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The Effects of Dill Powder in Diet on Some Blood Metabolites, Carcass Characteristics and Broiler Performance

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Abstract: This experiment was conducted to investigate the effect of Dill powder in diet on blood parameters, performance and carcass characterization in broiler chicken. 600 one-day old chicks were experimented in a completely randomized design with 10 treatments (from treatment 1 (T1) till treatment 10 (T10) and 3 replicates. T1 as negative control without the additive supplementation,T2 till T10 with different concentrations of Dill powder (DP) in diet. T6 had significantly higher feed intake than other treatments ($p<0.05$) in finisher and all over the period. Also the treatments had no significant effects on feed conversion ratio. The percent of thigh weight was significantly higher in T2, T3 and T5 than control group ($p<0.05$). Also T2 had lower weight of breast than control group ($p<0.05$). The use of the highest level of Dill powder in diet (T10) significantly had lower percent of inner fat ($p<0.05$) than control group. Dill powder had no significant effect on glucose, triglyceride and high density lipoprotein (HDL) level in 21 day of age. T2 and T3 had significant lower level of cholesterol than T4 in 21 day of age ($p<0.05$). The experimental treatments had no significant effect on triglyceride and cholesterol in 42 day of age, while HDL level in T2 was higher than control and glucose level in T2 and T3 were higher than T9 ($p<0.05$). This experiment shows that the use of Dill powder could increase the feed intake and HDL and decrease the percent of inner fat in broiler chickens.

Key words: Dill · Performance · Blood Parameter · Broiler

INTRODUCTION

Using antibiotics in diet would increase the growth and performance of broiler chicks. Extensive use of antibiotics raises bacterial resistant. Despite all positive effects of antibiotics in animal nutrition, the recent researches show that the antibiotic residue in broiler carcass produce resistant strain in human body. From 2006 onward, Europe union prohibits using antibiotic growth promoter in animal industry.

According to the positive effects of antibiotics in animal nutrition, it is predictable that removing them would cause some harm; therefor, one of substitute compounds which is extensively under analysis and research today is medical plant. Some researchers have shown that using medicinal plant in diet would improve the broiler performance and some other has not confirmed such a conclusion.

Dill which scientifically called *Anethum graveolens* L belongs to Apiaceae family and the only type of *Anethum* which is cultivated tamely in Iran. Dill essence includes limonene and carron which make more than 90 percent of this essence; the components of this essence are the same as Carum carvi L. ones [1].

Based on the properties of Dill which prohibits raising up the level of cholesterol [2, 3], anti-cancerous nature [4], anti-diabetes [5] and Antioxidant [6-8], we aimed to investigate the effect of Dill powder in feed on performance, blood parameters and carcass characterizes of broiler chicks.

MATERIALS AND METHODS

Birds and Experimental Facilities: Six hundred mixed sex broiler chicks (Ross 308) were used in this experiment. The birds were housed in a litter floor system. Routine

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Table 1: Composition of experimental diets of broiler chickens during 7-42 days of age 1-Vitamin premix provides the following (per kg of diet): vitamin A, 5,500 IU; vitamin D3 1,100 IU; vitamin E, 10 IU; riboflavin, 4.4 mg; vitamin B12, 12 mg; nicotimic

Ingredients	Starter (7-21 days)	Grower (21-42 days)
Corn	59.66	63.55
Soybean meal	27.02	30.11
Wheat bran	10	3.5
Dicalcium phosphate	1.19	1.12
Limestone	1.4	0.4
Vit1. Min2 Permix	0.2	0.2
Salt	0.4	0.4
DL-Methionine	0.13	0.05
Total	100	100
Calculated values		
ME (kcal/kg)	3100	3100
CP (%)	21.5	0.19
Ca (%)	1	0.9
Avail. P (%)	0.45	0.35
Met (%)	0.5	0.38
Lys (%)	0.1	0.1

acid, 44 mg; menadione, 1.1 mg; biotin, 0.11 mg; thiamine, 2.2 mg; and ethoxyquin, 125 mg.

