | 4×12 | 0.16±89.33 f | 0.11±8.00 d | 0.30±2.67 d |
| | 8×4 | 0.15±94.79 c | 0.02±4.18 h | 0.03±1.00 f |
| | 8× 8 | 0.02±92.02 e | 0.14±4.56 g | 0.02±3.40 c |
| | 8×12 | 0.90±84.72 h | 0.18±9.72 b | 0.16±5.55 a |
| | 12× 4 | 0.13±92.04 e | 0.10±5.68 f | 0.10±2.27 de |
| | 12×8 | 0.15±88.43 g | 0.06±8.33 c | 0.04±3.22 c |
| | 12×12 | 0.13±84.00 h | 0.09±10.66 a | 0.06±5.34 a |
| Significant level | | ** | * | * |

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Al-Qadisiyah Journal of Agriculture Sciences (QJAS)- Vol.8 NO.2 (2018)
ISSN Print ( 2077-5822) ISSN Online (2618-1479)

# تأثير الحضن المسبق وطول مدة خزن بيض تفقيس امهات فروج اللحم في بعض صفات الفقس .

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**الخلاصة**

استخدم في هذه الدراسة بيض تفقيس عدد 1800 بيضة من قطيع امهات تجاري لفروج اللحم روز 308 بعمر 47 اسبوع وزع البيض عشوائياً على 12 معاملة تجريبية بواقع 150 بيضة / معاملة، قسمت المعاملات كالاتي :

T1 0 ساعة حضن مسبق × 4 يوم خزن
T2 0 ساعة حضن مسبق × 8 يوم خزن
T3 0ساعة حضن مسبق × 12 يوم خزن
T4 4ساعة حضن مسبق × 4 يوم خزن
T5 4 ساعة حضن مسبق × 8 يوم خزن
T6 4 ساعة حضن مسبق × 12 يوم خزن
T7 8 ساعة حضن مسبق × 4 يوم خزن
T8 8 ساعة حضن مسبق × 8 يوم خزن
T9 8 ساعة حضن مسبق × 12 يوم خزن
T10 12 ساعة حضن مسبق × 4 يوم خزن
T11 12 ساعة حضن مسبق × 8 يوم خزن
T12 12ساعة حضن مسبق × 12 يوم خزن .

وكانت الصفات المدروسة في هذه الدراسة هي نسبة الهلاكات الجنينية الاسبوعية ونسبة البيض الكابس ونوعية سرة الافراخ الفاقسة.أظهرت نتائج هذه الدراسة وجود زيادة معنوية ($P < 0.05$) في نسبة الهلاكات الجنينية المبكرة للمعاملة التي تم حضنها مسبقا لمدة 8 ساعات و خزنها لمدة 12 يوما مقارنةً بالمعاملة التي لم تحضنمسبقاً وخزنت لمدة 4 ايام ، وارتفاع معنوي في نسبة الهلاكات الجنينية المتوسطة للمعاملة التي حضنت مسبقاً لمدة 8 ساعات وخزنت لمدة 12 يوما مقارنة بالمعاملة التي حضنت مسبقاً لمدة 8 ساعات وخزنت لمدة 4 أيام، ازدادت معنويا ( $P < 0.05$) نسبة البيض الكابس للمعاملة التي حضنت مسبقاً لمدة 4 ساعات وخزنت لمدة 12 يوما مقارنة بمعظم المعاملات ، الافراخ الفاقسة ذات السرة نوع A ازدادت معنوياً( $P < 0.05$) للمعاملة 4 ساعات حضن مسبق × 4 أيام خزن مقارنة مع المعاملة 12 ساعة حضن مسبق × 12 يوم خزن ، بشكل عام لوحظ ان كل صفات الفقس المدروسة تأثرت سلباً بطول مدة خزن البيض وإن لعملية الحضن المسبق لبيض التفقيس دوراً مهماً في تقليل هذه الاثار السلبية على صفات الفقس . نستنتج من هذه الدراسة عدم وجود تأثير سلبي لعملية الحضن المسبق لبيض التفقيس المخزون لمدة 4 ايام وان الحضن المسبق لمدة 4 ساعات قد حسّن من صفات الفقس .