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Evaluation of the Effects of Green Tea Powder on Carcass Traits and Blood Parameters of Broilers

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Abstract: This experiment was conducted to evaluate the effects of Iranian Green Tea (IGT) powder in diet onblood parameters and carcass traits of broilers. We used four treatments consisting (Basal diet+IGT 5 g kg^{-1} feed, Basaldiet+IGT 10 g kg^{-1} feed, Basal diet+IGT 15 g kg^{-1} feed and control) and three replicates (15 birds per pen). Results of this study showed that effects of green tea on cecum weight, LDL and Cholesterol were significant ($p<0.05$). LDL and Cholesterol were high, that related to control and 15 g green tea groups ($p = 0.05$), respectively. Furthermore, the highest and the lowest weight mean of cecum were related to 15 and 10 g kg^{-1} green tea groups ($p = 0.05$), respectively. However, additives had no significant effects on Glucose, Triglyceride (TG), HDL and other carcass traits ($p>0.05$). Generally, this experiment indicated that treatment with Iranian Green Tea (IGT) powder don't have positive effects on the broiler except to decrease of blood plasma LDL and Cholesterol reducing the cardiovascular diseases.

INTRODUCTION

Tea a product made up from leaf and bud of the plant cammelia sinensise is the second most consumed beverage in the world well ahead of coffee, beer, wine (Costa *et al*., 2002). Depending on the manufacturing process, teas are classified into three major types: 'non-fermented' green tea, 'semi-fermented' and 'fermented' black and redteas which undergo a post-harvest fermentation stage before drying and steaming (McKay and Blumberg, 2002). In addition to various kinds of catechin, vitamins and caffeine, green tea has been noted for having many different physiological effects (Kojima and Yoshida, 2008). Moreover, regarding aluminum presence in black and green tea, some studies revealed the high capacity of this plant to accumulate Al. This aspect is important for patients with renal failures because the body can accumulate Al, resulting in neurological diseases; it is therefore necessary to control the intake of food with high amounts of this metal (Costa *et al*., 2002). Furthermore Green tea contains a number of polyphenolic compounds, collectively termed catechins such as epicatechin, epicatechin gallate, epigallocatechin and Epigallocatechin Gallate (EGCG). EGCG accounts for approximately 50% of the total amount of catechins (Fujiki, 2005). These components are

known to have anti-tumorigenic, anti-inflammatory, anti-oxidative, anti-proliferative, anti-bacterial and anti-parasiticproperties (Fujiki, 2005). Previously, it was reported that layers fed with enriched green tea powder had low cholesterol in egg yolks (Biswas *et al*., 2000). Green tea added in broiler diets had positive effects on growths performance and lean meat production (Sarker *et al*., 2010). Recently, reported that ingestion of green tea improved growth of mice and did not affect plasma cholesterol and triglyceride concentrations (Miura *et al*., 2018). Moreover, green tea has been noted for having many different physiological effects, i.e., anti-oxidant, anti-allergen and anti-viral properties, its role in controlling high cholesterol and blood sugar and its ability to prevent cancer. Thus, the main objective of this experiment was to study and compare the efficacy of this additive on some of the parameters that mentioned.

MATERIALS AND METHODS

This experiment was conducted from May to June 2012 at the Department of Animal Science, Research Center of Qaemshahr Branch, Islamic Azad University of Iran.

Birds, housing and management: This research was conducted at the 0-21 and 21-42 day of old. Experimental Iranian Green Tea (IGT) powder was provided from Qaemshahr market. Before adding it to the feed, the leaves pulverized with a <1.1 mm diameter screen. One hundred eighty, one-week-old birds (Ross308, male) randomly assigned to four groups and three replicates (15 birds per pen) and were fed with four diets consisting: 1-control without additive, 2-Basal diet+ 5 g kg^{-1} (IGT), 3-Basal diet+10 g kg^{-1} (IGT) and 4-Basal diet+15 g kg^{-1} (IGT). Diets were prepared a few days before consumption and fed during a week. Diets (Table 1) were formulated based on NRC. Feed and water were offered ad libitum. At the end of experimental period, blood samples were collected (2 birds per pen). Concentrations of plasma metabolites were determined using commercial k its. Blood samples analyzed for Glucose, Cholesterol, TG, LDL and HDL.

