

Effects of Dietary Oregano Essential Oil on Growth Performance, Carcass Parameters and Some Blood Parameters in Japanese Male Quail

Reza BADIRI¹ and Seyyed Naeim SABER^{2*}

¹Department of Animal Science, Azad University of Shabestar Shabestar, Iran

²Department of Animal Science, Cukurova University, Adana, 01330, Turkey

*Corresponding Author E-mail: naeim_saber@yahoo.com

Received: 18.10.2016 | Revised: 27.10.2016 | Accepted: 30.10.2016

ABSTRACT

The aim of this experiment was to investigate the effects of oregano essential oil on growth performance, carcass characteristic and some blood metabolites in male Japanese quail. A total of 400 male Japanese quail (21 days of age) were used in completely randomized design with 5 traits (0, 50, 100, 200, and 400 mg/kg oregano oil respectively) and 4 replicate (20 birds per replicate). During this study the birds had free access to food and water. The results obtained from this study showed that adding of oregano essential oil in quail feed had not significant effect ($p>0.05$) on feed intake and feed conversion ratio but feed conversion ratio numerically was better in treatment groups. Supplementation of oregano essential oil in quail diet had significant effect on body weight gain and final body weight ($p<0.05$). The result obtained from this study showed that the addition of oregano essential oil had not significantly effect on liver, heart, breast, and wings weight but it had significant effect on thigh and neck weights ($p<0.05$). Also supplementation of oregano essential oil in quail diets could not have effect on blood metabolites ($p>0.05$).

Key words: Japanese quail, feed intake, oregano essential oil, blood metabolites.

INTRODUCTION

These days most people consume poultry meat since it is very important and popular kind of food¹. Antibiotics are one of growth promoters and also disease prevention in poultry. Though, antibiotic residues in poultry meat are dangerous to human health². Therefore, researchers are looking for natural alternatives to antibiotics in order to improve poultry production. Oregano essential oil can be used as one of natural alternatives for

antibiotics^{3,4}. Herbal composites especially essential oils are used as feed additives in animal and poultry production. In many researches it was reported that using of plant products is attributed to performance, antimicrobial properties, oxidative resistant activity, and enhancement of the immune system of poultry^{5,6,7,8}. Lee et al⁶ explained that using of essential oil in chicken diets does not have significant effect on their growth performance.

Cite this article: Badiri, R. and Saber, S.N., Effects of Dietary Oregano Essential Oil on Growth Performance, Carcass Parameters and Some Blood Parameters in Japanese Male Quail, *Int. J. Pure App. Biosci.* 4(5): 17-22 (2016). doi: <http://dx.doi.org/10.18782/2320-7051.2397>

According to Williams and Losa⁹, using of oregano oil in birds' diet increases feed utilization by the stimulating digestion process. Also, there is some proof that using herbs, spices, and different plant extracts are used as appetizing and digestion stimulating^{10,11,12}. Also, some studies documented that using of essential oil is beneficial in poultry performance^{13,14}. Symeon et al¹⁵ reported that adding of oregano oil in broilers diet improves body weight and feed intake of broilers. Supplementing of essential oil in birds diet induces the weight gain, feed intake, and feed conversion ratio¹⁶.

MATERIALS AND METHODS

In this experiment 400 male Japanese quail from 21 to 42 days of age were used in completely randomized design with 5

treatments, 4 replicates and 20 birds in each replicate. Treatment groups include: T1: Control (without oregano essential oil, T2: 50 mg/kg, T3:100 mg/kg, T4:200 mg/kg, and T5: 400 mg/kg oregano essential oil in diets. During the rearing all birds had access to feed and water ad libitum. The diets were formulated (Table 1) to meet the requirements of quail as established by NRC¹⁷. During this experiment feed intake, feed conversion ratio, and live body weight were measured. At the end of the trial 2 birds from each replication were selected randomly and after 5 hours of food deprivation were slaughtered to determine the carcass characteristics and blood Triglyceride, Cholesterol, HDL, and LDL contents. All data obtained from this experiment were analyzed by using the GLM procedure of SAS¹⁸.

Table 1. Feed ingredients and nutrient contents of experimental diets (Per Kg)

Ingredients	(g/kg)
Corn grain	525.6
Soybean meal	384.7
Corn gluten	40
Oyster shell	15.6
DCP	8.1
Methionine	1.1
Lysine	1.2
Vit. Premixes	2.5
Sodium bicarbonate	2.6
Soybean oil	14.5
Min. Premixes	2.5
Salt	1.6
Total	1000
Nutrients Calculated	
ME (MJ/kg)	12.26
Crude Protein	246.9
Crude Fiber	36.0
Ether extract	50.7
Ash	73.6
Dry Matter	880.3

For each kg of the diets ;15.000.000 IU Vitamin A, 5.000.000 IU Vitamin D₃, 100.000 mg vitamin E, 3.000 mg Vitamin K₃, 3.000 mg Vitamin B₁, 8.000 mg Vitamin B₂, 60.000 mg Niasin, 15.000 mg Ca-D-Pantotenat, 5.000 mg Vitamin B₆, 20 mg Vitamin B₁₂, 2.000 mg Folik Asit, 200 mg D-Biotin ve 100.000 mg Vitamin C, 120.000 mg Mn, 80.000 mg Fe, 80.000 mg Zn, 16.000 mg Cu, 1.250 mg I, 200 mg Co ve 300 mg Se.

RESULTS AND DISCUSSIONS

The data obtained during the experimental period for performance, carcass characteristic and some blood parameters were analyzed and the results were presented in Table 2, 3, and 4. The results are started under the following subheading to evaluate the effects of different dietary essential oregano oil levels.

