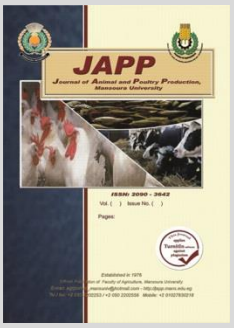
Journal of Animal and Poultry Production

Journal homepage: www.japp.mans.edu.eg
Available online at: www. jappmu.journals.ekb.eg

Productive Performance and some Blood Parameters of Broiler Chickens Fed Diets Supplemented with Thyme and Lavender Oils.

Shamma, T. A. ; A. A. El-Shafei and W. A. A. El-Yazby*

Department of Animal Production, Faculty of Agriculture, Al-Azhar University, Nasr City, Cairo, Egypt.



ABSTRACT

This study was conducted to investigate the impact of thyme *(Thymus vulgaris l.)* and lavender *(Lavandula augustifolia m.)* oils supplementation and their combination in broiler's diet on productive performance and some blood parameters. A total number of 120 broiler chicks (Arbor Acres) of one-week old were used in this study. Birds were randomly divided into 4 groups. The birds in each group were distributed to 3 replicates, 10 birds each. The first group (T1) was served as a control group and received only a basal diet. The 2nd group (T2) was fed basal diet supplemented with thyme oil at level of 0.4 ml/ kg diet. The 3th group (T3) was fed basal diet supplemented with lavender oil at level of 0.5 ml/ kg diet and 4th group (T4) was supplemented with mixture of thyme and lavender oils at levels of 0.4 and o.5 ml/kg diet, respectively. Results showed that supplementing thyme oil or mixture of thyme and lavender had no significant effect on live body weight (LBW) at the end of trial, while feed intake was significantly reduced, and feed conversion ratio was significantly improved compared with the control and lavender groups. Also, thyme and mixture group significantly increased thymus and bursa of Fabricius relative weights. Total blood protein, total albumin and total globulin were significantly increased by adding thyme or mixture of oils to broiler diet. Whilst, total cholesterol, triglyceride, LDL were significantly decreased, and HDL was significantly increased by adding thyme oil to broiler diet.

Keywords: broiler, thyme, lavender, growth performance, and blood parameters.

INTRODUCTION

It is well known that, the animal protein either from animal or poultry is very important for human (Byarugaba, 2007). In the year 1940, the growth promoter effects of antibiotics were discovered (Niewold, 2007). The United States Food and Drug Administration approved the use of antibiotics as a growth promoter in animal nutrition without veterinary prescription in 1951 (Jones and Ricke, 2003). Over use of antibiotic growth promoters (AGP) in animal production for long period caused many problems for both animal and human, one of these problems is the bacterial resistance to antimicrobial effect (Javed *et al.*, 2009). So, the European Union in 2006s banned the use of AGP in poultry production (Hashemipour *et al.*, 2013). This decision stimulated the researches to find alternative feed-additives in animal feeding including plants in different forms, as oils, extracts, flowers, buds, leaves, seeds, herbs, etc. (Sarica *et al.*, 2005). Thyme *(Thymus vulgaris L.)* is an aromatic plant belong to family *Lamiaceae.* thyme has major attention across the globe as a pharmaceutical and therapeutic agent. Reports indicated that the primary pharmacological effects of thyme comes from para cymene, thymol and carvacrol, which are the most important bioactive components in this aromatic plant (Grigore *et al.*, 2010). Active components such as carvacrol and thymol have an antiviral, antibacterial, antioxidant and aroma regulatory effects (Grosso *et al.*, 2010). So, some studies showed that mixing poultry feed with thyme enhance the growth performance (Abd El-Latif *et al.*, 2002; Hassan and Tolba, 2003). However, other researches reported that thyme had no significant effect on growth performance of broiler chickens (Mehdipour *et al.*, 2014; and Popović *et al.*, 2016). Lavender (*Lavandula augustifolia m.)* is also an aromatic plant belong to family *Lamiaceae* and had been used for centuries for a variety of therapeutic and cosmetic purposes, including antibacterial, sedative, hypnotic, antioxidant and anti-depressive uses which is attributed to the presence of phenolic and polyphenolic substances in this plant (Gülçin *et al.*, 2004).

