Evaluation of Sweet Basil Powder Plant (*Ocimum basilicum* L.) as a Feed Additives, on the Performance of broilerChicks

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Summary

The present study was carried out at the Poultry Farm, College of Veterinary Medicine -Baghdad University, for powder sweet basil plant evaluation as feed additives, and its effect on the performance and health of broiler. Three hundred one day old Hubbard broiler chicks were used in this study. Chicks were weighed and randomly divided into 10 treatments groups, with 2 replicates (15chicks each).These groups were fed with the following rations: The 1st group was fed the basal diet (control group).The 2nd,3rd and 4th groups were fed the basal diet+0.3, 0.4 and 0.5 % basil powder for the first 3 weeks only respectively. At the 5th, 6th and 7th groups were fed the same basal diet +0.3, 0.4 and 0.5 % basil powder for the second 3 weeks respectively. While the 8th, 9th and 10th were fed the same basal diet with 0.3, 0.4 and 0.5 % basil powder along the whole six weeks. The experiment was terminated when birds were 6 weeks old. Weight gain, feed intake and feed conversion ratio were measured at the end of first three weeks and also at the end of the experiment. The results revealed that adding sweet basil powder significantly (P< 0.05) increased live body weight, body weight gain and feed conversion ratio as compared with the control, especially on the level 3%, 4%, 5% of Sweet basil powder addition along the whole period of the experiment and There was a significant (P< 0.05) decrease in total feed intake compared with the control group.

Keywords: Sweet Basil, (*Ocimumbasilicum* L.), Feed Additives, broiler, Performance.

Introduction

The use of herbal feed additives, which include essential oils and (exotic) herbal mixtures, is extensively promoted by the producers, but the scientific background underpinning their use often is limited. Consequently an adequate knowledge of quality control, content of active substance(s), stability, efficacy and safety is often lacking. A critical examination of bioactive plant products has to cover analytical aspects, absorption, bioavailability and molecular functionality in addition to feeding experiments and technology development. (1)

Herbs and herbal products/botanicals represent a large array of nutraceuticals, which are defined as "any non-toxic feed component that has scientifically proven health benefits including disease prevention or treatment such as (dietary fiber, phenolic acids, flavonoids, vitamins, antimicrobial agents and neuropharmacological agents). One perceived advantage is that many of these plant products occur in complex mixtures and not only as single compounds, hence resistance is less likely to become a problem than with conventional synthetic compounds (2).

Ocimumbasilicum has over 50 medicinal activities and is reportedly used to treat over a hundred conditions. Hence, *O. basilicum* considered as antibacterial, antiseptic, a febrifuge and a nervine (3).

Several investigators reported that using medicinal and aromatic plants (MAP) in broiler diets improved body weight, body weight gain, feed conversion efficiency and reduce the cost of feed (4, 5, 6 and 7). So the objective of the present study is to investigate the impacts of sweet basil as natural feed additives on the performance of broiler chicks.

Materials and Methods

This experiment was carried out in the Poultry Farm, College of Veterinary Medicine, Baghdad University. The experiment was lasted for 42 days started from 15/12/2011 up to 25/1/2012. Three hundred day-old Hubbard chicks were divided randomly into 10 treatment groups of 30 birds; each treatment group was further sub-divided into 2 replicates of 15 birds

per replicate. The groups were divided as follow: The 1st group was fed the basal diet as control group. The 2nd, 3rd and 4th groups were fed the basal diet+0.3, 0.4 and 0.5 % basil powder for the first 3 weeks only respectively. Whereas the 5th, 6th and 7th groups were fed the same basal diet +0.3, 0.4 and 0.5 % basil powder for the second 3 weeks respectively. While the 8th, 9th and 10th were fed the same basal diet with 0.3, 0.4 and 0.5 % basil powder along the whole 42 days.

Live body weight at the end of 3rd and 6thweekswere taken. Body weight gain was calculated as:-

Weight Gain = body weight at the end of the period – body weight at the beginning of the previous period.

