Ragab, M.S., M. M. M. Namra, M. M. M. Aly, and M. A. Fathi (2013). Impact of inclusion fennel seeds and thyme dried leaves in broiler diets on some productive and physiological performance during summer season**. *Egypt. Poult. Sci., 33: 197-219.***

Egypt. Poult. Sci. Vol (33) (I): (197-219)

IMPACT OF INCLUSION FENNEL SEEDS AND THYME DRIED LEAVES IN BROILER DIETS ON SOME PRODUCTIVE AND PHYSIOLOGICAL PERFORMANCE DURING SUMMER SEASON

By

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Received**: 15/02/2013** Accepted: **04/03/2013**

ABSTRACT: *This study was carried out at the Poultry Research Station, El-Azab, Fayoum, Egypt during the period from June to August 2011. Chicks were initially fed a control diet for four days. The total number of the experimental birds (120 at five days of age) was divided into five treatments (24 birds each), each treatment contained three replicates of eight birds each.*

The experimental treatments were as follows:

1- *Chicks fed the control diet.*
2- *Chicks fed diet contained 1% fennel seeds (FS).*
3- *Chicks fed diet contained 2% FS.*
4- *Chicks fed diet contained 1% thyme dried leaves(TL).*
5- *Chicks fed diet contained 2% TL.*

Results obtained could be summarized in the following:

1- *Neither type of* medicinal *plants (fennel seeds (FS) or thyme dried leaves (TL)) nor treatment effect had any significant effect on live body weight, live body weight gain, feed conversion, crude protein conversion, caloric conversion ratio, growth rate and performance index during the period from 5 to 42 days of age. While chicks fed diet contained 2% TL had significantly higher feed intake during the period from 5 to 42 days.*
2- *Chicks fed diet contained 1% FS had significantly higher WBC as compared with other treatments and control group.*
3- *Breast meat% of chicks fed diet contained FS had significantly higher breast meat% than those fed diet contained TL. No other differences on slaughter parameters were recorded among the treatment groups.*
4- *Chicks fed diet contained FS had significantly lower body temperature than those fed diet contained TL. No significant differences on respiratory rate, intestinal pH and total microflora count were observed among the treatment groups. Chicks fed the control diet or that of 2% TL had higher mortality rate values during the whole experimental period as compared with those fed other treatments.*
5- *Chicks fed diet contained 1% FS had the best economical and relative efficiency as compared with other treatments and the control group.*

In conclusion*, inclusion of 1% FS enhanced growth and economical performance of Ross broilers, helped achieving physiological balance when broilers were subjected higher temperature .*

INTRODUCTION

Nowadays in Egypt there is necessity of increasing animal production to fulfill the insisting demand of animal protein. It is noticed that the price of animal protein is getting higher during the last few years. So, the increase in animal protein production may come from the poultry. Poultry feeding and management could be considered very reasonable in cost if compared with the other animals. One of the problems challenging in poultry industry in Egypt is the high ambient temperature, which persists for almost 5 months of the year (May to September) as it is can compromise the ability of birds to maintain homeostasis **(Kadim *et al.*, 2008).**

On the other hand, heat stress is the major problem that usually faces poultry as well as poultry farmers in summer months especially when poultry are kept in conventional naturally ventilated houses. A number of studies reported that the suitable temperature for poultry is between 16 and 25◦C **(Cerci *et al.*, 2003 and Sahin *et al.*, 2006)** and relative humidity of 60-70% is ideal for broiler as reported by **Hoffman and Gwin (1954).** Further, in a study by **Tayeb (2009)** suggested that the domestic fowl is a homoeothermic which can live comfortably only in a relatively narrow zone of thermoneutrality extending from 18-24 ^{o}C. Any deviation especially on the higher side depresses both the survival and the production. While, according to **Bollengier *et al.* (1998)** heat stress begins when the ambient temperature becomes higher than 27°C and is readily apparent above 30°C.

As poultry house temperature increases, respiration rates of poultry and body temperature loss increase. This accelerates with the increase of moisture in the poultry house **(Vona *et al.*, 1984).** Decreased rate of productive performance and even death has been reported in broilers reared at high environmental temperatures specially in tropical and subtropical countries, its effects can be economically significant **(Abu-Dieyeh, 2006).** Under summer conditions of Egypt, poultry production (broiler intensive production) suffered from high environmental temperature which caused many troubles.

In the study by **Witte (1998)** who reported that the extensive use of antibiotics in animal production has increased the risk of development of resistance in human and animal pathogens. As a result, the natural additives such as herbs and edible plants have some properties as growth enhancers to replace synthetic drugs. These additives are given to birds to improve their physiological and productive performance under normal or stress conditions **(Tollba and Hassan, 2003).**

For the above reasons, feed additives are given to improve productive performance of birds under normal or stress conditions. Among feed additives, fennel (Foeniculum vulgare L.) seeds and thyme (Thymus vulgaris L.) dried leaves. Fennel seeds (FS) are rich in total carbohydrates (61.0%) and low in total soluble sugars (7.6%), as well as it contains Ca, P and Mg and considerable amounts of K, Fe and Zn and traces of Ma. The major fatty acid components of FS are linoleic (71.31%) and linolenic (11.66%). Also, it contains a high amount of isoleucine and histidine **(Abou-Raiia *et al.*, 1991)**. So, fennel is a good herb for the entire digestive system as a laxative appetite stimulant, antispasmodic and carminative, relieves abdominal pain, and is useful for gastrointestinal and colon disorders. Fennel acts as a mild expectorant, useful for coughs or bronchitis and to resolve phlegm, promotes liver and kidney and health **(Simon *et al.*, 1984).** The aroma and flavor components of the essential oils for FS contain anethole, limonene, fenchone, estragole, safrole, alpha-pinene, camphene, beta-pinene, sabenine, beta-myrcene, phellandrene, cis-

ocimene, para-cymene, gamma-terpinene, camphor and several other volatile constituents as well as a fixed oil **(Charles *et al*., 1993).**

Thyme (TL) is one of the herbs that provide substantial amounts of flavonoids which have health promoting properties, as they extend the activity of vitamin C, acts as antioxidants, protect LDL cholesterol from oxidation, stimulate the immune system and acts as anti-inflammatory and antitumor agents **(Craig, 1999)**. Herbal growth promoter (TL or FS) had significant improvement of live body weight (LBW), live body weight gain (LBWG), mortality rate and feed conversion (FC) **(Tollba and Hassan, 2003)** with broilers**.** Thyme caused a significant improvement in LBW, FC and mortality rate of broilers **(Tollba, 2003),** in ducks **(Ghazalah and Ibrahim, 1996)** and in Japanese quail **(Abd El-Latif *et al*., 2002)**. In a study by **Abou-Sekken *et al*. (2007)** showed that, the best duck performance obtained from supplementing FS at 1.0% and mixture of FS and TL at 0.5% at the first period of growth (0-4 wks). however, the tested herbs had no effect on the productive performance at the second period (5-10 wks).

