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Effect of Peppermint and Basil as Feed Additive on Broiler Performance and Carcass Characteristics

Research Article

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ABSTRACT

This research was conducted to find out the effect of peppermint and basil as natural feed additives on broiler performance. The objective of the present study was to investigate the impact of the peppermint (*Mentha pipreitae*) and basil (*Ocimum basilicum*) as a feed additive on live body weight (LBW), body weight gain (BWG), feed intake (FI), feed conversion ratio (FCR), carcass weight, abdominal fat and liver weight characterization of broiler chickens. A total of 210 broiler chicks (Ross 308 strain) were selected and divided into 7 treatments and 3 replicates based on completely randomized design. One day-old chicks were reared for 35 days. Feed and water were provided *ad libitum*. Chicks were divided into seven treatments (30 birds each). Each treatment contained three replicates of 10 birds. Each group of birds were supplied with 0% (T1-control) 0.5% (T2), 1.0% (T3) and 1.5% (T4) of peppermint and 0.5% (T5), 1.0% (T6) and 1.5% (T7) of basil as feed additive and control group was supplied with neither peppermint nor basil in their ratio. As a result of this study, mean LBW, BWG, FI, FCR and liver weight against T4 (1.5% peppermint) was significantly ($P<0.05$) higher for broilers in the other group. But had there were non significant effect on the carcass, carcass yield and abdominal fat. Findings of the present study suggested that feeding peppermint and basil tend improve the growth performance and FCR of the broilers.

KEY WORDS basil, broiler performance, carcass characteristic, feed additive, peppermint.

INTRODUCTION

Feed additives derived from plants, also called phytogenic or phytobiotic or botanicals can be included in animals. Among these natural additives, aromatic plants, their extracts and their essential oils have been examined due to their advantages over the antibiotics as growth promoters. They are residue free and generally recognized as safe diets to improve their productivity and the properties of the resulting feed and animal products (Windisch *et al*. 2009). Antibiotic growth promoters have made a tremendous contribution to the profitably of the poultry industry. Recently, it has been reported that the use of antibiotics as a growth promoter in chicken has caused some unwanted results (Botsoglou and Fletouris, 2001). Therefore, most antibacterial performance promoters have been banned due not only to cross-resistance but also to multiple resistances (Hertrampf, 2001). Antibiotic resistant strains of bacteria have increased the concern about the potential public health problems and food safety is more seriously considered than before. Therefore, poultry nutritionists are being challenged to develop an alternative for antibiotic growth promoters and the search for alternative feed supplements has been stepped up. Considerable attention has been paid to medicinal herbs as replacements for antibiotic growth promoters (Ibrahim *et al*. 2005). Herbs or products including plant

extracts, essential oils or the main components of the essential oil are among the alternative growth promoters that are already being used in practice (Ocak *et al*. 2008). There is evidence suggesting that herbs, spices, and various plant extracts have appetizing, digestion-stimulating and antimicrobial properties. But there is only limited evidence about whether their inclusion as a solid herb material would have growth promoting effects in live birds. Chemical investigations have shown that peppermint and basil contains various active compounds, such as flavonoids, tannins, saponin, glycosides, terpenes and steroids (Pattnaik *et al*. 1997). The aim of this study was to describe the effects of dietary inclusion of dry peppermint (*Mentha piperita*) and basil (*Ocimum basilicum*) as growth promoter supplementation on growth performance and carcass characteristics parameters in broiler chicks.

MATERIALS AND METHODS

Animal and diets

Animal material in this research were 210 one-day-old Ross 308 broiler chicks which were obtained from local hatchery and placed in closed house in the poultry experiment farm of Animal Science Department, Agriculture Faculty, Kahramanmaras Sutcu Imam University, Turkey. A total of 210 three day old, because for the first three days chicks was fed standard diet after that unsexed broiler chicks were randomly distributed into seven treatments each treatment in the same weight. Each treatment divided into three replications each replication contain 10 chicks. They were wing-banded, weighed and randomly housed in floor pens with wood shavings. Continuous lighting was provided throughout the experiment. The ambient temperature was gradually decreased from 32 ˚C on day 7 to 25 ˚C on day 21 and was then kept constant. There were 3 each dietary treatment, each consisting of 3 replications. The replication was a pen with birds so that each treatment had 30 birds. Peppermint and basil used in current study were obtained from the Kahramanmaras, Turkey. The basic analysis results were shown some nutrient of contain in peppermint and basil in Table 1.

