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EFFECT OF IN-OVO INJECTION OF THYROXINE, VITAMIN C AND B_{12} ON HATCHABILITY, EMBRYONIC MORTALITY AND DUCKLINGS PERFORMANCE

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SUMMARY

Settable Domiaty duck eggs were injected with vitamins (ascorbic acid 3 mg/ egg and B_{12} 1 µg /egg) and thyroxin hormone (0.1µg /egg) at 0 day of incubation to investigate the effects of these materials on hatchability and embryonic mortality percentage and growth performance of the hatched ducklings throughout the growing period of age (8 weeks). The results indicated that all injected eggs had significantly ($p \leq 0.01$) higher hatchability and lower embryonic mortality percentages than the non injected eggs , the injected eggs by thyroxin hormone and ascorbic acid had higher percentage of hatchability and lower percentage of embryonic mortality than other treatments. Growth performance of the hatched ducklings throughout the growing period of age (0 –8 week) was not significantly affected by the injection of eggs at 0 day of incubation. Live body weight at the 8th week was heavier by about 2.4 to 8.3 % for the injected groups than the control , also, feed consumption at the interval 0 – 8 weeks of age increased by about 3.8 to 6.7 % for the injected groups than that in the control group, while, the injected group by ascorbic acid had better feed conversion ratio than other groups. The results suggested that the in-ovo injection in duck eggs with thyroxine ,ascorbic acid and B_{12} improved economic efficiency by about 99.0 , 64.8 and 22.3 % in respect than that of the control group ,respectively . It could be advised that the application of the in-ovo injection may be alternative methods to maximize the profitability and economically of Domiaty ducks strain.

Keywords: Ascorbic acid, thyroxine hormone, vitamin B_{12} ,hatchability, embryonic mortality and growth performance

INTRODUCTION

Normal embryonic growth and development depends on a complete supply of all required nutrients within the egg, marginal deficiencies may affect the embryos during incubation period and the growth performance .Thyroid hormones are necessary for hatching in precocial birds and plays a major role in maturation of vital tissues during the final stages of in-ovo life (Freeman and Vince , 1974 ; Wittmann *et al*., 1984 and Decuypere *et al*. ,1991). Thyroxin injection at any time of incubation period was significantly improved hatchability , decreased embryonic mortality and increased live body weight, feed consumption of hatched chickens (Mabrouk , 1997; Aly , 2000 and Meghawry ,2003).The injection of fertile turkey

eggs with physiological doses of T3 and T4 at setting day increased embryonic mortality and decreased hatchability (Christensen , 1985 ; Gomaa , 1990 and Samak,1996). Ascorbic acid supplementation to broiler breeder diets improved hatchability of fertile eggs , decreasing the early embryonic mortality and increased live body weigh (Peebles and Brake , 1985) . The injection of incubated eggs with ascorbic acid at different times of incubation had significant effects on hatchability and embryonic mortality , ascorbic acid dose of 3 mg/egg improved hatchability and live body weight, decreased embryonic mortality ,while the dose of 12 mg/egg decreased hatchability and increased embryonic mortality (Zakaria and Al-Anezi,1996) . Hatchability of eggs improved by dipping into ascorbic acid solution (10 g AA/ liter),also, early and late embryonic mortality were significantly decreased (Shafey , 2002) .Vitamin B_{12} is essential for normal hatchability (Landauer , 1967). The deficiency of vitamin B_{12} in the diet of layer stock decreased hatchability percentage of fertile eggs and increased embryonic mortality (Ward *et al*., 1986) The injection of vitamin B_{12} into eggs increased hatchability of eggs obtained from hens deficient in vitamin B_{12} (Lillie *et al*., 1949),. Hatchability improved significantly by spraying eggs with vitamin B_{12} solution (0.5 %) twice at 15 minutes intervals (Zhang *et al*. , 1994).

This study was conducted to investigate the effects of in-ovo injection with vitamins (C and B_{12}) and thyroxin hormone in duck eggs on hatchability, embryonic mortality and productive performance of hatched ducklings .

MATERIALS AND METHODS

This study was carried out at El-Serw Research Station , for water fowl , Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, during the period from September 2002 till March 2003.