Thyme oil as natural essential oil has to provide a powerful means for inhibiting mold growth and aflatoxin production due to the presence of active materials known as thymal and carvacrol (**Rao *et al*., 1985). Deighton *et al*. (1993)** stated that thyme oil has phenolic components which are primarily responsible for its antioxidative activity and **Schwartz *et al*. (1996)** TL has exhibited substantial antioxidant activity. **Aktug and Karapinar (1986)** reported that TL and their alcohol extracts had inhibitory effect on the growth of salmonella typhimurium, staphyloccus aureus and vibrio parahaemolytieus. Also, **Grzybowski *et al*. (1991)** reported that none of the bacteria *(E. Coli; Bacillus Subtilis; Streptococcus faecalis and Stapylococcus aureus)* at 35°C or fungi *(Dospora lactis, Aspergillus niger and Penicillium Spp.)* at 28°C showed increased growth when 0.5% TL was added as a natural replacement for chemical preservatives in food.

Considering previous review of literature, an experiment was carried out to study: The effects of FS and thyme dried leaves (TL) incorporation to broiler diets on growth performance, mortality rate, carcass parameters, bacteria enumeration, intestinal pH, blood serum parameters and economical efficiency during summer season.

MATERIALS AND METHODS

This study was carried out at the Poultry Research Station, El-Azab, Fayoum, Egypt during the period from June to August 2011. Chemical analyses were performed in the laboratories of the Poultry Research Station, Poultry Production Department, Faculty of Agriculture, Fayoum University according to the procedures outlined by **A.O.A.C. (1990).**

The total number of the experimental birds (120 at five days of age) was divided into five treatments (24 birds each), each treatment contained three replicates of eight birds each. The chicks were fed starter diet from one to 11 day, grower diet from 12 to 23 day, and finisher diet from 24 day to the end of the experiment at 42 day of age.

The experimental treatments were as follows:

1- Chicks fed the control diet.
2- Chicks fed diet containing 1% fennel seeds.
3- Chicks fed diet containing 2% fennel seeds.
4- Chicks fed diet containing 1% thyme dried leaves.
5- Chicks fed diet containing 2% thyme dried leaves.

All dietary supplementation were added on the expense of corn. Chicks were raised in electrically heated batteries with raised wire mesh floors. Batteries were

placed into a room provided with a continuous light and fans for ventilation. Feed and water were supplied *ad libitum.* The experimental diets were supplemented with minerals and vitamins mixture, DL-methionine and L-lysine HCl to cover the recommended requirements according to the strain catalog recommendations and were formulated to be iso-caloric and iso-nitrogenous. The composition and calculated chemical analyses of the experimental diets are shown in Table 1. The dried FS and sun dried TL used in the present study were obtained from the Egyptian Organic Agriculture Company, Fayoum Governorate, Egypt. Chemical composition of FS and TL used in the present study (on air dried basis) are shown in Table 2. Birds were individually weighed to the nearest gram at weekly intervals during the experimental period. At the same time, feed consumption was recorded and feed conversion (FC, g feed/g gain) and live body weight gain (LBWG) were calculated. Crude protein conversion (CPC) and caloric conversion ratio (CCR) were also calculated. Accumulative mortality rate was obtained by adding the number of dead birds during the experiment divided by the total number of chicks at the beginning of the experimental period.

Respiration rate and rectal temperature were determined at the end of the trial between 10:00 and 11:00 h for each chicks. These parameters were taken in the morning rather than the afternoon to avoid being inside the house during the severe period of increased temperature (12:00 to 14:00 h). The respiration rate (breaths/min) was recorded by counting the flank movements per minute by using a hand counter. Body temperature was measured as a rectal temperature (°C) by using a clinical thermometer inserted into the rectum for 1 min at depth of approximately 3 cm.

At the end of the experimental period (42 days of age), slaughter tests were performed using three chicks around the average LBW of each treatment. Birds were individually weighed to the nearest gram, and slaughtered by severing the jugular vein (islamic method). After four minutes bleeding time, each bird was dipped in a water bath for two minutes, and feathers were removed. After the removal of head, carcasses were manually eviscerated to determine some carcass traits, dressing% (eviscerated carcass without head, neck and legs) and total giblets% (gizzard empty, liver, heart and spleen). The abdominal fat was removed by hand from the parts around the viscera and gizzard, and was weighed to the nearest gram. The bone of front and rear were separated and weighed to calculate meat percentage. The meat from each part was weighed and blended using a kitchen blender. At the end of the growing period, individual blood samples were taken from three birds. The biochemical characteristics of blood were determined colorimetrically, using commercial kits. At the time of slaughter test, 3 samples of ileum content for each treatment were taken. Total microflora of ileum content were enumerated. The pH of intestinal contents was directly measured by pH-meter.

Egypt, the average minimum and maximum ambient temperatures during summer season (from June to August 2011) ranged between 21.75 and 40.65^{0}C, relative humidity 51.39% and temperature-humidity index (THI) from 31.26 to 57.85% under Fayoum Governorate, Egypt (Central Laboratory for Agricultural Climate) as show in Table 3, which was a burden on the chicks According to **Marai *et al.* (2002)** there is severe heat stress when THI is higher than 28.9.

The THI was calculated according to the formula by **Marai *et al.* (2001)** as follows**:** THI = db°C–[(0.31–0.031RH)×(db°C–14:4)].

Where: db°C is dry bulb temperature in Celsius degrees, and RH is the relative humidity as a percentage

To determine the economical efficiency for meat production, the amount of feed consumed during the entire experimental period was obtained and multiplied by the price of one Kg of each experimental diet which was estimated based upon local current prices at the experimental time. Statistical analysis of results was performed using the General Linear Models (GLM) procedure of the SPSS software **(SPSS, 1999),** according to the follow general model:

$$Y_{ij} = \mu + T_i + e_{ij}$$

Where:

Y_{ij}**:** observed value
μ: overall mean
T_i**:** treatment effect (**i**: (1 to 5).
e_{ij}**:** random error

Treatment means indicating significant differences (P≤0.01 and P≤0.05) were tested using Duncan's multiple range test **(Duncan, 1955)**.