Lavender oil has a complex structure with over 150 active constituents including terpinen-4-ol, linalool, camphor, linalyl acetate, 1,8-cineole, and β-cymene as the main components (Cavanagh and Wilkinson, 2002). Until now little scientific reports about the dietary supplementation effect of lavender on the antioxidant status of chicken meat or broiler performance response (Küçükyilmaz *et al.*, 2017). There is little information is available on using thyme and lavender oils or their combination in broiler diet. So, this study aimed to examine the effect of adding thyme or lavender oils and their mixture to broiler chicken's diet on their productive performance and some blood biochemsitry.

MATERIALS AND METHODS

This study was performed during May and June 2018, at the Poultry Research Station, Faculty of Agriculture, Al–Azhar University, Nasr City, Cairo, Egypt. A total of 120 one-day-old broiler chicks (Arbor Acres) of an average weight of 42 g, obtained from a commercial hatchery, then sexed and allocated in 2 floor pens one for

* **Corresponding author.**
E-mail address: waleed.abdelmoez@gmail.com
DOI: 10.21608/jappmu.2019.71180

females and the other for males. Water and feed were provided *ad libitum* until 7days of age. Thereafter, birds were divided into four groups with three replicates per treatment; every replicate was comprised of 10 birds (5 males and 5 females) to avoid the sex effect. The four dietary treatments consisted of T1: control, fed only basal diet, T2: fed basal diet + thyme oil (0.4 mg/kg diet), T3: fed basal diet + lavender oil (0.5 ml/kg diet) and T4: fed basal diet + thyme oil (0.4 ml/kg diet) + lavender oil (0.5 ml/kg diet). Birds were housed in open system and wood shaving bedded floor pen. The light regimen in the house was 23 h light: 1 h dark. Temperature was reduced from 32 ^{o}C during the first week of life to 25 ^{o}C at the week three and was then kept constant. Birds fed a diet free from antibiotics which were formulated according to the requirements of the Arbor Acres guidelines for broilers.

Two-phases feeding program was used, with a starter diet till 21 days of age, and the grower diet their after until 35 days of age. The composition of the two basal diets is shown in Table 1.

Essential oils of thyme and lavender were considered pure 100% and were commercially purchased from a local company and added to broiler diet from the 7th day of age to the end of trial. The analysis of essential oils was determined by the producing company as shown in Table 2. A standard vaccination program was applied during the whole period for all treatments group.

Table 1. Basal diet fed to broilers during the experimental periods.

Ingredients	Starter (1-21)	Grower (22-35)
Yellow corn (7.5% CP)	55.7	60.1
Gluten meal (60% CP)	14.0	12.9
Soybean meal (42.5% CP)	24.3	20.3
Mono-calcium phosphate (CaHPO4)	1.6	1.35
Limestone ($CaCO_3$)	1.9	1.9
Vegetable oil	1.5	2.5
Salt (NaCl)	0.3	0.3
Premix*	0.3	0.3
DL-Methionine (100%)	0.2	0.2
L-Lysine (100%)	0.2	0.15
Total (Kg)	100	100
Calculated analysis		
Crude protein (%)	23.02	21.00
Metabolizable energy (Kcal /Kg)	3049	3146
Calcium (%)	1.06	1.01
Available phosphorus (%)	0.47	0.40
L-Lysine (%)	1.14	1.04
DL-Methionine (%)	0.66	0.58
Methionine + Cystine (%)	1.07	0.96

***Premix supplied per Kg of diet: Vit. A, 12000 I.U; Vit. D_3, 3100 I.U; Vit. E, 30 mg; Vit. K_3, 1.65 mg; Vit. B_1, 4.44 mg; Vit. B_2, 5.5 mg; Vit. B_6, 3.3 mg; Vit. B_{12}, 15 µg; Niacin, 53 mg; Pantothenic acid, 11 mg; Folic acid, 1 mg; Biotin, 200 µg; Choline chloride, 715 mg; Copper, 9 mg; Iodine, 1.1 mg; Iron, 88 mg; Manganese, 66 mg; Zinc, 40 mg, Cobalt, 0.2 mg and Selenium, 0.3 mg.**

Table 2. Physico-chemical properties of aromatic oils derived from thyme (*Thymus vulgaris l.*) and lavender (*Lavandula augustifolia m.*).