Feed intake was at the end of 3rd and 6th weeks, while feed conversion for each treatment along the experiment was measured by the following equation mentioned by (8).

$$\text{Feed conversion} = \frac{\text{Average feed intake (g)}}{\text{Average body weight gain (g)}}$$

Statistical analysis was applied by using complete randomized design using statistical analysis system (SAS, 2001).

Results and Discussion

Live body weight due to effect of sweet basil as a feed additive is presented in table (1). During the first period (1-3weeks old) showed significant (P<0.05) increase in live body weight for treatments T3,T4 and T10 compared with other treated groups and control, but treatments T2 showed lower live body weight than other treated groups and control.

This could be due to the amount of the active compounds present in sweet basil powder were not quite enough as compared with feed consumed during this period to show an increase in the validity and absorption capability of the nutrient constituent to get benefit from food (9). While during the second period (4- 6 weeks old) the results of T8, T9 and T10 recorded the highest significant (P<0.05) increase in live body weight as compared with other treated and control groups. However, during the studied period, it was showed a significant (P<0.05) increase in live body weight in T8, T9 andT10 treated groups compared with the other treated and control groups, while T5 showed the lowest value of live body weight compared with other treated and control groups.

Table, 1: Effect of different levels of sweet basil powder on broiler chicks live body weight gain (g) during different three periods (M ± S.E)

Parameter Treatments	Live body weight gain (g)		
	1st three wks	2nd three wks	Whole period
T1	1061.25± 112.20de	1215.21± 104.61 d	2276.46± 116.65 d e
T2	1018.74± 81.90 e f	1340.74± 111.85 c	2359.47± 95.76 c de
T3	1090.10± 93.86 a	1267.92± 97.38 d	2358.02± 121.59 b c
T4	1067.69± 99.23 a b	1340.31 ± 97.72 c	2408.00± 116.96 b
T5	1049.18± 102.92 cd	1253.11± 125.41 d	2302.67± 98.95 e
T6	1006.75± 91.42 f	1388.13± 118.65 b	2394.88± 78.07 b c
T7	1041.23± 86.47 c d	1347.20± 120.35 c	2388.42± 93.88 bcd
T8	1053.88± 62.61 b c	1479.13± 112.98 a	2533.00± 70.36 b a
T9	1041.39± 45.45 c d	1492.62± 98.97 a	2534.01± 42.52 a
T10	1067.25± 31.03 a b	1475.13± 99.84 a	2542.38± 55.88 a

Different letters in columns show significant differences at level (P<0.05).

This significant increase through the 2nd period and the experimental period may be attributed to the fact that basil oils offering the greatest benefits often contain high levels of methyl chavicol, eugenol, linalool, camphor, and methyl cinnamate (10). The lowest gain in the second period of the 5th treatment group could be due to low level of sweet basil powder being fed. Many workers indicated that effect of cinnamate and its derivative compounds has an effect in digestion and feed metabolism, since these compounds have an active role in enhancing the intestine motility and the total secretion of bile through its stimulating role for enzymatic digestive canals secretions and also for the intestine and pancreatic secretion (11). Also it has been shown that the more important active compounds of basil powder is the

eugenol, it is a phenolic compound that had an antimicrobial property (12). However the synergistic action of both (cinnamate and eugenol) had led to improve the digestive canal status and attenuate the number of microbes in the intestine caused an increase in the available energy for growth, thus these microbes consumes a large amount of digestive nutrients and energy in the intestine needed for maintaining their live which reduces the microbial masses and increases the energyrequirments and cause an improvement in the total body weight (13).

Present results are in agreement with (14) in the importance effect of active substances in the medicinal and aromatic plants (cinnamate and eugenol) as an active substances and digestive stimulators, also its effect as antimicrobials, especially the intestinal microbes that located in the digestives.

