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EFFECT OF IN OVO INJECTION WITH FOLIC ACID ON SOME HATCHING TRAITS OF CHINESE WHITE DUCK EGGS

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Abstract

144 Chinese white duck hatching eggs were used, Brought from the waterfowl fields at the Agricultural Research Station, at 2-12-2016. The eggs were collected once from a single field, stored for two days, transferring eggs to the hatchery for injection, the injection was performed before inserting the eggs into the hatchery, the eggs were divided into four groups, each containing 32 eggs. A group without injection was counted as a negative control (T1), a group injected with distilled water was counted as a positive control (T2). Two groups were injected with folic acid with a dose of 10 and 20 micrograms dissolved in 0.1 mL of basal solution (T3 and T4), each group was divided into 3 replicates, the eggs were numbered in each group, the eggs were painted in different colors to distinguish between the groups, the eggs were transferred after injection to the hatchery in the poultry field of the Agricultural Research and Experimentation Station. The results showed a rise on egg hatchability, with decreased embryo mortality, pipped eggs and deformed chicks in folic acid injection treatments compared with negative and positive control.

Key words : In ovo injection, folic acid, hatching traits, Chinese white ducks.

Introduction

The hatching process of important processes in the poultry farming, the evolution of the poultry industry had increased the demand for hatching eggs and the production of good quality of chicks (Al-Zijaji and Ismail, 1981). In recent years, the methods to improve the quality of hatching eggs have been updated to produce eggs with a full nutritional value that contains all the needs of the fetus of food to make healthy, good-quality broiler chicken with high efficiency (Al-Fayadh and Naji, 2012).

The added nutrients such as vitamins to the breeder diet, transform only 25-30% of them to eggs, the remaining large part goes to the breeder's body, so researchers were interested in the injection of eggs hatching nutrients such as amino acids or vitamins important in the process of growth and development embryonic (Ohta *et al*., 2001). Folic acid is one of the important vitamins to integrate the nutritional value of hatching eggs for its importance in embryonic development, as it is a food for the brain and a regulator of the development of nerve cells of the fetus, Co-enzyme works in the synthesis of DNA and RNA that sends the body's genetic codes, includes a normal cell division (Anonymous, 2005). While at the same time forming the necessary blood protein to increase normal growth of the body (Scott, 2002). Some researchers have been interested in adding folic acid in the diet of breeders but found that increasing the amount of vitamin in the feed is not matched by the same percentage of vitamin in the components of eggs prepared for hatching so they took care of the subject of vitamin injection in eggs hatching (Robel, 1993). The aim of this study is to explain the in ovo injection with folic acid on some hatching traits of Chinese white duck eggs.

Materials and Methods

A total of 144 white chines duck eggs were received from the fields at the Agricultural Research Station at 2-12-2016. The eggs were divide into four groups, each containing 32 eggs, each treatment was divided into 3 replicates. The replicates of the four groups were distributed randomly, the eggs were numbered in each

group and in a different color to distinguish between groups. Treatments were as follows :

1. **Treatment (T1)**: Control group placed in the hatchery without injection.

2. **Second treatment (T2)**: This group was injected with distilled water 0.1 ml per egg.

3. **Third treatment (T3)**: This group was injected with a dose of 10 ìg folic acid dissolved in 0.1 ml of basal solution.

4. **Fourth treatment (T4)**: This group was injected with a dose of 20 ìg folic acid dissolved in 0.1 ml of basal solution.

In ovo injection

Preparation of solubility solution

Folic acid solution is prepared by adding sodium hydroxide to the normal distilled water until pH reaches 8 because folic acid dissolves in the base solutions (Sunde *et al*., 1950).

The vitamin dissolve

3 liters of the prepared solution and 3 glass containers were processed due to the UV sensitivity of UV (Hoffmann-La Roche, 1989), weighed quantities 50, 150 mg of vitamin and melted each of them in a liter of the solution, for concentrations of folic acid vitamin 10 and 20 µg folic acid/0.1 ml of solute solution are obtained.

In ovo injection method

The eggs were injected by a syringe of 0.1 milliliters. Inserted from the broad side of the egg after puncturing the crust through the air gap to the whiteness (Sunde *et al*., 1950) and inserted the needle inside the hole and injected 0.1 ml of material prepared in all cases and was closed the hole with paraffin medical paraffin.