	Thyme*		Lavender*
Solubility		Ethanol+ Light petroleum	
Relative density	0.921		0.881
Refractive index	1.498		1.458
Active Ingredients (Assay by GC)			
Thyme		Lavender	
Item	%	Item	%
Thymol	44.1%	Linalool	41.9
Para cymene	20.6%	Linalyl acetate	37.4
Gamma terpinene	6.2%	Terpinen-4-ol	2.8
Linalool	5.1%	Camphor	0.8
Carvacrol	1.9%	3-Octanone	0.3
Myrcene	1.6%	Lavandulyl Acetate	0.3
Terpinen-4-ol	0.9%	Cineole	0.2
		Lavandulol	0.2
		limonene	0.1
		Alpha- Terpineol	0.1

***Analysis by the producers.**

Live body weight, weight gain, feed intake and feed conversion ratio were evaluated for whole period. At the end of experiment, sex birds from all groups were slaughtered to evaluate the carcass quality, meat chemical composition, and at 35 days of age, six blood samples per treatment were collected from the wing vein. The blood samples were put into heparinized test tubes. Blood plasma were separated by centrifugation at 1500×g for 10 min at 4 ^{o}C and stored at -18 ^{o}C until the analyses were performed.

All biochemical traits of the blood plasma (total protein, albumin, total cholesterol, triglyceride, HDL and LDL were determined using the commercial diagnostic kits (Diamond Diagnostics Company, Egypt), as reported by Young (2001). Globulin concentration was calculated as the difference between total protein and albumin. LDL was calculated from the following equation: LDL (mg/dl) = Total Cholesterol – (Triglyceride / 5) – HDL. The experiment was arranged in a complete randomized design. Then one-way ANOVA was employed using the SPSS procedure (SPSS for Windows Release 16, SPSS Inc. 2010). The differences among groups were evaluated by Duncan's (Duncan's 1955) multiple comparison tests. Differences were considered statistically significant at ($P \leq 0.05$). The statistical model was: $\mathbf{Yij = \mu + A_j + e_{ij}}$,

where Yij= response variable, µ = is the overall mean, Aj = essential oils (j=1-4), eij = standard error.

RESULTS AND DISCUSSION

The impact of dietary supplementation of thyme and lavender oils on feed intake, weight gain, body weight,

and feed conversion ratio are presented in Table 3. Results indicated that treatments had no significant effect on live body weight and body weight gain at the end of the experiment compared with control group. These results are corresponding with (Cho *et al*,. 2006; Cross *et al.*, 2007; Hoffman and WU, 2010; Attia *et al.*, 2016; and Küçükyilmaz *et al.*, 2017). While, feed intake was significantly decreased, and the best feed conversion ratio was in thyme, mix and lavender treatments, compared with the control group. These results agreed with those of (AL-Kassie, 2009; Saki *et al.*, 2014; Ragaa *et al.*, 2016; and Adaszyńska-Skwirzyńska and Szczerbińska, 2018). These results may be due to the antimicrobial effects of EOs, which improvement of the bacterial classification in the intestinal tract, aromatic oils increasing the production of digestive enzymes and improving digestion (Khattak *et al.*, 2014 and Khosravinia, 2015). Also, Mathlouthi *et al.*, (2009) mentioned that the healthy effects of thyme and lavender on the performance of broiler chickens results from their effects on the digestion, nutrient absorption and immune system.

Table 3. Effect of aromatic oils on growth performance of broiler chickens.

