THE EFFECT OF BOTH PRE-INCUBATION DIPPING EGGS IN VITAMIN C AND COOLING EGGS DURING INCUBATION PERIOD ON EMBRYONIC AND HATCHABILITY PARAMETERS IN TWO LOCAL CHICKEN STRAINS.

By

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Abstract: *The present study was carried out to investigate the effect of pre-incubation dipping eggs in different concentrations vitamin C (AA) solution for 2 minutes and cooling eggs at 24˚C for 6 hrs at the 16th day of incubation on embryonic and hatchability parameters in two local strains of chickens. A total number of 4320 fertile hatching eggs were collected from Dokki 4 and Dandarawi local strains at 30 weeks of age Eggs from each strain (2160 egg) were randomly divided into four treatments. The sequence of the four treatments was as follows:-*

1 -Control (non dipped eggs).

2 -Eggs dipped into distilled water (0.0g AA/L) for 2 minutes

3 -Eggs dipped into AA solution (5.0g AA/L) for 2 minutes.

4 -Eggs dipped into AA solution (10.0g AA/L) for 2 minutes.

At the 16th day of incubation each treatment of the mentioned above was equally divided in to two groups, the first was left as a control (non cooled) while the second was cooled at 24˚C for 6 hours

The obtained results could be summarized as follows :- (1) Improvement in incubation traits were recorded for the eggs of Dokki4 strain dipped in 5.0g AA/L for 2 minutes at 0 day of incubation and those cooled at 24˚C for 6 hrs at the 16th day of incubation .(2) Pre-incubation Dipping eggs in 5.0g AA/L for 2 minutes may be alternative method to maximize the hatchability% which decrease embryonic mortality during hatching process in eggs of Dokki4 and Dandarawi strains without adverse effects. (3) Cooling eggs at 24˚C for 6 hrs at the 16th day of incubation significantly increased hatchability% , decreased embryonic mortality and caused delaying in hatching time in eggs of Dokki4 and Dandarawi strains. (4) Vitamin C is a weak acid and has the ability of diluted acids to interact with egg shell which may be led to increase egg shell conductance which consequently might be enhanced the movement of water vapor and CO2 across the shell and change the buffering capacity of albumin which resulted in increasing hatchability (5) Dandarawi strain was inferior in incubation traits compared to Dokki4 strain so more breeding selection plans are required for enhancing the performance of Dandarawi strain .

Key Word: Dipping Eggs, Vitamin C, Cooling Eggs, Local Chicken

INTRODUCTION

Optimum temperature is a very important factor during for the success of both hatching and the development of the embryo that is extremely sensitive to this temperature. Most poultry species have an optimum incubation temperature of 37 to 38˚C and small deviations from this optimum can have a major impact on hatch success and development *(Wilson, 1991)* but high incubation temperature were found to accelerate embryonic growth, while low temperature retarded embryonic growth.

There are several reports regarding the effect of vitamin C (ascorbic acid, AA) as an anti-stress agent on productive performance parameters in birds such as growth and reproductive traits, the most important of them are fertility and hatchability. In incubated eggs, chick embryos may be subjected to stress caused by excessive production of metabolic heat during the latter part of egg incubation so, the addition of vitamin C as an anti-stress agent may be beneficial for embryos viability and to protect them from any stress during incubation *(Tullett, 1990)*.

The artificial incubation is the imitation of the natural incubation needs special environmental conditions (temperature, humidity, turning and ventilation). Temperature control is probably the most critical factor for the success of embryonic development *(Lundy, 1969)*. The vast majority of poultry hatching eggs are artificially incubated in incubators that must be designed to provide the accurate temperature to ensure that the temperature of the developing embryo does not deviate from the optimum. *French (1997)* reported that, the temperature refrain for the developing embryo is dependent on three factors: - 1) The incubator temperature. 2) The ability of heat to pass between the incubator and the embryo. 3) The metabolic heat produced by embryo itself. *Burley and Vadehra (1989)*. Found a significant reduction in late death for cooled eggs for 12h compared with control and a significant improvement in hatchability of fertile eggs with a reduction in late embryonic death for eggs cooled for 24h under the same conditions. It was suggested that cooling reduced the metabolic rate of embryos during the latter part of incubation and relieved stress caused by excessive production of metabolic heat .This may explain in part, how broody hens can sometimes produce better hatchability results than incubators, because under natural conditions the eggs were cooled daily while the hens leave the clutch of eggs to feed. An incubation temperature lower than usual during the last week of embryonic development may induce a lower thermoregulatory set-point and enhance the potential for tolerance to cold (Tzchentke and Nichelmann, 1999). Therefore, this study was carried out to investigate: - The effect of pre-incubation dipping eggs in different concentrations of vitamin C (AA) solution for 2 minutes and the effect of cooling eggs at 24˚C for 6 hrs at the 16^{th} day of incubation on embryonic and hatchability parameters in two local strains of chicken.

MATERIALS AND METHODS

The present study was carried out at (Sides, Beni-Suef), the Poultry Breeding Research Station, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture. A total number of 4320 hatching eggs were collected from Dokki 4 and Dandarawi local strains at 30 weeks of age Eggs from each strain (2160 egg) were randomly divided into four treatments as shown in Table (1):-

1 -Control (non dipped eggs).

