http://dx.doi.org/ Artigo Científico

http://www.higieneanimal.ufc.br Medicina Veterinária

Effect of use different levels of encapsulated lavender essential oil supplemented diets on performance, carcass traits and characteristics in broiler Japanese quails

Amir Naghieh[1], Sayed Nouraldin Tabatabie*[1], Majid Toghyani **[1], Amir Davar Forouzandeh Shahraki[1], Mostafa Faghani[2]

Abstract: To determine the effect of use different levels of encapsulated lavender essential oil (Lavender EEO) supplemented diets on performance and carcass traits and characteristics in broiler Japanese quails the experiment was done with five hundred one days old quail with 5 treatments including the control group and others those consuming encapsulated lavender essential oil levels of 100 200,300 and 400 mg per kg of standard diet with 5 repetitions and 20 quail each. The feed intake (FI), body weight (BW), feed conversion ratio (FCR) and feed efficiency were (FER) calculated. At the end of the study period, two male quails were randomly selected, slaughtered and eviscerated. The carcass traits and carcass relative weights were evaluated. The proximate compositions of meat such as moisture, crude fiber and ash content percentage were determined. Data from the currents study showed that use of different levels of encapsulated lavender essential oil supplemented diets on performance such as feed intake, body weight, feed conversion ratio and feed efficiency ratio in experimental quails compared to the control but not significantly. Warm and cold carcass weights, tight and breast percentage were tended to increase insignificantly and abdominal fat percentage decreased by significantly ($p \leq 0.05$) by using of different levels of Lavender EEO supplemented diets. Additionally, data of proximate composition of thigh and breast meat showed that there were none significantly differences of moisture , crude fiber and ash contents percentage in quails were fed by different levels Lavender EEO supplemented diets compared to the control.

Conclusion: In conclusion, we may demonstrate that application of different levels of Lavender EEO supplemented diets had beneficial acts on performance, carcass traits and characteristics and proximate composition of thigh and breast meat in broiler Japanese quails.

Keywords: Lavender essential oil, Encapsulation, Performance, Carcass traits, Japanese quails.

---

http://dx.doi.org/
Autor para correspondência. E-mail: sntabaee@yahoo.com and toghiani@hotmail.com
Corresponding authors: Sayed Nouraldin Tabatabie * and Majid Toghyani**
Recebido em 16.03.2025. Areito em 30.06.2025
Email: sntabaee@yahoo.com and toghiani@hotmail.com
[1]. Department of Animal Science, Isf.C., Islamic Azad University, Isfahan, Iran
[2]. Department of Animal Science, Shk.C., Islamic Azad University, Shahrekord, Iran

Introduction

Now a day's herbal plants and their derived compounds as a growth promoter held a massive position in the poultry industry. Many researchers has focused on natural growth promoters include herbs and their essential oils for their stimulating advantages effects on birds digestive system. Lavender (*Lavandula angustifolia*), is belongs to the *Lamiaceae* family and it is a widely distributed aromatic plant which is known as a powerful medicinal plant and could be used as a feed additive. It has also antiviral, antibacterial, antifungal, and antioxidation properties (HUI et al. 2010).

Fakhari et al. (2005) declared that lavender oil contained linalool (32.8%), linalyl acetate (17.6%), lavandulyl acetate (15.9%), α-terpineol (6.7%), geranyl acetate (5%), and lavandulol (4.3%). In another survey, linalool acetate (46.25%) and linalool (35.17%) are considered the major compounds of lavender essential oil (KIM AND LEE, 2022).

The result of (Salarmoini et al .,2019) study showed that lavender extract at 400 ppm level significantly increased feed intake during the whole rearing period, especially in finisher period and also improved body weight gain and feed conversion ratio but there were no significant differences in the carcass traits and the relative weight of internal organs of the broilers including breast, thighs, liver, heart, gizzard and abdominal fat that fed by lavender extract at 400 ppm level.Laghouati et al, (2019) showed no deaths were recorded throughout the breeding period and highly significant differences were observed among the groups with regard to body weight measured on day 20 and day 42 respectively.

They also showed that the addition of lavender oil was accompanied by reductions in fat content of the meat ($p \leq 0.05$).

The results of different weeks of the experimental period showed an increase in daily weight in quails consuming lavender essential oil and antibiotics compared to the control group. In general, the feed conversion ratio using essential oils and antibiotics decreased compared to the control group during different breeding periods and a slight decrease in the relative percentage of body weight, liver and an increase in the weight percentage of empty breasts, thighs and carcasses of the studied quails under the influence of lavender essential oils and antibiotics (Naderi et al, 2021).