Item	BW at 7 days of age (g)	BW at 35 days of age (g)	BWG from 7-35 days of age (g)	FI from 7-35 days of age (g)	FCR from 7-35 days of age
Control	168.00	1955.33	1787.33	3092.14 [a]	1.73 [a]
Thyme	168.00	1975.22	1807.22	2963.14 [b]	1.64 [b]
Lavender	168.00	1962.17	1794.17	3069.20 [a]	1.71 [a]
Mix	168.00	1956.64	1788.64	2944.79 [b]	1.65 [b]
S.E.M.	0.161	9.079	9.083	15.294	0.000
p-value	1.000	1.000	0.393	0.000	0.000

[a,b]: Means within a column that do not share a common superscript are significantly different (P≤ 0.05).

The effects of dietary supplementation of thyme and lavender oils on blood-plasma protein's profile including total albumin, total globulin, total protein, and A/G ratio are presented in Table 4. Results showed that adding thyme oil to broiler diet significantly increase total blood protein value by 4.02 g/dl followed by lavender, mix and control groups 3.93, 3.84 and 3.79 g/dl, respectively.

Whilst, total albumin was significantly higher in lavender, thyme and the control groups compared with mix group. On the other hand, total blood globulin was significantly higher in thyme group followed by mix and lavender groups in comparison with control group. The best A/G ratio was in mix and thyme groups compared with lavender and control groups. The increase in plasma content of total protein suggested the capacity of aromatic oil to improve digestion and absorption of proteins as previously reported by Bento *et al.* (2013) and Krishan and Narang (2014) allowing a better use of protein in broiler chicken and thus improvement the weight gain. Also, these results may be due to effects of active compounds to stimulate protein synthesis in relative organs (Souri *et al.*, 2015). In addition, Houghton *et al.* (1995) illustrated that the growing in globulin fraction stated the effective role of using aromatic oils in enhancing immunity due to its role in developing and protecting cells; and inhibiting non-enzymatic oxidation.

Table 4. Effect of aromatic oils on blood-plasma protein's profile of broiler chickens.

Item	Total Protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	A/ G Ratio
Control	3.79 [d]	1.91 [a]	1.88 [c]	1.02 [a]
Thyme	4.02 [a]	1.93 [a]	2.09 [a]	0.93 [bc]
Lavender	3.93 [b]	1.95 [a]	1.98 [b]	0.99 [b]
Mix	3.84 [c]	1.84 [b]	2.01 [b]	0.92 [c]
S.E.M.	0.020	0.021	0.027	0.022
p-value	0.000	0.002	0.000	0.006

[a,b,c]: Means within a column that do not share a common superscript are significantly different (P≤ 0.05).

Table 5 discus the influence of thyme, lavender and the blend of them on the blood-plasma lipid's profile.

Thyme treatment significantly decreases the total cholesterol, triglyceride and LDL; while HDL was increased followed by lavender and mix group compared with control group. Further, VLDL value wasn't significantly affected by treatments. These results agreed with those of Case *et al*. (1995) and Lee *et al*. (2004). The decrease in cholesterol content recorded in this study could be due to the inhibiting effects of thymol and carvacrol on 3-hydroxy-3-methyl-glutaryl-CoA reductase (HMG-CoA reductase), a key enzyme in cholesterol synthesis which reduced fat absorption from the intestinal or the lipid catabolism for gluconeogenesis (El-Ghousein and Al-Beitawi, 2009 and Abdulkarimi *et al.*, 2011).

Table 5. Effect of aromatic oils on blood-plasma lipid's profile of broiler chickens.

Item	Cholesterol (mg/dl)	Triglyceride (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
Control	171.00 [a]	93.89 [a]	48.33 [c]	103.89 [a]	18.78
Thyme	136.50 [d]	78.33 [c]	64.28 [a]	55.67 [d]	15.67
Lavender	161.72 [b]	89.72 [b]	56.78 [b]	87.06 [b]	17.94
Mix	150.56 [c]	88.33 [b]	63.39 [a]	69.50 [c]	17.67
S.E.M.	1.14	1.29	0.55	1.23	0.26
p-value	0.000	0.000	0.000	0.000	0.000

[a,b,c,d]: Means within a column that do not share a common superscript are significantly different (P≤ 0.05).