2 -Eggs dipped into distilled water (0.0g AA/L) for 2 minutes

3 -Eggs dipped into AA solution (5.0g AA/L) for 2 minutes.

4 -Eggs dipped into AA solution (10.0g AA/L) for 2 minutes.

At the 16th day of incubation each of the above mentioned treatments of above was equally divided in to two groups, the first was served as a control (non cooled) while the second was cooled at 24˚C for 6 hours.

Each group of each strain had 270 eggs was subdivided into three replicates of 90 eggs (2 strains x 4 vitamin C treatments x 2 cooling groups x 3 replicates x 90 eggs = 4320 egg). The following criteria were measured or calculated in this study:- (egg weight loss % , shell weight % , shell thickness at the 18th day of incubation – embryo weight % at the 10th , the 18th and the 21st day of incubation –hatchability % - hatching date (hrs) – embryonic mortality % - embryonic malpositions % where:- [P1= malposition (1) (the head ~~is~~ buried between thighs). P2= malposition (2) (head in the narrow end of the egg). P3= malposition (3) (head is bent to the left side). 4= malposition (4) (beak is not directed toward the air cell). P5= malposition (5) (feet are over the head). P6= malposition (6) (beak is above the right wing)] and Culled chick %. Data were computed using analysis of variance procedure (*ANOVA*) using the general linear model (GLM) procedure of SAS *(SAS Institute 1996).* Differences between treatment means were tested for significans by using Duncan's new multiple range test *(Duncan 1955).*

RESULTS AND DISCUSSION

1. Egg weight loss % at the 18 th day of incubation:-

Data concerning the averages egg weight loss percentage are shown in Table (2).

(1) Egg weight loss% was significantly ($p<0.01$) affected by dipping eggs in AA solutions for 2 minutes. Eggs dipped in 10.0g AA/L increased the egg weight loss compared with those dipped in 5.0g AA/L or dipped in distilled water (0.00g AA/L) and non dipped (control) by 2.41, 4.76 and 8.32%, respectively. This increase in egg weight loss % may be due to the change of the cuticle properties. The changes may have been obtained from the interaction between the egg shell cuticle and AA in the dipping solution. This interaction may be produced by a thinner cuticle, resulting in increased egg shell conductance which, then, increases water loss. (Burley and Vadehra, 1989 and Shafey 2002). These results correspond with the findings of Shafey (2002) and Samak and Mahmoud(2007) who reported, significant increase in egg weight loss due to the increase of AA solution at a concentration of 10.0 or 20.0g/L for 2 minutes in Sinai eggs compared to the control group .

(2) Egg weight loss% was significantly ($p<0.01$) affected by cooling eggs at 24˚C for 6 hrs at the 16th day of incubation. Eggs exposed to cooling were the higher in egg weight loss% value (11.31%) compared to non cooled eggs (control) (10.76%). Similar results were obtained by

Booth and Rahn (1991) and Abd El-Wahed (2000) who found significant increase in egg weight loss in Fayoumi eggs at the 18th day of incubation as being affected by cooling eggs at 24˚C for 6 hrs at the 16th day of incubation. This increase in egg weight loss % may be due to the higher temperature inside the eggs during cooling period which increases the gradient difference of temperature between the embryos body and cooling chamber, leading in turn to more heat dissipated by evaporation which led to increased weight loss.

(3) Strain had a significant effect ($p<0.01$) on egg weight loss% where eggs of Dokki4 strain had the highest egg weight loss% (11.62%) while eggs of Dandarawi strain had the lowest egg weight loss (10.81%). These results were in agreement with those reported by *Abd El-Samad (2005) and El Full* et at *(2005)* who found significant differences in incubation traits between breeds.

Differences in egg weight loss % between strans may be attributed to their genetic variation (Sailar, 1985) where Dokki4 is a developed local strain obtained from (Fayoumi x Barred Plymouth Rocks) but Dandarawi is a pure local strain (Attia et al, 2004).

2. Egg shell weight percentage at the 18th day of incubation:-

Data presented in Table (2) showed that:

(1)There were no significant effects on egg shell weight % between treatments of dipping *solutions. The*se results agree with those of Karaly (2007) who found that, there were no significant differences between the controled eggs and injected eggs with AA on egg shell weight

(2) Cooling eggs at 24˚C for 6 hrs at the 16th day of incubation had no significant effect on egg shell weight %. Similar results were reported by Abd El-Samad (2004) in Fayoumi and Golden Montazah eggs.

(3) Shell weight % of Dokki4 eggs were insignificantly higher than Dandarawi eggs Similar results were found by Abd El-Samad(2005) and Hassan et al. (2008) who found no significant differences in shell weight % between Dokki4 and Dandarawi strains.

3. Shell thickness at the 18th day of incubation:-

As shown in (Table 2). Data revealed that:-

(1) AA treatment had insignificant effect on shell thickness. Eggs dipped in 10.0 or 5.0g AA/L insignificantly decreased in egg shell thickness as compared with eggs dipped in distilled water or control eggs. These results were fairly corresponded to those found by Karaly (2007) who stated that, injecting eggs with AA had insignificant effects on shell thickness.