RESULTS AND DISCUSSION

Live body weight (LBW) and live body weight gain (LBWG):

Results presented in Table (4) shows the effects of inclusion FS and TL in Ross broiler diets on LBW and LBWG. These results indicated no significant differences due to type of plant effect on LBW and LBWG at all ages studied, but numerically, birds fed diet contained TL had higher LBW at 42 days and LBWG during the period from 5 to 42 days of age as compared with those fed diet contained FS. Concerning the treatments effect, the results indicated that no significant differences on LBW at all ages studied except, at 23 days of age, chicks fed diet contained 2% TL had significantly (P≤0.01) higher LBW at 23 days of age than other treatments (Table 4).

Similar results were observed by **Vogt *et al.* (1989)** who found that there were no significant differences in LBW among broiler fed diet contains thyme flower at levels ranged between 100-800 mg/kg of diet. However, **Abdullah and Rabia (2009)** stated that addition of FS at both 1, 2 and 3 g/kg to broiler diets resulted in a significant improvement in the chicks LBW.

Concerning the treatments effect, the results of the present study indicated that, significantly affected LBWG during the periods from 5 to 11 (P≤0.05) and 12 to 23 days of age (P≤0.01). Chicks fed diet contained 2% TL and 1% FS had higher LBWG during the previously periods, respectively. Numerically, chicks fed diet contained 2% TL had higher LBW at 42 and LBWG during the period from 5 to 42 days followed by those fed diet contained 1% FS as compared with the other treatments and control group, but differences were not statistically different (Table 4). The improvement in LBWG may be due to the presence of fat soluble unidentified factor and vitamin F group (a mixture of essential fatty acids including linoleic, linolenic and arachidonic acids) in the supplemented herbal feed additives which have been essential for growth **(Murray *et al*., 1991)**.

In this respect, **Abou-Sekken *et al*. (2007)** showed that the best duck performance obtained from supplementing 1.0% FS and mixture of FS and TL at 0.5% during the period from 0-4 wks, they also showed that at the second period (5-10 wks), the tested herbs had no effect on the productive performance. Our results agree with those of **Ragab** (**2007)** who noted that growing quails fed control diet plus 1% FS plus 0.1% kemzyme dry had higher values of LBW and LBWG as compared with the other treatments studied. However, **Tollba** (**2003)** reported that adding 1% TL or FS recovered and compensated particularly retardation of LBW and LBWG, where significant difference could be detected compared with un-supplemented at high temperature groups. He also recommend that the addition of 1% TL or FS in broiler

diets has the best effects to improve their performance, livability and reduce the side effects of high temperature or any stressful conditions. Similar results were observed by **Tollba and Hassan (2003)**.

Feed intake (FI) and feed conversion ratio (FC):

Results presented in Table (5) summered the effects of inclusion FS and TL in Ross broiler diets on FI and FC. Type of plant and treatment effect significantly (P≤0.01) affected FI during all periods studied. Concerning type of plant, chicks fed diet contained FS had significantly (P≤0.01) higher FI during the periods from 5 to 11 and 12 to 23 day as compared to that contained TL, while, chicks fed diet contained TL had significantly (P≤0.01) higher FI during the periods from 24 to 42 and 5 to 42 days as compared to that contained FS.

Concerning treatment effect (Table 5), chicks fed control diet had significantly higher FI during the periods from 5 to 11 and 12 to 23 days of age, while, chicks fed diet contained 2% TL had significantly higher FI during the periods from 24 to 42 and 5 to 42 days (increasing FI during the final and overall periods may be attributed to improvement in the palatability of feed and for the smelling odor of the FS or TL).

The present results are in accordance with those reported by several studies that previously showed that adding herbal growth promoter (TL or FS) to the control diet significantly improved FI (**Vogt *et al*., 1989 and Abdel-Malak *et al*., 1995 and Ibrahim *et al*., 1998** in broiler; **Ghazalah and Ibrahim, 1996** and **Abou-Sekken *et al*., 2007)** in ducks and **Abd El-Latif *et al*., 2002** in Japanese quail). Also, **Hassan *et al*. (2004)** observed that FI values significantly increased by feeding some medicinal and aromatic plants. Quails fed 18% CP plus 1% FS diet had lower FI during the period from 10 to 38 days of age **(Ragab, 2007)**. However, FI was not affected by dietary TL or FS in broiler chicks **(Tollba, 2003 and Abdullah and Rabia, 2009).**

Data presented in Table 5 showed that type of plant insignificantly affected FC during the all periods studied except, the period from 5 to 11 days of age. Chicks fed diet contained TL had significantly (P≤0.05) better FC during this period. Numerically, chicks fed diet contained FS had better FC during the period from 5 to 42 days of age compared with those fed diet contained TL, but differences were not significant.

Concerning treatment effect (Table 5), chicks fed diet contained 2% TL had significantly better FC during the periods from 5 to 11 (P≤0.05) and 12 to 23 (P≤0.01) days of age. Numerically, chicks fed diet contained 1% FS had better FC during the overall period (5 to 42 days) as compared with other treatments and control group, but differences were not significant. These results agree with the findings of **Abd El-Latif *et al.* (2002)** who indicated that adding FS in quail diets improved FC. Moreover, adding herbal growth promoter (TL or FS) to the control diet improved FC **(Vogt *et al*., 1989, Abdel-Malak *et al*., 1995, Ibrahim *et al*., 1998 and Tollba, 2003** in broiler and **Ghazalah and Ibrahim, 1996** in ducks). The improvement in FC with feeding herbal products as feed additives could be attributed to their effect on improving the digestibility of dietary protein in the small gut **(Abd El-Latif *et al*., 2002** and **Hassan *et al*., 2004)**. The beneficial effects of supplemental FS and TL or their mixture may be due to the stimulation of appetite and FI, the improvement of endogenous digestive enzyme secretion, activation of immune response and antibacterial, antiviral, antioxidant and antihelminthic actions **(Jamroz *et al*., 2003). Tollba and Hassan (2003)** noted that adding black cumin 1% or garlic 1% to broiler diets under normal temperature (24°C) or high temperature (38°C for 3 hrs) increased LBW, LBWG as the result of improving

improved FC. Similarly, **Ciftci *et al.* (2005)** showed that, the supplementation of 0.25 and 0.50% FS to growing broiler diets significantly improved FC at 4 weeks. Also, **Abou-Sekken *et al*. (2007)** showed that FC were significantly improved by supplementing FS and TL or their mixture during the period from 0 to 4 wks. Similar results were observed by **Abdullah and Rabia (2009)**.

Crude protein conversion (CPC) and caloric conversion ratio (CCR):

Results presented in Table (6) show the effects of inclusion FS and TL in Ross broiler diets on CPC and CCR. Concerning type of plant, chicks fed diet contained TL had significantly (P≤0.05) better CPC and CCR during the period from 5 to 11 days, however, insignificant effects on CPC and CCR during the other periods.

