

PRODUCTIVE PERFORMANCE OF BROILERS (Ross 308) DIET SUPPLEMENTED WITH THYME, GARLIC AND COMBINATION.

الأداء الإنتاجي لفروج اللحم (Ross 308) المغذى على عليقة حاوية على الزعتر
والثوم وخليطهما

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ABSTRACT :

This experiment was conducted to investigate the effect of feeding Thyme leaves and garlic powder and combination on the productive performance of broilers. A total of 80 day-old (Ross 308) chicks were used in the experiment. Birds were partitioned into four experimental treatments (Trt) of 20 birds in each. Each treatment was composed of 2 replicates with 10 birds in each. The first and second treatments were supplemented with Thyme leaves and Garlic at the rate of 1% respectively. the third treatment was supplemented with combination of Thyme leaves and Garlic at the rate of 1% for each . the fourth treatment as control group which did not receive any thing but basal diet .

The results showed that using these medicinal plants had significant effects on performance . There were high significant ($p < 0.05$) effects among the treatments on live body weight , weight gain, feed intake and feed conversion ratio over the entire trial. The heaviest body weight and body weight gain was observed in the third Treatment and the lightest group was observed in control treatment. The highest amount of feed intake was observed in supplementary treatments but the lowest one was observed in control group . the best feed conversion ratio observed in third treatment which supplemented with combination of Thyme and garlic .In conclusion, supplementation of thyme and garlic as feed additives at levels of 1% in the present study improved productive performance of broiler chicks and we can used as alternative of antibiotics.

الخلاصة

أجريت هذه الدراسة بهدف معرفة تأثير إضافة أوراق الزعتر ومسحوق الثوم وخليطهما على الأداء الإنتاجي لفروج اللحم (Ross308). تم استخدام 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 اوراق الزعتر والثوم على التوالي . اما المعاملة الثالثة فقد تضمنت إضافة خليط من اوراق الزعتر والثوم وبنسب 1% من كليهما ، اما المعاملة الرابعة فتتمثل السيطرة وهي الخالية من أية إضافة . أظهرت النتائج تفوق عالي المعنوية ($p < 0.05$) لمعاملات الإضافة على الصفات الانتاجية المدروسة والتي شملت وزن الجسم الحي ، الزيادة الوزنية ، استهلاك العلف وكفاءة التحويل الغذائي بالمقارنة مع معاملة السيطرة . حيث سجلت النتائج اعلى وزن حي وزيادة وزنية في المعاملة الثالثة والتي تضمنت إضافة خليط من الزعتر والثوم بالمقارنة مع المعاملات الاخرى . اما استهلاك العلف فقد سجلت معاملات الإضافة اعلى استهلاك علف بالمقارنة مع معاملة السيطرة . اما كفاءة التحويل الغذائي فقد تفوقت المعاملة الثالثة على المعاملات الاخرى . نستنتج من ذلك ان استخدام الزعتر والثوم كأضافة علفية وبنسبة 1% في عليقة فروج اللحم قد أدى الى تحسن معنوي في الاداء الانتاجي لفروج اللحم وبالإمكان استخدامها كبديل عن المضادات الحيوية .

INTRODUCTION :

Antibiotics have been extensively used as feed additives and growth promoters in animal feed industry. The use of antibiotics as feed additives is hazardous due to crossresistance and multiple resistances of pathogens. Therefore, European Union has banned the application of most antibiotics in poultry diets (1).

Herbs have been used for natural therapy as pharmaceuticals; however, only in recent years aromatic plants and their extracts were introduced to the animal feeding .Some herbs or herbal extracts can beneficially affect feed intake, secretion of digestive tract juices and immune system of animals (2). Essential oils are derived mainly from herbs and spices and their purified compounds have antimicrobial properties (3).