Daily Body weight gain was found (Table, 2) there is a significant ($P<0.05$) differences between treated groups and the control in the daily body weight gain throughout the first period (0-3wks), second period (4-6wks) and the whole period of the experiment. In the first period (0-3wks), the daily body weight gain of treatments T3, 4 and 10 was significantly ($P<0.05$) the highest values compared with other treatments and the control groups. However treatment T8, 9 and 10 in the second three weeks and the whole period recorded the highest gain (70.43, 71.07, 70.24 and 60.30, 60.33, 60.53 g/day) respectively compared with other treated and the control groups (Table, 2).

These results are in agreement with many published research work (2, 15, 16 and 17).

The main constituents of sweet basil include chavicol methyl ether or estragole, linalool and eugenol, and that carried out by Ravid *et al.*, (18) whom suggested that linalool is the most active agent responsible for antibacterial activity, which caused an increase in broilers body weight gain, and linalool considered as the more active antimicrobial among most of sweet basil components and caused sterilization of the gastrointestinal tract, as a result of improving feed utilization and causing an increasing in daily body weight gains. However, other workers found that these improvements may be attributed the effect of chemical constituents (active compounds) of sweet basil powder, which had antimicrobial, antifungal, antioxidant and anti-inflammatory effects (19, 20 and 21).

Table, 2: Effect of different levels of sweet basil powder on daily body weight gain (g) during different three periods (M ± S.E)

Parameter / Treatments	Daily body weight gain (g)		
	1st three wks	2nd three wks	Whole period
T1	50.53± 4.58 d e	57.86± 4.69 d	54.20± 4.15 de
T2	48.51± 4.09 e f	63.84± 3.18 c	56.17± 6.13 c de
T3	51.90± 5.18 a	60.37± 3.35 d	56.14± 5.01 b c
T4	50.84± 3.43 a b	63.82± 2.36 c	57.33± 6.40 b
T5	49.96± 7.61 c d	59.67± 4.21 d	55.06± 6.68 e
T6	47.94± 3.44 f	66.10± 2.88 b	57.02± 5.66 b c
T7	49.58± 7.30 c d	64.15± 5.96 c	56.86± 4.33 bcd
T8	50.18± 4.12 b c	70.43± 5.61 a	60.30± 5.24 a
T9	49.59± 6.25 c d	71.07± 8.37 a	60.33± 5.60 a
T10	50.82± 5.17 a b	70.24± 9.08 a	60.53± 6.04 a

Different letters in columns show significant differences at level ($P<0.05$).

In addition, the supplementation of poultry diets with aromic plants have a stimulating effects on digestive system of the animals through the increasing the production of digestive enzymes and by improving the utilization of digestive products through enhanced liver function (22).

The results of this study agreed with (23) who showed that body weight gains of chicks were improved by an increasing herbal mixture supplementation up to 1% in broiler diets. Also, Abaza (24) found that broiler diets' containing 0.25 % of chamomile improved live body weight and body weight gain.

Feed intake was affected by addition of a sweet basil powder in the diet table (3).

Table, 3: Effect of different levels of sweet basil powder on daily feed consumption (g / bird) during different three periods (M ± S.E)

Parameter / Treatments	Feed intake per day (g)		
	1st three wks	2nd three wks	Whole period
T1	76.99± 7.29 a	146.54± 5.23 a	111.77± 9.59 a
T2	71.84± 3.80 a b	143.83± 5.15 a b	107.84± 5.47 b c
T3	74.37± 8.54 a	142.24± 7.95 a b	108.30± 9.54 b
T4	71.77± 5.13 a b	136.92± 7.55bcd	104.34± 5.20 c d
T5	69.57± 2.92 b c	138.07± 9.11 b c	104.13± 11.37c d
T6	72.68± 7.07 a b	142.07± 8.00 b	107.37± 5.50 b c
T7	67.19± 7.24 c d	135.74± 7.27b cd	101.46± 5.26 d e
T8	65.02± 9.85 d e	132.53± 7.01 c d	98.78± 7.41 e f
T9	61.77± 12.49 e	130.71± 9.14 c d	96.24± 11.81 f
T10	67.22 ± 4.13c d	130.16± 11.29 d	98.69± 3.78 e f