Concerning treatment effect, chicks fed diet contained 2% TL had significantly better CPC and CCR during the periods from 5 to 11 (P≤0.05) and 12 to 23 days of age (P≤0.01). It can be concluded that inclusion FS and TL in Ross broiler diets improved CPC and CCR values during the overall period compared with those fed control diet, but differences were not significant (Table 6).

Similar trend was observed by **Ragab (2007)** who reported that adding 1% FS to Japanese quail diet contained 18% CP improved CPC while the worst CPC was obtained by the control group during the period from 10-38 days.

Growth rate (GR) and performance index (PI):

Results presented in Table (7) show the effects of inclusion FS and TL in Ross broiler diets on GR and PI. Type of plant insignificantly affected GR and PI during the all periods studied.

Concerning treatment effect, chicks fed diet contained 2% TL had significantly (P≤0.05) higher GR during the period from 5 to 11 days and GR and PI (P≤0.01) during the period from 12 to 23 days. Numerically, chicks fed diet contained 1% FS had higher GR and PI during the period from 5 to 42 days of age as compared with other treatments and control group, but differences were not significant (Table 7). In this respect, **Gill (1999)** concluded that the medicinal herbs have a stimulating effect on growth of broilers. Also, **Abou-Sekken *et al*. (2007)** showed that PI were significantly improved by supplementing FS and TL or their mixture at the period from 0-4 wks. Also, growing quails fed control diet plus 1% FS plus 0.1% kemzyme dry had higher PI during the overall period **(Ragab, 2007)**.

Blood parameters:

Results presented in Table (8) show the effects of inclusion FS and TL in Ross broiler diets on some blood parameters. Type of plant insignificantly affected all blood parameters. Numerically, chicks fed diet contained TL had higher white blood cells count (WBC), red blood cells count (RBC), hemoglobin (Hg), hematocrit (HCT) and mean corpuscular volume (MCV), while, chicks fed diet contained FS had higher values of mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration(MCH), but differences were not significant (Table 8).

Concerning treatment effect**,** the results indicated that no significant differences were observed among treatment groups on all blood parameters except, WBC. Chicks fed diet contained 1% FS had significantly (P≤0.05) higher WBC than other treatments and control group. Numerically, chicks fed diet contained 2% TL had higher Hg, HCT and MCV as compared with other treatments and control group, but differences were not significant (Table 8). On the other hand, it can be concluded that chicks fed diet contained FS or TL at different levels had higher WBC, MCH and MCHC% compared with control group, but differences were not significant (Table 8). The results of the

present study did not confirm the findings of **Abdullah and Rabia (2009)** who reported that chicks received 1, 2 and 3 g/kg FS in their diets had significantly higher RBC, Hg and packed cell volume as compared with the control group.

Slaughter parameters:

The slaughter parameters of chicks fed FS and TL are presented in Table (9). Type of plant insignificantly affected all slaughter parameters except, breast meat%, chicks fed diet contained FS had significantly (P≤0.05) higher breast meat% than those fed diet contained TL. Numerically, chicks fed diet contained TL had higher abdominal fat and bursa%, while, chicks fed diet contained FS had higher values of other slaughter parameters, but differences were not significant (Table 9).

All slaughter parameters indicated that chicks fed diet contained 2% FS had numerically higher dressing% as compared with other treatments and control group, but differences were not significant (Table 9). On the other hand, it can be concluded that inclusion FS and TL in Ross broiler diets improves bursa% as compared with those fed control diet, but differences were not significant (Table 9).

The aforementioned results are in agreement with those of **Ghazalah and Ibrahim (1996), Tollba and Hassan (2003), Osman *et al.* (2004) and Abdullah and Rabia (2009)** found that no significant differences in all carcass characteristics. they revealed that herbs and spices had no negative impacts on broilers and Muscovi ducks carcass parameters. Also, **Abdel-Malak, *et al*. (1995) and Abaza (2001)** reported that no significant differences of TL on relative or absolute organ weights of liver, heart, spleen, intestine length, bursa and fabricus. Similar results were obtained by **Tollba (2003)** who reported that no significant effects on relative weights of liver, spleen, bursa, fabricus, thymus gland or intestine with normal additives under normal or high temperature conditions. **El-Deek *et al.* (2003)** fed Hubbard broiler chicks diets supplemented with FS at levels of 0.05% or 0.1% found that had no significant effect on dressing and body organs percentage. These results agree with the findings of **Abou-Sekken *et al*. (2007)** who found that no significant differences were shown in dressing and edible giblets%. Similarly, use of FS in growing Japanese quail diets varying in their protein content with or without kemzyme dry supplementation showed insignificant effects on slaughter parameters of Japanese quails **(Ragab, 2007).** However, **Abd El-Latif *et al.* (2002)** reported that the greatest percentages of dressing and edible giblets were obtained from birds fed dietary FS. Also, **Hassan *et al*. (2004)** found that addition of medicinal and aromatic plants in broiler diets significantly increased dressing% than those fed the control diet. **Abou-Sekken *et al*. (2007)** showed that a significant decrease in abdominal fat% was recorded for groups fed FS or TL compared with control. In addition, the higher levels of FS or TL (1.0%) recorded the lowest value of abdominal fat compared with the corresponding low levels (0.5%) of each.

Body temperature, respiratory rate, intestinal pH, total microflora count and mortality rate% (MR):

Effects of feeding FS and TL on body temperature, respiratory rate, intestinal pH, total microflora count and MR of Ross chicks are presented in Table (10). Type of plant significantly (P≤0.05) affected body temperature, chicks fed diet contained FS had significantly lower body temperature than those fed diet contained TL. This may be attributed to the biological function of components or pharmacological activities of FS. Numerically, chicks fed diet contained FS had lower respiratory value, intestinal pH and total microflora count compared with those fed diet contained TL, but differences were not significant (Table 10).

Concerning treatment effect no significant differences on body temperature, respiratory rate, intestinal pH and total microflora count were observed among the treatment groups. Numerically, chicks fed diet contained 2% FS had lower body temperature and total microflora count as compared with other treatments and control group, but differences were not significant (Table 10). This reduction may be due to the associative antimicrobial effect of FS. Similar results were reported by **Jamroz *et al*. (2003).** In this concern, **Cowan (1999)** reported that plants are rich in a wide variety of secondary metabolites, such as terpenoids, which was found to have antimicrobial properties. Similarly, **Abou-Sekken *et al*. (2007)** reported that the counts of *E.coli* and molds as well as the total bacterial count were significantly reduced due to diets contained mixture of FS and TL at 0.5 or 1.0% in both ileum and caecum of ducks compared with other tested and control groups.