Thyme (*Thymus vulgaris*) is an herbaceous perennial plant belonging to the Lamiaceae family (4). the phenolic compounds (carvacrol and thymol) present in the essential oil from *Thymus vulgaris* exhibit antimicrobial and antifungal activity (5) .

it would be expected that thymol and carvacrol could have positive effects on growth performance in broilers. Such studies showed that thyme plant could be considered as an alternative natural growth promoter for poultry instead of antibiotics (6), Garlic (*Allium sativum*) the spices of life is unique among the members of plant kingdom. Several clinical reports, including meta-analyses, have revealed a cholesterol lowering effect of garlic in humans (7). Allicin (the active compound in the garlic) may reduce the levels of serum cholesterol, triglyceride and Low Density Lipoprotein (8).

(9) ,(10) and (11) applied herbal plants as growth promoters in broiler diets and observed a pronounced improvement in their body weight gain, mortality rate and feed conversion..

Feed conversion and egg productions of laying hen were improved by thyme supplementation at level 0.1 and 0.5 %. Also, the usage of 0.1 and 0.5 % thyme in laying hens diets significantly ($P<0.05$) reduced *E. coli* concentration in feces.(12)

(13) observed that the garlic significantly ($p<0.05$) increased the body weight of birds at 50 and 100 mg dose and there was improvement in the feed conversion ratio of all the treated birds .

In contrast ,(14) indicated that garlic and thyme extracts did not have any significant effect on the broiler performance. Also, (15) reported that feed consumption, feed efficiency, egg weight and egg mass were not affected over 6 weeks when 0, 2, 6 and 8% dietary garlic powder was fed to the laying hens.

The aim of study is to investigate the effect of feeding Thyme leaves and garlic powder and combination on the productivity of broilers .

MATERIAL AND METHODS :

This study was conducted at the private herd in Kerbala province from 24/2/2013 to 1/4/2013 .eighty 1-day-old broiler chicks (Ross 308) were randomly divided into four treatment groups of 20 birds for each diets (each treatment contain two replicates with 10 chicks). The treatments were as follow: first treatment :*Thymus vulgaris* (Basal diet + 1 gm *Thymus vulgaris*/kg diet, second treatment :Garlic (basal diet + 1 gm Garlic/kg diet), third treatment :*Thymus vulgaris* + Garlic(Basal diet + 1 gm *Thymus vulgaris*/kg diet + 1 gm Garlic/kg diet) .fourth treatment :Control (basal diet only),

Feed and water were provided ad libitum .all the chickens were fed the same starter (from day one to 21 of age) and grower (from day 22 to 35 of age) (Table 1)

The chicks were reared in eight pens each 1×1.5 m (each replicate placed in pen) .16 hours light was provided per day. The temperature was 32°C on two first days, the temperature decreased 1 degree every three days and it was remained constant at 20-22°C . The addition of herbs to basal diet are done at beginning of second week until end of experiment .

Thyme leaves and garlic powder were purchased from local market .The thyme leaves and garlic powder were separately pulverized and stored in cellophane bags until required for use.

The body weight and body weight gain of the birds was determined at the end of each week of herbs administration and was repeated weekly up to the last day of the experiment. to determination of 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

Data obtained from the study were analyzed using computer software by statistical analysis system (16). the differences between Means were determined using least significant differences (LSD) .

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 *	10	10
Oil	3	3
Salt	0.3	0.3
Limestone	1	1.2
Total	100	100
Chemical Analysis **		
Gross energy	3078 kcal/kg	3125.2 kcal/kg
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

* : Jordan origin: (44% crude protean , 2800 Kcal gross energy , 12% fat , 25% Ash , 5% Ca , 2.9 P , 2.55 Methionine +cystein , 2.8 Lysin .

** : chemical analysis according to (17) .

RESULT AND DISCUSSION :

Data presented in table (2) showed that there is no significant difference among the treatments in live body weight at the second week but there is high significant difference among the treatments at the third, fourth and fifth weeks. The third treatment which supplemented with combination of thyme and garlic is achieved heaviest body weight and followed by first and second treatments

which there is no significant difference between them .the fourth treatment (control) is achieved lightest body weight .