Experimental birds and management :

Parent flock of the Domiaty ducklings were obtained from the hatchery of April , 2002. The ducklings were brooded in well ventilated brooding pens (3.4 × 8.6 m) from day-old up to 4 weeks of age . At the end of brooding period the ducklings were permitted to go out for yards . Throughout the brooding , rearing and egg production periods , feed and fresh water were available all the time . Ducklings were fed layer starter diet from 0 to 8 weeks and a layer grower diet from 8 to 16 weeks of age. The composition and analysis of the rations are shown in Table (1).The birds were transferred to well ventilated laying pens (3.5 × 8.6m)when they reached 16 weeks of age and fed a layer diet . Birds were chosen randomly and weighed, then divided into 4 groups .Each group for one of four treatments. It contained 48 females and 12 males and subdivided into 3 replicates. Each replicate comprised 16 females and 4 males . The ducks were housed at 4.5 birds / m^2 for all groups.

Egg injection procedure : A total number of 675 eggs were obtained from a local strain of duck named El – Domiaty at 7 months of age (first season) .Eggs were stored at 15ºc and 65 % relative humidity for 10 days pre-incubation. Eggs were

assigned to five treatments randomly .Each treatment was 135 eggs were subdivided into 3 replicate of 45 eggs each. Egg weight ranged from 58.6 to 59.3 g .

Table 1. Composition and calculated analysis of the rations fed to the basic flock of ducks throughout the experimental periods

Ingredients %	Diets		
	Starter (0–8 wks)	**Grower (8–16 wks)**	**Layer (16 up to the end)**
Yellow corn	65.00	63.00	66.00
Soya bean meal (44 %)	30.45	15.50	21.50
wheat bran	0.65	17.78	2.74
Dicalcium phosphate	1.80	1.25	1.50
limestone	1.40	1.80	7.60
Vit & Min. premix *	0.30	0.30	0.30
Salt (NaCl)	0.30	0.30	0.30
DL. Methiounin	0.10	0.10	0.10
Total	100.0	100.0	100.0
Calculated analysis **			
Crude protein	19.12	15.04	15.50
ME (Kcal / kg)	2865	2687	2724
Total calcium (%)	1.029	1.041	3.410
Total phosphorus (%)	0.72	0.71	0.64
Vit A IU / kg	4000	3900	4000
Vit E mg / kg	20.8	21.65	23.78
Vit D IU / kg	500	500	500

* Contents per 3 kg premix vit A 2 miu , vit D3 0.5 miu, vit E 5 g , vit K3 1 g , vit B1 1 g , vit B2 4 g , vit B6 1.5 g , N .acid 20 g , P. acid 10 g , F acid 1 g , Biotin 50 g , cholin 50 g , Zinc 45 g , copper 3 g , iodine 0.3 g , Iron 30 g , selenium 0.1 g , Manganese 40 g and carrier $CaCo_3$ to 3000 g .

** According to NRC (1994)

Experimental treatments :

1 – Non injected eggs (control group)
2 – Eggs injected with saline solution (0.09 % Nacl)
3 – Eggs injected with thyroxine hormone (0.1 µg/egg)
4 – Eggs injected with ascorbic acid (3 mg/egg)
5 – Eggs injected with vitamin B_{12} (1 µg/egg) .

Preparation of injection solutions : Eltroxin is a thyroid preparation in the form of L-thyroxin sodium BP . which is considered preferable to thyroid gland preparations because of its unvarying potency . It's a small white tablets engraved (Eltroxin 50 Glaxo)containing 50 µg = 0.05 mg anhydrous thyroxin sodium. Injection solution was prepared by dissolving two tablets of Eltroxin (50 µg) in 100 ml 0.9 Nacl solution . A dose of 0.1 ml from this solution containing 0.1 µg was used.B_{12} depot ampoule is an injectable anti – anaemic agent with delayed action .One ampoule containing 1 mg hydroxy- cobalamine acetate .Injection solution was prepared by dissolving one ampoule B_{12}depot (1mg) in 100 ml 0.9 NaCl solution . A dose of 0.1 ml from this solution containing 1µg was used .L-Ascorbic acid is a vitamin which soluble in water , the package of vitamin containing 100g powder which contain min.