In addition to this, **Tollba (2003)** showed that body temperature at 40 day and respiratory rate at 35 or 40 days of age were significantly decreased after heat exposure for birds fed 1% TL or FS as compared to control birds. There was a significant effect on pH values either before or after heat exposure at 35 days and after heat exposure at 40 days of age on treated compared to control birds.

As shown in Table (10), results indicated that chicks fed control diet or diet contained 2% TL had higher MR values being 8.33% during the whole experimental period as compared with those fed other treatments (4.17%). Adding herbal growth promoter (TL or FS) to the control diet significantly decrease MR (**Abdel-Malak *et al*., 1995 and Ibrahim *et al*., 1998** in broiler, **Ghazalah and Ibrahim, 1996** in ducks and **Abd El-Latif *et al*., 2002** in quail). Similarly, **Tollba (2003)** reported that the addition of TL or FS as natural feed additives to broiler diets under normal or high temperature conditions decreased MR. Similar results were observed by **Tollba and Hassan (2003).**

Chemical composition of broiler meat:

Results presented in Table (11) show the effects of inclusion FS and TL in broiler diets on chemical composition of meat. Type of plant and treatment effect insignificantly affected chemical composition of meat of chicks meat. Carcass parts were significantly influenced ($P \leq 0.01$) protein, fat, ash and NFE%. Rear part had higher fat and NFE, however, breast part had higher protein and ash% than rear part (Table 11).

In this respect, **El-Deek *et al.* (2003)** fed broiler chicks diets supplemented with 0.05% or 0.10% FS and found that fat content of broiler meat was significantly decreased. In another study, **Abou-Sekken *et al*. (2007)** showed that the addition of FS, TL and mixture of them did not affect the CP and EE content of the meat. Use of 1% FS in growing Japanese quail diets varying in their protein content showed significant effects on fat% while, the front part had significantly higher CP and lower EE content **(Ragab, 2007).**

Economical efficiency (EEf):

Results in Table (12) show that EEf values during the period from 5 to 42 days of age. Chicks fed diet contained 1% FS had the best economical and relative efficiency values being 1.502 and 106.70%, respectively (this may be due to the good performance) as compared with other treatments and control group. Whereas, chicks fed diet contained 2% TL had the lowest corresponding values, being 1.174 and 83.41%, respectively. The relative efficiency varied between 83.41% to 106.70%. This again favors the use of 1% FS.

These results may be agree with those of **Abd El-Latif *et al.* (2002), Soliman *et al.* (2003), Hassan *et al.* (2004)** and **Bahnas *et al.*** (**2009)** who reported that the inclusion of herbal feed

additives in quail or broilers diets resulted in the least feed cost/Kg gain and the highest EEf values as compared with the control diet.

The results of the present study indicated that inclusion of 1% FS enhanced growth and economical performance of Ross broilers, helped sustained the normal physiological balance when broilers were subjected to high temperature. Thus, several benefits might be gained by adding 1% FS to the diet of Ross broilers under heat stress conditions. Nevertheless, from an economic point of view, high levels of FS or TL are not recommended because it is reasonably effective at lower, less expensive doses.

Table (1): Composition and analyses of the experimental diets.

Items%	Starter period (5-11 days)					Grower period (12-23 days)					Finisher period (24-42 days)				
	Control	FS [1]%		TL [2] %		Control	FS%		TL %		Control	FS%		TL %	
		1.00	2.00	1.00	2.00		1.00	2.00	1.00	2.00		1.00	2.00	1.00	2.00
Yellow corn, ground	54.00	53.00	52.00	53.00	52.00	57.00	56.00	55.00	56.00	55.00	62.00	61.00	60.00	61.00	60.00
Soybean meal	30.60	30.64	30.78	30.48	30.45	25.66	25.79	25.94	25.63	25.58	22.08	22.15	22.30	21.99	21.96
Corn glutein meal	9.18	8.96	8.66	9.11	8.97	9.91	9.62	9.31	9.77	9.66	8.68	8.44	8.13	8.59	8.45
FS or TL	0.00	1.00	2.00	1.00	2.00	0.00	1.00	2.00	1.00	2.00	0.00	1.00	2.00	1.00	2.00
Calcium carbonate	1.55	1.55	1.55	1.55	1.55	1.40	1.40	1.40	1.40	1.40	1.35	1.35	1.35	1.35	1.35
Sodium chloride	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Vit. and Min. premix[3]	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Monocalcium phosphate	1.70	1.73	1.73	1.73	1.73	1.52	1.52	1.52	1.52	1.52	1.40	1.42	1.42	1.42	1.42
Vegetable oil[4]	1.70	1.84	1.99	1.85	2.01	3.41	3.55	3.70	3.56	3.71	3.57	3.71	3.86	3.72	3.88
DL – Methionine	0.28	0.29	0.30	0.29	0.29	0.19	0.20	0.21	0.20	0.21	0.11	0.12	0.13	0.12	0.12
L-Lysine HCl	0.39	0.39	0.39	0.39	0.40	0.31	0.32	0.32	0.32	0.32	0.21	0.21	0.21	0.21	0.22
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Calculated analysis[5]:															
Crude protein	23.50	23.50	23.50	23.50	23.50	22.00	22.00	22.00	22.00	22.00	20.00	20.00	20.00	20.00	20.00
Ether extract	3.86	4.06	4.27	4.03	4.22	5.57	5.77	5.98	5.74	5.92	5.76	5.95	6.16	5.93	6.11
Crude fiber	2.31	2.57	2.83	2.56	2.81	2.14	2.40	2.67	2.39	2.65	2.04	2.30	2.56	2.29	2.54
Calcium	1.00	1.00	1.00	1.00	1.00	0.90	0.90	0.90	0.90	0.90	0.85	0.85	0.85	0.85	0.85
Available phosphorus	0.50	0.50	0.50	0.50	0.50	0.45	0.45	0.45	0.45	0.45	0.42	0.42	0.42	0.42	0.42
Methionine	0.70	0.70	0.71	0.70	0.70	0.60	0.60	0.60	0.60	0.61	0.49	0.49	0.49	0.49	0.49
Methionine+Cystine	1.09	1.09	1.09	1.09	1.09	0.97	0.97	0.97	0.97	0.97	0.83	0.83	0.83	0.83	0.83
Lysine	1.44	1.44	1.44	1.44	1.44	1.25	1.25	1.25	1.25	1.25	1.05	1.05	1.05	1.05	1.05
ME, kcal./Kg	3010.1	3010.1	3010.2	3010.1	3010.3	3175.4	3175.1	3175.1	3175.1	3175.0	3225.2	3225.1	3225.0	3225.0	3225.2
Cost (£.E./ton)[6]	2443.2	2526.1	2606.4	2560.1	2671.5	2443.1	2524.8	2604.9	2558.8	2673.7	2304.5	2386.5	2466.7	2420.6	2531.9
Relative cost [7]	100.00	103.39	106.68	104.78	109.34	100.00	103.34	106.62	104.74	109.44	100.00	103.56	107.04	105.04	109.87