Table 6 displays that supplementing thyme, lavender or their mixture to broiler diet had no significant effect on carcass's chemical composition including protein, moisture, dry matter, fat and ash percentages.

Table 6. Effect of aromatic oils on carcass chemical composition of broiler chickens' meat.

Treatments	Moisture*		Dry matter*		Protein**		Fat**		Ash**	
	Breast	Thigh	Breast	Thigh	Breast	Thigh	Breast	Thigh	Breast	Thigh
Control	71.87	70.19	28.13	29.81	77.32	76.7	19.64	20.35	1.95	1.79
Thyme	72.43	70.66	27.57	29.34	77.91	76.94	19.17	20.34	1.93	1.67
Lavender	72.39	70.65	27.61	29.35	77.84	76.86	19.35	20.43	1.79	1.65
Mix	72.63	70.83	27.37	29.17	78.19	77.18	19.16	20.22	1.67	1.59
p-value	0.30	0.31	0.27	0.28	0.21	0.29	0.11	0.11	0.07	0.07

*** After transformed from Arcsin. ** As a percentage from dry matter.**

Table 7 explains the carcass characteristics as affected by supplementing diet with thyme, lavender and mixture of them. Results appeared that adding thyme, lavender or their mixture to broiler diet had any significant effect on carcass characteristics including dressing, total edible parts and total inedible parts relative weight. These results agreed with those of Ocak *et al.* (2008). Whilst, abdominal fat relative weight was significantly decreased in mixture group followed by thyme and lavender groups compared with control group. Also, thymus and bursa of Fabricius relative weights were increased by supplementing of thyme and mixture of thyme and lavender followed by lavender and control groups. The results here are similar to those obtained by Denli *et al.* (2004).

Table 7. Effect of aromatic oils on carcass characteristics of broiler chickens.

Treatments	LBW (g)	Dressing* %	Total edible parts* %	Total inedible parts* %	Abdominal fat* %	Bursa* of Fabricius %	Thymus* %
Control	1955.33	74.6	76.199	23.80	1.74[a]	0.0586 [b]	.00211 [d]
Thyme	1975.22	75.1	76.633	23.37	1.45[b]	0.0655 [a]	.00226 [a]
Lavender	1962.17	74.9	76.456	23.54	1.51[b]	0.0576 [b]	.00217 [c]
Mix	1956.64	74.9	76.427	23.57	1.33[c]	0.0646 [a]	.00224 [b]
p-value	1.000	0.088	0.288	0.288	0.001	0.000	0.000

[a,b,c,d:] Means within a column that do not share a common superscript are significantly different (P≤ 0.05).

*** After transformed from Arcsin.**

CONCLUSION

It can be concluded that the addition of 0.4 ml/kg thyme or mixture from thyme and lavender at level of 0.4 and 0.5 ml/kg diet, respectively for broiler's diet can improve growth performance, immunity and blood biochemical parameters of broiler chickens.

REFERENCES

Abd El-Latif, S.A., F.A. Ahmed and A.M. El-Kaiaty (2002). Effect of feeding dietary thyme, black cumin, dianthus and fennel on productive and some metabolic responses of growing Japanese quail. Egy. Poult. Sci. J., 22 (1): 109-125.

Abdulkarimi, R., M. Daneshyar, and A. Aghazadeh (2011). Thyme (*Thymus vulgaris*) extract consumption darkens liver, lowers blood cholesterol, proportional liver and abdominal fat weights in broiler chickens. Ital. J. Anim. Sci., 10: 101–105.

Adaszyńska-Skwirzyńska, M. and D. Szczerbińska (2018). Use of essential oils in broiler chicken production – a review. Ann. Anim. Sci., 17 (2): 317–335.

Al-Kassie, G.A.M., (2009). Influence of two plant extracts derived from thyme and cinnamon on broiler performance. Pakis. Vet. J., 29: 169-173.

