



Effect of using different methods of adding *Melissa officinalis* L. on some physiological and immunological traits of broiler

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Abstract

A study of the effect of adding lemon balm leaves and their extract on physiological performance and immunological traits of Ross308 broiler chickens. 300 broiler chicks were used, were randomly distributed to five groups, as follows: T1: (control treatment without any treatment). T2: adding *Melissa officinalis* L. leaves powder at a concentration of 5 gm / kg of feed. T3: adding the water extract of *Melissa officinalis* L. leaves at a concentration of 5 ml extract / liter of drinking water. T4: adding the oil extract of *Melissa officinalis* L. leaves at a concentration of 5 ml of oil / kg of feed. T5: adding alcoholic extract of *Melissa officinalis* L. leaves at a concentration of 5 ml of oil / kg of feed. The results indicated that all treatments of adding *Melissa officinalis* L. leaves powder improved the blood and immunological characteristics of broiler chickens, and that the best results were the use of water extract of melissa leaves powder compared to the rest of the treatments.

Keywords: comparative study, *Melissa officinalis* L. leaves, blood, immunity, broiler.

Introduction

Medicinal plants were extensively studied to identify the important components, an example of the use of these medicinal plants is the *Melissa officinalis* L. plant, which has many health benefits, many studies have been conducted to find out its medical and therapeutic importance, Zam *et al.* (2022) noted that the *Melissa officinalis* L. herb contributes to reducing the level and symptoms of anxiety in people with anxiety disorders, it has calming effects as well as treats mental disorders, such as lack of sleep, insomnia, hyperactivity disorders, lack of attention and focus. Drinking *Melissa officinalis* L. leaves twice a day contributes to the treatment of colic (infant colic) in infants (Savino *et al.*, 2005; Kaim *et al.*, 2022).

M. officinalis L. leaves contain volatile oils such as citronellal and citrals A and B., for its antioxidant properties, improve memory and increase attention in individuals with Alzheimer's disease as a result of its antioxidant action, which protect the cells of the body from damage caused by a chemical process called oxidative stress to this effect (Miraj *et al.*, 2017; Kiczorowska *et al.*, 2020). *M. officinalis* L. infusion also delays the appearance of signs of aging, it also has

antiviral properties through phenolic compounds, a natural plant-based antioxidant, as a free radical reducer in cells, which prevents the oxidative stress process (Schnitzler *et al.*, 2008).

The use of medicinal herbs, especially *Melissa officinalis* L., has an important role in supporting the immune system of broilers compared to antibiotics (Mehdi *et al.*, 2018; Mohammed and Al-Gharawi, 2022). Medicinal plants, including *Melissa officinalis* L., have improved the immunity of birds against viral diseases, especially Newcastle disease. (Raza *et al.*, 2015). The water extract of *Melissa officinalis* L. leaves at a ratio of 1, 1.5 and 2 ml per liter of broiler drinking water, a significant increase in the immunoglobulins IgG and IgM in the blood of broiler chickens at the age of 42 days (Faezeh and Mehrdad, 2015; Marzouk *et al.*, 2022). The extract of water of *M. officinalis* L. leaves at a ratio of 1, 1.5 and 2 ml\ liter of water of drinking for broiler chickens, did not significantly affect the relative weight of Fabricia gland compared to the two treatments of control and aqueous extract of melissa leaves at a ratio of 0.5 ml per drinking water liter (Poorghasemi *et al.*, 2017).

The aims of this study to demonstrate the effect of using different methods of

Melissa officinalis L. leaves on some physiological and immunological characteristics of broiler.

Material and methods

A study of the effect of using different methods of *Melissa officinalis* L. leaves on some immunological and physiological characters of Ross308 broiler chickens. This experiment was carried out in the field of poultry, the first Agricultural Research and Experiment Station, faculty of Agriculture, Al-Muthanna University, from 2/12/2018 to 6/1/2019. A total of 300 broiler chicks of Ross 308, one day, 40 gm, were used. The chicks were reared in a room measuring 40m x 10m, at batteries with four floors, each floor contains a cage with dimensions of 1.5 x 1 m. Chicks were randomly distributed to five experimental treatments, with 60 chicks per treatment, with three replicates for the treatment (20 chicks/ replicate), as follows:

T1: (control treatment without any treatment).