[1] Fennel seeds [2] Thyme dried leaves [3] Each 3.0 Kg of the Vit. and Min. premix manufactured by Agri-Vet Company, Egypt and contains : Vit. A, 12000000 IU; Vit. D_3 2000000 IU; Vit. E, 10 g; Vit. K_3, 2.0 g; Vit. B1, 1.0 g; Vit. B2, 5 g; Vit. B6, 1.5 g; Vit. B12,10 mg; choline chloride, 250 g; biotin, 50 mg; folic acid, 1 g; nicotinic acid , 30 g; Ca pantothenate, 10 g; Zn, 50 g; Cu,10 g; Fe, 30 g; Co, 100 mg; Se, 100 mg; I, 1 g; Mn, 60 g and anti-oxidant, 10 g, and complete to 3.0 Kg by calcium carbonate. [4] Mixture from 75% soybean oil and 25% sunflower oil. [5] According to **NRC, 1994** except yellow corn, soybean meal, fennel seeds and thyme dried leaves were analysis before start the experiment (Table 2). [6] According to the local market price at the experimental time. [7] Assuming the price of the control group equal 100.

Table (2): Chemical composition of fennel seeds, thyme dried leaves, yellow corn and soybean meal used in the present study (on air dried basis).

Items	Fennel seeds	Thyme dried leaves	Yellow corn	Soybean meal
Moisture %	6.9	7.1	3.2	10
Crude protein%	19.9	16.9	8.2	42
Ether extract %	8.8	5.2	2.5	1.9
Crude fiber%	27.7	27.3	1.5	4.5
Ash%	6.8	11.6	1.2	9.9
Nitrogen-free extract%	29.9	31.9	83.4	31.7
ME /Kcal	2815*	2504*	3350**	2230**

* Calculated according to **Carpenter and Clegg (1956)** by applying the equation:
ME (Kcal/kg)= (35.3*CP%)+(79.5*EE%)+(40.6*NFE%)+199.
** **NRC, 1994**

Table (3): Temperature (C^{o}) and relative humidity% during the experimental period from June to August 2011*.

Items	Temperature (C^{o})		Relative humidity%	Temperature humidity index (THI)	
	Minimum	Maximum		Minimum	Maximum
Minimum	19.29	34.06	36	24.44	46.10
Maximum	24.25	44.65	73	41.86	66.63
Mean	21.75	40.65	51.39	31.26	57.85
± Standard error	0.23	0.47	1.58	0.69	0.83

* Central Laboratory for Agricultural Climate

Table (4): Effects of inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on live body weight (LBW, g) and live body weight gain (LBWG, g).

Items	LBW, g (age/days)				LBWG, g (age period/days)			
	5	11	23	42	5-11	12-23	24-42	5-42
Type of plant:								
FS	115.56	170.52	694.91	1631.8	54.96	549.44	916.94	1515.8
TL	115.53	171.38	699.03	1646.8	55.85	531.94	940.00	1530.5
±SEM[1]	2.22	3.11	19.81	41.97	1.49	19.21	29.35	41.55
Treatments:								
Control	115.50	171.19	677.85^{B}	1663.1	55.69^{ab}	542.67^{AB}	942.57	1549.5
1%FS	115.36	173.10	754.86^{A}	1715.6	57.73^{ab}	605.89^{A}	944.20	1601.4
2%FS	115.76	167.95	634.95^{B}	1557.8	52.20^{b}	493.00^{BC}	892.88	1440.3
1%TL	115.63	167.71	623.50^{B}	1555.7	52.08^{b}	455.00^{C}	937.22	1436.9
2%TL	115.43	175.05	763.76^{A}	1721.4	59.62^{a}	604.61^{A}	942.27	1607.1
±SEM	3.26	4.34	25.62	52.63	1.98	22.33	39.13	51.60

a, …b, and A,.. C, values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b ; $P \leq 0.01$ for A to C). [1] Pooled SEM.

Table (5): Effects of inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on feed intake (FI, g) and feed conversion (FC).

Items	FI, g (age period/days)				FC (age period/days)			
	5-11	12-23	24-42	5-42	5-11	12-23	24-42	5-42
Type of plant:								
FS	91.31^{A}	1125.5^{A}	2074.7^{B}	3291.5^{B}	1.72^{a}	2.16	2.34	2.21
TL	85.45^{B}	1077.3^{B}	2373.8^{A}	3536.6^{A}	1.56^{b}	2.12	2.52	2.32
±SEM[1]	1.49	6.07	41.78	46.14	0.05	0.09	0.10	0.08
Treatments:								
Control	100.3^{A}	1157.2^{A}	2297.9^{B}	3555.4^{B}	1.85^{a}	2.21^{AB}	2.47	2.31
1%FS	93.43^{B}	1137.6^{B}	2184.7^{B}	3415.7^{BC}	1.66^{ab}	1.92^{B}	2.33	2.15
2%FS	89.19^{B}	1113.4^{C}	1964.8^{C}	3167.4^{D}	1.78^{ab}	2.40^{A}	2.34	2.25
1%TL	80.52^{C}	1033.1^{D}	2231.3^{B}	3344.9^{C}	1.57^{b}	2.36^{A}	2.41	2.34
2%TL	90.38^{B}	1121.4^{BC}	2516.4^{A}	3728.2^{A}	1.56^{b}	1.90^{B}	2.62	2.31
±SEM	1.78	6.12	48.12	51.05	0.07	0.12	0.13	0.09

a, …b, and A,.. D, values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b ; $P \leq 0.01$ for A to D). [1] Pooled SEM

Table (6): Effects of inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on crude protein conversion (CPC) and caloric conversion ratio (CCR).