Statistical analysis: The data obtained from this study were analyzed by Analysis of Variance (ANOVA) in a completely randomized design model consisting of four treatment and three replicates using General Linear Models (GLM) of SAS Package Program (1990). Significant means were compared using the Duncan's New Multiple Range Test. The differences were statistically assessed at $p<0.05$ as the following model:

Table 1: Composition and calculated analyses of the experimental diets (%)

Ingredients and analysis	Starter	Grower
Corn	58.73	54.20
Wheat	0	15
Soybean meal	32.67	23.82
Fish meal	3	3
Plant oil	2.45	1.17
Oyster shell	0.65	0.5
Bone and meat meal	1.60	1.51
Nacl	0.25	0.23
Vitamin premix[1]	0.25	0.25
Trace-mineral mix[2]	0.25	0.25
DL-methionine	0.15	0.07
Total	100	100
Calculated analysis		
ME kcal/kg diet	3.000	3.000
Crude protein (%)	21.56	18.57
Crude fiber	3.71	3.32
Calcium	0.94	0.84
Phosphorus	0.42	0.38
Sodium	0.14	0.14
Lys	1.25	1.02
Total sulfur amino acids (Met+Cys)	0.87	0.68

[1]Vitamin premix supplied the following amounts per kilogram of diet: vitamin A acetate, 7.700 IU; cholecalciferol, 2.750 IU; dl-atocopherol acetate, 11 IU; niacin, 44 mg; d-pantothenic acid, 13.2 mg; riboflavin, 5.5 mg; vitamin B6, 2.2 mg; menadione, 1.65 mg; folic acid, 1.1 mg; thiamine, 1.1 mg; biotin, 0.11 mg; vitamin B12, 8.8 mg. [2]Mineral mixes provided the following per kilogram of diet: manganese, 110 mg; zinc, 110 mg; iron, 60 mg; iodine, 2 mg; magnesium, 27 mg; selenium, 0.18 mg

$$Y_{ij} = \mu + Ti + e_{ij}$$

RESULTS AND DISCUSSION

Results of this experiment showed that the green tea had no significant effects on blood parameters, except cholesterol and LDL (Table 2) as the highest and the lowest means were related to control and 15 g IGT, respectively ($p<0.05$). Moreover, the TBA of meat as an oxidation index in groups fed with green tea have shown a significantly decrease followed by a control group ($p<0.05$) (Table 2). As well as Table 3 indicated the supplemented diets do not show any significantly different in carcass characteristics, except for cecum weight percentthat the highest and the lowest mean was related to 15 g kg^{-1} IGT and control, respectively ($p<0.05$).

In vitro studies with green tea extracts containing 25% of catechins have shown its capacity (in conditions similar to physiological ones) to significantly inhibit the gastric lipase. Thus, the lipolysis of long-chain triglycerides is reduced in a 37% (Juhel *et al*., 2000). In vitro studies have also shown that green tea extracts interfere in the fat emulsification process which occurs before enzymes act and is indispensable for lipid intestinal absorption (Juhel *et al*., 2000). In addition, green tea may have thermogenic properties, not only attributable to its caffeine content but also to the joint effect of caffeine and catechins. There were no significant

Table 2: Effects of green tea powder on blood parameters and meat TBA of broilers

Treatments	Glucose	Cholesterol	TG	LDL	HDL	TBA (%)
Control	261.67	102.66[a]	88.33	85	85.26	0.996[c]
5 g kg^{-1}	262.67	77[b]	90	59	57.66	0.955[bc]
10 g kg^{-1}	215.00	95.33[a]	80.33	75.93	66	0.943[b]
15 g kg^{-1}	241.00	91a[b]	90	73	64.66	0.898[a]
SEM	19.97	4.79	4.33	5.04	6.64	0.013

Table 3: Effects of green tea powder on carcass traits in broilers

Treatments	Breast	Thigh	Liver	Cecum	Pancreas	Spleen
Control	36.87	27.24	2.548	0.743[b]	0.297	0.171
5 g kg^{-1}	34.42	29.08	2.725	0.840[b]	0.340	0.190
10 g kg^{-1}	33.79	28.28	290.2	0.696[b]	0.304	0.156
15 g kg^{-1}	36.0	30.68	2.628	1.134[a]	0.328	0.189
SEM	2.423	1.032	0.154	0.063	0.027	0.015