T2: adding *Melissa officinalis* L. leaves powder at a concentration of 5 gm / kg of feed.

T3: adding the water extract of *Melissa officinalis* L. leaves at a concentration of 5 ml extract / liter of drinking water.

T4: adding the oil extract of *Melissa officinalis* L. leaves at a concentration of 5 ml of oil / kg of feed.

T5: adding alcoholic extract of *Melissa officinalis* L. leaves at a concentration of 5 ml of oil / kg of feed.

Study traits were packed cell volume (PCV), hemoglobin concentration (Hb), cholesterol, triglycerides, and glucose.

Results and Discussion

The results data of table (1) showing the effect of using different methods of adding *Melissa officinalis* L. leaves on PCV and Hb in the blood of broiler, a significantly higher ($P \leq 0.05$) of PCV for T3 treatment compared to T2, which increased significantly ($P \leq 0.05$) compared to control treatment, there were no significant differences between treatments T2, T4 and T5 and treatments T3, T4 and T5. Significantly higher ($P \leq 0.05$) of Hb for T3 treatment compared to T2, which was significantly superior ($P \leq 0.05$) compared to control treatment, and no significant differences between T2 and T4 and T3, T4 and T5 treatments.

Table (1) the effect of using different methods of adding *Melissa officinalis* L. leaves on PCV and Hb in the blood of broiler (mean \pm standard error).

Treatments	PCV (%)	Hb (gm/100 ml)
T ₁	0.32±30.47 c	0.025±11.29 C
T ₂	0.21±33.15 b	0.069±12.71 B
T ₃	0.15±35.69 a	0.044±13.57 a
T ₄	0.29±34.22 ab	0.052±13.17 ab
T ₅	0.11±34.52 ab	0.063±13.25 a
Sig	*	*

Table (2) shows the effect of using different methods of adding *Melissa officinalis* L. leaves on Glucose, Cholesterol and Triglycerides in the blood of broiler, a significant decrease ($P \leq 0.05$) on Glucose, Cholesterol and Triglycerides for all treatments of adding *Melissa officinalis* L. leaves compared to the treatment of control, no significant differences between all treatments of adding *Melissa officinalis* L. leaves.

Table (2) the effect of using different methods of adding *Melissa officinalis* L. leaves on Glucose, Cholesterol and Triglycerides in the blood of broiler (mean \pm standard error).

Treatments	The Glucose (mg/100 ml)	The Cholesterol (mg/100 ml)	The Triglycerides (mg/100 ml)
T ₁	1.07±175.25 a	0.15±140.65 a	0.17±145.89 a
T ₂	0.95±172.42 b	0.27±138.04 b	0.35±141.32 b
T ₃	1.11±170.65 b	0.27±137.42 b	0.35±140.22 b
T ₄	1.43±170.92 b	0.27±137.95 b	0.35±141.06 b
T ₅	1.24±171.05 b	0.27±137.88 b	0.35±140.78 b
Sig	*	*	*

Improve blood qualities when adding *Melissa officinalis* L. leaves, as the concentration of PCV and Hb increases, it may be due to RBC increase, due to the

Melissa officinalis L. leaves (Hashemnia *et al.*, 2017). Terpenes were inhibit hepatic biosynthesis and formation of a cholesterol nucleus in bile (Chung *et al.*, 2008).

Melissa officinalis L. It prevents hypercholesterolemia and reduces blood lipids as well as reducing lipid peroxidation in the liver (Bolkent *et al.*, 2005). Changizi-Ashtiyani *et al.* (2013) showed that *Melissa officinalis* L. showed an ability to reduce blood cholesterol, LDL and triglycerides, the hypolipidemic properties of the alcoholic extract of *Melissa officinalis* L. were most likely related to its antioxidant properties and its effect on increasing thyroid hormone. Chung *et al.* (2010) showed that the essential oils in *Melissa officinalis* L. leaves have anti-diabetic properties, which improves glucose tolerance as well as adjusting the expression of genes involved in gluconeogenesis in the liver.