Laghouati et al (2020) also found that the addition of lavender oil during all breeding phases resulted in significant differences in the characteristics of the carcass and the physicochemical properties of the meat. Their findings included a significant increase in both warm and cold carcass weights, carcass yield, and featherweights interestingly, we observed no effect on live weight or the weights of the feet, head and gizzards, similar to results reported previously.

Mokhtari et al., (2018) been showed that the lavender essential oil has antioxidant, antimicrobial, immune system enhancing and stimulator for digestion and absorption properties; hence the aim of this study was to determine effect of use different levels of dietary Lavender EEO on performance, carcass traits and characteristics in broiler Japanese quails.

Materials and Methods

The experiment was done with five hundred one days old quail with five treatments including the control group and others those consuming Lavender EEO levels of 100 200, 300 and 400 mg per kg of standard diet with five repetitions and 20 quail's each. The quails were kept into experimental cage compartments.

During the study period, the thermostat radiator was used to set the temperature at 35 degrees of centigrade for the first week, and afterward the temperature was gradually reduced every week until it was set at thermal natural zone 18-21°C. Basal diet was balanced based on corn and soybean meal recommended by National Research Council (NRC, 1994).

The fresh and drinkable water were available adlibitum during the study period. The live body weight gains, feed intake, feed conversion ratio and feed efficiency

were calculated. At the end of trial period (five weeks), two male quails form each replicate were slaughtered by via a neck cut method, then dressing and the internal organs were removed after slaughter and some visceral organ percentages were calculated.

Carcass traits and characteristics evaluation

The male quails were randomly selected and slaughtered via a neck cut, bled for 120s, and semi-scalded 54°C for 30 second before mechanical plucking. The quails were eviscerated manually, washed and allowed to drain for 10 min.

After evisceration, the carcasses were stored at 3±0.5°C for10–12 h and then dissected according to the method utilized by Barbut (2002).

The warm, cold carcass weights were calculated, and the thigh meat, breast meat and abdominal fat area was removed and measured as a percentage of the organ to the total body weight index.

Proximate composition of thigh and breast meat

For determination the proximate composition of meat, moisture, crude fat and crude protein contents percentage of tight and breast meat of quails were determined according to methods described by AOAC (2005) and according to the (GENCHEV et al.,2008; GENCHEV et al.,2010).

Statistical analysis

Revealed data were analyzed statistically by one-way ANOVA method using SAS 9.1(2004) software and Duncan's (1995) multiple range tests was used to detect the differences ($P \leq 0.05$) among different treatments means.

Data were analyzed based on the model as below:

$$\mathbf{Y_{ij}=\mu+t_i+e_{ij}}$$

Whereas: Y_{ij}= Means effect observed, μ=Mean, t_i = Effects of Lavender EEO, e_{ij}=Effect of errors.

Result and Discussion

The result of table 1 has shown the effects of different levels of Lavender EEO supplemented diets on performance in broiler Japanese quails.

The obtained result data showed that different levels of Lavender EEO have beneficial effect but none significantly on FI, BW FCR, and FER significantly. (Table 1).

This result is similar to that reported by (Nasiri Moghaddam et al.,2012) who reported that the addition of 350 ppm of essential oil of lavender to the diet of broiler

chickens resulted in increased live weights during the 22–42-day interval.

The beneficial effects of herbal plants or their active substances may include the stimulation of appetite and increase feed intake, the improvement of endogenous digestive enzyme secretion, activation of immune response and antibacterial, and antioxidant activities (KHEIRI et al., 2015).

It was reported that the use of essential oils in the diet improved the taste and aroma of eating, increased feed consumption, regulated digestive function, changed the micro flora or the gastrointestinal system of the animal, and as a result, improved the rate of conversion for growth and feed, which is especially important for decreasing feed costs (BARBARESTANIA YARMOHAMMADI et al., 2020).

The researchers showed that the supplementation of broiler chicken feed with varying levels of the black seed, alone or in combination with other medicinal plants, improved dressing percentage and breast and thigh weights of the carcass, whilst at the same time reducing abdominal fat weight, compared to the control diet (Nasir and GRASHORN, 2010).

The results of (Salarmoini et al., 2019) study showed that the relative weights of breast, thighs, proventriculus, gizzard, liver, pancreas, spleen, heart, and bursa of broilers at 42 days of age were not affected by dietary treatments.

