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Effect of Different Levels of DL-Methionine Replaced with Betafin on Some of Blood Parameters on Broiler Chickens

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Abstract: This experiment was conducted to evaluation the effect of dietary Betafin (Betaine anhydrous 97%) supplementation as a replacement for DL-Methionine on blood parameters of 42 days old broiler chickens. Total 300 days old Ross 308 broilers were used in a completely randomized design with 4 treatment and 5 replicates in each treatment and 15 birds/replicates and reared on the floor pens for 42 days. A basal diet was formulated as control according to NRC recommendations for starter (1-21 days) and grower (22-42 days) periods. In experimental diets, DL-Methionine levels were formulated either according to NRC (control (T_1)) or at 90 (T_2), 80 (T_3) and 70% (T_4) of the control. The incompletes levels of the Methionine in T_2-T_4 supplemented by adding Betafin to the diets. The results indicated that by replacement of Betafin instead of DL-Methionine in diets of broiler blood parameters was not altered significantly. Although, in birds fed T_4, the concentration of the all measured blood parameters except HDL was the maximum or minimum when compared to other groups.

Key words: Betafin, blood, broiler, DL-methionine, HDL, Iran

INTRODUCTION

Betaine is a natural compound having important functions in animal metabolism. Chemically, betaine (glycine betaine, trimethylglycine) is a quaternary ammonium compound (Yancey *et al*., 1982). The unique chemical properties of betaine are due to its bipolar structure and its chemically reactive methyl groups which it can donate in methylation reactions. Betaine is chemically stable and nontoxic.

Hence, betaine is not present in large quantities in most feedstuffs. Betaine plays an important function in the amino acid, lipid metabolism and antibody production in practical animal production (Fernandez *et al*., 1998; Verreschi *et al*., 2002; Kim *et al*., 2003; Zulkifli *et al*., 2004). Manifold studies available about effect of Betaine on performance and carcass characteristic of broiler chickens (Sun *et al*., 2008; Kermanshahi, 2001; Esteve-Garcia and Mack, 2000; Schutte *et al*., 1997) but there are limit information about effect of Betaine on hematological indices of broiler chickens.

Therefore, the purpose of this study was investigated the effect of using different levels of DL-Methionine replaced with Betafin on some of blood parameters on broiler chickens.

MATERIALS AND METHODS

Bird and diet: In this study, 300 broiler chickens of the commercial Ross 308 strain were used in a completely randomized design with 4 treatment and 5 replicates in each treatment and 15 birds/replicates and reared on the floor pens for 42 days. A basal diet was formulated as control according to NRC (1994) recommendations for starter (1-21 days) and grower (22-42 days) periods (Table 1).

Table 1: Ingredient composition (as percent of dry matter) and calculated analysis of the basal diets

Ingredients	Starter (1-21 days)	Grower (22-42 days)
Corn	58.70	61.00
Soybian meal	30.00	29.00
Wheat bran	5.00	5.00
Fish meal	2.00	0.00
Soybian oil	1.00	2.00
Oister shell meal	1.20	1.00
DCP	1.07	1.00
Vitamin and mineral perimix	0.50	0.50
DL-Methionine	0.13	0.10
L-lysine	0.15	0.25
Salt	0.25	0.10
Coccidiostat	0.00	0.05
Total	100.00	100.00
Nutrient content		
ME (Kcal kg^{-1})	2850.00	2950.00
Crude protein (%)	20.48	18.44
Crude fiber (%)	3.89	3.81

Vitamin and mineral provided per kilogram of diet: vitamin A, 360,000 IU; vitamin D3, 800000 IU; vitamin E, 7200 IU; vitamin K3, 800 mg; vitamin B1, 720 mg; vitamin B9, 400 mg; vitamin H2, 40 mg; vitamin B2, 2640 mg, vitamin B3, 4000 mg; vitamin B5, 12000 mg; vitamin B6, 1200 mg; vitamin B12, 6 mg; Choline chloraid, 200,000 mg, Manganeze, 40000 mg, Iron, 20000 mg; Zinc, 40000 mg, coper, 4000 mg; Iodine, 400 mg; Selenium, 80 mg