Table (3) shows the effect of using different methods of adding *Melissa officinalis* L. leaves on the immune response of broilers, the results indicate a significant increase ($P \leq 0.05$) on DTH, ELISA and Bursa Relative weight, for all *Melissa officinalis* L. leaves treatments, with no significant differences among all treatments of adding leaves of *Melissa*

officinalis L., while T3 treatment showed a significant increase ($P \leq 0.05$) compared to T2 treatment, which showed a significant increase compared ($P \leq 0.05$) to the control treatment, there were no significant differences between the treatments T2, T4 and T5 and the treatments T3, T4 and T5.

Table (3) the effect of using different methods of adding *Melissa officinalis* L. leaves on the immune response of broilers (mean \pm standard error).

Treatments	DTH	ELISA	Bursa Relative weight	Bursa index
T ₁	0.003 \pm 0.152 B	13.41 \pm 2255.1 b	0.001 \pm 0.037 b	0.000 \pm 1.000 c
T ₂	0.006 \pm 0.166 A	25.17 \pm 2341.2 a	0.002 \pm 0.053 a	0.005 \pm 1.432 b
T ₃	0.004 \pm 0.172 a	19.42 \pm 2372.0 A	0.001 \pm 0.060 A	0.003 \pm 1.622 a
T ₄	0.002 \pm 0.169 A	21.39 \pm 2360.3 A	0.001 \pm 0.057 A	0.004 \pm 1.540 ab
T ₅	0.005 \pm 0.167 A	20.66 \pm 2352.4 A	0.001 \pm 0.055 A	0.004 \pm 1.486 ab
Sig	*	*	*	*

All treatments adding *Melissa officinalis* L. leaves recorded the highest immunogenic performance compared to the control treatment, because essential oils have immunomodulatory and anti-inflammatory effects, it has a positive effect on the immune system of birds, it promotes the production of immunoglobulins, enhance lymphocyte activity, release of interferon, essential oils are used during periods when birds are stressed, the oils also relieve stress caused by vaccination against diseases (Al-Ramahi *et al.*, 2019).

Faezeh and Mehrdad (2015) indicated that *M. officinalis* leaves have a major role in raising the immune response of birds, by increasing the number of antibodies directed against pathogens, whether against viral disease. Mehdi *et al.* (2018) showed that medicinal plants, including lemon balm, contain active compounds, the most important of which is octinol, which works to support the immune system by increasing the stimulation against antigens to form a series of lymphocytes from T cells, produce lymphatics, highlights its importance in the inhibitory activity of the enzymes of the respiratory chain to control the inflammatory process, by inhibiting the production of Leukotriene and Prostaglandin, which are important factors in the inflammatory process.

Conclusion

We concluded from this study that all treatments added *Melissa officinalis* L. gave the best results for physiological and immunological traits of broiler compared to control treatment.

