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Impacts of In Ovo Feeding of DL-Methionine on Hatchability and Chick Weight

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A B S T R A C T

The aim of this study was to determine the effect of in ovo DL-methionine injection into the fertile broiler eggs on hatchability and relative chick weight. In the trial, 132 fertile broiler eggs were obtained from a breeder flock (34-wk-old Ross 308 parent stock). Fertile eggs were randomly assigned to two experimental groups. Experimental groups were 1) Control 2) DL-methionine injected group with three replicates. Injections were carried out at the 16th day of incubation. At the end of the study, hatchability was 90.29%, and 84.74% in control and DL-methionine injected eggs respectively. Relative chick weights were 70.04% and 72.70% control and DL-methionine injected group respectively. At the end of the study, it determined that injection of DL-methionine increased 3.8% relative chick weight according to control. It suggested that DL-methionine may use as an in ovo feed additive for obtain heavier chick.

In Ovo DL-Metiyonin Beslemesinin Kuluçka Randımanı ve Civciv Ağırlığı Üzerine Etkileri

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Ö Z E T

Bu çalışmanın amacı döllü etlik piliç yumurtalarına in ovo DL-metiyonin enjeksiyonunun kuluçka randımanı ve civciv ağırlığına etkisini belirlemektir. Denemede 34 haftalık yaştaki Ross 308 ebeveyn hatlardan elde edilen 132 adet döllü etlik piliç yumurtası kullanılmıştır. Döllü yumurtalar iki deneme gruplarına tesadüfî dağıtılmıştır. Deneme grupları 1) Kontrol ve 2) DL-metiyonin enjekte edilen gruplardan ve üçer tekerrürden oluşturulmuştur. Enjeksiyonlar kuluçkanın 16. gününde uygulanmıştır. Çalışmanın sonunda, kuluçka randımanı kontrol ve DL-metiyonin enjekte edilen gruplarda sırasıyla %90,29 ve %84,74. Oransal civciv ağırlığı ise kontrol ve DL-metiyonin enjekte edilen gruplarda sırasıyla %70,04 ve %72,70 bulunmuştur. Çalışmanın sonunda DL-metiyonin enjeksiyonunun oransal civciv ağırlığını kontrol grubuna göre %3,8 arttırdığı belirlenmiştir. DL-metiyoninin kuluçkadan sonra daha ağır civciv elde etmek için in ovo besin maddesi olarak kullanılabileceği önerilmektedir.

Introduction

The aim of in ovo feeding or injection is to increase the embryo weight by supporting to embryos with different nutrients at incubation. Bhanja et al., (2007) have demonstrated that subsequent growth performance of chicks increases if the embryo weight increases in hatch. Injection of different nutrients at 16, 17 and 18th day of hatch showed that embryos consumed to external nutrients with amniotic fluid and increased chick weight and increased subsequent growth performance. In these studies, especially injection of NaCl, maltose, sucrose, and dextrin (Uni and Ferket, 2004, Uni et al., 2005), arginine (Foye *et al.* 2005), β-hydroxy-β-methyl butyrate (Tako et al., 2004), albumin (Foye et al., 2006), and zinc-methionine (Tako et al., 2005) to fertile broiler eggs improved performance in broiler chicks by increasing embryo weight. Also, Ohta and Kidd (2001) reported that the injection of various amino acid solutions to amniotic fluid enhanced the embryonic growth during the incubation.

Different nutrients need to be examined for accelerating weight gain of embryos during incubation. There has not been sufficient study on the effect of DL-methionine injection on embryonic development. Maatman et al., (1993) reported that DL-methionine supplementation to broiler diets increased body gain and improved feed efficiency. Schutte et al., (1997) reported that dietary DL-methionine supplementation to broiler diets increased daily body gain and carcass yield. Also, Safaei et al., (2012) reported that supplementation of dietary DL-methionine to broiler feed over the level of reported by NRC (115%) did not affect feed intake but, increased live weight gain with improving feed efficiency. Therefore, this study was carried out to determine possible effects of in ovo feeding of DL-methionine on hatchability and relative chick weight.

Materials and Methods

This study was approved by the Ethical Committee of Ahi Evran University (AEÜ.HADYEK). In the trial, fertile eggs provided from a breeder flock at 34 wk of age (Ross 308) were obtained from Bakpilic (Bakpiliç Entegre Tavukçuluk AŞ, Turkey) and eggs were weighed, numbered and incubated at 37.8°C and 56% relative humidity in a Cimuka incubator (Cimuka, Turkey). At the 12th day of incubation, eggs were tested with lamp and those unfertilized or with dead embryos were discarded. The remaining eggs were divided into 2 treatment groups with equal standard of three replicate (n=22) and put in the incubator. Two eggs from each replicate opened and illustrated to determine the accuracy of the injection site during injection Figure 1. The experimental groups were: 1) Control (no injection); 2) injected of DL-methionine. Eggs were distributed according to the distribution of frequency equal weight to each replicate. During injection, the blunt side of the egg was sterilized with 80% ethanol. In ovo administration of DL-methionine at 1 ml per egg was applied through 18 mm deep of the blunt side of the eggs with using a 21-gauge needle. Before application, we calculated average membrane distance as 18 mm at 16th day of incubation via light control. Thus, injection depth was chosen as 18 mm both to make absolute injection into amniotic fluid and to avoid damaging embryo. DL-methionine was diluted in vehicle at 50 µl/1000 µl for per egg and vehicle solution generated with 0.5% NaCl. Negative control group was not performed since Uni et al., (2005) have reported that injection of 1 mL of 5 g/L NaCl did not affect chick BW. Post hatch weight of chicks determined 6 hours after hatch by using electronic scale (0.01g). Also, hatchability and relative chick weights (Post hatch chick weight/ initial egg weight) determined. DL-methionine provided from a feed company in Kirsehir. Data analyzed with the SPSS software 15, using t-test.