Chemical analysis for each plant was conducted at feed laboratory, USKIM (Research and Development Centre for University Industry Public Relation) and feed analysis laboratory in department of Animal Science for main contents (crude protein, crude fat, crude fiber, dry matter and ash).

The ingredients and composition of the basal diet (starter from 3 to 21 days of age, grower from 21 to 35 days of age) were presented in Table 2 and Table 3. All birds used in the experiment were cared for according to applicable recommendations of the national research council (NRC, 1994). All diets were fed in mash form. Feed and water were provided for *ad libitum* consumption.

The diets were made iso-caloric and iso-nitrogenous by adjusting the other ingredients. Total N was analyzed was estimated (CP=6.25×%N). Ash was determined by the AOAC (1995). Crude fibre (CF) was determined by VELP raw fibre extractor (Van Soest *et al*. 1991). The soxhlet method was used for total fat determination using ether for oil extraction AOAC (1995).

Table 1 The nutritive values of peppermint and basil

	Peppermint	Basil
Dry matter	98.08	98.75
Crude protein	14.56	22.08
Crude fiber	21.09	25.52
Crude fat	2.92	2.10
Crude ash	9.40	17.78

Experimental procedure

The peppermint or basil leaves were purchased commercially as dried herb supplements. All diets were fed in mash form. Feed and water were provided for *ad libitum* consumption. Feed intake per replicate was calculated weekly and used to calculate. The dietary peppermint and basil for each treatment as fallowing: T1 (control group chicks fed the standard diet (S.D), T2 (chicks fed standard diet include 0.5% peppermint (5 g/kg), T3 (chicks fed standard diet include 1% peppermint (10 g/kg), T4 (chicks fed standard diet include 1.5% peppermint (15 g/kg), T5 (chicks fed standard diet include 0.5% basil (5 g/kg), T6 (chicks fed standard diet include 1% basil (10 g/kg), T7 (chicks fed standard diet include 1.5% basil (15 g/kg). Feed intake per pen was calculated by week and used to calculate the feed to gain ratio. Individual body weight was recorded each week. In end of experiment; birds were slaughtered by cutting the throat and jugular vein using a sharp knife near the first vertebra. From each replicate 2 birds (each treatment 6 birds) were picked for eviscerating to calculate the dressing percent without the edible giblets (abdominal fat, heart, liver and gizzard) after recording their total live weight.

Statistical analyses

The data (weight gain, feed intake, feed efficiency and characteristics of carcase and gut) obtained from experiment analyzed by Statistical Package programme (SAS, 1999) with a general linear model procedure for ANOVA. Differences between means were analyzed with Duncan's multiple tests. The significant difference statements were based on the possibility ($P<0.05$).

RESULTS AND DISCUSSION

Table 4 refers to the effect of different levels of peppermint and basil on totally broiler performance. The different level of peppermint and basil had significant ($P\leq0.05$) effect on BWG, FI and FCR.

Table 2 Composition experimental diets in starter periods of experiments (as feed basis (kg))

Ingredients		T1	T2	T3	T4	T5	T6	T7
Yellow corn	kg	475	475	475	475	475	475	475
Soybean meal (CP %, 47)	kg	224	224	224	224	224	224	224
Full-fat soybean (CP %, 36)	kg	200	200	200	200	200	200	200
Boncalite	kg	57	57	57	57	57	57	57
Wheat middling	kg	15	10	5	0	10	5	0
Peppermint	kg	0	5	10	15	0	0	0
Basil	kg	0	0	0	0	5	10	15
Limestone	kg	11.02	11.02	11.02	11.02	11.02	11.02	11.02
Dicalcium phosphate	kg	10.69	10.69	10.69	10.69	10.69	10.69	10.69
Salt	kg	3.03	3.03	3.03	3.03	3.03	3.03	3.03
DL-methionine	kg	2.56	2.56	2.56	2.56	2.56	2.56	2.56
L-lysine	kg	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Broiler Vit. and Min. mix[1]	kg	1	1	1	1	1	1	1
Anti coccidial	kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total	kg	1000	1000	1000	1000	1000	1000	1000
Results of analysis calculated[2]								
Dry matter	%	87.21	87.21	87.21	87.21	87.21	87.21	87.21
Metabolizable energy (kcal)	kg	3100	3100	3100	3100	3100	3100	3100
Crude protein	%	23.5	23.5	23.6	23.6	23.5	23.6	23.6
Crude fat	%	5.98	5.98	5.98	5.98	5.98	5.98	5.98
Crude fiber	%	3.6	3.7	3.8	3.9	3.6	3.7	3.8
Ash	%	5.7	5.8	5.9	6	5.8	5.9	6
Methionine	%	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Lysine	%	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Methionine and cysteine	%	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Calcium	%	1	1	1.01	1.01	1	1.01	1.01
Available phosphorus	%	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total phosphorus	%	0.63	0.63	0.63	0.64	0.63	0.64	0.64
Sodium	%	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Potassium	%	0.96	0.96	0.97	0.98	0.96	0.97	0.98
Chlorine	%	0.22	0.22	0.22	0.22	0.22	0.22	0.22
Linoleic acid	%	3.16	3.16	3.17	3.16	3.16	3.16	3.17
Na + K - Cl, (mEq/kg)	kg	252.19	252.19	252.22	252.19	252.19	252.21	252.22