(2) The shell thickness values of cooled eggs at 24˚C for 6 hrs at the 16th day of incubation were insignificantly reduced than that of non cooled eggs (control). These results were fairly correspond to the findings of Abd El-Samad (2004) in Fayoumi and Golden Montazah eggs

(3) Eggs of Dokki-4 strain had the highest shell thickness values (0.389mm) while eggs of Dandarawi strain had the lowest (0.369mm) egg shell thickness (Table 2). These results were agreed with El Full et al (2005) but opposite results were obtained by Hassan et al. (2008) who found insignificant differences in shell thickness between Dandarawi and Dokki4 local strains.

4. Embryonic weight % at the 10th, the 18th and the 21st day of incubation

Results in Table (3) indicated that

(1) There were no significant differences between treatments on embryonic weight % at the 10th, the 18th and at 21st day of incubation. Similar results were obtained by Zakaria and Al-Anezi (1996), Shafey (2002) and Karaly (2007) who found no

significant difference in embryo weight due to dipping Gimmizah eggs in AA solutions.

(2) Embryonic weight % at the 18th day of incubation was significantly ($p<0.01$) affected by cooling eggs, where cooling eggs at the 16th day of incubation decreased embryonic weight % compared to non cooled eggs by 2.36 % . While at 21st day of incubation there were no significant differences in embryonic weight %. This decrease in embryonic weight % may be attributed to the fact that, embryo in cooled eggs have reduced heat production because they reduced metabolic rates during the time of exposure to lower temperature, which may disrupt embryonic development(Sarpong and Reinhart 1985) .

(3) Strain had significant effect ($p<0.01$) on embryonic weight percentage at all periods studied .The eggs of Dokki4 strain had the highest value in embryonic weight (11.14 , 52.76 and 67.45 %) while eggs of Dandarawi strain had the lowest embryonic weight (10.10 51.01 and 65.45 %) at the 10th, the 18th and 21st day of incubation respectively . This increase in embryonic weight % may be due to the differences in egg weights from $Dokki_4$ and Bandara (Abd El-Galil 1993).

5. Hatchability %:-

Results presented in Table (4) indicated that:

(1) Hatchability % from fertile and set eggs was significantly improved by dipping eggs in 5.0g AA/L solution (88.92 and 79.06%) followed by those dipped in 10.0g AA/L solution (87.21 and 77.38%) compared with the control group(83.63 and 74.21%) respectively . Those findings suggest that the improvement of hatchability percentage may be due to the decreasing of embryonic mortality where ascorbic acid may be regarded as an anti-stress agent which led to the reduction of corticosterone which in turn has a negative impact in collagen synthesis and metabolism of minerals and vitamin D (Pardue and Thaxton, 1986 and Tullet 1990). These results correspond with the results of Shafey (2002), Tag El-Din et al. (2004), Samak and Mahmoud (2007) and Ghonim et al. (2008) who found significant increase in hatchability % due to dipping eggs of Muscovy ducks in AA at 0 day of incubation.

(2) Hatchability % of fertile and set eggs were significantly ($p<0.01$) affected by cooling eggs, where exposed fertile and set eggs to cooling at 24˚C for 6 hrs at the 16th day of incubation had higher hatchability by 1.82 and 0.9 % compared to those of non cooled (control) eggs. The increase in hatchability % suggests that, cooling reduced the metabolic rate of embryos during the latter part of incubation and relieved stress caused by excessive production of metabolic heat. These results correspond with those of Igabi (1989), Tullet (1990) and Abd El-Wahed (2000).

(3) Hatchability % either from fertile or set eggs of Dokki4 strain improved by 4.06 and 8.15% respectively as compared to the fertile and set eggs of Dandarawi strain. The increase in hatchability % may be due to the fact that Dokki 4 is a developed local strain obtained from (Fayoumi x Barred Plymouth Rocks) but Dandarawi is a pure local strain (Attia et al. 2004). These results were in agreement with those reported by EL Full et al. (2005), Abd El-Samad (2005) and Kosba and Abd El-Halim (2008) who found significant differences in hatchability percentages among Mamourah, Mandarah and Dokki4 local strains.

6 Hatchability% during different incubation intervals (hrs):-

Results regarding the hatchability % during the incubation intervals (hrs) are shown in (Table 5) indicated that:

(1) A gradual increase in hatchability percent in all treatment groups followed by a decrease in hatchability percent during the intervals from 21-21.5 days of incubation. However data showed that hatchability was not statistically affected by dipping treatments throughout the intervals from 19 to 20.5 and

from 21 to 21.5 days of incubation. Meanwhile, significant differences were observed in hatchability during the interval from 20.5 to 21 days of incubation. Data concerning the effect of AA treatments on incubation period (hours) showed that, all dipping eggs treatments in AA had no significant effect on the whole incubation period (hours) comparing with control group where dipping eggs in AA solution at concentration 5.0 or 10.0 g AA/L insignificantly increased the length of incubation period . This may be attributed to the delay in the initiation of embryo development. The current results are in agreement with the findings of El-Sheikh and El-Gammal (2000) who found no significant effect of vitamin C supplementation on incubation period at hours in Dandarawi eggs.