Attia, Y., A. Bakhashwain and N.K. Bertu (2016). Thyme oil (*Thyme vulgaris* L.) as a natural growth promoter for broiler chickens reared under hot climate. Itali. J. Anim. Sci., 16: 275-282.

Bento, H.L., A.C. Ouwehand, K. Tiihonen, S. Lahtinen, P. Nurminen, M.T. Saarinen, H. Schulze, T. Mygind, and J. Fisher (2013). Essential oil and their use in animal feeds for monogastric animals – effect on feed quality, gut microbiota, growth performance and food safety: a review. Vet. Med., 58 (9): 449-458.

Byarugaba, D.K. (2007). The structure and importance of the commercial and village-based poultry systems in Uganda. FAO-Consultancy Report, Food and Agriculture Organization of the United Nations, Rome, Italy.

Case, G.L., L. He, H. Mo, and C.E. Elson (1995). Induction of geranyl Pyrophosphate pyrophosphatase activity by cholesterol suppressive isoprenoids. Lipids, 30: 357-359.

Cavanagh, H.M.A. and J.M. Wilkinson (2002). Biological activities of lavender essential oil. Phyto. Ther. Res., 16: 301–308.

Cho, J.H., Y.J. Chen, B.J. Min, H.J. Kim, O.S. Kwon and K.S. Shon, (2006). Effects of essential oils supplementation on growth performance. IgG concentration and fecal noxious gas concentration of weaned pigs. Asia. Austr. J Anim. Sci., 19: 80-89.

Cross, D.E., R.M. Mcdevitt, K. Hillman, and T. Acamovic (2007). The effect of herbs and their associated essential oils on performance, dietary digestibility and gut microflora in chickens from 7 to 28 days of age. Brit. Poult. Sci., 48 (4): 496-506.

Denli, M., F Okan, and A.N. Uluocak (2004). Effect of dietary supplementation of herb essential oils on the growth performance, carcass and intestinal characteristics of quail. South Africa. J. Anim. Sci., 34 (3): 174-179.

Duncan, D.B., (1955). Multiple rang and multiple F-test. Biometrics, 11: 1-42.

El-Ghousein, S.S. and N.A. Al-Beitawi (2009). The effect of feeding of crushed thyme (Thymus vulgaris) on growth, blood constituents, gastrointestinal tract and carcass characteristics of broiler chickens. J. Poult. Sci., 46: 100-104.

Grigore, A., I.N. Paraschiv, S. Colceru-Mihul, C. Bubueanu, E. Draghici and M. Ichim, I. (2010). Chemical composition and antioxidant activity of Thymus vulgaris L. volatile oil obtained by two different methods. Romanian Biotechnological Letters.,15 (4): 5436-5443.

Grosso, C, A.C. Figueiredo, J. Burillo, A.M. Mainar, J.S. Urieta and J.G. Barroso (2010). Composition and antioxidant activity of Thymus vulgaris volatiles: comparison between supercritical fluid extraction and hydro distillation. J. Separation Sci., 33(14): 2211- 2218.

Gülçin, İ., İ.G. Şat, Ş. Beydemir, M. Elmestaş and Ö.İ. Küfrevioğlu, (2004). Comparison of antioxidant activity of clove (Eugenia caryophylata Thunb) buds and lavender (Lavandula stoechas L.). Food Chem., 87: 393-400.

Hashemipour, H., H. Kermanshahi, A. Golian and T. Veldkamp (2013). Effect of thymol and carvacrol feed supplementation on performance, antioxidant enzyme activities, fatty acid composition, digestive enzyme activities, and immune response in broiler chickens. Poult. Sci., 92: 2059-2069.

Hoffman, P.D. and C. Wu (2010). The effect of thymol and thyme oil feed supplementation on growth performance, serum antioxidant levels and cecal Salmonella population in broilers. J. Appl. Poult. Res., 19: 432-443.

