

EFFECT OF MINT AND FENUGREEK AND MIXTURE ON PRODUCTION AND IMMUNITY OF BROILERS

تأثير النعناع والحلبة وخليطهما على الأداء الإنتاجي والمناعي لفروج اللحم

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Abstract :

This study conducted to determine the effect of dietary mint, fenugreek and combination on productive and immune parameters of broiler chicks (Ross308).A total of 80 broiler chicks of one day old have been reared for 35 day under good hygienic condition .The chicks were randomly divided into four groups :Treatment 1 (Mint 1%) ,Treatment 2 (fenugreek 1%) ,Treatment 3 (Mint 1%+ fenugreek 1%) & Treatment 4(Control), each of one have 20 chicks with 2 replicate for each treatment .the addition of dry leaves of Mint and fenugreek started at one day until end of experiment, while the control group given the standard feed only .the productive parameters are measured weekly, and immune status of chicks are measured at 21 and 35 day by ELISA technique. The results have appeared that there is an improvement in performance and immunity traits for all treated groups if compared with the control group. However, the chicks feed with 1% mint and 1% fenugreek performed better than those fed with others concerning live body weight and body weight gain. with regards to feed consumption, the first treatment that supplemented with 1% mint achieved better one.

the second treatment that supplemented with 1% fenugreek recorded high antibody titer against Newcastle disease virus and Gumboro disease virus at 21 and 35 day of broilers age .

from these results we can say that the dietary addition of herbs will improve the production and immunity in broiler chicks .

الخلاصة :

أجريت هذه الدراسة بهدف معرفة تأثير إضافة أوراق النعناع والحلبة وخليطهما على الأداء الإنتاجي والمناعي لفروج اللحم . استخدم 80 فروج لحم بعمر يوم واحد وزعت عشوائيا على 4 معاملات (كل معاملة 20 طير) وبواقع مكررين لكل معاملة و 10 طيور لكل مكرر ، تضمنت المعاملات الأولى والثانية إضافة 1% من أوراق النعناع والحلبة الى العليقة على التوالي .اما المعاملة الثالثة فقد تضمنت إضافة خليط من أوراق النعناع والحلبة وبنسب 1% من كليهما ، اما المعاملة الرابعة فتمثل السيطرة وهي الخالية من أي إضافة . اضيفت الأعشاب من اليوم الأول ولغاية نهاية التجربة .تم حساب الصفات الإنتاجية أسبوعيا أما المناعية فقد قيست في الأعمار 21 و 35 يوم باستخدام فحص الاليزا .

أظهرت النتائج تفوقاً عالي المعنوية ($p<0.01$) لمعاملات الإضافة على الصفات الإنتاجية والمناعية المدروسة مقارنة مع معاملة السيطرة ، بالرغم من تفوق المعاملة الأولى والثانية بصفة وزن الجسم الحي والزيادة الوزنية . أما استهلاك العلف فقد تفوقت المعاملة الأولى المزودة بأوراق النعناع حيث سجلت أعلى معدل لاستهلاك العلف مقارنة مع باقي المعاملات المدروسة .

اما بالنسبة للداء المناعي فقد سجلت المعاملة الثانية والمزودة بالحلبة بنسبة 1% أعلى مستوى للأجسام المناعية ضد فايروس مرض نيوكاسل والكمبورو للعمر 21 و35 يوم من عمر الأفراخ .

من هذه النتائج نستطيع القول أن استخدام النعناع والحلبة كأضافة علفية وبنسبة 1% في عليقة فروج اللحم قد أدى إلى تحسن معنوي في الأداء الإنتاجي والمناعي لفروج اللحم .

Introduction :

There is a need to find alternatives to antibiotics because of side effects and hazardous effects of antibiotics and chemical compounds for poultry health and its residues in meat can make danger for human health ,also the consumers prefers organic meat without chemical or antibiotic residues (1). Herbal products with attention to their availability, application are used as side effect-less antibacterial and antioxidant supplements from many years ago (2) .these herbs have the potential to

reduce enteric diseases and improve performance in poultry and decrease subsequent contamination of poultry products (3,4). On the other hand, herbs or products containing plant extracts, essential oils or main components of the essential oil are among the alternative growth promoters that are already being used in practice (5,6).