Items	CPC (age period/days)				CCR (age period/days)			
	5-11	12-23	24-42	5-42	5-11	12-23	24-42	5-42
Type of plant:								
FS	0.40^{a}	0.46	0.47	0.47	5.19^{a}	6.58	7.54	6.35
TL	0.37^{b}	0.47	0.51	0.44	4.71^{b}	6.74	8.14	6.43
±SEM[1]	0.01	0.02	0.02	0.01	0.16	0.22	0.31	0.19
Treatments:								
Control	0.43^{a}	0.46^{BC}	0.49	0.47	5.56^{a}	6.69^{BC}	7.98	6.61
1%FS	0.39^{ab}	0.42^{C}	0.47	0.43	5.00^{ab}	6.09^{C}	7.52	6.26
2%FS	0.42^{ab}	0.49^{AB}	0.47	0.46	5.39^{a}	7.09^{AB}	7.55	6.42
1%TL	0.37^{b}	0.52^{A}	0.48	0.44	4.73^{b}	7.49^{A}	7.77	6.44
2%TL	0.37^{b}	0.42^{C}	0.52	0.44	4.68^{b}	6.04^{C}	8.44	6.41
±SEM	0.02	0.02	0.03	0.02	0.23	0.26	0.40	0.27

a, …b, and A,.. C, values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b ; $P \leq 0.01$ for A to C). [1] Pooled SEM

Table (7): Effects of inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on growth rate (GR) and performance index (PI).

Items	GR (age period/days)				PI (age period/days)			
	5-11	12-23	24-42	5-42	5-11	12-23	24-42	5-42
Type of plant:								
FS	0.39	1.22	0.78	0.79	10.61	36.27	74.72	40.30
TL	0.39	1.19	0.80	0.80	11.30	35.75	68.08	38.51
±SEM[1]	0.01	0.02	0.02	0.01	0.46	2.10	3.90	1.81
Treatments:								
Control	0.39^{ab}	1.24^{A}	0.79	0.81	9.57	34.45^{B}	69.24	37.74
1%FS	0.40^{ab}	1.25^{A}	0.76	0.81	11.01	42.29^{A}	75.69	42.59
2%FS	0.37^{b}	1.18^{B}	0.80	0.76	10.20	30.26^{B}	73.87	38.28
1%TL	0.37^{b}	1.13^{B}	0.86	0.78	10.94	28.26^{B}	66.15	34.89
2%TL	0.41^{a}	1.25^{A}	0.75	0.81	11.67	42.82^{A}	69.66	41.47
±SEM	0.01	0.02	0.03	0.02	0.61	2.41	5.13	2.51

a, …b, and A,.. B, values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b ; $P \leq 0.01$ for A to B). [1] Pooled SEM

Table (8): Effects of inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on some blood parameters.

Items	White blood cells count ($10^3/mm^3$)	Red blood cells count ($10^6/mm^3$)	Hemoglobin (g/dL)	Hematocrit (HCT)%	Mean corpuscular volume (MCV) μ^2	Mean corpuscular hemoglobin (MCH) µµg	Mean corpuscular hemoglobin concentration (MCHC)%
Type of plant:							
FS	16.20	2.35	10.98	34.30	146.25	46.85	32.10
TL	16.75	2.43	11.43	36.83	151.00	46.78	31.00
±SEM[1]	0.86	0.08	0.36	1.22	4.91	0.81	0.73
Treatments:							
Control	12.85^{c}	2.60	11.60	38.25	148.00	44.80	30.30
1%FS	17.85^{a}	2.38	10.85	33.85	142.00	45.70	32.20
2%FS	14.55^{bc}	2.32	11.10	34.75	150.50	48.00	32.00
1%TL	16.15^{ab}	2.34	10.85	35.30	149.50	45.85	30.70
2%TL	17.35^{a}	2.52	12.00	38.35	152.50	47.70	31.30
±SEM	0.73	0.22	0.91	2.91	7.18	0.86	1.12

a, …c values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to c). [1] Pooled SEM

Table (9): Effects inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on some slaughter parameters.

Items	Live body weight (g)	Slaughter parameters%								Intestinal length, cm
		Total giblets	Abdominal fat	Breast meat	Rear meat	Carcass weight after evisceration	Dressing	Bursa	Thymus	
Type of plant:										
FS	1802.8	5.49	1.99	73.47[a]	80.06	63.22	68.71	0.09	0.18	106.50
TL	1632.5	5.19	2.16	61.41[b]	74.58	59.89	65.08	0.11	0.18	103.00
±SEM[1]	85.3	0.25	0.28	3.40	2.06	1.51	1.43	0.02	0.04	3.88
Treatments:										
Control	1783.0	6.19	2.17	69.08	77.23	61.92	68.11	0.06	0.10	106.00
1%FS	1817.5	5.82	2.42	71.68	78.45	60.76	66.58	0.10	0.10	111.00
2%FS	1788.0	5.16	1.55	75.26	81.66	65.68	70.84	0.08	0.25	102.00
1%TL	1475.0	5.17	2.51	54.93	71.98	58.20	63.36	0.10	0.21	107.50
2%TL	1790.0	5.21	1.81	67.90	77.18	61.58	66.79	0.11	0.14	98.50
±SEM	78.30	0.33	0.42	3.66	2.53	1.38	1.39	0.04	0.04	6.98

a, …b values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b). [1] Pooled SEM

Table (10): Effects of inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on body temperature (C°), respiratory rate, intestinal pH, total microflora count (10^4 cfu/g) and mortality rate.

Items	Body temperature (C°)	Respiration rate (breaths/min)	Intestinal pH	Total microflora count (10^4 cfu/g)	Mortality rate		
					Total number of chicks at the beginning of Experiment	Number of dead birds	Mortality %
Type of plant:							
FS	41.32[b]	51.17	6.78	1.16	---	---	---
TL	41.93[a]	55.00	6.79	1.25	---	---	---
±SEM[1]	0.21	2.75	0.10	0.24	---	---	---
Treatments:							
Control	41.88	53.67	6.78	1.18	24	2	8.33
1%FS	41.55	48.17	6.75	1.48	24	1	4.17
2%FS	41.08	54.17	6.81	0.85	24	1	4.17
1%TL	41.88	55.67	6.71	1.25	24	1	4.17
2%TL	41.98	54.33	6.87	1.25	24	2	8.33
±SEM	0.30	3.63	0.15	0.36	---	---	---

a, …b values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.05$ for a to b). [1] Pooled SEM

Table (11): Effects of inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on chemical composition of broiler meat %(on dry matter bases).