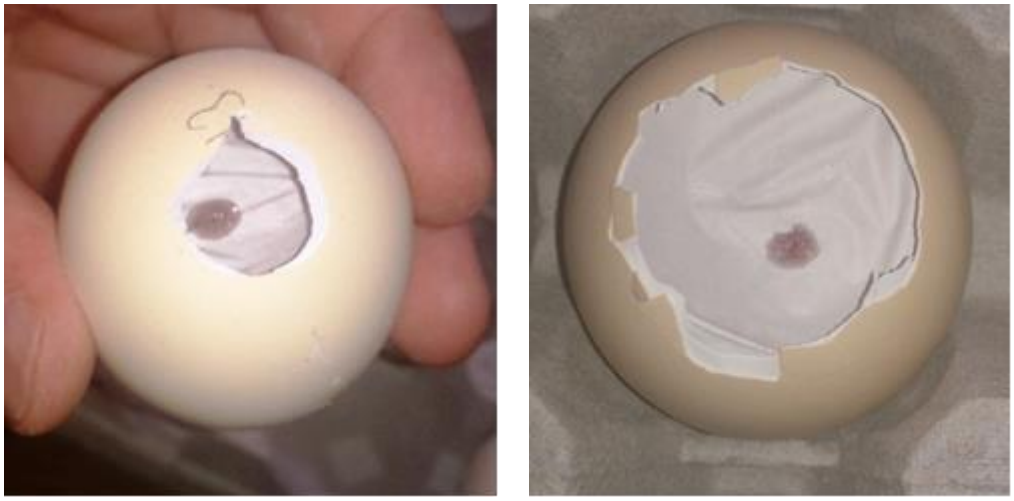

Figure 1. Injection sites

Table 1. Effects of DL-methionine injection into the fertile eggs on hatchability and relative chick weight

	Hatchability (%)	Relative Chick Weight (%)
Control	90.29a	70.04b
DL-methionine	84.74b	72.70a
SEM	2.16	0.64
Variation source	0.23	0.007

a-b Means in the same column with no common superscripts differ (P <0.01), SEM= Standard Error of Means.

Results and Discussion

The effect of DL-methionine injection into the fertile broilers eggs on hatchability and relative chick weights are presented in Table 1. At the end of the study, it was found that DL-methionine injected eggs have 84.74% hatchability and control group 90.29%. In addition, relative chick weights increased with DL-methionine injection (72.7%), compared with the control group (70.04%).

In ovo feeding of DL-methionine decreased hatchability, but in ovo feeding of DL-methionine increased chick weight in comparison to control group (P<0.01). Ohta et al., (1999) reported similar results that injection of 16 different amino acid solutions to yolk sac and air cell at the 0th and 7th day of incubation decreased hatchability to 66.7% but, increased relative chick weight to 79%. At the another study of Ohta et al., (2001) found that injection of 18 different amino acid solutions to fertile broilers eggs at the 5th day of incubation with same injection procedure increased hatchability from 84.5 to 90.9%. At our study, injection of DL-methionine decreased hatchability 7% according to control group. Different results were observed in hatchability with in ovo injection. For example, it has reported that in ovo injection decreased hatchability (Ohta et al., 1999; Zhai et al., 1999; McGruder et al, 2011a) and increased (Ohta et al., 2001; Bottje et al, 2010) and not affected (Zhai et al., 1999; McGruder et al., 2011b). These contradictious results about hatchability might be related with the different injection techniques or injection depths. In our study, we carried out 18 mm depth to DL-methionine and injection to 18 mm depth decreased hatchability. Also, Ohta and Kidd, (2001) indicated that injection of different amino acid solution to 19 mm depth at the 6th day of incubation decreased hatchability from 88% to 70% but, injection to 13 mm depth did not affect hatchability and increased relative chick weight from 71.6% to 73.2%. Also it was reported that in ovo β-hydroxy-β-methyl butyrate injection to turkey eggs (Foye et al., 2006, 2007) increased subsequent chick weight developed between 3% and 7% after hatch. Injection of DL-methionine to fertile broiler eggs provided 3.8% heavier chick compared to control group. Although tissue development and glycogen status of embryos did not determine during the study, increasing relative chick weight after hatch may be due to DL methionine provides nutrient for tissue development and hatching. Chen et al. (2009) have reported that high level of energy needs for the rapid development of the digestive organs and to ensure the normal development of embryos at the last day of incubation. It has reported that poultry embryos use to degradation of proteins from pectoral muscle to provide the energy in late term incubation via gluconeogenesis (Hammer and Dikson, 1989), as a result of protein degradation to provide energy from pectoral muscle decreases breast meat weight in chicks (Vieira and Moran, 1999). Also Tangara et al., (2010) have demonstrated that liver glycogen status of duck embryos was not different 25th embryonic days, but at hatch liver glycogen status markedly decreased in control group (not injected energy substrate). This finding shows that through to hatch embryo consumes yolk nutrients and body reserves for hatching. Tangara et al., (2010) have reported that injection of digestible carbohydrates and arginine to fertile duck eggs increased chick weight at 7 day after hatch by increasing embryo weight. Similar results were revealed by some researchers (Foye et al., 2006, 2007, McGruder et al., 2011b, Ohta et al., 1999). In conclusion, DL-methionine might be used as a substrate of in ovo feeding to obtain heavier chicks. However, further studies are needed to reveal the effects of in ovo feeding of DL-methionine on the fertile eggs.

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