Within columns, means with no common letter differ significantly ($p<0.05$)

impacts of feed additives on the most of the plasma constituents except for LDL and Cholesterol (Table 2). Results indicated that green tea addition to the diet decreased levels of plasma LDL and Cholesterol compared to the control ($p<0.05$). As the highest and the lowest level of Cholesterol was related to control and 5 g kg^{-1} (IGT), respectively. The highest and the lowest level of LDL was also related to control and 15 g kg^{-1}, (IGT), respectively. The present results oppose with those reported by Miura *et al*. (2018) who reported that ingestion of green tea did not affect plasma cholesterol and triglyceride (TG) concentrations. Jung (2001) reported that the cholesterol content of broilers meat was decreased when broilers were fed 0.5-2.0% green tea. An experimental animal study showed that green tea polyphenol increased insulin activity (Waltner-Law *et al*., 2002). Increase levels of green tea in diet, reduced TBA in carcass meat significantly ($p<0.05$). The present results agree with those reported by Ei-Deek, etc. who reported that ingestion of green tea decreased the carcass meat TBA percentage. Table 3 indicate that there was significant different between feed additives on cecum weight percent by 1.134 ($p<0.05$). Uuganbayer (2004) reported diets containing 0.5% green tea showed a significant weight loss of the small intestine compared to the control diet which is adverse to our study. However, in present study the highest cecum weight was belong to 15 g kg^{-1} (IGT) and the lowest was related to control diet. This problem could be as reason of high fiber of green tea (15.5%) and passage toward terminal of gut and fermentation by microorganisms. In this study results revealed that green tea increased liver, pancreas and spleen (Table 3) ($p>0.05$). Increase of liver percentage may indicate fat accumulation due to addition of green tea. Results were confirmed only in animal studies. The findings described by Ito *et al*. (2008) and Murase *et al*. (2002) confirm that catechins (much more than caffeine) at clinically appropriate doses, affects lipid metabolism in non-obese and obese subjects.

CONCLUSION

From the results of the present study, it can be conclude that addition of Iranian green tea powder in diet of broilers did not affect on Glucose, TG, HDL and other carcass traits. Thus, supplementation of diets with green tea could not be very useful in broilers. More research studies are needed to conduct on green tea because of limited works are done in this potential supplement.

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REFERENCES

Biswas, M.A.H., Y. Miyazaki, K. Nomura and M. Wakita, 2000. Influences of long-term feeding of Japanese green tea powder on laying performance and egg quality in hens. Asian-Aust. J. Anim. Sci., 13: 980-985.

Costa, L.M., S.T. Gouveia and J.A. Nobrega, 2002. Comparison of heating extraction procedures for Al, Ca, Mg and Mn in tea samples. Anal. Sci., 18: 313-318.

Fujiki, H., 2005. Green tea: Health benefits as cancer preventive for humans. Chem. Rec., 5: 119-132.

Ito, Y., T. Ichikawa, Y. Morohoshi, T. Nakamura, Y. Saegusa and K. Ishihara, 2008. Effect of tea catechins on body fat accumulation in rats fed a normal diet. Biomed. Res., 29: 27-32.

Juhel, C., M. Armand, Y. Pafumi, C. Rosier, J. Vandermander and D. Lairon, 2000. Green tea extract (AR25®) inhibits lipolysis of triglycerides in gastric and duodenal medium in vitro. J. Nutr. Biochem., 11: 45-51.

Jung, Y.C., 2001. Effect of dietary green tea by-product on productivity in broiler and laying hens. J. Poult. Sci., 2: 536-547.

Kojima, S. and Y. Yoshida, 2008. Effect of green tea powder feed supplementation on performance of hens in the late stage of lying hen. Poult. Sci., 1: 491-496.

McKay, D.L. and J.B. Blumberg, 2002. The role of tea in human health: An update. J. Am. Coll. Nutr., 21: 1-13.

Miura, Y., T. Chiba, I. Tomita, H. Koizumi and S. Miura *et al*., 2018. Tea catechins prevent the development of atherosclerosis in apoprotein E-deficient mice. J. Nutr., 131: 27-32.

Murase, T., A. Nagasawa, J. Suzuki, T. Hase and I. Tokimitsu, 2002. Beneficial effects of tea catechins on diet-induced obesity: Stimulation of lipid catabolism in the liver. Int. J. Obes. Relat. Metab. Disord., 26: 1459-1464.

Sarker, M.S.K., M. Wakita and C.J. Yang, 2010. Effect of green tea and biotite on performance, meat quality and organ development in Ross broiler. J. Egypt. Poult. Sci., 30: 77-88.

Uuganbayer, D., 2004. A study on the utilization of green tea for hens and broiler chicks. Ph.D. Thesis, Sunchon National University, Sunchon, Korea.

Waltner-Law, M.E., L.X. Wang, B.K. Law, R. Hal, M. Nawano and D.K. Granner, 2002. Epigallocatechin gallate, a constituent of green tea, represses hepatic glucose production. J. Biol. Chem., 277: 34933-34940.