INFLUENCE OF PREINCUBATION EGG STORAGE DURATION ON EGG QUALITY, HATCHABILITY, EMBRYONIC MORTALITY AND VIABILITY OF DANDARAWI CHICKS

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SUMMARY

The aim of this study was to identify the optimal storage duration of incubated eggs of Dandarawi hens on embryonic mortality, hatchability, one-day chick weight and viability of chicks at 14 days of age. Eggs were collected 4 times daily for 15 consecutive days and stored at 16°C and 70% RH until sorted into treatments and then were incubated for 21 d under standard incubation conditions. The 15 experimental groups and control group were as follows: The fresh eggs as control incubated in the same day of lay, while eggs of one to fifteen experimental groups (G1 to G15) were stored from d 1 to 15, respectively. Three replications of 80 eggs per group treatment per incubation setting (total of 3,840 eggs) were studied.

The results showed that, the albumen height, Haugh units and egg yolk index were lower (P≤0.05) in eggs stored from 1 to 15 d than in fresh eggs, but the egg yolk percentage (EYP) was higher (P≤0.05). At 0 to 5 d of storage had no effect on viability of chicks at 14 days of age (VC), but storage periods of more 5 d decreased (P≤0.05) VC. Day-old chick weights and chick weights at hatch as percentage of egg weights increased slightly when storage days increased. The hatchability of eggs was lower (P≤0.05) with longer periods of storage, but the embryonic morality percentage increased (P≤0.05) during the periods from 0 to 6 d and from 13 to 21 d of incubation.

Present results suggest that hatchability declines with presetting storage start 1 d after lay, possibly due to deterioration in egg quality.

Keywords: Eggs storage length, hatchability parameters, viability of chicks

INTRODUCTION

Due to variable market demand for 1-d-old chicks in the poultry industry and the maximum hatchery capacity, the total length of egg storage varies between a few days and several weeks. Storage of hatching eggs beyond 7 d is associated with an increase in incubation duration (Mather and Laughlin, 1976; Tona *et al*., 2003), a decrease in hatchability (Becker, 1964; Merritt, 1964; Fasenko *et al*., 2001b; Tona *et al*., 2004; Yassin *et al*., 2008), and a decrease in chick quality (Byng and Nash, 1962; Merritt, 1964; Tona *et al*., 2003, 2004). During egg storage, embryo viability declines, likely due to an increase in cell death (Arora and Kosin, 1968; Bloom *et al*., 1998). In addition, egg characteristics change due to a loss of CO_2 and water from the egg. Albumen pH increases from about 7.6 to about 9.0 within 4 d of storage (Lapão *et al*., 1999). Yolk pH increases from about 6.0 to about 6.5 (Shenstone, 1968), albumen viscosity decreases (Shenstone, 1968; Burley and Vadehra, 1989), and the strength of the yolk membrane decreased as well as during prolonged cold storage (Fromm, 1966; Jones *et al*., 2002). These changes in embryo viability and egg characteristics may be related to the negative effects of prolonged egg storage on hatchability and chick quality (Becker *et al*., 1968; Meijerhof, 1992; Reijrink *et al*., 2008).

Increasing the number of storage days increases the proportion of embryonic mortality during storage and incubation and thereby increases the probability of failure to hatch (Whitehead *et al*., 1985; Yoo and Wientjes, 1991; Scott and Mackenzie, 1993). Influence of the number of storage days before incubation on proportion of embryos that died up to Day 7 of incubation, i.e., early embryonic mortality, and on proportion of embryos that died from Day 8 through Day 22 of incubation, i.e., late embryonic mortality, has been assessed among fertile eggs (Yoo and Wientjes, 1991; Scott and Mackenzie, 1993). Each proportion of early or late embryonic mortality increased at different rates for broiler eggs incubated immediately, compared with those incubated after 7 d in storage (Scott and Mackenzie, 1993). As the number of days in storage increased from 0 to 20, the proportion of

early embryonic mortality increased in each of two layer lines, but the proportion of late embryonic mortality increased in only one line (Yoo and Wientjes, 1991).