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References

- Al-Ramahi, R.K.A., J.K.M. Al-Gharawi and R.A. Al-Zeadi.** 2019. Use of Melissa leaves water extract as a natural antibiotic on some immunological and blood traits of broilers. *Plant Archives* Vol. 19, Supplement 1:1349-1351.
- Bolkent S., R. Yanardag, O. Karabulut-Bulan and B. Yesilyaprak.** 2005. Protective role of *Melissa officinalis* L. extract on liver of hyperlipidemic rats: A morphological and biochemical study. *J Ethnopharmacol.* 99(3): 391-8.
- Changizi-Ashtiyani, S., A. Zarei and S. Taheri.** 2013. A comparative study of hypolipidemic activities of the extracts of *Melissa officinalis* and *Berberis vulgaris* in rats. *J Med Plants.* 12(47): 38-47.
- Chung M.J., S.Y. Cho and M.J. Bhuiyan.** 2010. Anti-diabetic effects of *Melissa officinalis* L. (*Melissa officinalis*) An essential oil on the lipid and glucose and regulating the enzymes in type 2 diabetic rats. *Br J Nutr.* 2010; 104(2): 180-8.
- Chung, M.J., K.W. Park and K.H. Kim.** 2008. Asian plantain (*Plantago asiatica*) essential oils suppress 3- hydroxy-3-methyl-glutaryl-co-enzyme A reductase expression in vitro and in vivo and show hypocholesterolaemic properties in mice. *Br J Nutr.* 99(1): 67-75.
- Faezeh, A. and M. Mehrdad.** 2015. Effect of *Melissa officinalis* L. (*Melissa officinalis*) aqueous extract on immune response and performance of broilers. *Journal of Animal Production.* 17 (2): 281-290.
- Hashemnia, M., F. Rezaei, Z. Nikousefat and M. Bahiraei.** 2017. Toxicological evaluation of chronic oral administration of *Melissa officinalis* hydro-ethanol extract in Sprague-Dawley rats. *Veterinary Science Development,* 7(1).
- Kaim, H.H., J. K. Al-Gharawi and H.H. Blaw.** 2022. Studying the effect of different levels of aqueous extract of sage (*Salvia officinalis*) leaves on some carcass quality traits of Chinese ducks. *Jornal of Al-Muthanna for Agricultural Sciences,* 9(2): 78-83.
- Kiczorowska, B., W. Samolinska, A. Al-Yasiry and M. Zajac.** 2020. Immunomodulant feed supplement *Boswellia serrata* to support broiler chickens' health and dietary and technological meat quality. *Poultry Science* 99:1052–1061.
- Marzouk, A.A., I.F. Al-Zamili and J.K. Al-Gharawi.** 2022. The effect of

- added the Iraqi probiotics to diet on some blood traits of Chinese ducks. *Jornal of Al-Muthanna for Agricultural Sciences*, 9(2): 31-39.
- Mehdi, Y.**, M.L. Montminy, M. Gaucher, Y. Chorfi, G. Suresh, T. Rouissi, S.K. Brar, C. Caot, A.A. Ramirez and S. Godbout. 2018. Use of antibiotics in broiler production: Global impacts and Alternatives. *Animal Nutrition* 4:170-178.
- Miraj S.**, R. Kopaei, S. Kiani. 2017. *Melissa officinalis* L.: A Review Study With an Antioxidant Prospective. *J Evid Based Complementary Altern Med*.22(3): 385-394.
- Mohammed**, A.K. and J.K. Al-Gharawi. 2022. Study the effect of different levels of aqueous extract of licorice on the carcass traits of Chinese ducks. *Jornal of Al-Muthanna for Agricultural Sciences*, 9(2): 84-89.
- Poorghasemi**, M., M. Chamani, S.Z. Mirhosseini, A.A. Sadeghi and A. Seidavi. 2018. Effect of probiotic and different sources of fat on performance, carcass characteristics, intestinal morphology and ghrelin gene expression on broiler chickens. *Fak. Derg*.24(2): 169-178.
- Raza, A.**, F. Muhammed, S. Bashiri, M.I. Anwar, M.M. Awis, M. Akhtar, B. Aslam, T. Khaliq and M.U. Naseers. 2015. Antiviral and immune boosting activities of different medicinal plants against Newcastle disease virus in poultry. *World's Poultry Science Journal*, Vol. 71: 523-52.
- Savino, F.**, F. Cresi, E. Castagno, L. Silvestro and R. Oggero. 2005. A randomized double-blind placebo-controlled trial of a standardized extract of *Matricariae recutita*, *Foeniculum vulgare* and *Melissa officinalis* (ColiMil) in the treatment of breastfed colicky infants. *Phytotherapy Research.*, 19: 335–340.
- Schnitzler P.**, A. Schuhmacher, A. Astani and J. Reichling. 2008. *Melissa officinalis* oil affects infectivity of enveloped herpesviruses. *Phytomedicine*. 15(9):734-40.
- Zam, W.**, C. Quispe, J. Sharifi-Rad, M.D. López, M. Schoebitz, M. Martorell, F. Sharopov, P.V.T. Fokou, A.P. Mishra, D. Chandran, M. Kumar, J.T. Chen and R. Pezzani. 2022. An Updated Review on The Properties of *Melissa officinalis* L.: Not Exclusively Anti-anxiety. *Front Biosci (Schol Ed)*.,14(2):16.