Effect of Dill Powder (*Anethum graveolens*) as a Dietary Supplement on Productive Performance, Mortality and Economic Figure in Broiler

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Abstract

**Background and Aim:** Dill "*Anethum graveolens*" is considered to be an important herbal medicinal plant in the celery family “Apiaceae”. It is the only member of the genus “*Anethum*. Dill seed's health benefits include the potential to improve digestive health, as well as supplying insomnia, hiccups, respiratory disorders, nausea, dysentery, and cancer relief. This experiment was conducted to shed light the influences of dietary Dill leaves powder supplementation on growth performance, edible giblets and mortality rate with reference to its economical figure for Ross 308 broiler. **Experimental:** 120 one-day-old Ross 308 broiler chicks have been allotted into the four dietary experimental groups, each with three replicates and 10 birds each as randomized design. The experimental groups were classified into basal diet with no Dill powder kept as control, and 1, 2 and 3 g of Dill powder per kg of diets respectively. The birds growth performance including live body weights gain, feed intake and feed conversion ratio were monitored weekly. At the end of the experiment eight male birds were selected randomly from each replicate slaughtered and edible giblets viz., gizzard, heart and liver, were calculated. In addition, the effect of dill powder supplementation on the mortality rate as well as its economic figure was recorded. **Results:** Data indicated that using Dill leaves powder at the level of 1 g/kg ration significantly increased feed intake (FI), live body weight (BW), weight gain (WG) compared to control and other treatment groups. Additionally, there were remarkable differences (p ≤ 0.05) for feed conversion ratio (FCR) among experimental groups. In addition, edible giblets were better in groups supplemented with dill leaves powder compared with the control. The Dill leaves powder at the level of 1 g/kg ration did not reported any mortalities and the economic figures did not show any significant differences among the experimental groups. **Recommended applications/industries:** Conclusively, dietary supplementation of Dill leaves powder enhanced the productive performance of broilers chicks especially at the level of 1 g/kg ration.

Keywords: Dill; broiler; Performance; Mortality; Economic figure

1. Introduction

During the past few decades, the world wide poultry industry has been demonstrated the commendable transition from subsistence farming to an extremely business-oriented and intensive enterprise. The biggest challenge in modern poultry production systems, is to restrict antibiotic growth promoters (AGPs), which are used to boost bird production efficiency, particularly in broiler birds. Nonetheless, there has been an increase in consumers awareness and demand for organic products, which imposes need of rigorous researches to substitute these traditional feed additives with alternative performance enhancers that improve the production efficiency in appropriate way, preserve animal health and without creation of harmful residues in feed [1]. Medical and herbal plants are containing wide types of chemical compounds which contribute in many important reactions inside body. Therefore, it play an important role to enhance growth and health in human and animals [2].

Several researchers are drawing attention to phytogenic feed additives [3] to be used in live stock and poultry diets. Phytochemicals are organic bioactive chemical compounds which occur naturally in plants [4], such as glycosides, alkaloids, flavonoids and essential oils, but are not yet established to be the essential nutrients. India is considered to be the “land of herbs" and has a rich heritage of “Ayurveda.”

The supplementation of Dill seed (*Anethum graveolens*) is already studied in broilers [5] has improved overall performance. Dill seeds contain essential oils such as limonene, carvone, [6] and dill a piole [7] as principle active ingredients, having an...
excellent ability to minimize oxidative stress on birds by scavenging reactive oxygen species (ROS). Interestingly, dill seed has antibacterial [8] as well as hypolipidemic [9] properties. From the light of these facts, the present investigation was conducted to determine the beneficial impact of different levels of dietary Dill (*Anethum graveolens*) powder supplementation on growth performance as well as mortality rate with reference to its economic figure of Ross 308 broiler chicks.

2. Materials and Methods

2.1 Ethical statement:
The research was endorsed and approved by the Committee of Local Experimental Animal Care of the College of Agriculture, University of Kufa, Iraq. During the experiment, all precautions were taken to reduce the animal suffering.