Peppermint (*Mentha piperita*) or mint is a member of the Labiatae family and one of the world's oldest medicinal herbs, and is used in both Eastern and Western traditions. It is widely used in herbal medicine and believed to be particularly beneficial in building of the immune system and fighting secondary infections (7). *Mentha* is an important raw material that has been used as a carminative, antispasmodic, diuretic, and used as flavorings in breath fresheners, drinks, antiseptic mouth rinses, toothpaste, chewing gum, desserts and candies. The main medicinal action of the leaves and flowers of the mint depend on the abundant menthol which is the main phenolic component which has antibacterial activities (8). Also, peppermint contains polyphenolic compounds, and hence could possess strong antioxidant properties (9).

(10) Observed the beneficial influence of wild mint on broilers productive performance. On the other hand, (11) and (12) did not observed any positive effect of dry peppermint on broiler performance and carcass traits.

Fenugreek (*Trigonella Foenum*), like other legumes is a good source of dietary protein (approximately 20-30%) for consumption by human and animals, the fatty acids from 5-10% which are predominantly linoleic, linolenic, oleic and palmitic acids, also It had 45-65% total carbohydrates with 15% of galactomannan (a soluble fiber) (13), Also it contains many minerals and vitamins (14).

Fenugreek leaves and seeds have been used extensively to prepare extracts and powders for medicinal uses (15). It's reported to have anti-diabetic, anti-fertility, anti-cancer, anti-microbial, antiparasitic, hypo-cholesterolaemic effects (16). Also it seeds has been reported to have anti-microbial hypoglycemic, hypolipidemic, and antioxidant effect on animals (17,18).

Fenugreek seeds supplementation significantly ($p < 0.05$) affected Live body weight, feed intake and feed conversion ratio (19).

So the objective of the present study was to investigate the impacts of 1% mint, 1% fenugreek and mixture as natural feed additives on the performance and immunity of broiler chicks.

Materials and methods :

This study was carried out in private farm at Karbala province, from 24/2/2013 to 30/3/2013. A total of 80 day-old (42 gm weighted) broiler chicks (Ross-308) were randomly distributed into four treatments (Trt) of 20 chicks each (with 2 replicates in each Trt). Each Trt was fed on the one of the following experimental diets: 1- Control diet supplied with dried mint leaves at 10g/kg of the diet. 2- Control diet supplied with dried Fenugreek leaves at 10g/kg of the diet 3- Control diet supplied with dried mint leaves + dried Fenugreek leaves at 10g/kg of the diet of each. 4- Control diet without any supplementation. The control diet for all groups was formulated according to (20) recommendations, based on corn and soybean meal for 1 to 21 days of age and 22 to 35 days of age. The composition of the control diet is presented in Table 1.

The temperature was 35°C on two first days, the temperature decreased 1 degree every three days and it was remained constant at 20-22°C until the experiment end. Each Trt was fed *ad libitum* its own diet. The vaccination regime of Birds is presented in Table 2.

Chicks were weighted every 7 days of age. The body weight and body weight gain of the birds was determined at the end of each week of herbs administration. To determine feed intake: weekly feed intake of the birds was determined by weighing the amount of feed given to each group and subtracting the weight of the remaining feed from the initial weight to get the amount of feed consumed. The feed conversion ratio was determined weekly by dividing the feed intake by the body weight gained in each week.

Blood was collected from each treatment via brachial vein at days 21 and 35 of age, serum were separated, labeled and stored at -20°C until analysis. Batches of sera were subjected to

serological test .antibody titter against Newcastle Disease virus (NDv) and Infectious Bursal Disease virus (IBDv) measured using ELISA technique which described by (21).

Data obtained from the study were analyzed by using Complete Randomized Design (CRD) by computer software (statistical analysis system)(22).the differences between Means of treatments were determined using Duncan’s multiple range (23).

Table (1). Ingredients, and nutrient composition of experimental diets.

Ingredient %	Starter (1-21 day)	Finisher (22-35 day)
Corn	30	30
Soya bean meal (44% protein)	28	20
Wheat	27.7	35.5
Animal Protean (50%)	10	10
Oil	3	3
Salt	0.3	0.3
Limestone	1	1.2
Total	100	100
Chemical Analysis*		
Gross energy	3078	3125.2
Crude protein %	22.74	20.16
Energy/protein	135.35	155.07
Calcium %	0.97	1.0
Available Phosphate %	0.41	0.48
Methionine +cystein	0.83	0.75
Lysine	1.02	0.95
Methionine	0.78	0.51

* : chemical analysis according to (20) .