(2) A gradual increase in hatchability% was observed during the different incubation intervals either in control eggs or cooled eggs except control eggs during the interval from 21-21.5 days of incubation which recorded a remarkable decrease in hatching%. Significant differences ($p<0.01$) between control eggs and cooled eggs were recorded at all intervals studied where the control group was higher in hatchability (7.45, 10.22, 28.44 and 37.36) than the cooled eggs at the period from 19-21 days of incubation (0.11, 6.65, 9.09 and 31.48) respectively. In contrast, the hatchability percentages of cooled eggs during the intervals from 21- 21.5 days of incubation were significantly increased (39.67%) compared to the control (1.97%).

It is clear that, exposing eggs to cooling during incubation increased the time of hatch compared to control. Also, the whole incubation period in hours was significantly ($p< 0.01$) affected by cooling eggs during late incubation where the whole incubation period of cooled eggs for 6 hrs at 24˚C at the 16^{th} day of incubation was 509.12 hrs while that of non cooled ones was 500.67 hrs. From these results, it could be concluded that, cooling eggs at 24˚C for 6 hrs at the 16^{th} day of incubation increased the time of hatch compared to control eggs by about 8.45 hrs. This increase in hatch time may be due to the positive relationship between cooling period and incubation time.

These results are in agreement with those reported by Igabi (1989) and Abd El-Wahed (2000) who found an increase in hatch time due to cooling of incubated eggs in Fayoumi .

(3) Strain had significant effect ($p<0.01$) on hatchability % during the interval from 19.0 to 20.0 days of incubation where eggs of Dandarawi strain had the highest hatchability % (4.33 and 8.77%) as compared to Dokki 4 strain (3.23 and 8.11%) during 19.0 - 19.5 and 19.5 - 20.0 days intervals, respectively . During 20.0 to 21.0 days of incubation, there were no significant differences between two local strains in hatchability %. At 21.0 to 21.5 days of incubation strain had significant effect ($p<0.01$) on hatchability % where eggs of Dokki 4 strain had the highest hatchability % (23.24%) compared to eggs of Dandarawi strain (18.39%).

Also, the whole incubation period in hours was highly significantly ($p<0.01$) affected by strain where incubation period for eggs of Dokki 4 strain was 508.75 hrs while that of Dandarawi strain was 501.04 hrs. From these results, it could be concluded that, eggs of Dokki 4 strain required more time for hatching than those of Dandarawi strain by about 7.71 hrs

7 Embryonic mortality %:-

Table (6) illustrated that:

(1) There was a significant differences between treatments of dipping eggs in AA on embryonic mortality % at 1-18, 19-21 and 1-21 days of incubation whereas dipping eggs in 5.0g AA/L for 2 minutes reduced embryonic mortality compared with the other treatments by 13.31, 25.45 and 32.25 % for eggs dipped in 10.0g AA/L, dipped in 0.0g AA/L and

control eggs respectively. This decrease in embryonic mortality % may be attributed to ascorbic acid effects on the level of energy available to the embryo to develop, and to protect them from any stresses during incubation (Tag El-Din et al. 2004). These results were in agreement with those reported by Zakaria and Al-Anezi (1996), Shafey (2002), Samak and Mahmoud (2007) and Ghonim et al. (2008) who found lower embryonic mortality due to dipping Muscovy duck eggs in AA solutions.

(2) Embryonic mortality from 1 to 18, 19 to 21 days of incubation and total of embryonic mortality % of fertile eggs were significantly ($p<0.01$) affected by cooling eggs whereas fertile eggs cooled at 24˚C for 6 hrs at the 16th day of incubation decreased embryonic mortality than those non cooled (control) by 15.32, 7.67 and 10.73 % respectively . This decrease may be due to cooling during the latter part of incubation relieved stress caused by excessive production of metabolic heat (Sarpong and Rienhart 1985) or also may be due to the mortality rate decreases with the increasing of embryonic ages at cooling exposure (Abd El-Wahed 2000). These results were fairly in agreement with those of Sarpong and Reinhart (1985) and Abd El-Wahed (2000) who found similar results.

(3) Strain had significant effect ($p<0.01$) on embryonic mortality from 1 to 18, 19 to 21 days of incubation and total of embryonic mortality % whereas fertile eggs of Dokki4 strain had lowerembryonic mortality compared to fertile eggs of Dandarawi strain by 25.08, 20.15 and 22.11% respectively . These results were fairly in agreement with the findings of EL Full et al. (2005) who found significant differences in embryonic mortality between Fayoumi and Dandarawi strain.

8 Embryonic malpositions and culled chicks (% of fertile eggs):-

Table (7) illustrated that:

(1) There were no significant differences in all embryonic malpositions between treatments of dipping eggs in AA solutions for 2 minutes. These data were in agreement with those of El-Sheikh and El-Gammal (2000) who found similar results in Dandarawi eggs. The results also indicated that, type of malpositions 2 and 4 recorded the highest values compared with the other types of malpositions as affected by dipping eggs in AA solution before incubation.