[1] Provides per kg of diet: vitamin A: 12000 IU; vitamin D_3: 2400 IU; vitamin E: 50 mg; vitamin K_3: 4 mg; vitamin B_1: 3 mg; vitamin B_2: 6 mg; Niacin: 25 mg; Calcium-d-pantothenate: 10 mg; vitamin B_6: 5 mg; vitamin B_{12}: 0.03 mg; D-biotin: 0.05 mg; Folic acid: 1 mg; Mn: 80 mg; Zn: 60 mg; Fe: 60 mg; Cu: 5 mg; Co: 0.2 mg; I: 1 mg; Se: 0.15 mg and Choline chloride: 200 mg.
[2] Calculated from NRC (1994).

At the treatments T1, T2, T3 and T5 showed significant (P≤0.05) increases in BWG as compared with other treatments, but there were non- significant effect if compare between T2, T3, T5, T6 and T7, but T4 which give lowest BWG at the totally BWG. At the totally broiler on T1, T2, T3, T5, T6 and T7 achieved highly significant (P≤0.05) increase on FI as compared with T4 treatments. At the treatments T1 showed significant (P≤0.05) increases in FI as compared with T4, but there were non-significant effect if compare between T1 and T2 and T3 and T5 and T6 and T7, but T4 which give lowest FI.

There were non-significant (P>0.05) effect if compare between T1 T2, T3, T4 and T5, but this groups showed significant different (P≤0.05) as compared with T6 and T7 on FCR. At the treatments T6 and T7 showed significant (P≤0.05) showed high value FCR as compared with other treatments. However there were non-significant if compare between T1, T2, T3, T4 and T5, but this groups showed the best value as compared with the other treatments.

Table 5 refers to the effect of different levels of peppermint and basil on broiler performance at the final day we use final LBW because have not tools and place to slaughter chicken in the 35 day we wait 2 days extra until organizing tools and place.

The different level of peppermint and basil significant (P≤0.05) had significant in final LBW and liver weight at the final day of age.

But different level of peppermint and basil had were non-significant effect in carcass weight and abdominal fat and carcass yield at the final day of age.

At the final day of age, the broiler on T1 and T5 achieved highly significant (P≤0.05) increase on LBW as compared with other treatments. But there were non-significant differences between T1 and T2 and T3 and T5, T4 and T6 and T7, T2 and T3 and T5 at the final of liver weight. At the final day of age, the broiler on T6 achieved highly significant (P≤0.05) increase on liver weight as compared with other treatments.

Table 3 Composition experimental diets in grower periods of experiments (as feed basis (kg))

