



Effect of using different levels of Dill seeds on performance, some blood biochemical and intestinal microbial population in Ross 308 broiler chicks

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ARTICLE INFO

Type: Original Research

Topic: Medicinal Plants

Received July 24th 2016

Accepted December 16th 2016

Key words:

- ✓ Broiler chicks
- ✓ Dill seeds
- ✓ Performance
- ✓ Blood biochemical
- ✓ Intestinal microbial population.

ABSTRACT

Background & Aim: Dill "*Anethum graveolens*" is an annual medicinal plant in the celery family "*Apiaceae*". It is the sole species of the genus "*Anethum*". The health advantages of dill seed include its ability to increase digestive health, as well as providing relief from insomnia, hiccups, diarrhea, dysentery, menstrual disorders, respiratory disorders, and cancer. This experiment aimed to determine the effects of using different levels of Dill seeds on performance, some blood biochemical parameters and intestinal microbial population in Ross 308 broiler chicks.

Experimental: 300 one-day-old male broiler chicks were divided into the four treatments with six replicates and 15 birds each as randomized design. The treatments contained basal diet with no Dill seeds kept as control, and 200, 400 and 600 g of Dill seeds per each ton of diets respectively. The live body weight gain, feed intake and feed conversion ratio of birds were calculated weekly. At the end of the experiment four male birds from each replicate were slaughtered and dressing percentage were calculated. In addition, some carcass traits and chick's visceral part were weighed separately as percentage of carcass and some organs weight.

Results: Data indicated that using Dill seeds increased feed intake (FI) in treatments compared to control. Also body weight (BW) (g/d) and Pre-slaughter weight (g) were higher in groups that were fed by dill seeds compared to the control. Additionally, there were significant differences ($p < 0.05$) for feed conversion ratio (FCR) among treatments.

Recommended applications/industries: In conclusion, increasing levels of Dill seeds improved performance and some blood biochemical parameters of broiler chicks.

1. Introduction

Recently, considerable research has been done to explore some alternative to antibiotics as growth

promoters (Jamroz, 1989; Cyberhorse, 1999). Herbal plants or its products including plant extracts, essences or the components of the essential oils hold promise as

alternatives to antibiotics (Burger and Wachter, 1998). Many studies have been conducted to determine the efficacy of herbal on broilers performance. Because of the importance of poultries as an economic and nutritious form of animal protein and the fast growing traits of this animal, researchers have devoted studies to the use of some herbal in avian (Jamroz *et al.*, 2003). A series of medicinal and spicy herbs were used as additives, given as powder into the fodder, singular or mixed, either as aqueous, oily extracts or as essential oil (Rezaian, 2006).

Dill is called (*Anethum graveolens*) belongs to *Apiaceae* family and the only type of *Anethum* which is cultivated in some part of Iran. Its essence includes limonene and caron, which make more than 90 percent of this essence. Based on the properties of Dill which prohibits raising up the level of cholesterol (Zheng *et al.*, 1992 and Bahramikia *et al.*, 2009), anti-cancerous (Panda, 2008), anti-diabetes (Al-Ismail *et al.*, 2004), and antioxidant (Satyanarayana *et al.*, 2008), the objective of this study was to evaluate the effect of using different levels of Dill (*Anethum graveolens*) seeds on performance and some blood biochemical in Ross 308 broiler chicks.

2. Materials and Methods

The experiment was done at the Broiler farm of Islamic Azad University, Shahrekord, Iran.

2.1. Birds and the diets

A total of 300 one-day-old male Ross 308 broiler chicks with an average weight of 39.50 ± 50 g were divided into four treatments and also were subdivided into the six replicates with 15 birds in each. Dill seeds were purchased from a local market in Shahrekord, Iran and were grounded to obtain a fine and uniform powder. Additionally, soybean meal and corn grains were analyzed in the lab to determine of dry matter, crude protein, calcium, phosphorus and its crude fiber with Association of Official Analytical Chemists (AOAC, 2000) method. The basal diet was balanced based on corn and soybean meal as recommended by National Research Council (NRC, 1994) as shown in (table 1). The treatments were separated as basal diet

with no dill seeds kept as control and 200, 400 and 600 g per ton, respectively. During this experiment, diets and fresh water were provided *ad libitum*. The live body weight gains, feed intake and feed conversion ratio of birds were calculated weekly.

2.2. Investigation of the carcass characteristics

At the end of experimental period, four male broiler chicks from each replicates (initially 96 chicks) were slaughtered and then dressing and some visceral organ percentage were calculated. The internal organs were removed after slaughter.