On the other hand, cull chicks % of eggs dipped in 5.0g AA/L decreased compared to both those dipped in 10.0g AA/L or dipped in 0.0g AA/L and control eggs ones by 11.39 or 38.49 and 50.0%, respectively. . This decrease in cull chicks may be due to AA which regarded as an anti stress agent (Pardue and Thaxton 1986) or AA may have a role in reducing stress (Zakaria and Al-Anezi 1996). These results were fairly in agreement with those of Samak and Mahmoud (2007) they found that, significantly lower culled chicks in Sinai eggs dipped in 10g AA/L.

(2) There were no significant differences in all embryonic malpositions due to cooling eggs during incubation these results were in agreement with those reported by Sarpong and Reinhart (1985) who found that, the percentage of malpositions were not affected by cooling treatments. Also, cooling eggs during incubation had no significant effect on cull chicks % whereas control eggs or non cooled had the highest insignificant percent in cull chicks (2.63%) compared with those exposed to cooling (2.52%). Similar results were reported by Zakaria and Al-Anezi (1996).

(3) The differences between the two local strains eggs in all embryonic malpositions % were insignificant. While eggs of Dokki4 strain had significantly the lowest percentage of cull chicks (2.08 %) compared with eggs of Dandarawi strain (3.08%). The reduction of cull chicks from eggs of Dokki 4 strain were calculated to by

32.25% compared to the eggs of Dandarawi strain. These results were fairly agree with those of EL Full et al. (2005) who found significant effect on hatching traits between Fayoumi and Dandarawi strain

Table (1): The experimental design.

Pre and during incubation period			
Pre-incubation		**At the 16th day of incubation**	
Dokki4 strain	**Dandarawi strain**	**Dokki4 strain**	**Dandarawi strain**
Vitamin C treatments :- **(1) non dipped eggs** **(2) eggs dipped into (0.0 g AA / L)** **(3) eggs dipped into (5 g AA / L)** **(4) eggs dipped into (10 g AA / L)**		**Cooling treatments:-** (1) **non cooled eggs** (2) **cooled eggs at 24˚C For 6 hrs at 16th day of incubation**	

Table (2): Egg weight loss (%), shell weight (%) and shell thickness (mm) of incubated eggs at the 18th day of incubation as affect by pre-incubation dipping in different solutions of AA and cooling during incubation of two local strains of chicken

Treatments	Egg weight loss%	Shell weight%	Shell thickness
Dipping in AA	**	NS	NS
Control	**10.57 d**	**12.28**	**0.380**
0.0g AA/L	**10.93 c**	**12.27**	**0.380**
5.0g AA/L	**11.18 b**	**12.25**	**0.379**
10.0g AA/L	**11.45 a**	**12.23**	**0.379**
SE	**±0.02**	**±0.15**	**±0.0004**
Cooling	**	NS	NS
Control	**10.76 b**	**12.27**	**0.379**
Cooled eggs	**11.31 a**	**12.20**	**0.378**
SE	**±0.01**	**±0.10**	**±0.0003**
Strain	**	NS	**
Dokki 4	**11.26 a**	**12.30**	**0.389 a**
Dandarawi	**10.81 b**	**12.17**	**0.369 b**
SE	**±0.01**	**±0.10**	**±0.0003**

Means within each column having different letter (s) are significantly different ($p < 0.05$)
Cooled eggs = at 24˚C for 6 hrs at the 16th day of incubation .

Table (3): Effect of dipping eggs at different solutions of AA and cooling during incubation on embryonic weight (%) at the 10 th , 18th day and 21st day of incubation of two local strains .

Treatments	The 10th day	The 18th day	The 21stday
Dipping in AA	**NS**	**NS**	**NS**
Control	**10.46**	**51.74**	**66.27**
0.0g AA/L	**10.57**	**51.81**	**66.42**
5.0g AA/L	**10.72**	**51.93**	**66.51**
10.0g AA/L	**10.75**	**52.06**	**66.60**
SE	**±0.2**	**±0.3**	**±0.4**
Cooling	**empty**	******	**NS**
Control		**52.51 a**	**66.53**
Eggs Cooled		**51.27 b**	**66.37**
SE		**±0.1**	**±0.2**
Strain	******	******	******
Dokki4	**11.14 a**	**52.76 a**	**67.45 a**
Dandarawi	**10.10 b**	**51.01 b**	**65.45 b**
SE	**±0.1**	**±0.1**	**±0.3**

Means within each column having different letter (s)are significantly different ($p<0.05$) .
Cooled eggs = at 24˚C for 6 hrs at the 16th day of incubation .

Table (4): Effect of dipping eggs at different solutions of AA and cooling during incubation on hatchability percentage of fertile and set eggs of two local strains.