Ingredients		T1	T2	T3	T4	T5	T6	T7
Yellow corn	kg	486	486	486	486	486	486	486
Soybean meal (47)	kg	116	116	116	116	116	116	116
Full-fat soybean	kg	291	291	291	291	291	291	291
Boncalite	kg	62	62	62	62	62	62	62
Wheat middling	kg	15	10	5	0	10	5	0
Peppermint	kg	0	5	10	15	0	0	0
Basil	kg	0	0	0	0	5	10	15
Limestone	kg	11.53	11.53	11.53	11.53	11.53	11.53	11.53
Dicalcium phosphate	kg	11.05	11.05	11.05	11.05	11.05	11.05	11.05
Salt	kg	3.13	3.13	3.13	3.13	3.13	3.13	3.13
DL-methionine	kg	2.24	2.24	2.24	2.24	2.24	2.24	2.24
L-lysine	kg	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Broiler Vit. and Min. mix[1]	kg	1	1	1	1	1	1	1
Anti coccidial	kg	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total	kg	1000	1000	1000	1000	1000	1000	1000
Results of analysis calculated[2]								
Dry matter	%	87.18	87.18	87.18	87.18	87.18	87.18	87.18
Metabolizable energy (kcal)	kg	3200	3200	3200	3200	3200	3200	3200
Crude protein	%	22	22	22.01	22.02	22	22.01	22.02
Crude fat	%	7.5	7.5	7.5	7.5	7.5	7.5	7.5
Crude fiber	%	3.74	3.75	3.79	3.84	3.77	3.79	3.84
Ash	%	5.65	5.69	5.72	5.75	5.68	5.75	5.77
Methionine	%	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Lysine	%	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Methionine and cysteine	%	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Calcium	%	1	1.01	1.02	1.03	1.01	1.02	10.3
Available phosphorus	%	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Total phosphorus	%	0.63	0.63	0.63	0.63	0.63	0.63	0.63
Sodium	%	0.16	0.16	0.16	0.16	0.16	0.16	0.16
Potassium	%	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Chlorine	%	0.23	0.23	0.23	0.23	0.23	0.23	0.23
Linoleic acid	%	4	4	4	4	4	4	4
Na + K - Cl, (mEq/kg)	kg	239.84	239.89	239.88	239.91	239.84	239.89	239.92

[1] Provides per kg of diet: vitamin A: 12000 IU; vitamin D_3: 2400 IU; vitamin E: 50 mg; vitamin K_3: 4 mg; vitamin B_1: 3 mg; vitamin B_2: 6 mg; Niacin: 25 mg; Calcium-d-pantothenate: 10 mg; vitamin B_6: 5 mg; vitamin B_{12}: 0.03 mg; D-biotin: 0.05 mg; Folic acid: 1 mg; Mn: 80 mg; Zn: 60 mg; Fe: 60 mg; Cu: 5 mg; Co: 0.2 mg; I: 1 mg; Se: 0.15 mg and Choline chloride: 200 mg.
[2] Calculated from NRC (1994).

Table 4 Effect of peppermint and basil on broiler performance

Groups	Total BWG (g)	Total FI (g)	Total FCR
	X±SE	X±SE	X±SE
T1	2186±62.88^{c}	3095±83.13^{b}	1.42±0.009^{a}
T2	2054±34.64^{abc}	2960±46.43^{ab}	1.44±0.002^{ab}
T3	2036±80.08^{abc}	2955±115.93^{ab}	1.45±0.002^{ab}
T4	1908±43.50^{a}	2762±42.48^{a}	1.45±0.013^{ab}
T5	2070±32.97^{bc}	2955±72.81^{ab}	1.43±0.017^{ab}
T6	2000±20.55^{ab}	2919±43.42^{ab}	1.46±0.008^{b}
T7	1977±26.10^{ab}	2892±25.10^{ab}	1.46±0.017^{b}

The means within the same row with at least one common letter, do not have significant difference (P>0.05).
SEM: standard error.
BWG: body weight gain; FI: feed intake and FCR: feed conversion ratio.

But there were non significant differences between T1 and T5 and T7, T2 and T3 and T4, T1 and T5 and T6 and T7 at the final of liver weight. At the treatments T5 showed significant (P≤0.05) increases in liver weight as compared with other treatments, but there were non- significant effect if compare between T1 and T5 and T7, T2 and T3 and T4, T1 and T5 and T6 and T7, but T2 which give lowest liver weight at the final day of age. The results revealed that the dietary treatment had no significant effect (P>0.05) on the body weight gain and these results were in parallel to the findings of Amasaib *et al.* (2013) who used spearmint as feed additive to the diets of birds. The findings of the present study were also in the line of (Galib and Al-Kassie, 2010), who found insignificant effect of addition of peppermint on broiler body weight, but with improving performance compared to the control.