Houghton, P.J., R. Zarka, B. de las Heras and J.R. Hoult (1995). Fixed Oil of Nigella Sativa and Derived Thymoquinone Inhibit Eicosanoid Generation in Leukocytes and Membrane Lipid Peroxidation. Planta Med., 61: 33-36.

Javed, M., F. Durrani, A. Hafeez, R.U. Khan and I. Ahmad (2009). Effect of aqueous extract of plant mixture on carcass quality of broiler chicks. J. Agric. Biolog. Sci., 4: 37-40.

Jones, F.T., and S.C. Ricke (2003). Observations on the history of the development of antimicrobials and their use in poultry feeds. Poult. Sci., 82: 613–617.

Khattak, F, A. Ronchi, P. Castelli and N. Sparks (2014). Effects of natural blend of essential oil on growth performance, blood biochemistry, cecal morphology, and carcass quality of broiler chickens. Poult. Sci., 93: 132-7.

Khosravinia, H. (2015). Litter quality and external carcass defects in broiler chicken influenced by supplementation of drinking water with savory (*Satureja khuzistanica*) essential oils. Global J. Anim. Scient. Res., 1: 247–252.

Krishan, G. and A. Narang (2014). Use of essential oils in poultry nutrition: A new approach. J. Adv. Vet. Anim. Res., 1: 156-162.

Küçükyilmaz, K., Z. Kiyma, A. Akdağ, M. Çetinkaya, H. Atalay, A. Ateş, F. E. Gürsel and M. Bozkurt (2017). Effect of lavender (*Lavandula stoechas*) essential oil on growth performance, carcass characteristics, meat quality and antioxidant status of broilers. S. Afr. J. Anim. Sci., 47: 178- 186.

Lee, K.W., H. Everts, H.J. Kappert, H. Wouterse, M. Frehner and A.C. Beynen (2004): Cinnamanaldehyde, but not thymol, counteracts the carboxymethyl cellulose-induced growth depression in female broiler chickens. Int. J. Poult. Sci., 3: 608-612.

Mathlouthi, N., T. Bouzaienne, I. Oueslati, F. Recoquillay, M. Hamdi and R. Bergaoui (2009). Effet de deux préparations d'huiles essentielles sur la croissance des bactéries *in vitro* et les performances du poulet de chair. INRA (Eds). 8èmes Journée de Recherche Avicole, INRA St Malo., 454-458.

Mehdipour, Z., M. Afsharmanesh and M. Sami (2014). Effects of supplemental thyme extract(*Thymus vulgaris* L.) on growth performance, intestinal microbial populations, and meat quality in Japanese quails. Comparative Clinical Pathol., 23 (5): 1503-1508.

Niewold, T.A. (2007). The nonantibiotic anti-inflammatory effect of antimicrobial growth promoters, the real mode of action? A hypothesis. Poult. Sci., 86: 605–609.

Ocak, N., G. Erener, A. Burak, M. Sungu, A. Altop and A. Ozmen (2008). Performance of broilers fed diets supplemented with dry peppermint (*Mentha piperita* L.) or thyme (*Thymus vulgaris* L.) leaves as growth promoter source. Czech J. Anim. Sci., 53 (4): 169-175.

Popović, S., N. Puvača, L. Kostadinović, N. Džinić, J. Bošnjak and M. Vasiljević (2016). Effects of dietary essential oils on productive performance, blood lipid profile, enzyme activity and immunological response of broiler chickens. Euro. Poult. Sci., 80: 1-12.

Ragaa, N.M., R.S. Korany and F.F. Mohamed (2016). Effect of thyme and/or formic acid dietary supplementation on broiler performance and immunity. Agri. Agri. Sci. Procedia, 10: 270-279.

Saki, A., M. Kalantar and V. Khoramabadi (2014). Effects of drinking thyme essence (*Thymus vulgaris* L.) on growth performance, immune response and intestinal selected bacterial population in broiler chickens. Poultry Science Journal, 2 (2): 113-123.

Saleh, N., A. Tamer, A. Abd El-latif and E. Ghazy (2014). The effects of dietary supplementation of different levels of thyme (*Thymus vulgaris*) and ginger (*Zingiber officinale*) essential oils on performance, hematological, biochemical and immunological parameters of broiler chickens. Glob. Vet., 12 (6): 736-744.