Studied traits

Hatchability of total eggs

According to the number of hatches at the end of day 21 of hatching. The following equations were used to measure hatchability :

$$\text{Hatchability of total eggs} = \frac{\text{Chicks number}}{\text{Eggs number}} \times 100$$

Embryos mortality

The total number of died embryo was calculated by examining the remaining eggs at the end of the hatching period according to the following equation:

$$\text{Embryo mortality} = \frac{\text{Total number of dead fetuses}}{\text{Fertile eggs number}} \times 100$$

Pipped eggs percentage

The number of eggs per replicate was calculated by examining the remaining eggs at the end of the hatching period according to the following equation:

$$\text{Pipped eggs percentage} = \frac{\text{Pipped eggs number}}{\text{Fertile eggs number}} \times 100$$

Deformed chicks percentage

The number of deformed chicks per duplicate was calculated according to the following equation :

$$\text{Deformed chicks percentage} = \frac{\text{Deformed chicks number}}{\text{Total broiler chicks}} \times 100$$

Statistical analysis

Experimental data analysis using Completely Randomized Design (CRD), to study the effect of the studied treatments in the different traits, the differences between the averages were compared with the Duncan (1955) test, and used the statistical program SAS (2001) in statistical analysis.

Results and Discussion

Hatchability

Fig. 1 shows the effect of In ovo injection of hatching eggs of folic acid on the hatchability (%), T4 showed a significantly increased (P≤0.05) compare with T3 while T3 showed a significantly increased (P≤0.05) compare with negative and positive control, the hatchability in T4 was 52% compared to T3, which reached 48%, T2 and T1 were 37 and 33%, respectively.

The improvement in T4 of the hatchability to the role of this vitamin in reducing damage to the nervous system of fetus and to increase the vitality of dividing cells in the embryonic stages, especially the growth and development of the spinal cord, as well as increased metabolic rates and its important role in blood formation (Guay *et al*., 2002).

Embryo mortality

Fig. 2 shows the effect of injection of hatching eggs with folic acid on embryo mortality, T1 showed a significantly increased (P≤0.05) compare with T2, while T2 showed a significantly increased (P≤0.05) compare with T3 and T4, the embryo mortality in the first treatment was (35%) compared to the second treatment, which reached 30%. The third and fourth treatment reached (23 and 26%), respectively.

The low of embryo mortality in folic acid injection

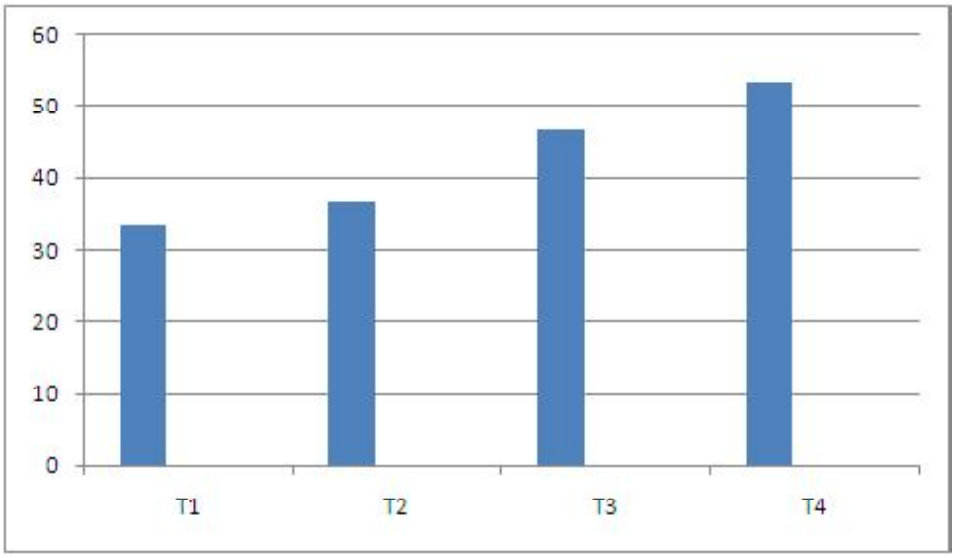

Fig. 1 : Effect of in ovo injection of Chinese white duck eggs with folic acid on hatchability (%).