2.3. Microbial population determination

To determine the microbial count, about 7 cm from the length of the ileum was sampled to investigate the microbial population. Also 1 g of ileum content was used to make 10-fold dilution using buffered peptone water and 0.1 mL of the appropriate ileum dilution was spread on Lactobacillus MRS1 Agar-Hi Media Laboratories to detect lactic acid bacteria and Violet Red Bile Agar to detect *E. coli* and *Klebsiella* form. The plates were stored and incubated at 37.5°C for 48 h. After counting the number of colonies in each plate, the number so obtained was multiplied by inverse of the dilution and the result was stated as the number of colony forming unit (cfu) in 1 g of the sample described by (Kheiri *et al.*, 2015).

2.4. Statically analyzing

To determine the effect of dill powder on blood parameters, performance and carcass traits data were analyzed statistically by one way-ANOVA with SAS 9.1 (2001) software. Additionally Duncan's (1995) multiple range test was used to detect the differences ($P < 0.05$) among different group means.

3. Results and discussion

Results of using Dill seeds effects on performance of broilers were shown in Table 1. Results revealed that the use of different levels of Dill seeds had increased feed intake (FI) significantly ($p < 0.05$). Result showed that body weight BW (kg) difference was more significant when the birds were fed by Dill seeds. Additionally, feed conversion ratio (FCR) was lesser in Dill seeds group and there were significant differences

compared to the control ($p < 0.05$). The usage of Dill seeds had significant influences on FI, BW, FCR and carcass yield. According to Richter (2010) Dill could completely improve digestive process and the digestibility of foods.

Table 1. Composition (%) of the experimental diets for broiler chicks

Ingredients %	0-14 (days)	14-21 (days)	21-42 (days)
Corn grain	54.8	59.4	65
Soybean meal	39.6	35.5	30
Soybean Oil	1.45	1.50	1.70
Di Calcium Phosphate	1.70	1.45	1.30
Oyster shells	1.05	0.95	0.86
Methionine - D-L	0.310	0.250	0.230
Lysine -L	0.22	0.10	0.10
Edible Salt	0.3	0.3	0.25
Vitamin Premix*	0.25	0.25	0.25
Mineral Premix*	0.25	0.25	0.25
Theronine -L	0.09	0.04	0.04
Calculated nutrient content			
ME(Kcal per Kg)	2850	2900	2940
CP (%)	21.8	20.4	18.4
Ca(%)	0.91	0.82	0.74
Available Phosphorus (%)	0.46	0.41	0.37
Lysine (%)	0.180	0.120	0.130
Methionine+Cystine (%)	0.92	0.84	0.75

*Supplied per each kilogram of broiler feed: 7,500 IU of vitamin A, 2000IU vitamin D3, 30 mg vitamin E, 1.5 µg vitamin B12, 2mg B6, 5 mg Vitamin K, 5 mg vitamin B2, 1 mg vitamin B1, 40 mg nicotinic acide, 160µg vitamin Biothine, 12 mg Calcium pantothenate, 1mg Folic acid, 20 mg Fe, 71 mg Mn, 100µg Se, 37mg Zn, 6 mg Cu, 1.14 mg I, 400 µg Cu.

The beneficial effects of medical plantor active substances in poultry nutrition may include the stimulation of appetite and the improvement of endogenous digestive enzyme secretion, antibacterial, and antioxidant activities (Kheiri *et al.*, 2015). Bahadori *et al.* (2013) showed that the use different levels of dill powder had no significant effect on feed intake in earlier growth period ($p > 0.05$). The feed

intake of birds in Dill groups was higher than control and other treatments at grower and whole of the rearing period significantly ($p < 0.05$). In Rafiei-Tari *et al.* (2016) study, feed intake was also influenced by dietary treatment of herbal plant as birds that received diet containing Dill seeds showed a significantly ($P < 0.05$) lower feed intake over the course of their experiment.

Table 2. The effect of using Dill seeds on broilers chicks performance

Treatments	FI(g/d)	BW(g/d)	FCR	Pre-slaughter weight (g)	Carcass(%)
Control	98.2 ^b	48.0 ^{b*}	1.96 ^b	2360.6 ^a	70.1
200 g per ton Dill seeds	99.8 ^b	49.1 ^{ab}	1.94 ^{ab}	2355.2 ^{ab}	70.5
400 g per ton Dill seeds	100.2 ^a	49.4 ^{ab}	1.92 ^{ab}	2342.7 ^{ab}	70.8
600 g per ton Dill seeds	101.6 ^a	50.4 ^a	1.90 ^{ab}	2295.5 ^b	71.11
SEM	2.52	1.41	0.093	82.44	1.75

*Means in each column followed by the same letters are not significantly different ($P < 0.05$).