99.7 gL-Ascorbic acid .Injection solution prepared by dissolving 3.01 g L-Ascorbic acid in 100 ml 0.9 NaCl solution . A dose of 0.1 ml from this solution containing 3 mg was injected into each egg

Injection technique : Eggs were cleaning and fumigation. The area over the air cell was disinfected by small piece of cotton wetted by alcohol (70%) .A small hole was drilled with sterilized needle through the egg shell along the center axis at the top of the egg . Holes were blocked with a small drop of sterilized melt paraffin wax . The eggs were injected by prepared injection solutions immediately before setting eggs in incubator.

Incubation conditions : Incubation was carried out during the period from November till December 2002 . Incubator , hatchery and eggs were fumigated directly before operation setting . The temperature of the incubator ranged from 99º to 100ºFand ranged from 98 - 99ºF in the hatchery . The relative humidity was about 55 – 60% during the first 24 days of incubation and then elevated to be 70% at the rest of hatching period . Eggs were turned automatically every one – hour until the 24^{th} day of the incubation. Eggs were transferred to the hatchery at the end of the 24^{th} day of incubation. All eggs were individually candled using a hand candling ultraviolet lamp at the 10^{th} day of incubation to examine the infertile and early embryonic mortality and at 28 days of incubation to record the late embryonic mortality.

Ducklings brooding , rearing and management : All hatched duckling from each treatment were weighed and divided into 3 replicates .All duckling were reared under similar managerial and hygienic conditions .Temperature was adjusted at 32 -33ºc during the first two days after hatch and decreased by 0.5ºc daily until reaching 23ºc at the 22^{nd} days , then it remained constant up to the 8^{th} week of age . Ducklings were housed as 4.5 birds /m^2. Gas – heaters were used to provide the proper brooder temperature . The lighting was continuos during the experimental period , food and water were affered ad-libitum up to 8 weeks of age . Birds were fed starter ration for the first 3 weeks , grower ration for the second 3 weeks and finisher ration till the end of the experiment at 8 weeks of age .The composition and analysis of the rations are shown in Table (2).

Parameters :

1- Embryonic mortality percentage:Embryonic mortality was classified according to the time of incubation as follows :

a – Early dead embryos up to the end of the first 10^{th} days of incubation .

b – late dead embryos after the first 10^{th} days of incubation till the end of hatching time.

Embryonic mortality percentage was calculated according to the following formula:

Embryonic mortality%= Number of dead embryos /Number of fertile eggs x100

2- Hatchability percentage :

It was calculated on the basis of number of fertile eggs :

Hatchability % = Number of healthy ducklings / Number of fertile eggs x100

3- Body weight and weight gain :

Ducklings were individually weighed to the nearest gram at hatch and 8 weeks of age . Weight gain calculated according to the following

formula :

Weight gain = W2 – W1 where, W1 = initial body weight at hatch , W2 = final body weight at 8 weeks of age.

Table 2. Composition and calculated analysis of the rations used to the ducklings throughout the growing periods

Ingredients %	Diets		
	Starter	Grower	Finisher
Yellow corn	63.00	68.00	73.00
Soya bean meal (44 %)	25.00	20.00	15.00
Broiler concentrate (52 %)	10.00	10.00	10.00
Diculcium phosphate	1.00	1.00	1.00
Limestone	0.65	0.65	0.65
Vit & Min. premix *	0.30	0.30	0.30
Salt (Nacl)	0.05	0.05	0.05
Total	100	100	100
Calculated analysis **			
Crude protein (%)	21.55	19.78	18.0
ME (K cal / kg)	2960	3020	3080
Total calcium (%)	1.03	1.36	1.35
Total phosphorus (%)	0.82	0.80	0.78

* Contents per 3 kg premix vit A 2 miu , vit D_3 0.5 miu, vit E 5 g , vit K3 1 g , vit B1 1 g , vit B2 4 g , vit B6 1.5 g , N. acid 20 g , P. acid 10 g , F. acid 1 g , Biotin 50 g , cholin 50 g , Zinc 45 g , copper 3 g , iodine 0.3 g , Iron 30 g , selenium 0.1 g , Manganese 40 g and carrier $CaCo_3$ to 3000 g. ** According to NRC (1994)

4- Feed consumption and conversion :

Feed consumed by all ducklings of each replicate was weekly recorded and then averaged for the treatment and expressed in gram per duck at the periods 0 – 8 weeks of age .

Feed conversion ratio was calculated according to the following formula :

Feed conversion ratio = feed consumption (g) / weight gain (g).