Table (2). Vaccines program of chickens.

Age	Vaccine
1	Newcastle vaccine (Clone30 strain)+Influenza vaccine (H9N2 strain) by S.C injection
9	Newcastle vaccine (vetabest strain) by drinking water
14	Infectious Bursal disease vaccine (D78 strain) by drinking water
20	Newcastle vaccine (lasota strain) by drinking water

Results and discussion :

Data presented in table (3) showed that there is high significant difference ($P \leq 0.01$) among the treatments in live body weight from the first week until the end of experiment. The results have appeared that there is an improvement in all treated groups if its compared with the control group. However, the chicks fed with 1% peppermint and 1% fenugreek performed better than those of mixture and control. concerning weekly body weight, the third treatment is achieved better live weight among other treatments during the first week of chicks age .the better group during second and third weeks was first treatment which supplemented with mint in their diet .in respect of fourth and fifth week ,the second treatment achieved the better result .

These results agree with (11) who observed that Supplementing of 4 g/kg peppermint increased body weight of broilers at 28 days of age ($P < 0.05$). in respect of fenugreek effect, The results of

study match with (24) who indicates 0.5% of fenugreek leaves improve live body weight ($P < 0.05$), also with those of (25) who noted that adding fenugreek to broiler diet resulted in increased body weight. .

Means of body weight gain is given in Table (4) showed high Significant effect ($P \leq 0.01$) of supplementary treatments as compared to control .the body weight gain of birds is the same to live body weight during the first week, the reason of this may be due to the age of chicks and short time of herb addition .the first treatment that supplemented with mint in their diet is recorded higher body weight gain if compared with other treatments at second week .during third ,fourth and accumulative weeks ,the second treatment which supplemented with fenugreek recorded higher body weight gain in comparison with other treatments .the better treatment during fifth week was the first one that provided with mint at 1% .

These results have same line of (10) who observed there is improvement in body weight, body weight gain and feed intake at level 150g/kg of mint .also (12) noticed that supplementation of peppermint and thyme from 7 days to 35 days of age, the body weight gain was higher in broilers fed the peppermint-supplemented diet compared to the control .also (24) observed that the adding of 0.5% of fenugreek leaves improve ,body weight gain .

Data presented in table (5) showed that there is high significant differences ($P \leq 0.01$) among the treatments in the feed consumption if compared with control treatment along the period of experiment .so the first treatment which provided with 1% mint achieved better feed intake in comparison with control one, the third treatment that supplemented with mixture of mint and fenugreek was achieved the next class and the control treatment recorded less feed consumption .these result agree with (26) who observed that the addition of mint in poultry ration improve the feed intake in comparison with control .also (27) indicated that the level (0.5%) fenugreek seeds caused significant decrease in feed consumption and improved the feed conversion of laying hens.

Data presented in table (6) showed that there is high significant differences ($P \leq 0.01$) among the treatments in feed conversion ratio .the third group recorded the best ratio in comparison with other groups while the fourth treatment achieved best ratio at second week .in respect of 3-4 weeks, the second treatment which supplemented with 1% fenugreek recorded best ratio in comparison with other treatments even control. the fourth treatment achieved best ratio during fifth and accumulative weeks.

The findings of these study match with (24) which found the supplementation of 1% fenugreek had improvement on feed conversion ratio if compared with control .also Fenugreek seeds supplementation significantly ($p < 0.05$) affected feed conversion ratio. (17)

Table (7) showed the effect of different treatments on antibody titer against Newcastle disease virus and infectious bursal disease virus at 21 and 35 day of broilers age .these results indicate that the second treatment which supplemented with 1% fenugreek achieved higher and best immunity against two studied diseases because it have higher antibody titer ,while the control treatment recoded lowest immunity against the diseases if compared with other treatments .

(28) indicate there is significant increase of fenugreek treatment on antibody titer against ND at 24 and 34 days if compared with control group .the reason of these increase may be immunomodulating ability of these herbs to improve immunity by active ingredients (flavonoids,steroid saponin)or by raising the weight of lymphatic tissue .