Items	Moisture	Protein	Fat	Ash	NFE
Type of plant:					
FS	5.41	60.93	30.52	2.85	0.30
TL	5.39	60.94	30.55	2.81	0.31
±SEM[1]	0.02	1.26	1.38	0.15	0.04
Carcass part:					
Breast	5.42	64.26^{A}	26.91^{B}	3.22^{A}	0.21^{B}
Rear	5.36	57.61^{B}	34.19^{A}	2.45^{B}	0.40^{A}
±SEM	0.02	0.02	0.02	0.02	0.01
Treatments:					
Control	5.36	60.93	30.60	2.83	0.28
1%FS	5.41	60.96	30.50	2.82	0.32
2%FS	5.41	60.89	30.53	2.88	0.29
1%TL	5.40	60.94	30.57	2.78	0.32
2%TL	5.37	60.94	30.54	2.85	0.31
±SEM	0.04	1.92	2.10	0.22	0.06

A, B, values in the same column within the same item followed by different superscripts are significantly different (at $P \leq 0.01$ for A to B).

[1] Pooled SEM

Table (12): Effects of inclusion fennel seeds (FS) and thyme dried leaves (TL) in broiler diets on economical efficiency (EEf).

Treatments Items	**Control**	**1%FS**	**2%FS**	**1%TL**	**2%TL**
a_1	0.10030	0.09343	0.08919	0.08052	0.09038
b_1	244.320	252.610	260.640	256.010	267.150
$a_1 \times b_1 = c_1$	24.505	23.601	23.246	20.614	24.145
a_2	1.1572	1.1376	1.1134	1.0331	1.1214
b_2	244.31	252.48	260.49	255.88	267.37
$a_2 \times b_2 = c_2$	282.72	287.22	290.03	264.35	299.83
a_3	2.2979	2.1847	1.9648	2.2313	2.5164
b_3	230.45	238.65	246.67	242.06	253.19
$a_3 \times b_3 = c_3$	529.55	521.38	484.66	540.11	637.13
$(c_1+c_2+c_3) = c_{total}$	836.77	832.20	797.93	825.07	961.10
d	1.5495	1.6014	1.4403	1.4369	1.6071
e	1300.0	1300.0	1300.0	1300.0	1300.0
d x e=f	2014.4	2081.8	1872.4	1868.0	2089.2
$f - c_{total} = g$	1177.6	1249.6	1074.5	1042.9	1128.1
g / c_{total}	1.407	1.502	1.347	1.264	1.174
r	**100.00**	**106.70**	**95.68**	**89.82**	**83.41**

a_1, a_2 and a_3 …….average feed intake (Kg/bird) during the periods of starter, grower and finisher, respectively.

b_1, b_2 and b_3 …..… price / Kg feed (P.T.) during the periods of starter, grower and finisher, respectively (based on average local market price of diets during the experimental time).

c_1, c_2 and c_3 …….. Feed cost (P.T.) during the periods of starter, grower and finisher, respectively.

Total feed cost (P.T.) = $c_{total} = c_1+c_2+c_3$

Average LBWG (Kg/ bird) d

Price / Kg live weight (P.T.) e…….…(according to the local market price at the experimental time)**.**

Total revenue (P.T.) = d x e = f

Net revenue (P.T.) = $f - c_{total} = g$

Economical efficiency = (g / c_{total}) ……(net revenue per unit feed cost).

Relative efficiency r……...(assuming that economical efficiency of the control group (1) equals 100).

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الملخـــص العـــربي

تأثير احتواء علائق بداري التسمين علي بذور الشمر و أوراق الزعتر الجافة علي الأداء الإنتاجي والفسيولوجي خلال فصل الصيف

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تم إجراء التجربة في محطة بحوث الدواجن بالعزب بالفيوم – معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية – وزارة الزراعة بالدقي – مصر . وذلك خلال الفترة من شهر يونيه إلى أغسطس لسنة ٢٠١١. غذيت الكتاكيت عمر يوم ولمدة ٤ أيام علي عليقة الكنترول وتم توزيع 120 كتكوت غير مجنس (سلالة روس) بصورة عشوائية إلى خمس معاملات (٢٤ طائر/معاملة) كل معاملة مقسمة إلي ثلاثة مكررات (٨ طائر/مكرر). وكانت المعاملات التجريبية كما يلي:

١- غذيت الكتاكيت علي عليقة المقارنة.
٢- غذيت الكتاكيت علي عليقة بها ١% بذور شمر.
٣- غذيت الكتاكيت علي عليقة بها ٢% بذور شمر.
٤- غذيت الكتاكيت علي عليقة بها ١% أوراق زعتر جافة.
٥- غذيت الكتاكيت علي عليقة بها ٢% أوراق زعتر جافة.

وتم تلخيص النتائج المتحصل عليها كما يلي :

١- لم يكن هناك أي تأثير معنوي لأي من نوع الإضافة (شمر أو زعتر) ولا للمعاملات التجريبية علي وزن الجسم الحي والزيادة في وزن الجسم، معامل التحويل الغذائي، كفاءة تحويل البروتين و الطاقة، معدل النمو ومعامل الأداء الإنتاجي خلال الفترة من ٥ إلي ٤٢ يوم من العمر. انخفضت معنويا كمية الغذاء المأكول للكتاكيت المغذاة علي العلائق المحتوية علي ٢% أوراق زعتر جافة خلال الفترة من ٥ إلي ٤٢ يوم من العمر.
٢- الكتاكيت المغذاة علي العلائق المحتوية علي ١% بذور شمر كانت أعلي معنويا في قيمة عدد خلايا الدم البيضاء عند مقارنتها بالمعاملات الاخري ومجموعة المقارنة.
٣- كان للكتاكيت المغذاة علي العلائق المحتوية علي بذور الشمر أعلي قيمة للحم الصدر% عن تلك المغذاة علي العلائق المحتوية علي أوراق الزعتر الجافة. لم يكن للمعاملات التجريبية أي تأثير معنوي علي صفات الذبيحة.
٤- كانت درجة حرارة جسم الكتاكيت المغذاة علي العلائق المحتوية علي بذور الشمر أقل معنوياً عن تلك المغذاة علي العلائق المحتوية علي أوراق الزعتر الجافة. لم يكن للمعاملات التجريبية أي تأثير معنوي علي معدل التنفس، pH الأمعاء، العدد الكلي للميكروفلورا. الكتاكيت المغذاة علي علائق المقارنة أو المحتوية علي 2% أوراق زعتر جافة كان لها أعلي نسبة نفوق عند مقارنتها بالمعاملات الاخري.
٥- أحسن كفاءة اقتصادية ونسبية للكتاكيت المغذاة علي ١% بذور شمر عند مقارنتها بالمعاملات الاخري ومجموعة المقارنة.

يمكن التوصية بأن تغذية الكتاكيت علي العلائق المحتوية علي ١% بذور شمر حسن من أداء النمو والكفاءة الاقتصادية لكتاكيت الروس، مع الحفاظ علي التوازن الفسيولوجي الطبيعي عند تعرض الطيور لارتفاع رجة الحرارة.