Sarica, S., A. Ciftci, E. Demir, K. Kilinc and Y. Yildirim (2005). Use of an antibiotic growth promoter and two herbal natural feed additives with and without exogenous enzymes in wheat-based broiler diets. South Afric. J. Anim. Sci., 35: 61-72.

Souri, H., A. Khatibjoo, K. Taherpoor, A.H. Abadi and F. Fattahnia (2015). Effect of *Thymus vulgaris* and *Satureja khuzestanica* ethanolic extracts on broiler chicken's performance and immune response. Iran. J. Appl. Anim. Sci., 5 (2): 437-446.

SPSS: Statistical Package for Social Sciences (2010): Release 16.0.1 version. SPSS Inc.

Tolba, AAH. and MSH. Hassan (2003). Using some natural additives to improve physiological and productive performance of broiler chicks under high temperature conditions. 2-Black cumuin (*Nigella sativa*) or garlic (*Allium sativum*). Egy. Poult. Sci. J., 23: 327-340.

Young, D.S. (2001). Effects of disease on Clinical Lab. Test, 4th ed. AACC.

الأداء الإنتاجي وبعض مقاييس الدم لدجاج التسمين المُغذي علي علائق مضاف إليها زيوت الزعتر واللافندر

طريف عبد العزيز شما ، عبد الرفيع احمد الشافعي و وليد عبد المعز عباس الياظبي*

قسم الإنتاج الحيواني ـ كلية الزراعة بالقاهرة- جامعة الأزهر- جمهورية مصر العربية

أجريت هذه الدراسة في المزرعة البحثية التابعة لكلية الزراعة جامعة الأزهر بالقاهرة خلال شهري مايو ويونيو من عام 2018 م باستخدام عدد 120 طائرا من دجاج التسمين عمر أسبوع، وذلك لدراسة تأثير إضافة زيوت كل من الزعتر واللافندر وخليطهما علي الأداء الإنتاجي والذبيحة والتحليل الكيميائي للحم وبعض صفات الدم لدجاج التسمين. قُسمت الطيور الي 4 مجموعات بكل منها 30 طائرا مقسمة الي ثلاث مكررات بكل منها 10 طيور(5 ذكور+ 5 إناث). غُذيت المجموعة الأولي (الكنترول) علي عليقة بدون أي إضافات، المجموعة الثانية غُذيت علي علائق مضاف إليها زيت الزعتر بمعدل 0.4 مل/ كجم عليقة، المجموعة الثالثة غُذيت علي علائق مضاف إليها زيت اللافندر بمعدل 0.5 مل/ كجم عليقة، بينما المجموعة الرابعة غُذيت علي علائق أضيف إليها خليط من زيتي الزعتر واللافندر بمعدل 0.4 مل زعتر+ 0.5 مل لافندر/ كجم عليقة. أشارت النتائج الي تحسن معنوي في الأداء الإنتاجي للطيور التي غذيت علي العلائق المحتوية علي الزعتر(المجموعة الثانية) وعلي العليقة المحتوية علي خليط من الزعتر واللافندر (المجموعة الرابعة) مقارنة بالمجموعة التي غُذيت علي اللافندر (المجموعة الثالثة) والمعاملة الكنترول. لوحظ تحسنا معنويا في كل من البروتين الكلي والألبيومين والجلوبيولين في دم دجاج المعاملات مقارنة بالكنترول. انخفضت نسبة الكوليستيرول والدهون الثلاثية في الدم مع زيادة نسبة الليبوبروتين عالي الكثافة في المعاملات مقارنة بالكنترول. أيضا انخفضت نسبة دهون البطن في المعاملات مقارنة بالكنترول. وبناء علي ذلك، فإنه يمكن إضافة زيوت الزعتر واللافندر الي علائق دجاج التسمين لتحسين الصفات الإنتاجية بدون حدوث أضرارا عكسية.