Treatments	Hatchability % of fertile eggs	Hatchability % of set eggs
Dipping in AA	******	******
Control	**83.63 d**	**74.21 d**
0.0g AA/L	**85.14 c**	**75.79 c**
5.0g AA/L	**88.92 a**	**79.06 a**
10.0g AA/L	**87.21 b**	**77.38 b**
SE	**±0.30**	**±0.25**
Cooling:-	******	******
Control	**85.44 b**	**75.94 b**
Eggs cooled	**87.00 a**	**77.28 a**
SE	**±0.21**	**±0.18**
Strain:-	******	******
Dokki4	**87.94 a**	**79.61 a**
Dandarawi	**84.51 b**	**73.61 b**
SE	**±0.21**	**±0.18**

Means within each column having different letter (s) are significantly different ($p< 0.05$).
Egg cooled = cooling eggs at 24˚C for 6 hrs at the 16th day of incubation.

Table (5): Effect of dipping eggs at different solutions of AA and cooling during incubation on hatchability% at different intervals during incubation and the whole incubation period (hours) of two local strains.

Treatments	Hatchability % during different intervals (days)					Incubation Period (hrs)
	19.0-19.5	19.5-20.0	20.0-20.5	20.5-21.0	21.0-21.5	
Dipping in AA :	NS	NS	NS	**	NS	NS
Control	4.04	8.51	18.68	31.42^{D}	20.98	504.50
0.0g AA/L	3.79	8.59	18.72	33.09^{C}	20.95	504.58
5.0g AA/L	3.69	8.37	18.86	37.27^{A}	20.73	505.08
10.0g AA/L	3.59	8.28	18.79	35.91^{B}	20.64	505.42
SE	±0.16	±0.21	±0.3	±0.35	±0.21	±0.33
Cooling :-	**	**	**	**	**	**
Control	7.45 a	10.22^{a}	28.44^{a}	37.36^{a}	1.97^{b}	500.67b
Egg cooled	0.11 b	6.65^{b}	9.09^{b}	31.48^{b}	39.67a	509.12^{a}
SE	±0.12	±0.15	±0.21	±0.25	±0.14	±0.23
Strain :-	**	**	NS	NS	**	**
Dokki 4	3.23^{b}	8.11b	18.68	34.68	23.24^{a}	508.75^{a}
Dandarawi	4.33^{a}	8.77a	18.85	34.17	18.39^{b}	501.04^{b}
SE	±0.12	±0.15	±0.21	±0.25	±0.14	±0.23

Means within each column having different letter (s) are significantly different ($p<0.05$).
Cooled eggs = at 24˚C for 6 hrs at the 16^{th} day of incubation.

Table (6): Effect of dipping eggs at different solutions of AA and cooling during incubation on embryonic mortality (% of fertile eggs) of two local strains.

Treatments	(1 – 18) days	(19 – 21) days	(1 –21) days
Dipping in AA :-	**	**	**
Control	6.49 a	9.85 a	16.34 a
0.0g AA/L	5.80 a	9.05 b	14.85 b
5.0g AA/L	4.25 b	6.82 d	11.07 d
10.0g AA/L	4.93 b	7.84 c	12.77 c
SE	±0.26	±0.23	±0.29
Cooling	*	*	*
Control	5.81 a	8.73 a	14.54 a
Eggs cooled	4.92 b	8.06 b	12.98 b
SE	±0.18	±0.16	±0.21
Strain	**	**	**
Dokki 4	4.60 b	7.45 b	12.05 b
Dandarawi	6.14 a	9.33 a	15.45 a
SE	±0.18	±0.16	±0.21

Means within each column having different letter (s) are significantly different ($p<0.05$).
Egg cooled = cooling eggs at 24˚C for 6 hrs at the 16^{th} day of incubation.

Table (7): Effect of dipping eggs at different solutions of AA and cooling during incubation on embryonic malpositions and culled chicks (% of fertile eggs) of two local strains.

Treatments	Embryonic malpositions						Culled Chicks
	P1	P2	P3	P4	P5	P6	
Dipping in AA :-	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	******
Control	**0.56**	**1.90**	**0.45**	**1.34**	**0.78**	**1.01**	**3.58 a**
0.0g AA/L	**0.44**	**1.79**	**0.44**	**1.23**	**0.67**	**0.78**	**2.91 a**
5.0g AA/L	**0.44**	**1.90**	**0.44**	**1.11**	**0.55**	**0.66**	**1.79 b**
10.0g AA/L	**0.44**	**1.80**	**0.33**	**1.12**	**0.89**	**0.78**	**2.02 b**
SE	**±0.20**	**±0.27**	**±0.23**	**±0.29**	**±0.27**	**±0.24**	**±0.29**
Cooling :-	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**
Control	**0.50**	**1.79**	**0.39**	**1.29**	**0.89**	**0.89**	**2.63**
Egg cooled	**0.45**	**1.90**	**0.44**	**1.11**	**0.56**	**0.72**	**2.52**
SE	**±0.14**	**±0.19**	**±0.16**	**±0.21**	**±0.19**	**±0.17**	**±0.21**
Strain :-	**NS**	**NS**	**NS**	**NS**	**NS**	**NS**	******
Dokki 4	**0.49**	**1.59**	**0.44**	**1.09**	**0.76**	**0.71**	**2.08 b**
Dandarawi	**0.45**	**2.11**	**0.40**	**1.31**	**0.68**	**0.91**	**3.07 a**
SE	**±0.14**	**±0.19**	**±0.16**	**±0.21**	**±0.19**	**±0.17**	**±0.21**