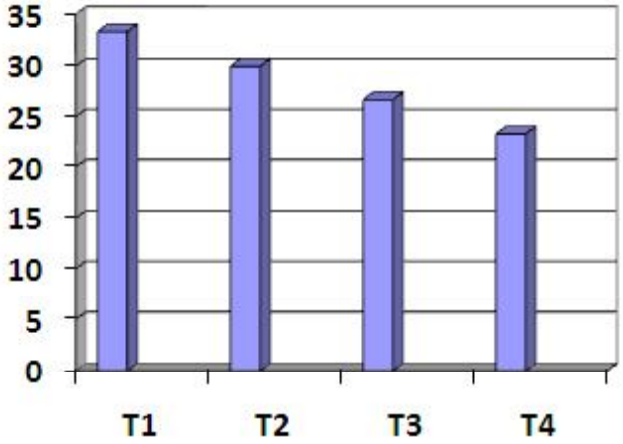

Fig. 2 : The effect of injection of white eggs of Chinese white duck with folic acid in the percentage of total embryonic mortality (%).

processes indicates the importance of folic acid to reduce the proportion of dead fetuses during the hatching process. Sunde *et al*. (1950) observed the proportion of dead embryos, especially in the final stage of incubation, when folic acid incubation eggs were injected in the early days of incubation. Embryo mortality in the first stage of the nursery are generally the result of the accumulation of harmful products in the egg (such as lactin and ammonia), dysfunction of the respiratory system and feeding of the fetus due to delayed growth of the blood system (the blood network on the yolk) or the adhesion of the fetus to the whiteness or the crust due to lack ofneurons for the fetus through the disruption of the nervous system and skeletal axis (Orlov, 1987), therefore, the injection of folic acid incubation eggs has the lowest reduction in embryo mortality due to the effect of folic acid in the production of red blood cells and the development of the nervous system in the embryos (Anonymous, 2005). The embryo thus has benefited from dietary supplementation of folic acid at this age. In the second stage, embryo mortality may also be attributed to the disruption of vital actions (especially protein). The results show that embryos of folic acid in the second stage and the decrease in fetal disorders. In the third stage of embryonic breakdowns, the causes of the embryo mortality may be due to an imbalance in the nutritional value of the eggs as well as storage conditions prior to incubation or significant imbalance in the biological growth of the fetus (Moran, 2007). Sunde *et al*. (1950) noted that embryo mortality would not be affected by folic acid deficiency until the age of 17 days of incubation. The embryos looked normal but died immediately after the cleft liposuction. Thus, the injection of folic acid hatching eggs has increased the embryo availability and reduced the embryo mortality, especially in the latter stages of embryonic development because of the role of this vitamin in the processes of improving protein synthesis and metabolism of the cheese and thus improve the hatching rate (Guay *et al*., 2002; Robel, 1993). This finding is consistent with what Ryu *et al*. (1995) found that the addition of folic acid to the breeder' relationship was lower than that of the fetus.

Pipped eggs

Fig. 3 shows the effect of In ovo injection of hatching eggs for folic acid in the pipped eggs, the first and second treatments showed a significantly increased ($P \leq 0.05$) compare with third and fourth treatment, while the third and fourth treatments showed equal results. The percentage of piped eggs in the first and second treatment was (7%) in the third treatment and fourth reached the percentage of pipped eggs in which the captive (3.5%).

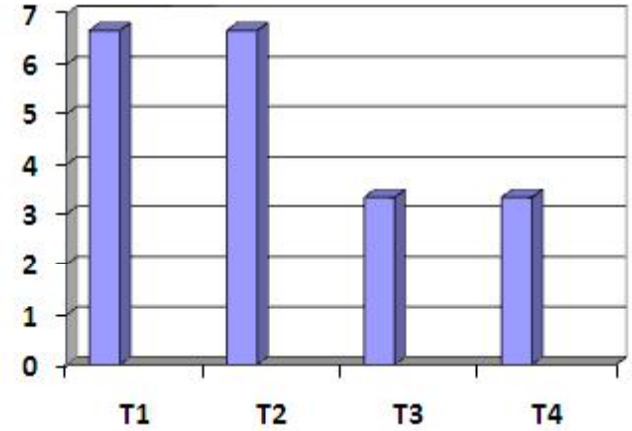

Fig. 3 : Effect of injection of hatching eggs of the Chinese white duck in the percentage of pipped (%).