2-Mineral premix provides the following (per kg of diet): Mn, 120 mg; Zn, 100 mg; Fe, 60 mg; Cu, 10 mg; Se, 0.17 mg; I, 0.46 mg; Ca, minimum: 150 mg, maximum: 180 mg.

management procedures in intensive broiler production were followed to ensure disease control and comfort of the experimental birds. Feed and water were provided to appetite. Pens were placed inside a commercial farm so that experimental broilers were reared with other birds at the farm. The initial temperature of 32°C was gradually reduced according to the age of the birds and reached 20°C at the end of the experiment. Chicks were randomly allotted to groups of 20 birds to each of 30 floor pens (2 × 1 m), with 3 pens per treatment.

Experimental Design and Diets: Ten experimental diets, with 3 replicates were fed to broiler chicks for 42 d: a negative control diet, without the additive supplementation (T_1); T_2 (0-21 0 and 21-42 1%); T3 (0-21 0 and 21-42 3%); T4 (0-21 0 and 21-42 6%); T5 (0-21 1% and 21-42 1%), T6 (0-21 1% and 21-42 3%); T7 (0-21 1% and 21-42 6%); T8 (0-21 3% and 21-42 3%); T9 (0-21 3% and 21-42 6%) and T10 (0-21 6% and 21-42 6%) Dill powder (DP) in diet. Table 1 shows the composition of the experimental diets. All the diets were made up with essential ingredients such that they supplied the required nutrients of the birds recommended by NRC [9]. A research was conducted in a completely randomize design. The required amount of Dill was purchased from the local market and finely ground. All birds received a starter diet in mash form from 7 to 21 d and grower diet from 21 to 42.

Sampling and Measurements: At the 21 and 42 day of experiment, one bird in each pen was bled from a wing vein. Two milliliter of blood was aspirated from each bird then coagulated to sera for blood chemistry measurements. The bottles of coagulated blood were subjected to standard methods of serum separation and the harvested sera used for evaluation of glucose, cholesterol, triglyceride and HDL. Biochemical blood parameters measured at 21 and 42 days of experiment using appropriate commercial laboratory kits with RA1000 spectrophotometer. At the end of the experiment, one male chicken from each replicate of treatments were slaughtered and the relative weight of abdominal fat pad, liver, pancreas and carcass yield to live body weight were measured. Chicken body weight and feed intake were recorded each week to calculate weight gain and feed conversion.

Statictial Analyses: The effect of dill powder on blood chemistry, performance and carcass traits were analyzed statistically by ANOVA with SAS 9.1 software [10]. Duncan's multiple range test was used to detect the differences ($P<0.05$) among different group means.

RESULTS AND DISCUSSION

Performance and Carcass: The effects of DP supplementation on feed intake, weight gain and feed conversion ratio on broilers are presented in Table 2. Different level of dill powder no significantly effect on feed intake in starter period ($p>0.05$). The feed intake of birds in T6 was significantly higher than control and other treatments at grower and whole of the rearing period ($p<0.05$).

Lavinia *et al.* [11] used serviceberry, spearmint and service by 0.05% dose and there was no significant effect on the feed intake ($p>0.05$). Hernandez *et al.* [12] did not find any significant effect of using different levels and doses of avilamysin antibiotic, a mixture of cinnamon, oregano and pepper by amount of 200 ppm and 5000 ppm from sage, thyme and rosemary on feed intake of broiler chicks in their different periods of growth; moreover, Lee *et al.* [13] used 100 mg/kg of thymol and cinnamaldehyde in broiler diet that did not find any significantly effect on feed intake. Dill powder supplementation had no significant effect on broiler weight gain in starter period ($p>0.05$).