Different letters in columns show significant differences at level (P<0.05)

The results showed that there was a significant difference (P<0.05) in feed intake during the first period (1-3 weeks), second period (4-6 weeks) and also whole period. In the first period T8 and T9 showed significantly (P<0.05) lowered feed intake than other groups. A significant (P<0.05) difference noticed in feed intake for the second three weeks and whole periods among the treated groups, while T8, T9 and T10 groups shows a significantly (P<0.05) lowered feed intake in whole period as compared with other groups, especially the control group showed the highest level of this trait. Present results agreed with Yurtseven *et al.*, (25) found significant and linear reduction in feed intake due to sage extract (which is below the same family) occurred in weeks 9 to 12 ofage of the partridges.

Rabia, (26) indicated that feeding different types of MAP as feed additive significantly (p<0.05) affected feed intake (FI) value during the experimental period ,indicated that broiler fed basil, parsley and fenugreek seeds had the lower feed intake value during 42 days of age as compared with the control group. While Abd EL-Latif *et al.*, (27) found that the lowest values of feed intake and best feed conversion ratio with the addition of 0.5% chamomile flower to the Japanese quail feed diets. Mehmet *et al.*, (28) found that feed intake was reduced linearly by increasing doses of black seeds extract during 0 to 12 weeks of age. The results in this study were in contrast with the findings of Erener *et al.*, (29) who found that supplementation of black seeds increased feed intake of broiler chicks. However, the results of this study were in contrast with Cabuk (14) found that feed intake be improved with the addition of MAP and attributed to essential oils and their main components which stimulate the appetizing and digestive process in animals.

The lowest values of feed intake in this study occurred in the groups those treated with sweet basil powder, these may be attributed to the strong smell and sharp taste of the extract since these are properties known to characterize antioxidants in basil plants (30).

Table, 4: Effect of different levels of sweet basil powder on daily feed conversion ratio (g /body wt. /feed intake) during different three periods (M ± S.E)

Parameter / Treatments	Feed conversion ratio (Feed intake/ g/body wt.)		
	1st three wks	2nd three wks	Whole period
T1	1.52± 0.04 a	2.54± 0.31 a	2.06± 0.05 a
T2	1.48±0.04 a b	2.25± 0.22 b c	1.91± 0.02 b
T3	1.43± 0.02 b c	2.36± 0.04 b	1.92± 0.02 b
T4	1.41±0.06 c d	2.14± 0.02 c	1.81± 0.08 c d
T5	1.38± 0.04 c d e	2.34± 0.23 b	1.89± 0.04 b c
T6	1.51±0.06 a	2.14± 0.24 c	1.88± 0.02 b c
T7	1.35± 0.03 d e f	2.12± 0.23 b	1.78± 0. 03 d
T8	1.29± 0.02 f g	1.88± 0.21 d	1.63± 0.06 e
T9	1.24± 0.05 g	1.83± 0.17 d	1.59± 0.09 e
T10	1.32± 0.02 e f	1.85± 0.11 d	1.63± 0.08 e

Different letters in columns show significant differences at level (P<0.05)

Feed conversion ratio is regarded as an the bird to convert the diet into a live body weight. Significant (P<0.05) differences were observed (table,4) in feed conversion ratio among treated and control groups in the three periods, however, T8,T 9 and T10 in the 2nd period and whole period of the experiment showed a significant (P<0.05) improvement as compared with other treatments and control groups, they recorded 1.85,1.83,1.88 and 1.63,1.59,1.63 respectively.

Present results were supported with the findings (31) indicated that there was an improvement in feed conversion with herbal products used as feed additives, and could be important economic indicator on the ability of attributed to their effect on improving the digestibility of dietary protein in the small intestine. Narahari *et al.*, (32) reported that basil leaves and other herbs be added in laying hens diet improved the egg weight, feed efficiency and health of hens.