The albumen height of all eggs and Haugh units are at maximum when the egg is laid and decreases with increased storage time (Kahraman-Dogan *et al.,* 1994; Jones *et al.,* 2002). Silversides and Villeneuve (1994) reported that changes in albumen quality during storage are described equally well by albumen height and HU. Stern (1991) reported that, after oviposition, carbon dioxide is released from the egg, resulting in an increase in albumen pH from about 7.6 to 9.5 within a short period of time, whereas the yolk remains slightly acid, at a pH around 6.5. Therefore, a 1,000-fold hydrogen ion concentration gradient (3 pH units) may exist across the blastoderm. The rise in albumen pH with storage time and hen age is associated with a decrease in albumen height and viscosity. Albumen liquefaction probably facilitates the movement of nutrients from the albumen to the blastoderm (Brake *et al*., 1997) and may reduce resistance to gaseous diffusion (Meuer and Baumann, 1988). The extended periods of egg storage allow the albumen to degrade excessively. This degradation causes the blastoderm to move into close proximity to the eggshell, so that early embryonic mortality results from dehydration during the early stages of incubation (Brake *et al*., 1993).

According to Deeming (1995), day- old chick quality can be related to several factors, such as incubator quality, incubation environment, and egg characteristics. Although egg storage is a normal practice after egg collection and often a necessity in commercial incubation, it negatively influences egg quality and embryo development and results in a longer incubation time (Muambi *et al.,* 1980). Furthermore, the spread of hatch can be influenced by the storage length of incubating eggs (Muambi *et al.,* 1980; Christensen *et al.,* 2001a), resulting in an increase in the number of chicks that experience delayed access to first feed (Decuypere *et al.,* 2001). Because the end of 7 d of rearing is often considered as the true starting point for production, the performance (chick relative growth) of the chicks at this time may be an additional indication of chick quality. Chick relative growth rather than absolute weight gain measure the speed of growth in time and had previously been used to determine chick performance (Kühn *et al.,* 1982).

In this paper, the influence of storage days on egg quality, the distribution for time of embryonic mortality during incubation, fertile hatchability and chick's viability at 14 days of age had been evaluated for Dandarawi chicken hatching eggs.

MATERIALS AND METHODS

Experimental Design:

This experiment was carried out at the Poultry Research Farm, Faculty of Agriculture, Assiut University, Assiut, Egypt. Hatching eggs were collected from 31 to 32 weeks of age Dandarawi hens. Eggs were collected 4 times daily for 15 consecutive days and stored at 16°C and 70% RH until sorted into treatments and set into incubators. Any abnormal shaped eggs were eliminated. The eggs were incubated in a Petersime setter and hatcher. The setter was operated at 37.4±0.2°C dry-bulb temperature and 28.9±0.2°C wet-bulb temperature. The Hatcher was operated at 37.2±0.2°C dry-bulb temperature and 30.0±0.2°C wet-bulb temperatures. Eggs were turned once per hour through an angle of 90 from d 2 to 18 of incubation and then they were transferred to the hatcher. The 15 experimental groups and control group were as follows: The fresh eggs as control incubated in the same day of lay (C), while eggs of one to fifteen treatments groups (G1 to G15) were stored from d 1 to 15, respectively. Three replications of 80 eggs per group treatment per incubation setting (total of 3,840 eggs) were studied.

Egg Quality:

Thirty eggs were taken from each group. Egg weight was recorded to the nearest 0.1 g using special automatic balance and broken onto a flat surface where the height of the albumen was measured half way between the yolk and the edge of the inner thick albumen by a micrometer as described by Brant and Shrader (1952). The diameter of yolk was measured, using sliding caliber. The yolk was separated from the albumen and then yolk was weighted. Individual Haugh unit (Haugh, 1937) score was calculated using the egg weight and thick albumen height (Doyon *et al.,* 1986), using the following formula: Haugh unit = $100 \, Log \, (H - 1.7X \, W^{0.37} + 7.6)$. Where: H = the observed height of the thick albumen in millimeters and W = Weight of egg (grams). Also, the egg yolk index (EYI) was calculated by dividing the yolk's height X 100 /yolk's diameter.

Hatching parameters:

Eggs were individually weighed and labeled

in order to identify the hatchlings with the eggs for each treatment (in pedigree baskets).. On d 6 and 12 of incubation, eggs were examined by candling to identify clear eggs and embryonic mortality. Eggs with embryonic development were considered fertile. After 510 h of incubation, the number of hatched chicks was recorded, weighed and it was expensed as percentage of egg weight, while all un-hatched eggs were opened to determine embryonic mortality from d 13 to 21 plus pipped. Fertile hatchability was calculated as the number of chicks hatched per fertile egg set. Embryonic mortality was calculated as a percentage of fertile eggs and divided into 4 categories: embryonic mortality from d 0 to 6, from d 7 to 12, from d 13 to 21, and pepping.