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Table 2: The effect of treatments on serum lipid concentrations of broilers

	Parameters					
Treatments	Glucose (mg dL^{-1})	Cholesterol (g dL^{-1})	Triglycerides (g dL^{-1})	HDL (mg dL^{-1})	LDL (mg dL^{-1})	VLDL (mg dL^{-1})
T_1	218.62±2.10	121.34±2.38	27.79±1.24	41.08±0.94	74.67±3.03	5.56±0.25
T_2	221.79±0.70	122.19±1.54	28.65±0.46	40.34±0.95	76.12±2.41	5.73±0.09
T_3	222.53±4.19	123.21±1.08	29.16±0.26	40.07±0.55	77.31±1.25	5.83±0.05
T_4	223.93±3.32	124.02±1.22	30.59±2.26	39.18±0.51	78.71±1.55	6.11±0.45
p-values	0.63	0.68	0.53	0.45	0.63	0.54

[a-c]means in each column with different superscripts are significant different ($p<0.05$)

In experimental diets, Methionine levels were as formulated (control (T_1)) or at 90 (T_2), 80 (T_3) and 70% (T_4) of the control. The incompletes levels of the Methionine in T_2-T_4 supplemented by adding Betafin to the diets. During the experiment birds had *ad libitum* access to feed and water.

Sample collection: At 42nd day of the experimental period, 5 mL of blood was collected from wing vein from 6 birds in each treatment. Blood samples were centrifuged (at 3,000×rpm for 15 min) and serum was separated and then stored at -20°C until assayed for measuring blood parameters (glucose, cholesterol, triglycerides and High Density Lipoprotein cholesterol (HDL)) using appropriate laboratory kits (Friedewald *et al*., 1972; Gordon *et al*., 1977; Gowenlock *et al*., 1988). Very Low Density Lipoprotein (VLDL) was calculated from triglycerides by dividing the factor by 5. The Low Density Lipoprotein cholesterol (LDL) was calculated by using the equation:

LDL cholesterol = Total cholesterol-HDL cholesterol-VLDL cholesterol

Statistical analysis: All data were analyzed using the One-Way ANOVA procedure of SAS® (SAS Institute Inc, 1998) for analysis of variance. Significant differences among treatments were identified at 5% level by Duncan's multiple range tests.

RESULTS AND DISCUSSION

Blood parameters: The effect of experimental treatments on blood parameters are shown in Table 2. Treatments had no significant effect on serum cholesterol, glucose, triglycerides, HDL, LDL and VLDL content of blood, although in birds fed T_4, the concentration of the all measured blood parameters, except HDL were different in compare with the control treatment. These results are in agreement with Konca *et al*. (2008) and Attia *et al*. (2005), they indicated that betaine supplementation had no significant effect on most of serum constituents. However, Hassan *et al*. (2005) revealed that betaine supplementation in diet (0.072-0.144% DM) caused an increase in serum total protein and globulin but cholesterol level was not affected by betaine supplementation which results are in agreement with our results. Zhan *et al*. (2006) found that dietary betaine addition decreased serum uric acid and serum triglycerides content in broilers. In their experiment free fatty acids concentration of serum and Hormone-Sensitive Lipase (HSL) activity in abdominal fat increased. HSL is an enzyme that initials the catabolism of TG in adipocytes (Mersmann, 1998), therefore may it be the reason decrease of triglyceride. Zou and Lu (2002) showed that supplementation of betaine (600 mg kg^{-1}) increased serum glucose in laying hens. According to the results of present study, it seems that using different levels of betafin was not able to cause beneficial changes on lipid metabolism.

CONCLUSION

The results suggested that addition of betafin to broiler diets had no effect on blood parameters of broilers and betafin can replace as part of methionine. There are some factors which cause to differences among reports of experiment that use betafin, including the basal diets, genetic stocks used and environmental conditions of the experiments. Therefore, further experiments should need to be conducted to determine the effect of betafin at different condition in broilers.

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