In conclusion the highest body weight and the lowest Feed conversion ratio were related to 0.3%, 0.4%, 0.5% groups, it could be postulated that to the antioxidant, antifungal and antiseptic activities of *O.basilicum* which may protects the chicks diet from oxidation and save the value of vitamins and proteins of the diet.

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تقييم تأثير مسحوق نبات الريحان كأضافة علفية على الأداء الأنتاجـي لأفـراخ اللـــــحم

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الخلاصة

أجريت هذه الدراسة في حقل الطيور الداجنة في كلية الطب البيطري، جامعة بغداد، لتقييم تأثير إضافة مسحوق نبات الريحان(الأوراق والسيقان) إلى عليقة دجاج اللحم في الأداء الإنتاجي لدجاج اللحم. استخدمت في هذه التجربة 300 من افراخ اللحم نوع هبرد وزنت ووزعت بصورة عشوائية على 10 معاملات بواقع مكررين (15فرخه لكل مكرر) وغذيت المعاملات على النحو الآتي: المعاملة الأولى عوملت عليقة اعتيادية بدون أضافه أي مادة، أما المعاملة الثانية أضيف لها 0.3 % من مسحوق نبات الريحان الى العليقة الاعتيادية من عمر يوم واحد حتى اليوم الحادي والعشرون من مدة التجربة، بينما في المعاملة الثالثة أضيف 0.4 % من مسحوق نبات الريحان الى العليقة الاعتيادية من عمر يوم واحد حتى اليوم الحادي والعشرون من مدة التجربة، في حين في المعاملة الرابعة أضيف 0.5 % من مسحوق نبات الريحان الى العليقة الاعتيادية من عمر يوم واحد حتى اليوم الحادي والعشرون من مدة التجربة، ولكن في المعاملة الخامسة أضيف 0.3 % من مسحوق نبات الريحان الى العليقة الاعتيادية من اليوم الثاني والعشرون حتى نهاية التجربة، أما في المعاملة السادسة فقد أضيف 0.4 % من مسحوق نبات الريحان الى العليقة الاعتيادية من اليوم الثاني والعشرون حتى نهاية التجربة، بينما في المعاملة السابعة أضيف 0.5 % من مسحوق نبات الريحان الى العليقة الاعتيادية من اليوم الثاني والعشرون حتى نهاية التجربة، ولكن في المعاملة الثامنة أضيف 0.3 % من مسحوق نبات الريحان الى العليقة الاعتيادية من عمر يوم واحد حتى نهاية التجربة، اما في المعاملة التاسعة أضيف 0.4 % من مسحوق نبات الريحان الى العليقة الاعتيادية من عمر يوم واحد حتى نهاية التجربة وأخيرا في المعاملة العاشرة أضيف 0.5 % من مسحوق نبات الريحان الى العليقة الاعتيادية من عمر يوم واحد حتى نهاية التجربة.

تم قياس الزيادة الوزنية ومعدل استهلاك العلف ومعدل كفاءة التحويل الغذائي في نهاية الاسبوع الثالث ونهاية الاسبوع السادس من التجربة وقد بينت النتائج : أن إضافة مسحوق نبات الريحان إلى العليقة أدى إلى زيادة معنوية ($P<0.05$)في معدل وزن الجسم الحي ومعدل الزيادة الوزنية وكفاءة التحويل الغذائي خصوصا عند مستوى0.3 , 0.4 و0.5 %على طوال فترة التجربة عند مقارنتها مع مجموعة السيطرة وباقي المعاملات. إن إضافة مسحوق نبات الريحان الى العليقة أظهرفرقا معنويا ($P<0.05$)في معدل استهلاك العلف مقارنة بمجموعة السيطرة. من هذة الدراسة يستنتج ان اضافة مسحوق نبات الريحان الى عليقة الدواجن له تاثيرفي الاداء الانتاجي لدجاج اللحم.

الكلمات المفتاحية: مسحوق نبات الريحان، اضافات علفية، افراخ اللحم، الاداء الانتاجي.