These results agree with the finding of (18) who observed adding of Thyme and garlic to the control diet at level 1.5 % improved the performance of broilers which include body weight ,feed intake and feed conversion ratio .Also the results of our study agree with the finding of (19) who observed adding of Thyme to the control diet at level 0.1% improved body weight and weight gain .

(20) and (21) reported the thyme leaves had digestive stomic stimulant and anti-oxidant and anti-septic effect ,they also showed that it have useful microbial activity of digestive system and thyme promote fat absorption which lead to more weight gain .

(22) reported that a garlic active based growth promoter given at 250 ppm significantly increased the body weight of broilers chickens by day 42 of trial .

In other hand, the results against with the finding of who observed adding of Thyme and garlic to the control diet at level 0.3% and 0.6% were not significant effects among the treatments on weight gain, feed intake and feed conversion ratio over the entire trial (23) .

Table (2) :show the effect of different treatments on live body weight (gm).

Trt	Second week	Third week	Fourth week	Fifth week
First Trt	345	633 AB	1074 B	1572 B
Second Trt	340	626 B	1071 B	1566 B
Third Trt	335	650 A	1083 A	1590 A
Fourth Trt	326	602 C	1043 C	1500 C
LSD	25.226	17.231	6.454	11.833
Significance	Ns	0.002	0.001	0.0001

*Means with same letters within same column not significantly different . Ns :not significant .

Data presented in table (3) showed the thyme and garlic had high significance effect on body weight gain from the second week until end of experiment .during the second and third weeks the third treatment which supplemented with combination of thyme and garlic is achieved heaviest body weight gain and followed by first and second treatments which there is no significant difference between them .the fourth treatment (control) is achieved lightest body weight gain.

with respect to fourth week there is no significance difference on body weight gain between the first and fourth treatment in spite of there is numerical difference between them .the results of fifth week and accumulative (2-5 weeks) is similar to result of second and third weeks .

the results of these research agree with (24) who said the supplementation of broilers diet with 0.5 gm/Kg of thyme in feed significantly improve body weight gain ($p < 0.05$) as compared with Control but there is no significantly difference in feed conversion ratio .Similarly, the supplementation of 200 ppm thyme oil and antibiotic increased the daily live weight gain and improved the feed conversion ratio when compared with the control group (25)

Table (3) :show the effect of different treatment on weight gain (gm) .

Trt	Second week	Third week	Fourth week	Fifth week	Accumulative (1-5) week
First Trt	211 B	288 B	441 AB	498 B	1438 B
Second Trt	212 B	286 B	445 A	495 B	1438 B
Third Trt	223 A	315 A	433 B	507 A	1478 A
Fourth Trt	203 C	276 C	435 AB	457 C	1377 C
LSD	6.723	8.153	11.871	8.313	9.461
Significance	0.0006	0.0001	0.0002	0.0001	0.0001

*Means with same letters within same column not significantly different .

Data presented in table (4) showed that feed consumption is high significantly affected by addition of thyme and garlic during the period of experiment , during the period 2-5 weeks there is high significant difference of supplementary treatments if compared with control treatment although there is no difference between the first and second treatments but there is difference between them and control group in spite of there is numerical difference among them . with respect to accumulative (2-5 weeks) the first treatment consumed more feed and followed by second ,the third treatment consumed less feed if compared with other treatments .

The positive effect of oil extract of thyme (thymol and carvacrol) added to the chickens feed (at 100 and 200 ppm) demonstrated improved weight gain, feed intake and feed conversion.(26) ,Also The results of our study is agree with (27) who reported that at 1, 2 and 4% levels in feed, garlic increased feed intake in a 4 weeks trial in laying hens.