5-Statistical analysis:

Data were analyzed by the analysis of variance according to Snedecor and Cochran (1982) . Significant differences among means were detected by the method of Duncan (1955) .

The following model was used :

$\mathbf{Y_{ij} = \mu + T_i + e_{iJ}}$

where,

Y_{ij} = An observation

μ = overall mean

T_i = Effect of treatment (1, 2 , … , b) and

e_{iJ} = Random error .

RESULTS AND DISCUSSION

Data in Table (3) shows hatchability and embryonic mortality percentages of fertile eggs as affected by treatments applied . The results indicated that all injected eggs had significantly ($P \leq 0.01$) better hatchability percentages than those of the non injected eggs .Hatchability improved by about 15.2 , 45.0 , 34.5 and 12.0 % in

saline , thyroxin , ascorbic acid and vitamin B_{12} injected groups of the control , respectively . Thyroxin and ascorbic acid injected eggs were significantly higher for hatchability values than those injected with vitamin B_{12} and saline solutions .

Although the differences between groups were not significant, the injection of thyroxin and ascorbic acid into eggs had lower early embryonic mortality by about 25.9 and 24.6 % than the control group ,respectively .Late embryonic mortality percentage averaged 31.5 , 22.7 , 7.0 , 13.2 and 25.4 % for the control, saline, thyroxin , ascorbic acid and vitamin B_{12} injected eggs , respectively. In general all injected eggs had the lower total embryonic mortality percentage than the control group. The total embryonic mortality averaged 38.6 , 30.2 , 12.2 , 18.5 and 32.2 % for the control , saline , thyroxin , ascorbic acid and vitamin B_{12} injected eggs, respectively. Differences in total embryonic mortality due to injection of eggs were significantly ($P \leq 0.01$) less than that of the non injected eggs (control) , the eggs injected with saline , thyroxin , ascorbic acid and vitamin B_{12} resulted in less of the total embryonic mortality percentage than the control by about 21.7 , 68.4 , 52.0 and 16.6 % , respectively .

Injection of incubated eggs with thyroxin ,ascorbic acid and vitamin B_{12} at 0 day of incubation period significantly improved hatchability and decreased embryonic mortality percentages .

Table 3. Means and standard errors (x ± SE) of hatchability and embryonic mortality percentage as affected by in-ovo injection with thyroxin hormone, ascorbic acid and B_{12} vitamins in Domiaty duck eggs

Treatment	Traits			
	Hatchability %	**Embryonic mortality (%)**		
		Early	**Late**	**Total**
Non Injected eggs:				
Control(C)	60.55 ± 0.91^{d}	7.04 ± 0.95	31.54±1.03^{a}	38.59 ± 0.47^{a}
%of C.	**100**	**100**	**100**	**100**
Injected eggs :				
Saline sol.	69.78±2.28^{c}	7.54 ± 1.40	22.67±1.29^{b}	30.21±2.28^{b}
%of C.	**115.24**	**107.10**	**71.87**	**78.28**
Throxin	87.80±0.96^{a}	5.22 ± 0.09	6.97±092^{d}	12.19±0.98^{d}
%of C.	**145.00**	**74.34**	**22..09**	**31.58**
Ascorbic acid	81.45±1.25^{b}	5.31±1.55	13.23±1.32^{c}	18.54±1.25^{c}
%of C.	**134.41**	**75.42**	**41.94**	**48.04**
B_{12}	67.82±1.40^{c}	6.77±0.81	25.40±1.28^{b}	32.17±1.40^{b}
%of C.	**112.00**	**96.16**	**80.53**	**83.36**
Significance	**0.01**	NS	**0.01**	**0.01**

Means within each column having similar litter (s) are not significant at p≤0.05

These results may be attributed to their effects on the level of energy available to the embryo to develop and protect them from any stresses during incubation. These results agreed with those obtained by Freeman and Vince (1974); Wittmann *et al*. (1984); Christensen (1985). Similar results obtained by Aly (2000) and Meghawry

(2003) who found that injected eggs during incubation by thyroxin at levels of 0.10 µg and 0.15 µg/egg resulted in significant improvement hatchability and decreased embryonic mortality percentages, also, Peebles and Brake (1985); Zakaria and Al-Anezi (1996) who found that the injection of incubated eggs with ascorbic acid at level of 3.0 mg/egg at different times of incubation had significant improved of hatchability and decreased embryonic mortality ,and Shafey (2002)who reported that hatchability was significantly improved by ascorbic acid with eggs dipped into ascorbic acid solution (10 g AA / liter) for up to 2 minutes before incubation .Also, Lillie *et al*. (1949); Landauer (1967) who found that vitamin B_{12} is essential for normal hatchability and Zhang *et al*. (1994) who found that hatchability significantly improved by spraying eggs with vitamin B_{12} solution (0.5 %) twice at 15 minutes intervals .