From 21 to 42 d of age (grower), broiler fed the T6 diet was significantly higher body weight gain than T4, T8, T9 and T10 groups ($p<0.05$). In the overall of rearing period,

Table 2: Growth performance in broiler chickens fed the experimental diets

Parameters	FI (7-21)	FI (21-42)	FI (7-42)	WG (7-21)	WG (21-42)	WG (7-42)	FCR (7-21)	FCR (21-42)	FCR (7-42)
T1	0.72	3.5^{b}	4.22^{b}	0.63	1.42^{ab}	2.05^{ab}	1.68	2.46	2.05
T2	0.75	3.44^{b}	4.19^{b}	0.67	1.4^{ab}	2.07^{ab}	1.60	2.45	2.02
T3	0.69	3.59^{b}	4.28^{b}	0.61	1.43^{ab}	2.04^{ab}	1.68	2.51	2.09
T4	0.77	3.47^{b}	4.24^{b}	0.65	1.36^{b}	2.01^{ab}	1.68	2.55	2.1
T5	0.76	3.56^{b}	4.32^{b}	0.66	1.51^{ab}	2.17^{ab}	1.62	2.53	1.99
T6	0.73	3.65^{a}	4.38^{a}	0.63	1.62^{a}	2.25^{a}	1.70	2.64	1.94
T7	0.74	3.39^{b}	4.13^{b}	0.66	1.38^{ab}	2.04^{ab}	1.60	2.45	2.02
T8	0.71	3.38^{b}	4.09^{a}	0.63	1.35^{ab}	1.98^{ab}	1.64	2.50	2.06
T9	0.69	3.29^{b}	3.98^{b}	0.65	1.29^{b}	1.94^{b}	1.53	2.64	2.05
T10	0.72	3.49^{b}	4.21^{b}	0.66	1.32^{b}	1.98^{ab}	1.57	2.96	2.12
SEM	0.01	0.08	0.08	0.01	0.04	0.04	0.04	0.1	0.07

*Means in each column followed by the same letters are not significantly different at 0.05.

*T_1 (Control); T_2 (0-21 0 and 21-42 1%); T3 (0-21 0 and 21-42 3%); T4 (0-21 0 and 21-42 6%); T5 (0-21 1% and 21-42 1%), T6 (0-21 1% and 21-42 3%); T7 (0-21 1% and 21-42 6%); T8 (0-21 3% and 21-42 3%); T9 (0-21 3% and 21-42 6%)

Table 3: Carcass characterized in broiler chickens fed the experimental diets

Parameters	Breast	Wing	Drumhead	Back	Neck	Carcass	Spleen	Pancreas	Gizzard	Fat	Liver
T1	35.82^{a}	11.15	27.50^{c}	20.79	4.71	69.37	0.08	6.6	1.93	1.27^{a}	2.26^{ab}
T2	31.36^{b}	11.28	30.59^{a}	21.36	5.39	71.12	0.08	6.3	1.91	0.74^{ab}	2.36^{ab}
T3	31.85^{ab}	11.28	31.25^{a}	20.44	5.16	71.45	0.09	5.2	2.05	0.64^{ab}	2.31^{ab}
T4	32.09^{ab}	11.41	30.38^{ab}	20.82	5.27	69.89	0.1	5.1	1.96	0.42^{ab}	2.44^{ab}
T5	32.33^{ab}	11.12	30.86^{a}	20.67	4.99	70.70	0.09	5.4	1.88	1.03^{ab}	2.18^{b}
T6	32.85^{ab}	11.08	30.39^{ab}	20.40	5.26	70.05	0.1	6.2	1.84	0.59^{ab}	2.47^{ab}
T7	33.90^{ab}	11.56	29.78^{ab}	19.90	5.35	70.55	0.13	5.6	1.91	0.62^{ab}	2.47^{ab}
T8	32.81^{ab}	11.73	28.23^{bc}	21.50	5.71	69.90	0.09	5.8	1.90	0.80^{ab}	2.83^{a}
T9	33.33^{ab}	11.08	29.98^{ab}	19.67	5.90	69.86	0.08	6.4	1.87	0.62^{ab}	2.71^{ab}
T10	33.07^{ab}	11.4	30.31^{ab}	19.72	5.48	68.11	0.1	5.4	1.88	0.33^{b}	2.76^{ab}
SEM	1.2	0.3	0.3	0.5	0.2	0.6	0.01	0.3	0.07	0.1	0.1

*Means in each column followed by the same letters are not significantly different at 0.05.