In contrast to the above reports, (28) reported a reduction in the feed intake of broiler birds fed garlic supplement. Similarly, the inclusion of 0.1 and 0.2% garlic and thyme in layers meal significantly decreased their feed intake by the 6th week (4),(29) .

Table (4) :show the effect of different treatment on feed consumption (gm) .

Trt	Second week	Third week	Fourth week	Fifth week	Accumulative (2-5) week
First Trt	304 A	555 A	537 AB	993 A	2389 A
Second Trt	302 A	553 A	540 A	989 A	2384 A
Third Trt	300 A	449 C	533 B	991 A	2273 C
Fourth Trt	286 B	531 B	522 C	971 B	2310 B
LSD	6.101	6.788	5.241	9.078	8.524
Significance	0.008	0.0001	0.0001	0.0001	0.0001

*Means with same letters within same column not significantly different .

Data presented in table (5) showed that the addition of herbs have good effect on feed conversion ratio. The addition of thyme and garlic mixture decreased the feed conversion ratio at second and third weeks. with respect to fourth week, there is no significant difference between treatments. during the fifth week, the supplementary treatments were achieved the best ratio if compared with control group in spite of there is no significant difference between them .

(30) reported that the low dosage (5g/Kg) of Thyme have significant effect on broilers body weight and their feed conversion ratio, while the high dosage (10g/Kg) in did not show this effect.

These result in accordance with the report (31) that reported addition of garlic (3%) decreased feed conversion ratio in comparison with control group .Also (32) reported that the group which fed by thyme-included diet had significantly better body weight and feed conversion ratio, .But (33) and (34) reported opposite results; they found that thyme has no influence on broilers performance.

The use of growth promoter combinations such as antibiotics (35), probiotics (36) and herb additives (37) result in preventing the growth of pathogens by competitive elimination mechanism., and use of growth promoter combinations may have had desirable effect on bird's performance.(23) and may be similar to that with the use of antibiotics.(38)

The reason of this improvement is antibacterial activity of Thyme against E.coli which improve health status of chicks and finally promote productive performance ,also thyme contain amylase,lipase,trypsin , chemotrypsin,trypsin and protease which play important role in digestion and absorption of carbohydrates, proteins and lipids (39) . also containing essential amino acids like methionine in addition to linolinic fatty acid .

Table (5) :show the effect of different treatment on feed conversion ratio .

Trt	Second week	Third week	Fourth week	Fifth week
First Trt	1.44 A	1.92 A	1.21	1.99 B
Second Trt	1.42 AB	1.93 A	1.21	1.99 B
Third Trt	1.34 C	1.74 B	1.23	1.95 B
Fourth Trt	1.40 B	1.92 A	1.20	2.12 A
LSD	0.029	0.049	0.054	0.048
Significance	0.0001	0.0001	Ns	0.0001

*Means with same letters within same column not significantly different . Ns : not significant .

The improvement in feed conversion ratio may be related with presence of thymol and carvacol (active ingredients) of thymus which has antibacterial action (40) .or enhancing liver function (41).

(42)observed that thyme decreased the heterophils/lymphocytes ratio and finally promote immune status of broilers .(43) found that broilers fed diet containing diet thyme had improved total fecal digestibility and crude protein digestibility which may be enhanced performance of broilers .

(13) observed that the garlic significantly ($p<0.05$) increased the body weight of birds at 50 and 100 mg dose and there was improvement in the feed conversion ratio of all the treated birds . Garlic has several beneficial effects on both humans and animals having antimicrobial, antioxidant as well as antihypertensive properties and these functions were attributed to bioactive components present in garlic like diakyl polysulfides which possess antimicrobial activity that could be responsible for the growth promoting effect of garlic (44) .

CONCLUSION

The results of the study demonstrated that the effects of Thyme and Garlic on growth performance would appear that adding Thyme and Garlic to broiler's diet would promote live body weight ,weight gaining, feed consumption and FCR .

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