Table 5 Effect of peppermint and basil on broiler carcass characteristics

Groups	Total LBW (g)	Carcass weight (g)	Carcass yield %	Abdominal fat (g)	Liver weight (g)
	X±SE	X±SE	X±SE	X±SE	X±SE
T1	2413±49.33^{b}	1777±47.94	73.73±3.12	24.67±4.00	41.83±1.30^{bc}
T2	2281±20.51^{ab}	1741±89.36	76.45±3.25	22.00±1.52	35.67±0.92^{a}
T3	2288±82.05^{ab}	1801±32.23	79.11±4.18	18.00±0.76	38.50±0.28^{abc}
T4	2178±12.19^{a}	1687±91.52	77.56±4.31	21.33±2.72	37.33±1.92^{ab}
T5	2313±28.08^{ab}	1755±52.48	75.85±1.41	21.50±2.59	42.33±2.35^{bc}
T6	2228±23.55^{a}	1705±50.17	76.53±1.70	20.50±1.25	44.17±1.48^{c}
T7	2205±35.83^{a}	1720±30.98	78.06±1.62	23.50±2.46	41.50±2.78^{bc}

The means within the same row with at least one common letter, do not have significant difference (P>0.05).
SE: standard error.
LBW: live body weight.

Same results were noted by (Demir *et al*. 2008) concerning the effect of spearmint on broiler body weight. The results of Amasaib *et al*. (2013) revealed that the dietary treatment had no significant effect (P>0.05) on feed intake. The insignificant effect of addition of spearmint to the basal diet may be due to the fact that, the diets were iso-caloric and it is expected that the feed consumption could be similar or may be due to the similar environmental during this period. Durrani *et al*. (2007) were reported the similar results that mean body weight gain. The three level of infusion used in this study have shown increased body weight gain compared with control group, but the best level that had highest effect was that of no control. The findings of this research is supported by the results of Al-Ankari *et al*. (2004) who reported that wild mint (*Mentha longifolia*) inclusion to broiler diet resulted a significant increase in mean body weight gain. The findings of this experiment could also be correlated to the findings of Durrani *et al*. (2006) who reported that broiler diet containing medicinal plant (*Curcuma longa*) resulted in higher weight gain as compared to control.

In addition, antimicrobial, antifungal, antioxidant and anti-inflammatory effects of peppermint and basil were also reported by several researchers (Ali, 1999; Uma-devi, 2001; Padurar *et al*. 2008). Similarly, the supplementation of poultry diets with aromatic 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 (Hernandez *et al*. 2004).

Present results are in agreement with the finding of Cabuk *et al*. (2006) 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 digestive system. Murray *et al*. (1999) reported that the improvement in body weight may be due to the presence of fat soluble, unidentified factors and essential fatty acids in medicinal and aromatic plant, or due to stimulating effect on the digestive system of broilers (Hernandez *et al*. 2004).

Such improvement may be due to the anti-spasmodic and carminative properties of therapeutic and similarly antipyretic, antispasmodic, stomachic antioxidant and antimicrobial activities of basil (Hussain *et al*. 2008). These finding were disagreement with those of Azoua (2001) who noted that adding fenugreek to broiler diet resulted in increased body weight.

Also, feeding different type of medicinal and aromatic plants supplementation significantly (P<0.05) affected feed intake value during the experimental period. Broiler fed basil, parsley and fenugreek seeds had the lower feed intake value during 42 days of age while there are insignificant differences appeared when chicks fed fenugreek seeds during 21 days as compared with control groups. The improvement in feed intake with the addition of MAP could be due to essential oils and their main component which stimulated the appetizing and digestive process in animals (Cabuk *et al*. 2003).

Abaza (2007) indicated that fenugreek seeds decrease feed consumption. There was no significant difference in FCR showed between fenugreek, parsley and control groups at 21 days of age. While chicks fed the diets supplemented with basil at levels 3 g/kg had the best FCR value at the two ages as compared to control groups. These results agree with the finding of El-Gendi *et al*. (1994) who indicated that there was an improvement in feed conversion with feeding herbal products as feed additives that could be attributed to their effect on improving the digestibility of dietary protein in the small intestine.

The results of Toghyani *et al*. (2010) were in parallel to the findings of Al-Ankari *et al*. (2004) who observed the beneficial influence of wild mint on broilers productive performance but later in another study Ocak *et al*. (2008) failed to monitor any significant effect of dry peppermint on broiler performance and carcass traits. Al-Beitawi and El-Ghousein (2008) also reported the positive effect of feeding black seed to broilers on body weight, FCR and some carcass characteristics. Those results agree with Rabia (2010), who reported that chicks fed basil diets had significantly heaviest body weights than those fed the control and fenugreek diets.