2.2 Animals, management and the experimental design:
The research was carried out at the broiler farm of Animal Production Department, Faculty of Agriculture, University of Kufa, Iraq during the period of 11/3/2018 to 15/4/2018. A total of 120 one-day-old Ross broiler chicks with an average weight of 39.50±50 g were allotted into four experimental groups, 30 per each, subdivided into the three replicates with 10 birds in each pen (a CRD design with 4 treatments, 3 replicates and 10 chicks). Dill seeds were purchased from a local market in Kufa, Iraq and grounded to get a fine and uniform powder. In addition, soybean meal and corn grains have been exposed to laboratory analysis to assess dry matter, crude protein, calcium, phosphorus and its crude fiber in according to Official Analytical Chemists [10] method. The control diet was balanced based on corn and soybean meal. Diets were designed as starter and grower based on NRC [11] recommendations. All birds were fed on starter ration (23% protein and 2900 kcal/kg) for the first 3 weeks and grower ration (21% protein and 3200 kcal/kg) for remaining period of the experiment. The experimental groups were separated as basal diet without any additives kept as control and 1, 2 and 3 g of Dill leaves powder per kg ration, represented as T1, T2, T3 and T4, respectively. Feed and fresh water were provided ad-libitum. The productive performance including weekly live body weight, weight gains, feed intake and feed conversion ratio of birds were calculated for starter (0-3<sup>rd</sup> Week of experiment) and finisher periods (4-5<sup>th</sup> Week). The lightening schedule was 23 h light and 1 h darkness at 32 °C in first day and then reduced 3°C weekly until third week.

The first experimental group (T1): control ration.

The second experimental group (T2): control ration supplemented with 1 g Dill leaves powder per kg ration.

The third experimental group (T3): control ration supplemented with 2 g Dill leaves powder per kg ration.

The fourth experimental group (T4): control ration supplemented with 3 g Dill leaves powder per kg ration.

At the end of experimental period, eight birds were selected randomly from each experimental group and slaughtered. Giblets individual and collective weight, viz., gizzard, heart and liver, was reported and expressed as % pre-slaughter weight as well as the mortality rate during the whole of the weeks of experiment was recorded and the economic evaluation. All data analysis was done using GLM procedure of SAS software [12]. Duncan’s [13] Multiple Range Test was used for comparison of means (P≤0.05).

3. Results and discussion

The productive performance of broilers by using Dill powder supplementation were illustrated in Table 2. The present findings suggested that dietary Dill leaves supplementation at different levels had a significant impact on feed intake (FI) (P≤0.05) during the 5<sup>th</sup> weeks of experiment and the level of 1 g/kg diet was the optimum dose of supplementation. At the same trend, body weight BW (g) and weight gain (WG) enhanced when the birds were fed by Dill leaves powder especially at the level of 1 g/kg diet. Moreover, feed conversion ratio (FCR) also improved significantly in Dill leaves powder supplemented groups in comparison with the control (P≤0.05) particularly during the period of 4-5<sup>th</sup> Weeks of experiment (Table 3). Therefore, the supplementation of Dill seeds had remarkable influences on FI, BW, FCR and edible giblets (heart weight and liver weight). According to Richter [14] the enhancement of the productive performance by using Dill leaves powder in poultry diets may be associated with its ability to enhance digestive process and the digestibility of foods appropriately. The beneficial impacts of medicinal plant or active substances in poultry diets have a role in the stimulation of appetite and the enhancement of endogenous digestive enzyme secretion as well as antioxidant activities [15]. The present findings were not in agreement reported by Ismail et al. [16] and Talha et al. [17] in chicken and Konca et al. [18] in Japanese quails. Bahadori et al. [19] investigated that the feed intake did not affected by using dill powder in diets especially in early period of growth. However, at grower and whole of the rearing period significantly influenced (P≤0.05). Likely, Rafiei-Tari et al. [20], reported that dietary Dill supplementation had an influence on feed intake in broiler (P≤0.05) by lowering feed intake over the course of their experiment. With regard to carcass traits, the obtained results from this experiment supported by other studies that similarly reported observable change in the relative weight of carcass, and the giblet organs of broilers fed diets supplemented dill seed. Bahadori et al. [19] revealed that carcass traits especially thigh weight percentage was better in supplemented groups than non-supplemented group (P≤0.05). However, breast weight, inner
fat percentage were significantly lower than non-supplemented group ($P \leq 0.05$). Unlikely, RafieiTari et al. [20] reported that supplementation of Dill powder did not improve the carcass traits in poultry. Interestingly, the level of 1g Dill leaves powder/kg diet did not recorded any mortalities (Table 3). Finally, based on the data, the economic figures did not show any significant variations between the all experimental groups.