Table 1- The effects of different levels of encapsulated lavender essential oil supplemented diets on performance in broiler Japanese quails

Treatments	Feed Intake (g)	Live Body weight (g)	Feed conversion ratio (g/g)	Feed efficiency ratio (%)
Control	750.5	241.2	3.10	0.32
Lavender EEO (100mg)	748.1	242.1	3.07	0.32
Lavender EEO (200mg)	746.2	243.4	3.04	0.33
Lavender EEO (300mg)	745.6	245.3	3.03	0.33
Lavender EEO (400mg)	745.2	245.9	3.02	0.33
P-value	n.s	n.s	n.s	n.s

*a.b.c: Different superscripts indicate statistically differences in each column ($p \leq 0.05$).

The result of Table 2 has showed the effects of different levels of Lavender EEO supplemented diets on carcass traits and characteristics in broiler Japanese quails.

The result showed that warm and cold carcass, tight and breast percentage were not increased significantly and abdominal fat percentages of quail's carcass were decreased significantly instead ($p \leq 0.05$). (Table 2).

The current data are in line with the (Rahimian et al., 2022) result that they have been showed that there were significant differences between warm and cold carcass, tight and breast percentage in quails were fed different levels of black seed and sesame active compounds compared to the control.

Bozkurt et al. (2012) have suggested that the antioxidant and antimicrobial properties of the phenolic compounds found in lavender have a direct effect on growth performance, carcass characteristics, and meat quality.

El-Kady et al (2024) showed that all different oil additives increased body weight and weight gain, but realized an insignificant increase in feed intake and improved feed conversation ratio compared to control.

However, black oil seed realized the highest dressing percentage, but no significant differences were detected in giblets, edible parts and offal's in different oil diets comparable to the control.

Table 2- The effects of different levels of encapsulated lavender essential oil supplemented diets on carcass traits and characteristics in broiler Japanese quails

Treatments	Warm carcass (g)	Cold carcass (g)	Thigh (%)	Breast (%)	Abdominal fat (%)
Control	173.2	162.5	33.2	34.6	2.6[a]
Lavender EEO (100mg)	174.5	163.2	32.3	34.7	2.4[b]
Lavender EEO (200mg)	175.2	164.8	32.9	35.1	2.2[c]
Lavender EEO (300mg)	176.9	165.1	32.9	35.4	2.1[c]
Lavender EEO (400mg)	177.6	166.4	33.1	36.1	1.8[d]
P-value	n.s	n.s	n.s	n.s	**

*a.b.c: Different superscripts indicate statistically differences in each column ($p \leq 0.05$).

The result of effects of different levels of Lavender EEO supplemented diets on proximate composition of tight and breast meat in broiler Japanese quails are shown in

table 3. According to the available data use of different levels of encapsulated lavender essential oil supplemented diets have insignificant increasing in breast and tight moisture, crude fiber and ash contents in experimental Japanese quails. (Table 3).

Rahimian et al (2022) showed that there were significant differences between treatments for crude fiber, ash content, crude protein and crude fiber for quails fed by different levels of black seed and sesame active compounds compared to the control.

Alleman et al. (2013) also noted several varied effects of essential oils on the physicochemical properties of meat.

Table 3- The effects of different levels of encapsulated lavender essential oil supplemented diets on proximate composition of tight and breast meat in broiler Japanese quails

Treatments	Moisture %		Crude Fiber%		Ash %	
	Breast	Thigh	Breast	Thigh	Breast	Thigh
Control	0.49	0.46	1.82	1.94	1.59	1.69
Lavender EEO (100mg)	0.50	0.47	1.80	1.92	1.57	1.67
Lavender EEO (200mg)	0.51	0.47	1.80	1.91	1.55	1.66
Lavender EEO (300mg)	0.51	0.49	1.76	1.89	1.54	1.64
Lavender EEO (400mg)	0.52	0.50	1.73	1.86	1.52	1.61
P-value	n.s	n.s	n.s	n.s	n.s	n.s

*a.b.c: Different superscripts indicate statistically differences in each column ($p \leq 0.05$).

Conclusions

According to the result of current study, dietary Lavender EEO supplementation had influenced the carcass traits and composition. In conclusion, we could demonstrate that the dietary Lavender EEO supplemented diets have beneficial acts on performance, carcass traits and proximate composition of tight and breast meat in Japanese quails.

Therefore, we may note that the future studies are needed for more explanation.

Acknowledgments

The authors are especially thankful to Department of Animal Sciences and Veterinary Sciences of Islamic Azad University, Shahre-Kord Branch, Shahre-Kord, Iran, for the cooperation and assistance us in order to perform the test.