These finding agree with (29) who observed that the fenugreek increasing the immunity of birds at 24 and 34 day and because these herb increase the cellularities of thymus gland and bone marrow ,also they noticed increasing the action of macrophage and humeral response by plaque-forming cell assay. Also (30) who observed that the beneficial effect of mint on immune response against Newcastle disease and Infectious Bronchitis at 15gm/kg feed .

The findings of study proved that there is improvement in supplementary groups in comparison with control group may be due to the effects of the most important activities of essential oils which cause improvement in the endogenous enzymes secretion and stimulation of appetite, digestibility and nutrients absorption .also Improvement of the microflora balance and the decrease of *E.coil* and

Clostridium population and stimulating of the *Lactobacillus spp* Proliferation, were also involved in the advantage of these oils. Intestinal villi layer production, antibacterial, antiviral and anti diarrhea activity and stimulation of the immune system were also enhanced (31, 32).also the thymol is able to disintegrate the outer membrane of gram-negative bacteria, releasing lipopolisacharides and increasing the permeability of cytoplasmic membrane (33) .

the higher body weight gain observed in broilers fed the peppermint diet may be related to the reported properties of menthol . The active principles of essential oils act as a digestibility enhancer, balancing the gut microbial system and stimulating the secretion of endogenous digestive enzymes and thus improving growth performance in poultry (5,34,35). Therefore, the main compound of peppermint may probably improve the digestibility of diet as a digestion stimulant, and hence increase the nutrient entry rate at an early stage of bird’s life without affecting feed conversion.

(10) indicated that the Improvement in production performance could be attributed to the antioxidant prosperities of herbs that may stimulate protein synthesis by bird enzymatic system as well as to antimicrobial components which act as growth promoter .

the disappearing of beneficial effect of herbs in older birds may be due to the fact that the nutrient requirements decrease with age (20). Also due to the development of the digestive tract and organs (36).

with respect of benefit of fenugreek, the improvement in body weight of fenugreek treatment may be due to the presence of the fatty acids (37), or due to stimulating effect on the digestive system of broilers (38). The improvement in feed intake of mint may be due to the effects of the most important activities of essential plant oils which cause improvement in the endogenous enzymes secretion and stimulation of appetite, digestibility and nutrients absorption .(26)

fenugreek seeds significantly ($p<0.01$) affected Feed Conversion Ratio. This is related to the development of the broiler chicks’ gut. Morphological changes of gastrointestinal tissues can be induced by differences in gut load of microbial content including their metabolites (38).

Conclusion :

The fore mentioned results confirm the beneficial use of mint and fenugreek (1%) in broiler chicken diets, as it increases production performance and immunity, also can be an alternative to antibiotic growth promoters and is highly recommended as feed supplement.

Table (3) :show the effect of Mint and Fenugreek on live body weight (gm/bird).

Trt	First week	Second week	Third week	Fourth week	Fifth week
First Trt	124 b	353 a	610 a	1041 c	1459 b
Second Trt	116 d	335 c	599 b	1145 a	1490 a
Third Trt	126 a	315 d	575 c	1055 b	1396 c
Fourth Trt	121 c	340 b	554 d	1010 d	1344 d
Probability	$P\leq 0.01$				

*Means with the different letters in the same column are significantly different .

Table (4) :show the effect of Mint and Fenugreek on body weight gain (gm/bird) .

Trt	First week	Second week	Third week	Fourth week	Fifth week	Accumulative (1-5)weeks
First Trt	82 b	229 a	257 c	431 d	418 a	1417 b
Second Trt	74 d	219 b	264 a	546 a	345 c	1448 a
Third Trt	84 a	189 c	260 b	480 b	341 d	1354 c
Fourth Trt	79 c	219 b	214 d	456 c	381 b	1349 d
Probability	P≤0.01	P≤0.01	P≤0.01	P≤0.01	P≤0.01	P≤0.01

*Means with the different letters in the same column are significantly different .

Table (5) :show the effect of Mint and Fenugreek on feed consumption (gm/bird) .