*T_1 (Control); T_2 (0-21 0 and 21-42 1%); T3 (0-21 0 and 21-42 3%); T4 (0-21 0 and 21-42 6%); T5 (0-21 1% and 21-42 1%), T6 (0-21 1% and 21-42 3%); T7 (0-21 1% and 21-42 6%); T8 (0-21 3% and 21-42 3%); T9 (0-21 3% and 21-42 6%)

the body weight gain in T6 was significantly greater than T9 group ($p<0.05$). In all of periods, the experimental treatments had no significantly effect on FCR ($p>0.05$). Also Hernandez *et al.* [12] did not find any significant effect on body weight gain in broiler chicks in the whole period of rearing using mixtures of herbs. Experimental treatments had no significant effect on FCR of broiler chicks in none of periods (starter and grower) and totally in the whole period; however, in starter period the least FCR are observed in T9 and T10 which consumed high amount of dill powder; anyway the difference in data was not statistically significant. AL-kassie [14] adding the mixture oil of thyme and cinnamon showed that the FCR of consuming chicks in this feed, significantly improve the FCR. They reported the reason of this improvement to be in presence of effective substance in herbs in stimulating the process of digestion and the antibiotic characteristic of them against the bacteria of intestine [14].

Effect of dill powder on carcass characterized and inner organ weights are presented in Table 3. Experimental treatments had no significant on percent of wing, back, neck, carcass, spleen, pancreases and gizzard weight ($p>0/05$). Breast weight in T2 was significantly higher than control group ($p<0.05$). The thigh weight in control was significantly lesser than other treatments (except in T8) ($p<0.05$). Broilers fed the T_{10} diet has significantly lowest abdominal fat than control group ($p<0.05$).

Garcia *et al.* [15] analyzed the effects of different levels of formic acid and herbs in broiler chicks. They did not find any significant effect on right leg of broiler chicks which is against our experiments' results. Durrani *et al.* [16] showed that using turmeric powder has a significant effect on increasing weight of right leg of broiler chicks which is in agreement with experiments' results. Relation with internal fat, the comparison of means showed that using dill powder in highest amount (T10) (in the whole of period; 6% dill powder in diet), decreases significantly the internal fat in broiler chicks ($p<0.05$). Shahriari *et al.* [17] showed that using 4 % of garlic powder in diet decreases the abdominal fat in broiler chicks which is in agreement with experiments' results. Koochaksaraie *et al.* [18] adding cinnamon powder in diet did not observe any significant

Table 4: Blood parameters in broiler chickens fed the experimental diets

Parameters	Glucose 21	Triglyceride 21	Cholesterol 21	HDL 21	Glucose 42	Triglyceride 42	Cholesterol 42	HDL 42
T1	232.2	1/74	1.95^{ab}	35.79	173.59^{ab}	8.58	45.38	39.66^{b}
T2	190.3	1.85	1.82^{b}	43.39	196.54^{a}	11.14	75.30	76.72^{a}
T3	226.2	2.01	1.89^{b}	29.68	187.24^{a}	7.93	67.87	51.01^{ab}
T4	263.8	1.77	2.28^{a}	48.89	177.74^{ab}	10.12	59.23	52.31^{b}
T5	264.4	1.90	1.93^{ab}	35.27	170.03^{ab}	11.01	58.63	46.93^{ab}
T6	252.9	1.51	2.01^{ab}	43.74	170.03^{ab}	8.07	66.27	6048^{ab}
T7	240.0	1.66	1.96^{ab}	42.95	164.09^{ab}	10.67	61.85	62.97^{ab}
T8	246.6	1.27	1.95^{ab}	35.88	176.76^{ab}	8.16	46.39	55.90^{ab}
T9	235.8	1.25	1.92^{ab}	57.97	144.02^{b}	8.44	68.67	42.25^{b}
T10	175.2	1.89	2.00^{ab}	37.71	182.20^{ab}	12.09	72.49	39.16^{b}

*Means in each column followed by the same letters are not significantly different at 0.05.