Table 1. Effect of diets containing different levels of dill powder on the live body weight, weight gain and feed intake of broilers

| Treatments* | Age/ week/ bird | weight gain (g) | Age/ week/ bird | feed intake (g) |
|-------------|----------------|----------------|----------------|----------------|
|             | 0-3            | 4-5            | 0-5            | 4-5            |
| T1          | 958.3$^{ab}$   | 2199.6         | 912.7$^{ab}$   | 1241.3         |
| T2          | 976.1$^{a}$    | 2287.3         | 930.5$^{a}$    | 1311.2         |
| T3          | 955.7$^{ab}$   | 2196.1         | 910.1$^{ab}$   | 1240.5         |
| T4          | 938.9$^{ab}$   | 2259.5         | 893.3$^{ab}$   | 1320.6         |
| SEM         | 18.15          | 60.50          | 18.15          | 46.80          |
| P Value     | 0.17           | 0.25           | 0.17           | 0.12           |

*T1: Control (0% dill leaves powder/ kg feed), T2: (1gm dill leaves powder/ kg feed), T3: (2gm dill leaves powder/ kg feed) and T4: (3gm dill leaves powder/ kg feed)

Table 2. Effect of diets containing different levels of dill powder on the feed conversion ratio, Edible giblets, mortality rate and economic figure of broilers during 5-weeks experiment

| Treatments* | Age/ week/ bird | Feed conversion ratio | Heart weight % | Liver weight % | Gizzard weight % | Mortality % | Economic figure |
|-------------|----------------|-----------------------|----------------|---------------|-----------------|-------------|-----------------|
|             | 0-3 4-5 0-5    |                       |                |               |                 |             |                 |
| T1          | 1.35           | 1.63 1.51 1.49        | 0.49           | 3.48          | a               | 1.04        | 0.00            | 414.7          |
| T2          | 1.37           | 1.51 1.46 1.44        | 0.44           | 2.61          | ab              | 0.80        | 0.00            | 447.2          |
| T3          | 1.38           | 1.52 1.47 1.54        | 0.54           | 3.29          | ab              | 0.99        | 0.33            | 428.0          |
| T4          | 1.37           | 1.54 1.47 1.57        | 0.57           | 2.11          | a               | 0.93        | 0.33            | 437.9          |
| SEM         | 0.02           | 0.03 0.02 0.04        | 0.04           | 0.54          | b               | 0.13        | 0.40            | 16.65          |
| P Value     | 0.49           | 0.01 0.11 0.03        | 0.03           | 0.05          | 0.05            | 0.59        | 0.18            |                |

*T1: Control (0% dill leaves powder/ kg feed), T2: (1gm dill leaves powder/ kg feed), T3: (2gm dill leaves powder/ kg feed) and T4: (3gm dill leaves powder/ kg feed)

Conclusion
Conclusively, we demonstrated that the Dill leaves powder can be used as growth promoters in poultry besides its using as a medicinal plant and the recommended level is 1 go fusing Dill leaves powder/ kg poultry diet.

Conflicts of interest
The authors declare no conflict of interest.

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