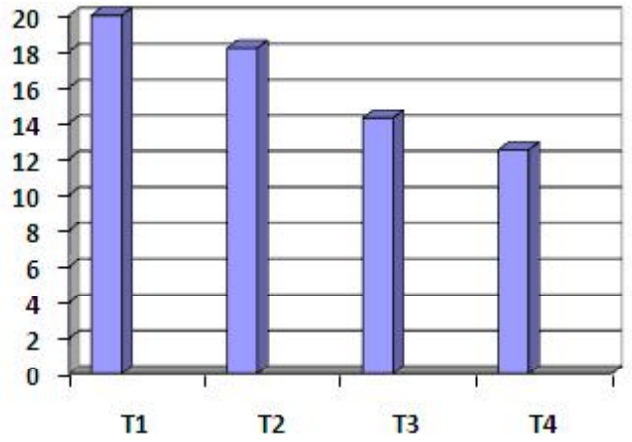

Fig. 4 : Effect of in ovo injecting white hatching eggs of the Chinese white dew in the percentage of deformed chicks (%).

Deformed chicks percentages

Fig. 4 shows the effect of injection of fecal eggs for folic acid in the proportion of deformed chicks, T1 showed a significantly increased (P≤0.05) compare with T2, while T2 showed a significantly increased (P≤0.05) compare with T3 and T4, T3 showed a significantly increased (P≤0.05) compare with T4. Percentage of deformed chicks in T1 was 20%, as for T2 reached 18%, T3 was 14% and T4 reached the percentage of deformed chicks was 12%.

Conclusion

In ovo Injection of hatching eggs at levels (10-20 µg) folic acid / egg resulted in a significant improvement in hatchability, Folic acid In ovo injection resulted in a significant reduction of total embryo mortality and pipped eggs of Chinese white ducks, folic acid resulted in a significant reduction of deformed chicks, benefits obtained from egg injection make birds healthier, reduce stress and improve the production performance of birds.

References

Al-Fayyad, H. A. A. and S. A. H. Naji (1989). *Product technology of poultry*. First Edition. Directorate of Higher Education Press. Baghdad.

Al-Zijaji, R. J. and Kh. I. Ismael (1981). Hatching and management of Hatchery. Publishing House of Books, Printing and Publishing, University of Mosul, Republic of Iraq.

Anonymous (2005). The export feed grade folic acid, feed vitamin m, vitamin m. Web site: http://sznorinco.com/chemicals/feed_additive/follic_acid.htm

Duncan, D. B. (1955). Multiple ranges test and Multiple F – test. *Biometrics*, **11** : 1-42.

Guay, F., J. J. Matte, C. L. Girard, M. F. Palin, A. Giguere and J. P. Laforest (2002). Effect of folic acid and glycine supplementation on embryo development and folate metabolism during early pregnancy in pigs. *Anim. Sci.*, **80** :2134-2143.

Hoffmann-La, Roche (1989). Vitamin nutrition for poultry. folacin.Hoffmann-La Roche Inc., RCD 07110-1199, Nutley, New Jersy.

Moran, E. T. (2007). Nutrition of the developing embryo and hatchling. *Poultry Sci.*, **86(5)** : 1043-1049.

Ohta, Y., M. T. Kidd and T. Ishhibashi (2001). Emberyo growth and amino acid concentration profiles of broiler breeder eggs. Emberyos and chicks after in ovoadmenestration of amino acids. *Poult. Sci*., **80** : 1430-1436.

Orlov, M. V. (1987). *Biological Control in Incubation*, 3rd ed. Moschow, Russcellezgat.(in Russian)

Robel, E. J. (1993). Evaluation off egg injection of folic acid and effect of supplemental folic acid on hatchability and poult weight. *Poultry Sci.*, **72** : 546-553.

Ryu, K. S., K. D. Roberson, G. M. Pesti and R. R. Eitenmiller (1995). The folic acid requirements of starting broiler chicks fed diets based on practical ingredients. 1. Interrelationships with dietary choline. *Poult Sci*., **74(9)** : 1447-55.

SAS (2001). SAS users guide .statistics version 6.12. SAS institute, Inc. Cary, NC.

Scott, R. B. (2002). Frequently Asked Questions About Poultry, Poultry science department of animal science, Kansas, state University. Web site: http://www.oznet.ksu.edu/poultry/faq.htm#A.General Information

Sunde, M. L., W. W. Cravens, CC. A. Elvehjem and J. G. Halpin (1950). The Effects of folic acid on Embryonic development of the domestic fowl. *Poultry Sci*., **29** : 696-702.