*T_1 (Control); T_2 (0-21 0 and 21-42 1%); T3 (0-21 0 and 21-42 3%); T4 (0-21 0 and 21-42 6%); T5 (0-21 1% and 21-42 1%), T6 (0-21 1% and 21-42 3%); T7 (0-21 1% and 21-42 6%); T8 (0-21 3% and 21-42 3%); T9 (0-21 3% and 21-42 6%)

effect on the internal fat in broiler chicks, which is not in agreement with experiments' results. Also, Yazdanparast and Alavi [2] reported that dill extract have reduces cholesterol and triglyceride properties. As we know there is a positive correlation between the level of triglyceride plasma and amount of abdominal fat [5]; therefore, the abdominal fat may have been reduced due to the characteristic of reducing in lipid of dill powder.

Blood Parameters: The effects of DP supplementation on blood biochemical parameters (glucose, cholesterol, triglyceride and HDL) in 21 and 42 day of age are presented in Table 4. Different levels of DP had no significant effect on glucose, triglyceride and HDL level, in 21 day of age ($p>0.05$). Cholesterol level was significantly increase in T4 rather T2 and T3 ($p<0.05$). Dill powder had no significantly effect on cholesterol and triglyceride level in 42 day of age, however, in 42 day of age, glucose level in T2 and T3 was significantly higher than T9, also HDL level was significantly higher in T2 rather T4, T9 and T10 ($p<0.05$).

In Iran, dill extract is consumed as a drug to reduce the lipids in blood. Yazdanparast and Bahramikia [3] studies showed that the water extract of dill leaf can reduce the total triglyceride and total cholesterol in hyperlipidemia male rats, which is not in agreement with our results in comparative with control group. Hosseini [20] reviewed the effects of oregano oil on blood parameters of broiler chicks. The results showed that using different levels of oregano oil has a significant effect on glucose, triglyceride, cholesterol, LDL and HDL levels. These results are in agreement with our results in this regard except regarding to HDL of which in T2 is significantly higher in comparison with the T4, T9 and T10. Qureshi *et al*. [21] showed that using the water and methanol extract of garlic powder along with reducing the synthesis of fatty acid, reduces serum and liver triglyceride of broiler chicks.

Various mechanisms are proposed to reduce lipid by herbs. Qureshi *et al*. [21] introduced the stop of enzymes involved in lipid metabolism, including 3-hydroxy-3-methylglutaryl-CoA redoctase, cholesterol -7 hydroxylase, fatty acid synthase and of course the Pentose phosphate pathway as the suggested mechanisms in reducing lipid due to consuming herbs.

CONCLUSION

Dill powder improved feed intake and body weight gain in broiler chicken. Also use of dill powder in diet could decrease abdominal fat and cholesterols level of plasma.

REFERENCES

1. Kabeczka, K.H., 2002. Essential oils Analysis by Capillary Gas Chromatography and Carbon -13 NMR Spectroscopy. John wiley & Sins LTD. Englad., pp: 461.
2. Yazdanparast, R. and M. Alavi, 2001. Antihy perlipidaemic and antihypercholesterolaemic effects of Anethum graveolens leaves after the removal of furocoumarins, Cytobios, 105: 85-91
3. Yazdanparast, R. and S. Bahramikia, 2008. Evaluation of the effect of *Anethum graveolens* L. crude extracts on serum lipids and lipoproteins profiles in hypercholesterolaemic rats. DARU, 16(2): 88-94.
4. Zheng, G.Q., P.M. Kenney and K. Lam, 1992. Anethofuran, carvone and limonene: Potential cancer chemoprotective agents from dill weed oil and caraway oil. Planta Medica, 58: 338-341.