Chick's viability:

All of the hatched chicks were reared up to 14 d of age at 30 to 32°C on floor pens. The photoperiod was 24 hrs / day during the first 3 days, which was gradually decreased by one hr/week, and a grower diet (2,800 kcal metabolizable energy and 18% crude protein) and water were provided *ad libitum*. The number of dead chicks was recorded daily and viability calculated of chicks.

Statistical Analyses:

The effect of storage duration was analyzed by one-way ANOVA with the general linear model (GLM) procedure (SAS Institute, 2004). Significance of differences among means was partitioned by the Duncan option (SAS Institute, 2004). Statements of statistical significance were based upon P≤0.05.

RESULTS AND DISCUSSION

The results presented in Table 1 showed that during storage, the albumen height (AH), Haugh units (HU) and egg yolk index (EYI) decreased (P≤0.05) but the egg yolk percentage (EYP) increased (P≤0.05). These results are in agreement with those of many authors (Oosterwoud, 1987; Scott and Silversides, 2000; Silversides and Scott, 2001; Jones and Musgrove, 2005). Scott and Silversides (2000) reported that eggs from 31-wk-old ISA-White and ISA- Brown hens were sampled immediately after lay and after periods of storage of 1, 3, 5, and 10 d at room temperature. Longer periods of storage resulted in lower albumen weight and AH. Silversides and Scott (2001) found that during storage, albumen weight of eggs from ISA-White and ISA- Brown hens decreased and

yolk weight increased slightly. Also, Jones and Musgrove (2005) revealed that, during storage, AH and HU decreased significantly (P≤0.01). The longer periods of storage resulted in higher EYP because the strength of the vitelline membrane decreased during storage due to the yolk absorbing water (Oosterwoud, 1987). Jones *et al.* (2002) reported that the elasticity of the vitelline membrane increased with egg age.

The results presented in Table 2 showed that the hatchability of eggs (F) was lower (P≤0.05) with longer periods of storage, but the embryonic morality (EM) percentage increased (P≤0.05) during the periods from 0 to 6 d and from 13 to 21 d of incubation. The improvement in F in control seems to be due to the reduction in EM. El-Hammady *et al.* (2012) reported that normal hatchability of Dandarawi hens under production conditions were 78.0 and 65.3% in Autumn and winter, respectively. These results are in agreement with those found by Decuypere and Bruggeman (2007), Elibol and Brake (2008) and Reijrink *et al*. (2010) who found that hatchability decreased with increasing egg storage period as percentage early and late embryonic mortality increased. Prestorage incubation decreased embryonic mortality during the first 2 d of incubation, which was in agreement with Reijrink *et al.* (2009). Many investigators reported that egg storage longer significantly reduced F (Scott, 1933; Asmundson, 1947; Kosin, 1950; Merritt, 1964; Whitehead *et al.,* 1985; Fasenko *et al.,* 2001a,b) and increased EM (Merritt, 1964; Mather and Laughlin, 1976; Fasenko *et al.,* 1992, 2001a, b; Brake *et al.,* 1997; and Elibol *et al.,* 2002) with increasing storage length. Lapã *et al.* (1999) suggest of that declines in hatchability with presetting storage start 1 d after lay, possibly due to deterioration in egg albumen quality. Each study suggests that the number of storage days before incubation might influence the distribution for time of embryonic mortality during incubation. There are two phases of increased embryonic mortality during incubation: the first phase occurs during the first week of incubation and the second phase during the last week (Payne, 1919; and Byerly, 1930).