They increased as inclusion level increased. This could be attributed to the presence of essential oils in basil. Several researchers have also reported improved body weight, body weight gain, feed conversion efficiency. Also feed intake was not significantly (P>0.05) different. However, there are numerical differences in feed intake. The slight numerical differences in feed intake of the treatments over the control are in agreement with the Herb Society of America (2004) which states that basil has appetizing properties. This has a positive implication to feed industries and farmers alike, as the feed miller is interested in profit accrued from bulk sales. Feed conversion and live weight were also found to be significantly (P<0.05) different. This result agrees with Rabia (2010), who reported that chicks fed basil diets had significantly heaviest body weights than those fed the control and fenugreek diets.

The results of this study support the observations of Spirling and Daniels (2001) who reported that mint has a positive effect on digestion and can strongly affect feed intake. These results could also be supported by the findings of Mimica-Dukic *et al*. (2003) who reported that pharmacological properties of wild mint were resulted in increased intestinal motility, total bile secretion, hepatic anti-oxidant status and feed intake. There is an evidence to suggest that herbs, spices and various plant extracts have appetite and digestion stimulating properties and antimicrobial effects (Kamel, 2001). Amasaib *et al*. (2013) showed the effect of spearmint on FCR which was found to be insignificant in the first five weeks of age, but it is significantly affected by addition of spearmint in the sixth week. This may be due to change in environment during this week and increasing of bird's age. Al-Kelabi and Al-Kassie (2013) reported that feed intake was affected by addition of a sweet basil powder. Present results agreed with the findings of Cabuk *et al*. (2006) who found significant and linear reduction in feed intake due to sage extract. Rabia (2010) indicated that feeding different types of MAP as feed additive significantly affected feed intake value during the experimental period, while Abd El-Latif *et al*. (2004) 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. The results in this study were in contrast with the findings of Erener *et al*. (2010) who found that supplementation of black seeds increased feed intake of broiler chicks. Moreover, the results of that study were in contrast with Cabuk *et al*. (2006) found that feed intake to 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 (Telci *et al*. 2006). Significant (P<0.05) differences were observed feed conversion ratio among treated and control groups in the three periods, Narahari *et al*. (2004) reported that basil leaves and other herbs be added in laying hens diet improved the egg weight, feed efficiency and health of hens. Also daily body weight gain was found there is a significant (P<0.05) differences between treated groups and the control in the daily body weight gain.

These results are in agreement with many published research works (Craig, 1999; Triantaphyllou *et al*. 2001; Abdo-Zeinab *et al*. 2003; Soliman and Abdo-Zeinab, 2003; Al-Kassie, 2010).

These results were in agreement with the findings of Lee *et al*. (2003) determined an increase in relative liver weight for birds given thymol, but this was seen only at the age of 21 d and not at 40 days that led increases of body weight. The leaves of peppermint also contain many important B-complex vitamins like folates, riboflavin and pyridoxine and the herbs are an excellent source of vitamin-K (USDA, 2012).

A significant role in maintaining epithelial lining membrane of the organs and systems then increase their effectiveness (Vendrell *et al*. 2001), thereby improving the feed intake, FCR, body weight and body weight gain, also herbal because of their high percentage fiber content which led to reduce the speed passage of food into the gastro-intestinal tract and thereby increase the rate of digestion and absorption of feed materials (Naji and Kabro, 1999).

Galib and Al-Kassie (2010) showed the effect of peppermint on liver weight. They also reported that liver weight of control group was higher than those of the other groups.

No differences in abdominal fat deposition were found in treated and untreated groups. Findings of the present study are supported by Hernandez *et al*. (2004) and Ismail *et al*. (2004), who reported no influence of treatment on weight of liver, in broilers, fed herbal plants extracts. Abbas (2010) presented that feeding of 3 g/kg of fenugreek, parsley and basil seeds had not significantly affected liver, carcass and abdominal fat.

CONCLUSION

Using the ratio of peppermint and basil showed no significant effect on broiler performance, but it is not effect of harmful. However, feeding broilers a peppermint diet resulted in significant improvements in growth performance compared to the control. The addition of peppermint to the diet could be an alternative to the use of antibiotics as a growth promoter in poultry production.

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