Means within each column having different letter (s) are significantly different ($p<0.05$).
Cooled eggs = at 24˚C for 6 hrs at the 16th day of incubation .
P1= malposition (1) (the head ~~is~~ buried between thighs).
P2= malposition (2) (head in the narrow end of the egg).
P3= malposition (3) (head is bent to the left side).
P4= malposition (4) (beak is not directed toward the air cell).
P5= malposition (5) (feet are over the head).
P6= malposition (6) (beak is above the right wing)

REFERENCES

Abd El-Galil, M. A. (1993). *Evaluating the performance of some local breeds of chickens under certain plans of nutrition. ph.D. Thesis, Fac. of Agri., Minia univ., Egypt.*

Abd El-Samad, M. H. (2004). *Effect of temperature and light during incubation on the productive performance and semen characteristics of males of two local breeds of chickens. Egypt. J. Agric. Res., 82 (4): 1853 - 1866.*

Abd El-Samad, M. H. (2005). *Effect of early acclimation on performance of some local breeds of chickens under hot climate conditions. Egypt. J. of Appl. Sci., 20 (12 B) : 407 - 420.*

Abd El-Wahed, E. M. I. (2000). *Relationship between egg quality and some physiological and chemical changes during and after incubation stage. M. SC., Thesis, Cairo univ.,Egypt.*

Attia, M. Y.; M. A. M. Sayed; M. A. Abd El-Galil and M. H. Abd El-Samad. (2004). *Manganese requirement of Dokki 4 and Dandarawi growing chicks. Egypt. J. Appl. Sci. 19 (3B) 426 – 442.*

Booth, D. T. and H. Rahn. (1991). *Effect of periodic egg cooling during incubation in: Tullet, S. G. (Ed.), Avian incubation, pp, 321 (London, Butterworth – Heinemann).*

Burley, R. W. and D. V. Vadehra. (1989). *The egg shell and shell membranes: properties and synthesis, in Burley, R. W. and D. V. Vadehra (Eds) The Avian egg: Chemistry and Biology, PP. 25 – 64 (Newyork, John Wiley).*

Duncan, D. D. (1955). *Multiple range and multiple test. Biometric II: 1-42.*

El Full, A. E.; H. M. Abd El Wahed; M. M. Namra; A. M. R. Osman and N.A. Hataba. (2005). *Results of random sample test for laying performance of nine egyptian strains of chickens. Egypt. Poult. Sci. vol (25) (I): 195 – 208.*

El-Sheikh, T. M. and A. M. El-Gammal. (2000). *Effect of the holding temperature, holding period as well as vitamin C supplementation on hatching traits of Dandarawi eggs. Egypt. Poult. Sci. J. 20: 839- 855.*

French, N. A. (1997). *Modeling incubation temperature: The effects of incubator design, embryonic development and egg size. Poult. Sci. 76: 124 - 133.*

Ghonim, A. I. A.; A. L. Awad; A. M. El-Shhat; M. H. A. Fatouh and Kh. A. A. Ali. (2008). *Effect of dipping and spraying hatching eggs of Muscovy duck by ascorbic acid solutions during incubation period on hatchability traits. Egypt. Poult. Sci. vol (28) (I): 283 – 298.*

Hassan, M. S. H. ; E. A. Abd Alla and M. H. Abd El-Samad.(2008) *Physiological and immunological roles of acetic acid for improving egg production and decreasing pollution and ammonia level in local laying hens houses. Egypt. Poult. Sci. vol (28) (I): 223 – 250.*

Igbai, A.(1989). *Effect of temperature on thyroid function in the domestic fowl (Gallus Domesticus). Ph.D. Thesis (biology). Catholic university of Leuven. Pelgium.*

Karaly, M. A. M.(2007). *The effect of ascorbic acid on some physiological and productive performance of laying local strains. Ph.D. Thesis, Fac. of. Agric, Alexandaria univ. Egypt.*

Kosba, M. A. and H. A. H. Abd El-Halim.(2008). *Evaluation of the Egyptian local strains of chickens. Egypt. Poult. Sci. Vol (28)(IV): 1239 – 1251.*

Lundy, H.(1969). *A review of the effects of temperature, humidity, turning and gaseous environment in the incubator on the hatchability of the hens egg. Pages 143-176 in: The fertility and hatchability of the hens egg. Carter, T.C. and B. M. Freeman, Oliver and Boyd, Edinburgh, Scotland.*

Pardue, S. L. and J. P. Thaxton.(1986). *Ascorbic acid in poultry : A review. World's poult. Sci. J. 42: 107 – 123.*

Sailar, K.(1985). *Nutzung Kom pensaterischer wachstum effekte beider produktion schwerer most broiler .Ph .D. Thesis, Hohenhein univ. Germany*

Samak, H. R. and R. M. Mahmoud. (2007). *Effect of ascorbic or citric acid solutions on egg shell conductance and incubation traits of Sinai eggs. J. Agric. Sci. Mansoura univ. 32 (10) :8111 – 8118.*