Trt	First week	Second week	Third week	Fourth week	Fifth week	Accumulative (1-5)weeks
First Trt	154 a	327 a	539 a	675 a	1186 a	2881 a
Second Trt	151 b	323 b	458 c	578 c	990 c	2500 c
Third Trt	150 c	323 b	460 b	613 b	1144 b	2690 b
Fourth Trt	146 d	252 c	453 d	549 d	977 d	2377 d
Probability	P≤0.01	P≤0.01	P≤0.01	P≤0.01	P≤0.01	P≤0.01

*Means with the different letters in the same column are significantly different .

Table(6):show the effect of Mint and Fenugreek on feed conversion ratio(gm feed intake/gm weight gain).

Trt	First week	Second week	Third week	Fourth week	Fifth week	Accumulative (1-5)weeks
First Trt	1.87 b	1.42 c	2.09 b	1.56 a	2.83 c	1.95 b
Second Trt	2.04 a	1.47 b	1.73 d	1.05 d	2.86 b	1.83 c
Third Trt	1.78 d	1.70 a	1.76 c	1.27 b	3.35 a	1.97 a
Fourth Trt	1.84 c	1.15 d	2.11 a	1.20 c	2.56 d	1.77 d
Probability	P≤0.01	P≤0.01	P≤0.01	P≤0.01	P≤0.01	P≤0.01

*Means with the different letters in the same column are significantly different .

Table (7) :show the effect of Mint and Fenugreek on antibody titer .

Trt	Antibody titer against NDv		Antibody titer against IBDv	
	21 Days	35 Days	21 Days	35 Days
First Trt	461 c	1995 c	4366 c	3645 c
Second Trt	513 a	4979 a	5561 a	4510 a
Third Trt	488 b	3217 b	4610 b	3724 b
Fourth Trt	459 d	1451 d	1612 d	2840 d
Probability	P≤0.01	P≤0.01	P≤0.01	P≤0.01

*Means with the different letters in the same column are significantly different .

Discussion :

The improvement in body weight may be due to the presence of the fatty acids (Murray et al, 1991), or due to stimulating effect on the digestive system of broilers (Hernandez et al, 2004). These findings were in agreement with those of Azoua (2001) who noted that adding Fenugreek to broiler diet resulted in an increased body weight.(17)

The improvement in feed intake with the addition of fenugreek seed could be attributed to the carbohydrates and their main component (galactomannan) which stimulated the appetizing and digestive process in animals (Steiner, 2009). .(17)

fenugreek seeds significantly ($p < 0.05$) affected Feed Conversion Ratio during the 42 days of age. This is related to the development of the broiler chicks' gut. Morphological changes of gastrointestinal tissues can be induced by differences in gut load of microbial content including their metabolites (Xu et al, 2003) .(17).FF

A 20 g feugreek treatment enhanced blood glucose level ($P < 0.01$), but decreased triglyceride level ($P < 0.01$) compared to control (70)

Al-Kassie (2010) reported that the chicks fed with 0.50% peppermint performed better than those fed with 1.5%

peppermint, with regards to weekly body weight gain, feed conversion ratio and dressing percent, whereas the

liver weight showed significant difference between treatments when compared with the control.(24)

The improvement in feed intake with the addition of fenugreek could be due to essential oils and their main component which stimulated the appetizing and digestive process in animals (Cabuk *et al.*, 2003).(16)

From 7 to 21 or 35 days of age, broilers fed the peppermint diet grew faster ($P < 0.05$) than broilers fed the control diets(23),

The difference in body weight gain between the control and peppermint group was not reflected in the body weights of slaughter age. Such a case can firstly be explained by the fact that the old birds were better able to perform with finisher basal diet due to the fact that the nutrient requirements decrease with age (NRC, 1994). Also due to the development of the digestive tract and organs (Lilja, 1983). In fact, the effect of supplements was not significant on the relative weights of the edible organs.(24)

The differences in body weight gain between the control and peppermint group at an early stage of

the bird's life were not reflected in the body weights at slaughter age. Such a case can firstly be explained by the fact that the older birds were better able to perform with finisher basal diet due to the fact that nutrient requirements decrease with age (NRC,1994), and also they may be better able to digest the finisher diet due to the development of the digestive tract and organs (Lilja, 1983).(23)

Decreasing of body weight and body weight gain may be due to the stress which increase the stimulation of adrenal gland to produce some hormones such as estrogen which has a direct effect in analyzing alymphatic cell which causes increase in H/L ratio (Gross and Siegol, 1983). (24)

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