Data in Table (4) shows that live body weight ,body weight gain ,feed consumption and feed conversion ratio of hatched ducklings during growing period interval 0 – 8 weeks of age as affected by treatments applied . Differences in live body weight at various ages due to in-ovo injection were not significant , the injected groups of saline , ascorbic and B_{12} surpassed the non–injected groups in respect of live body weight by about 2.4 , 8.5 and 4.0 % , respectively at 8 week of age but the thyroxin group was similar to the control .

Table 4. Live body weight , body weight gain ,feed consumption and feed conversion of ducklings at 0 – 8 week interval of age as affected by in-ovo injection material in Domiaty duck eggs

Treatment	*Traits*				
	Body weight (g)		**B.W.G.(g) at 0– 8 week**	**Feed consumption(g) at 0 – 8 week**	**Feed conversion at 0-8 week**
	At hatch	**At 8 week**			
Non injected eggs	33.1±0.30	1409.1±36.66	1375.0±35.9	4534.9 ± 33.9	3.30±0.05
Control (c)	**100**	**100**	**100**	**100**	**100**
% of C.					
Injected eggs.	33.4±0.13	1442.8±32.15	1410.0±31.9	4707.6 ± 60.0	3.34 ±0.03
Saline sol.	**100.90**	**102.39**	**102.54**	**103.80**	**101.21**
% of C.	33.2±0.17	1396.6 ± 5.42	1363.3±3.1	4839.4 ±113.	3.52 ±0.04
Eltroxin	**100.30**	**99.11**	**99.14**	**106.71**	**106.66**
% of C.	34.1±0.52	1529.3±61.54	1495.2±61.6	4826.5 ± 41.2	3.24 ±0.14
Ascorbic acid	**103.02**	**108.53**	**108.74**	**106.43**	**98.18**
% of C.	33.3±0.64	1465.0±43.99	1431.8±43.7	4748.2 ± 48.8	3.31 ±0.01
B_{12}	**100.60**	**103.96**	**104.13**	**104.7**	**100.30**
% of C.					

Injection of eggs at 0 day of incubation period had no significant effect in body weight gain at different intervals of age . The accumulative body weight gain

throughout the growing period (0-8 weeks) for the injected groups with (saline, ascorbic and B_{12})were heavier than the control by about 2.5 , 8.7 and 4.1 %, respectively . The results indicated that the non-injected group had the low feed consumption during the interval 0-8 weeks of age than that all injected groups .. Throughout the growing period interval (0-8 weeks) ascorbic acid had better feed conversion ratio than the other groups but the group injected with thyroxin showed the lowest feed conversion ratio .

Injection of incubated eggs with ascorbic acid and vitamin B_{12} at 0 day of incubation period had higher live body weight and body weight gain of hatched ducklings during growing period (0–8 weeks) than the control group (non injected), on the other hand , the injected group with thyroxin was lower value than other groups. These results agreed with those obtained by Kafri and Cherry (1984); Michael *et al* (1992)and Zakaria and Al-Anezi (1996) who found that ascorbic acid injection of fertile eggs at incubation period (3 mg / egg) increased body weight at hatch ..However, Samak(1996); Aly (2000)and Meghawry (2003) found that injected eggs during incubation by thyroxin at levels of 0.10 µg and 0.15 µg resulted in significantly improvement of live body weight of chicks at different ages of growing period .

Injection of incubated eggs resulted in more feed consumption of hatched ducklings during growing period (0–8 weeks) than the control . These results agreed with those obtained by Samak (1996); Aly (2000) and McKee and Harrison (1995) they found that feed consumption significantly improved by using ascorbic acid supplementation .