Preincubational egg storage is known to affect general egg quality (yolk membranes, yolk, perivitelline layers). The incidence of more abnormal and dead embryos may be related to a higher number of embryonic cells with necrotic nuclei (Arora and Kosin, 1966b) and an increase in number of apoptotic cells (cells programmed to die) as a result of storage (Arora and Kosin, 1966a; and Mather and Laughlin, 1979). Bakst

and Akuffo (1999) observed that a reduction of 32.8% in total number of turkey embryonic cells occurred during the first 2 d of storage. The initiation of embryonic development is delayed, which could be brought into relation with the delay in hatching time. This delay is seen in a later occurrence of the start of internal pipping (IP) and a prolonged IP stage (Tona *et al*., 2003). Moreover, the rate of embryonic development is slower due to longer storage, but this phenomenon is not observed for all embryos, indicating that not all embryos are affected by storage in the same way (Fasenko *et al*., 2002). Not only growth but also metabolism is found to be influenced by storage time. It has been shown that the metabolism of embryos, as measured indirectly by embryonic CO_2 output, proceeds at a slower rate. Interestingly, Fasenko (1996) showed that turkey embryos from 14-d stored eggs relied more upon gluconeogenesis during pipping and hatching than embryos from 4-d stored eggs. Christensen *et al*., (2001b) showed that embryos from a line that resisted storage mortality maintained higher glycogen concentrations in muscle and heart tissues than those from a line susceptible to storage. The ability of the embryos to metabolize adequate carbohydrate reserves at time of hatching seems to be an advantage for embryonic growth and survival.

The results presented in Table 2 showed that day-old chick weights and chick weights at hatch as percentage of egg weights increased slightly when storage days increased. Silversides and Scott (2001) reported that, during storage of eggs from ISA-White and ISA-Brown hens, albumen weight decreased and yolk weight increased slightly. Yolk weight could be expected to increase with a longer period of storage as amino acids move through the vitelline membrane from the albumen (Heath, 1977). Fasenko (1996) demonstrated increased hepatic and renal gluconeogenic activities in turkey embryos from eggs that were stored prior to setting, compared to controls. In contrast, in the study of Reijrink *et al.* (2009), prestorage incubation (PSI) did not affect chick length on the day of hatch when egg storage was prolonged.

The control as well as G1 to G5 had no effect on viability of chicks at 14 days of age (VC), but VC was lower (P≤0.05) when storage days increased from 6 to 15 d (Table 2). Reijrink *et al.* (2010) reported that chick quality decreased when storage time increased. Tona *et al.* (2003, 2004) have shown that prolonged egg storage had a negative effect on chick quality in terms of physical parameters on the day of

hatch, relative growth during the first 7 d of life, and weekly body weight until the slaughter age. Day-old chick quality is the result of events during embryonic development, and from the foregoing, it is clear that storage clearly affects embryonic development in different aspects (Decuypere and Bruggeman, 2007).

In general, storage period affected F, EM and VC. Our study suggests that incubation of Dandarawi eggs stored for longer periods decreases hatchability. Additional research is needed to define optimal incubation conditions to increase hatchability of Dandarawi eggs.

ACKNOWLEDGMENTS

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Table 1. Effect of eggs storage days on egg quality (n=30 eggs)

Items Treat	Egg weight (g)	Albumen height (mm)	Haugh Units (mm)	Egg yolk index (%)	Egg yolk (%)
Go	47.4±0.31	8.13[a] ±0.31	92.55[a] ±1.65	58.52[a] ±0.73	32.61[g] ±0.42
G1	47.5±0.32	6.97[b] ±0.24	86.23[b] ±1.43	56.05[a] ±0.87	33.69[g] ±0.60
G2	47.3±0.29	5.56[c] ±0.23	76.97[c] ±1.74	53.11[b] ±0.79	34.13[efg] ±0.53
G3	47.1±0.28	5.31[cd] ±0.22	75.55[c] ±1.57	53.15[b] ±0.98	34.34[efg] ±0.61
G4	47.6 ±0.33	4.97[cde] ±0.28	72.31[cd] ±2.28	51.11[bc] ±1.07	34.65[def] ±0.62
G5	47.6±0.34	4.83[def] ±0.29	71.82[cde] ±2.08	49.39[cd] ±0.71	34.78[cdef] ±0.62
G6	47.0±0.36	4.54[efg] ±0.15	68.85[def] ±1.41	48.49[de] ±0.95	34.91[cdef] ±0.53
G7	47.4±0.37	4.27[efg] ±0.19	67.67[defg] ±1.72	48.30[de] ±1.04	34.92[cdef] ±0.72
G8	47.5±0.38	4.25[fgh] ±0.23	67.0[defgh] ±2.09	47.59[def] ±0.80	35.33[bcdef] ±0.64
G9	47.4±0.28	4.15[fgh] ±0.17	65.88[eghf] ±1.93	46.42[efg] ±0.73	35.55[abcdef] ±0.63
G10	47.7±0.29	3.99[fgh] ±0.19	64.88[ghf] ±1.65	46.17[efg] ±0.60	35.65[abcde] ±0.61
G11	47.6±0.39	3.89[ghi] ±0.18	63.85[fgh] ±1.98	46.07[efg] ±1.15	36.35[abcd] ±0.52
G12	47.8±0.28	3.79[hi] ±0.18	62.42[ghi] ±1.79	45.87[efg] ±1.10	36.57[abc] ±0.56
G13	47.3±0.25	3.75[hi] ±0.26	61.69[ghi] ±2.78	45.25[fg] ±0.73	36.88[ab] ±0.52
G14	47.8±0.24	3.74[hi] ±0.25	60.87[hi] ±2.60	44.42[g] ±0.91	36.95[ab] ±0.54
G15	475 ±0.26	3.32[i] ±0.15	57.15[i] ±1.85	44.12[g] ±0.92	37.23[a] ±0.46