5. Panda, S., 2008. The effect of *Anethum graveolens* L. (dill) on corticosteroid induced *diabetes mellitus* :involvement of thyroid hormones, Phytother Res., 22(12): 1695-1697.
6. Al-Ismail, K.M. and T. Aburjai, 2004. Antioxidant activity of water and alcohol extracts of chamomile flowers, anise seeds and dill seeds. J. Sci. Food. Agric., 84: 173-178.
7. Bahramikia, S. and R. Yazdanparast, 2009. Efficacy of different fractions of *Anethum graveolens* leaves on serum lipoproteins and serum and liver oxidative status in experimentally induced hypercholesterolaemic rat models. Am. J. Chinese Med., 37: 685-699.
8. Satyanarayana, S., K. Sushruta, G.S. Sarma, N. Srinivas and R.G.V.N. Subba, 2004. Antioxidant activity of the aqueous extracts of spicy food additives--evaluation and comparison with ascorbic acid in *in vitro* systems. J. Herb Pharmacother. 4: 1-10.
9. NRC. 1994. Nutrient Requirements of Poultry. 9th rev. ed. Natl. Acad. Press, Washington, DC.
10. SAS Institute, 2002, SAS/STAT User's guide, Version 9.1, SAS Institute Inc. Cary, NC.
11. Lavinia Stee, Dumitrescu Gabi, D. Drinceanu, D. Stee, C. Mot Daniela, Julean, Tetileanu Ramona and N. Corcionivoschi, 2009. The effect of medicinal plants and plant extracted oils on broiler duodenum morphology and immunological Profile. 14(4): 4606-4614.
12. Hernandez, F., J. Madrid, V. Garcıà, J. Orengo and M. D. Megıàs. 2004. Influence of Two Plant Extracts on Broilers Performance, Digestibility and Digestive Organ Size. Poultry Science, 83: 169-174
13. Lee, K.W., H. Everts, H.J. Kappert, M. Frehner, R. Losa and A.C. Beynen, 2003. Effects of dietary essential oil components on growth performance, digestive enzymesand lipid metabolism in female broiler chickens. Br. Poult. Sci., 44: 450-457.
14. Al-Kassie, G.A.M., 2009. Influence of two plant extracts derived from thyme and cinnamon on broiler performance. Pak. Vet. J., 29(4): 169-173.
15. Garcia, V., P. Català-Gregori, F. Hernàndez, M.D. Megìas and J. Madrid. 2007. Effect of Formic Acid and Plant Extracts on Growth, Nutrient Digestibility, Intestine Mucosa Morphology and Meat Yield of Broilers. J. Appl. Poult. Res., 16: 555-562.
16. Durrani, F.R. Mohammad Ismail, Asad Sultan, S.M. Suhail, Naila Chand and Z. Durrani, 2006. Effect OF different levels of feed added turmeric (*Curcuma longa*) on the performance of broiler chicks. Journal of Agricultural and Biological Science, 1(2): 9-11.
17. Shahriari, A., R. Fatemi Tabatabaie, R.A. Jafari and B. Ghorbanzadeh, 2009. Modulation of serum and liver triglyceride and abdominal fat pad weight by dietary garlic in male broilers. Int. J. Vet. Res., 3(2): 101-105.
18. Koochaksaraie, R.R., M. Irani and S.H. Gharaveysi, 2011. The Effects of Cinnamon Powder Feeding on Some Blood Metabolites in Broiler Chicks. Brazilian Journal of Poultry Science. 13(3): 197-201.
19. Crespo, N. and E. Steve-Garcia, 2003. Polyunsaturated fatty acids reduce insulin and very low density lipoprotein levels in broiler chickens. Poultry Sci., 82: 1134-1139.
20. Hosseini Mansoub. 2011. Performance, carcass quality, blood parameters and Immune System of broilers fed diets supplemented with oregano oil (*Origanum* sp.). Annals of Biological Research, 2(6): 652-656
21. Qureshi, A.A., N. Abuirmeileh, Z.Z. Din, C.E. Elson and W.C. Burger, 1983. Inhibition of cholesterol and fatty acid biosynthesis in liver enzymes and chicken hepatocytes by polar fractions of garlic. Lipids, 18: 343- 348.