References

ALLEMAN F, GABRIEL I, DUFOURCQ V, PERRIN F, GABARROU J.-F.2013. Use of essential oils in poultry feed.1. Growth performance and regulations. INRA Prod. Anim.26(1):3–12.

AOAC. 2005.Official methods of analysis, Association of official analytical chemists. AOAC Press, Gaithersburg, USA.

BARBUT, S.2002: Poultry products processing, an industry guide, (LLC, NW, USA, CRC Press).

BOZKURT M, KUCUKYILMAZ K, CATLI A.U, OZYILDIZ Z, CINAR M, CABUK M, Coven F.2012.

Influences of an essential oil mixture supplementation to corn versus wheat-based practical diets on growth, organ size, intestinal morphology and immune response of male and female broilers. **Ital. J. Anim. Sci.**11 (3):290–297.

DUNCAN DB.1955.Multiple range test and F-test. Biometrics.11. pp:1-42.

JURGENS, M.H.1996.Animal Feeding and Nutrition, 8th Ed., (Dubuque, IA, Kendall/Hunt Publishing Company).

EL-KADY, R., YASSEIN, S. E., EL-GHAMRY, A., ABEDO, A., SALLAM, M.2024. Response of Growing Japanese Quails to Different Types of Some Medicinal Seed Oils as Enhancing Additives. **Egyptian Journal of Veterinary Sciences**.56(3): 575-585.

GENCHEV, A., G. MIHAYLOVA, S. RIBARSKI, A. PAVLOV, M. KABAKCHIEV.2008. Meat quality and composition in Japanese quails. **Trakia J. Sci**.6 (4):72-82.

GENCHEV, A., S. RIBARSKI, G. ZHELYAZKOV. 2010. Physicochemical and technological properties of Japanese quail meat. **Trakia J.Sci**.8 (4):86-94.

KIM, N.S., LEE, D.D., 2002. Comparison of different extrac tion method for the analysis of fragrance from Lavandula species by gas chromatography-mass spectrometry**. Journal of Chromatography A**, 982, 31-47.

KHEIRI.F, RAHIMIAN.Y, NASR.J.2015.Application of sumac and dried whey in female broiler feed. Arch. **Anim. Breed**.58. pp:205–210.

LAGHOUATI.O, ARBOUCHE F, ARBOUCHE Y.2019. Effects of using essential oil of Lavandula stoechas in quail feed on growth performance, carcass characteristics, meat quality, and health status. **Vet World**. 13(4):789-795.

NADERI.I, AKBARI, SAYED MOSTAFA, MANOCHEHRI, HAMID.2021. The effect of different levels of Lavender essential oil and bacitracin methylene disalicylate supplementation on performance, carcass traits, some blood parameters, small intestinal morphology and micro flora in Japanese quails. **Revista Brasileira de Higiene e Sanidade Animal**.15 (4):1-11. **http://dx.doi.org/10.5935/1981-2965.20210033**

NASIRI-MOGHADDAM H, HASSANABADI A, BIDAR N.2012. Effects of increasing levels of lavender essential oil (Lavandula angustifolia) on performance and hematological traits of broilers. **Iran. J. Anim. Sci. Res**.4.pp:115–121.

MOKHTARI, S., RAHATI, M., SEIDAVI, A., HAQ, Q.M.I., KADIM, I., LAUDADIO, V. AND TUFARELLI, V. 2018 Effects offeed supplementation with lavender (Lavandula angustifo-lia) essence on growth performance, carcass traits, blood constituents and caecal microbiota of broiler chickens. **Eur.Poult. Sci**., 82: 1-11.

NRC, National Research Council. 1994. Nutrient requirements of poultry.9th Rev. Ed., Washington, DC. National Academy Press.

RAHIMIAN.Y, KHEIRI, FARSHID AND FAGHANI, MOSTAFA.2022. Carcass characteristics and some physical quality parameters of meat in male Japanese quails fed by different levels of vitamin E, sesamine and thymoquinone supplemented diets. **Revista Brasileira de Higiene e Sanidade Animal**.16. (2):1-13. **http://dx.doi.org/10.5935/1981-2965.20220010**

SALARMOINI, M. SALAJEGHEH, A, M.H. SALAJEGHEH AND M. AFSHARMANESH.2019. The effect of Lavender (Lavandula angustifolia) extract in comparison to antibiotic on growth performance, intestinal morphology, ileal Microflora, antioxidant status and meat quality of broilers. **Iranian Journal of Applied Animal Science**.9(4):717-725.

SAS Instiute, SAS.STAT user's guide for personal computer. 2004. Release 6.21, SAS Institute, Inc., Cary, N.C.,USA.