[a—l] Means ± SE within each column with different superscripts are significantly different (P≤0.05).
Go to G15 = the eggs were stored from d 0 to 15, respectively.

Table 2. Effect of eggs storage days on fertile hatchability (FH), embryo mortality (EM), egg weight (EW), day -old chick weights (DCW), chick weights at hatch as percentage of egg weights (DCWP) and viability of chicks (VC)

Items Treat	FH (%)	EM (%) 0 to 6 d of incubation	7 to 12 d of incubation	13 to 21 d of incubation	Pipping	DCW (g)	DCWP (%)	VC (%)
Go	74.07[a]±0.96	0.79[h] ±0.10	2.38[de] ±0.46	16.67[g] ±0.46	6.09[fg] ±0.53	27.68[c] ±0.20	57.70[b] ±0.53	98.89[a] ±0.64
G1	71.88[b]±0.90	0.78[h] ±0.10	2.34[de] ±0.45	17.97[fg] ±0.47	7.03[ef] ±0.90	27.11[c] ±0.19	57.77[b] ±0.54	98.68[a] ±0.76
G2	71.47[b]±0.71	3.20[g] ±0.46	1.60[e] ±0.42	18.67[f] ±0.27	4.80[g] ±0.46	27.11[c] ±0.25	57.93[b] ±0.65	98.68[a] ±0.76
G3	66.41[c]±0.12	3.91[g] ±0.45	3.91[abc] ±0.41	17.97[fg] ±0.44	7.81[de] ±0.90	27.28[c] ±0.23	58.10[b] ±0.71	98.31[a] ±0.98
G4	62.30[d]±0.17	5.74[f] ±0.47	4.10[abc] ±0.40	19.12[f] ±0.47	8.75[bcde] ±0.27	27.29[bc] ±0.28	58.29[ab] ±0.70	97.30[a] ±0.80
G5	59.84[e]±0.45	6.30[f] ±0.45	3.94[abc] ±0.44	22.83[e] ±0.43	7.09[ef] ±0.45	27.29[bc] ±0.23	58.31[ab] ±0.63	96.55[abc] ±1.00
G6	59.68[e]±0.93	9.68[e] ±0.46	4.03[abc] ±0.45	17.74[fg] ±0.42	8.87[bcd] ±0.47	27.34[bc] ±0.25	58.54[ab] ±0.67	94.60[bcd] ±0.78
G7	58.79[e]±0.52	10.24[e] ±0.45	3.94[abc] ±0.41	16.80[g] ±0.40	10.24[b] ±0.44	27.38[bc] ±0.28	58.60[ab] ±0.63	94.32[bcde] ±0.66
G8	57.97[e]±1.41	10.32[e] ±0.42	3.97[abc] ±0.41	17.72[fg] ±0.26	10.05[b] ±0.27	27.45[bc] ±0.29	58.62[ab] ±0.73	93.41[cdef] ±0.64
G9	52.85[f]±1.41	10.57[de] ±0.47	4.07[abc] ±0.47	22.76[e] ±0.47	9.76[bc] ±0.47	27.51[bc] ±0.35	58.64[ab] ±0.90	93.55[cdefg] ±1.86
G10	47.72[g]±0.20	10.48[de] ±0.45	5.11[a] ±0.27	29.30[c] ±0.27	8.06[cde] ±0.46	27.71[bc] ±0.27	59.49[ab] ±0.74	92.55[defgh] ±0.62
G11	46.72[g]±0.26	11.02[de] ±0.46	4.98[a] ±0.46	27.56[d] ±0.26	9.97[b] ±0.52	27.72[bc] ±0.33	59.56[ab] ±0.97	90.74[efgh] ±1.07
G12	42.52[h]±0.46	11.81[d] ±0.47	4.72[ab] ±0.41	32.28[b] ±0.46	8.66[bcde] ±0.46	27.96[abc] ±0.34	59.82[ab] ±0.86	90.00[fgh] ±1.92
G13	39.37[j]±0.46	15.72[c] ±0.41	4.72[ab] ±0.40	31.50[b] ±0.47	8.66[bcde] ±0.45	28.13[ab] ±0.48	60.04[ab] ±1.28	89.86[gh] ± 0.83
G14	21.55[j]±0.50	18.97[b] ±0.50	3.45[abc] ±0.50	43.97[a] ±0.50	12.07[a] ±0.51	28.18[ab] ±0.35	60.09[a] ±0.87	89.29[h] ±2.0
G15	15.69[k]±0.74	24.37[a] ±0.49	3.08[cd] ±0.28	42.86[a] ±0.49	13.45[a] ±0.48	28.74[a] ±0.47	61.27[a] ±1.18	80.39[i] ±1.13