Sarpong, S. and B. S. Reinhart. (1985). *Broiler hatching stress and subsequent growth out performance. Poult. Sci. 64: 232 – 234.*

SAS Institute, (1996). *SAS User's Guide, statistics (6.2th Ed.) Cary NC: SAS Institute Inc.*

Shafey, T. M. (2002). *Egg shell conductance, embryonic growth, hatchability and embryonic mortality of broiler breeder eggs dipped into ascorbic acid solution. Br. Poult. Sci. 43: 135 – 140.*

Tag El-Din, H. T.; A. A. El-Serwy; E. H. Abou-Egla; I. A. Homuda and A. L. Awad. (2004). *Effect of in-ovo injection material in duck eggs on hatchability, embryonic mortality and ducklings performance. Egyptian J. Anim. Prod. 41, Suppl. Issue, Nov: 459 – 469.*

Tullet, S. G. (1990). *Science and the art of incubation. Poult. Sci. 69:1-15.*

Tzschentke, B. and M. Nichelmann. (1999). *Development of avian thermoregulatory system during early postnatal period : Development of the thermoregulatory set point. Ornis Fennica 76: 189 – 198.*

Wilson, H. R. (1991). *Physiological requirements of the developing embryo: Temperature and turning. Chapter 9 Pages 145 – 156 in: Avian incubation. S. G. Tullet, ed. Butterworth – Heinemann, London, UK.*

Zakaria, A.H. and M. A. Al-Anezi (1996). *Effect of ascorbic acid and cooling during incubation on hatchability, culling, mortality and body weight of broiler chickens. Poult. Sci. 75: 1204 – 1209.*

الملخص العربي

تاثير كل من غمر البيض فى محلول فيتامين C قبل التفريخ وتبريد البيض اثناء فتره التفريخ على الصفات الجنينية والفقس فى سلالاتين من الدجاج المحلى

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اجريت الدراسة لفحص تأثير غمر البيض قبل التفريخ في محلول فتيامين ج (حمض الاسكوربيك) بتركيزات مختلفه لمدة دقيقتين وايضا فحص تأثير تبريد البيض فى درجة حرارة 24 مْ لمدة 6 ساعات في اليوم السادس عشر من التفريخ علي الصفات الجنينية وصفات الفقس في سلالتين من الدجاج المحلي. تم جمع 4320 من سلالة الدقي 4 والدندراوي فى عمر 30 اسبوع بواقع 2160 بيضة من كل سلالة وتم تقسيمه عشوائيا الى أربعه معاملات على النحو التالى :-

١. معامله المقارنه (لم يتم غمر البيض).

٢. غمر البيض في ماء مقطر (صفر جم/لتر) لمدة دقيقتين.

٣. غمر البيض في محلول حمض الاسكوربيك بتركيز 5 جم/ لتر مقطر لمدة دقيقتين.

٤. غمر البيض محلول حمض الاسكوربيك بتركيز 10 جم/ لتر مقطر لمدة دقيقتين.

فى اليوم السادس عشر من التفريخ كل معاملة من المعاملات السابقة قسمت بالتساوى الى مجموعتين تبريد الاولي تركت بدون تبريد البيض (كمجموعة مقارنة) بينما فى الثانية تم تبريد البيض فى درجه حراره 24مْ لمدة 6 ساعات . ومن النتائج المتحصل عليها يمكن تلخيصها على النحو التالى :-

١ -تم تسجيل تحسن لصفات التفريخ لبيض الدقى 4 المغمور فى 5 جم حمض الاسكوربيك / لتر لمده دقيقتين والتى تم تبريدها فى درجه حراره 24مْ لمدة 6 ساعات فى اليوم السادس عشر من التفريخ

٢ -غمر البيض في محلول حمض الاسكوربيك بتركيز 5 جم/ لتر لمدة دقيقتين قبل التفريخ ربما يكون طريقه غير تقليديه لتعظيم النسبه المئويه للفقس وخفض النسبه المئويه للنفوق الجنينى اثناء عمليه التفريخ لبيض الدقى 4 والدندراوى وبدون تأثيرات ضارة.

٣ -تبريد البيض فى درجه حراره 24مْ لمدة 6 ساعات فى اليوم السادس عشر من التفريخ ادى الى زياده معنويه فى النسبه المئويه للفقس وخفض النفوق الجنينى وتسبب فى تأخير وقت الفقس فى بيض الدقى والدندراوى.

٤ -فيتامين C حامض عضوى ضعيف له قدره الأحماض المخففة للتفاعل مع قشره البيضة التى ربما تؤدى إلى زياده التوصيل لقشره البيضه (نقل الماء وخلافه) ويكون من نتيجة ذلك زيادة حركه بخار الماء وثانى أكسيد الكربون عبر القشره وتغيير السعه التنظيميه للبياض والتى ينتج عنها زياده نسبه الفقس.

٥ -كانت سلاله الدندراوى متدنيه فى صفات التفريخ مقارنة بسلاله الدقى 4 وبالتالى فهى تحتاج لمزيد من برامج التربيه والانتخاب لزياده اداء تلك السلاله.