Table 3. The effect of using Dill seeds on some visceral organs percentage

Treatments	Intestine (%)	Liver (%)	Gizzard (%)	Abdominal Fat (%)
Control	5.56 ^{ab}	2.29	1.79 ^a	3.41 ^a
200 g per ton Dill seeds	5.05 ^b	2.40	1.64 ^{ab}	2.69 ^b
400 g per ton Dill seeds	5.10 ^b	2.16	1.53 ^{ab}	2.21 ^c
600 g per ton Dill seeds	5.07 ^b	2.04	1.55 ^{ab}	1.94 ^d
SEM	0.31	0.21	0.096	0.42

*Means in each column followed by the same letters are not significantly different ($P < 0.05$).

Bahadori *et al.* (2013) noted that thigh weight percentage was significantly higher in experimental groups than control group ($p < 0.05$), and they had lower weight of breast than control group ($p < 0.05$). They also demonstrated that the use of the highlevel of Dill powder in broiler diet had lower percent of inner fat

significantly ($p < 0.05$) than control group. Rafiei-Tari *et al.* (2016) demonstrated that carcass weight and carcass components were not positively influenced by the dietary treatments with Dill seeds.

Table 4. The effect of using Dill seeds on some blood biochemical.

Treatments	Triglyceride (mg/dl)	Cholesterol (mg/dl)	HDL (mg/dl)	LDL (mg/dl)
Control	72.50 ^a	134.10 ^a	68.11 ^c	62.10 ^a
200 g per ton Dill seeds	69.00 ^b	132.50 ^b	70.10 ^b	58.34 ^b
400 g per ton Dill seeds	66.01 ^b	130.20 ^b	70.11 ^a	55.11 ^b
600 g per ton Dill seeds	62.00 ^c	128.11 ^c	72.02 ^a	54.20 ^c
SEM	1.01	1.11	0.98	1.11

*Means in each column followed by the same letters are not significantly different ($P < 0.05$).

Table 5. The effect of using Dill seeds on (*Escherichia Coli* and *Klebsiella*) bacteria (cfu.g).

Treatments	Dilution 1	Dilution 2	Dilution 3
Control	2.45 ^a	1.86 ^a	1.10
200 g per ton Dill seeds	2.16 ^a	1.74 ^{ab}	0.99
400 g per ton Dill seeds	1.94 ^{ab}	1.36 ^{ab}	0.96
600 g per ton Dill seeds	1.75 ^{ab}	1.29 ^{ab}	0.88
SEM	0.36	0.46	0.26

*Means in each column followed by the same letters are not significantly different ($P < 0.05$).

Data from table 4 showed that serum triglyceride, cholesterol and low density lipoprotein decreased and HDL increased significantly ($p < 0.05$).

Scientific research on the effect of Dill seeds on serum biochemical in poultry is limited. Bahadori *et al.* (2013) suggested that there were not significant effects of Dill seeds on cholesterol and serum blood high-density lipoprotein levels in broilers. It has been argued that dill has dose-dependent cholesterol-lowering effects (Zhang *et al.*, 2007). They also showed that

birds fed by Dill seeds showed significantly ($P < 0.05$) lower very low-density lipoprotein and triglyceride serum compared to control group. Yazdanparast and Alavi (2008) reported that the dill extract could reduce broilers cholesterol and triglyceride properties.

In the present study, the intestinal microbial population of gram-negative (*Escherichia Coli* and *Klebsiella*) bacteria decreased significantly in treated groups ($P < 0.05$).

Ghaedi *et al.* (2014) who observed that inclusion of black pepper in the diet lowered microbial colony in the ileal content of broiler chickens. Faghani *et al.* (2014) demonstrated that the reduction in microbial load of broiler chickens intestinal could be due to the antibacterial effect of some herbals on intestinal microbiota. Our findings about intestinal microbiota are in agreement with Faghani *et al.* (2014) and Ghaedi *et al.* (2014).

4. Conclusion

Briefly, we could demonstrate that the using of Dill seeds as medical plant and its advantages on broilers chicks' performance. These beneficial acts may be due to the biological functions of this medical plant to improve performance or may be due to its role as appetite stimulant, carminative, digestibility enhancer, antioxidant and antimicrobial properties. Additionally, further studies are needed for more discussion and explanations.

5. Acknowledgements

We are thankful to the Agricultural and Veterinary Staff of Islamic Azad University, Shahrekord Branch, for the cooperation and assistance in order to run this test. In addition, the authors sincerely acknowledge the sincere assistance provided by Professor Abdollah Ghasemi Pirbalouti.

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