[a—k] Means ± SE within each column with different superscripts are significantly different (P≤0.05).
Go to G15 = the eggs were stored from d 0 to 15, respectively.

تأثير طول فترة تخزين البيض قبل التفريخ علي نسبة الفقس والنفوق الجنيني وحيوية الكتاكيت
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هدفت هذه الدراسة الي معرفة الوقت الامثل لتخزين بيض التفريخ لدجاج الدندراوي وتأثيرة علي نسبة النفوق الجنيني ونسبة الفقس علي اساس البيض المخصب ، ووزن الكتاكيت عند عمر يوم ، وحيوية الكتاكيت عند عمر ١٤ يوم. تم جمع البيض أربع مرات يوميا لمدة ١٥ يوما متتالية ، وخزن البيض في درجة حراره ١٦ درجة مئوية ، ورطوبة نسبية ٧٠% ، وبعد توزيع البيض علي المعاملات فرخ البيض لمدة ٢١ يوم تحت ظروف التفريخ القياسية. استخدمت ١٥ مجموعة معاملة ومجموعة مقارنة كالتالي: البيض الطازج استخدم كمجموعة مقارنة وفرخ في نفس يوم الوضع ، بينما خزن البيض للمجاميع المعاملة من ١ الي ١٥ (G1 to G15) لمده يوم الي ١٥ يوم علي التوالي. وكل مجموعة اشتملت علي ثلاث مكررات بكل مكرة ٨٠ بيضة (المجموع الكلي للبيض المفرخ المستخدم في الدراسة ٣٨٤٠ بيضة).

اظهرت النتائج المتحصل عليها ، حدث انخفاض معنوي في كل من ارتفاع البياض ، ووحدات قياس جودة البياض (Haugh units) ، ودليل صفار البيضة في البيض المخزن من يوم الي ١٥ يوما عن البيض الموضوع في نفس اليوم، ولكن ارتفعت نسبة صفار البيضة بدرجة معنوية. لم يوجد تأثير للتخزين حتي اليوم الخامس علي حيوية الكتاكيت حتي عمر ١٤ يوما ، ولكن انخفضت حيوية الكتاكيت معنويا بطول فترة التخزين البيض عن اليوم الخامس. زاد قليلا وزن الكتاكيت عند عمر يوم وكذلك نسبتها علي اساس وزن البيضة مع زيادة أيام التخزين. انخفضت نسبة الفقس علي اساس البيض المخصب مع الفترات الطويلة للتخزين ، ولكن زادت نسبة النفوق الجنيني اثناء الفترتين من ٠– ٦ ، الفترة من ١٣ –٢١ من التفريخ.

ومن النتائج السابقة توضح انخفاض نسبة الفقس مع تخزين البيض بداية من اليوم الاول بعد وضع البيض ، ويرجع سبب ذلك الي تدهور في جودة البيض اثناء التخزين.