Table (5) shows economic efficiency (E.E %) of incubation Domiaty duck eggs as affected by in-ovo injection. Economic efficiency improved due to in-ovo injection of fertile Domiaty duck eggs because the cost of each duckling produced was almost lower for the thyroxin injected group followed by ascorbic acid then saline solution , vitamin B_{12} and the control in a descending order. Total return ,net return and economic efficiency (E.E.%)values obtained from the injected groups were higher than the control group .Generally, the saline , thyroxin ,ascorbic acid and B_{12} injected groups surpassed the control group by about 38.8 , 99.0 , 64.8 and 22.3 % in respect of the E.E. %,respectively .

CONCLUSION

The obtained results generally showed that the best results in most studied traits were recorded for in-ovo injection with thyroxin hormone and ascorbic acid before incubation. It could be advised that the application of the in-ovo injection may be alternative methods to maximize the profitability and economically of Domiaty ducks strain.

Table 5. Economic efficiency (E.E %) of incubation Domiaty eggs as affected by in- ovo injected materials

Treatment	Total Cost L.E.	No. of Hatched ducklings	Total Return L.E.	Net Return L.E.	E.E. %
Non injected eggs					
Control (c)	**40.5**	**69.0**	**69.0**	**28.5**	**70.3**
% of C.	100	100	100	100	100
Injected eggs:					
Saline solution	**42.0**	**83.0**	**83.0**	**41.0**	**97.6**
% of C.	103.7	120.2	120.2	143.8	138.8
Eltroxin	**42.10**	**101.0**	**101.0**	**58.9**	**139.9**
% of C.	103.9	146.3	146.3	210.1	199.0
Ascorbic acid	**42.6**	**92.0**	**92.0**	**49.4**	**115.9**
%of C.	105.1	133.3	133.3	173.3	164.8
B_{12}	**43.0**	**80.0**	**80.0**	**37.0**	**86.0**
% of C.	106.1	115.9	115.9	129.8	122.3

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تأثير حقن بيض البط بفيتامين ج ، ب ١٢وهرمون الثيروكسين قبل التفريخ على نسبة الفقس والنفوق الجنيني وأداء الكتاكيت الفاقسة خلال فترة النمو

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أجرى هذا البحث بمحطة بحوث الطيور المائية بالسرو – معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية وزارة الزراعة . **صممت الدراسة** لبحث إمكانية حقن بيض التفريخ للبط الدمياطي عند بداية التفريخ بفيتامينات ج (٣ ملجم / بيضة، ب١٢(١ ميكروجرام /بيضة) وهرمون الثيروكسين (٠.١ ميكروجرام /بيضة) وتأثيره على صفات الفقس وأداء الكتاكيت الفاقسة خلال فترة النمو حتى ٨ أسابيع وكانت **المعاملات التجريبية هي :** بيض غير محقون (كنترول)، بيض محقون بمحلول ملحي ٠.٠٩% ، بيض محقون بهرمون الثيروكسين ٠.١ ميكرو جرام/بيضة ، بيض محقون بفيتامين ج ٣ ملجم / بيضة ثم بيض محقون بفيتامين ب١٢ ١ ميكروجرام / بيضة.

وكانت أهم النتائج المتحصل عليها:

نسبة الفقس: تحسنت معنوياً(١%) لكل البيض المحقون بالمقارنة للغير المحقون وتفوقت المجموعة التي حقنت بهرمون الثيروكسين تلاها المحقون بفيتامين ج .النفوق الجنيني:انخفض معنوياً (١%) للبيض المحقون عن الكنترول .أداء النمو خلال فترة النمو الأولى (٨ أسابيع) لصفات : الوزن الحي و معدل الزيادة الوزنية و استهلاك العليقة و كفاءة التحويل الغذائى لم تتأثر معنوياًّ بحقن البيض وان كانت ذو قيم أفضل بالمقارنة بالكنترول. الكفاءة الاقتصادية تحسنت الكفاءة الاقتصادية نتيجة حقن بيض البط الدمياطي قبل التفريخ وكانت افضل المعاملات من الناحية الاقتصادية تلك التي حقنت بالثيروكسين ثم فيتامين ج بالمقارنة بالكنترول. **ومن النتائج يتضح:** أنه يمكن استخدام حقن بيض البط عند التفريخ بهرمون الثيروكسين أو فيتامين جً لتحسين صفات الفقس ومن ثم الكفاءة الاقتصادية .