Feed intake: Effects of adding oregano oil in quails' diet on feed intake parameter were showed in Table 2. The data obtained from this study indicated that oregano oil levels in quails' diet did not influence ($p>0.05$) feed intake. But it was numerically higher in the group that received 50 mg/kg oregano oil. The result obtained from this study was similar with those reported by Roofchae et al¹⁹ and Fotea et al²⁰, that the oregano oil cannot affect feed intake in birds. Also our study results were inconstant with Alp et al²¹ experiment's results which showed that oregano oil had a significant effect on feed intake.

Feed conversion ratio: The data presented in Table 2 shows that during the experiment oregano source levels did not have affect ($p>0.05$) on feed conversion ratio. However it was numerically lower in group that received 50 mg/kg oregano oil in diet. The results were same with those described by Skoufos et al²², Giannenas et al²³ and Roofchae et al¹⁹ results. They reported that the supplementation of chicks' diet with oregano oil had not effect on feed conversion ratio. Also Ather²⁴ reported that oregano oil had a significant effect on feed conversion ratio but this study results were inconstant with Alp et al²¹, Basset²⁵, and Alcicek et al²⁶, who reported that oregano oil can influence feed conversion ratio. Also our

experiment results were in accordance with Fotea et al²⁰ results, who showed that oregano oil cannot influence on feed intake.

Body weight gain: body weight gain and final body weight of quail were presented in Table 2. Data showed that average of body weight gain in quails significantly increased ($p<0.05$) in the experimental groups in comparison to control group. And the higher body weight gain (136.16 g) was related to a group that received 50 mg/kg oregano essential oil. Also, at the end of the experiment obtained data showed that final body weight significantly increased in experimental groups and it was higher in groups which received 50, 100, 200, and 400 mg/kg oregano oil respectively. The results obtained from this experiment was in line with that of Roofchae et al¹⁹ who reported the addition of oregano oil in broiler chickens' diet had a significant effect on body weight at 22-42 days of age. Also this experiment results were similar to the study done by Basset et al²⁵, who explained that supplementing oregano oil in the drinking water can improve body weight gain. Also the results of Hertrampefs' study²⁷ showed that essential oregano oil had a significant effect on body weight gain.

Fotea et al²⁰ indicated that adding of oregano oil in broiler diets had a significant effect on live body weight but it did not had significant effect on body weight gain. However, the results of our experiment were inconstant with Alp et al²¹ and Bostoglou et al²⁸ study results. Alp et al²¹, showed that the adding of oregano oil in broiler diets did not have significant effect on body weight gain.

Table 2. Effects of different levels of oregano oil on performance in Japanese male quail (days 42)

Levels of Oregano oil	Parameters			
	Feed intake (g)	Body weight gain (g)	Feed conversion ratio	Final body weight (g)
0 mg/kg	604.47	131.36 ^c	4.60	228.12 ^b
50 mg/kg	612.28	136.16. ^a	4.49	232.18 ^a
100 mg/kg	610.46	134.88 ^{ab}	4.52	229.84 ^b
200 mg/kg	608.75	133.04 ^{bc}	4.57	229.16 ^b
400 mg/kg	608.34	132.53 ^{bc}	4.57	229.08 ^b
SED	1.780	0.754	0.026	0.693
P=	0.0731	0.0031	0.0720	0.0102

^{a,b,c}: Mean in same row with different superscript letters are significantly different ($p<0.05$).

Carcass Characteristics: The data presented in Table 3 show that different levels of oregano oil had a significant effect ($p < 0.05$) on some carcass characteristic. According to Table 3, it can be seen that there was not significant effect ($p > 0.05$) on live body weight and heart weight ($p > 0.05$). And also different levels of oregano oil could not have influence on liver, breast, and wing weight. But they were numerically higher in group that was fed with diet containing 50 mg/kg oregano oil. The results of this study showed that different levels of oregano oil had significant ($p < 0.05$) effect on thighs and neck weights. It can be seen that the higher weight of thighs is related

to a group that received diet containing 100 mg/kg oregano oil. Alp et al²¹ indicated that dietary oregano oil did not have a significant effect on carcass yield. In another study Hosseini Mansoub²⁹ showed that adding of different oregano oil in broiler chicken diets had a significant effect on breast and liver weights but it did not have a significant effect on thigh weight. Corduk et al³⁰ pointed out that supplementing of oregano essential oil in broiler chicken diet had an effect on liver weight of birds. Abou-Elkheir et al³¹ explained that supplementing of essential oil on broiler diets had a significant effect on heart and liver weights of broilers.

Table 3. Effects of different levels of oregano oil on carcass parameters in Japanese male quail (days 42)

Levels of Oregano oil	Parameters						
	Live body weight (g)	Heart weight (g)	Liver weight (g)	Breast weight (g)	Thigh weight (g)	Neck weight (g)	Wing weight (g)
0 mg/kg	219.66	0.828	2.23	23.75	13.86 ^a	14.49 ^a	4.48
50 mg/kg	220.46	0.907	2.46	24.00	13.89 ^a	14.39 ^a	4.41
100 mg/kg	218.45	0.892	2.20	23.01	14.46 ^a	12.66 ^b	4.26
200 mg/kg	220.91	0.805	2.12	23.26	13.55 ^{ab}	12.45 ^b	3.98
400 mg/kg	219.52	0.838	2.25	22.62	12.36 ^b	13.24 ^{ab}	3.62
SED	1.171	0.056	0.116	0.627	0.427	0.546	0.244
P=	0.628	0.662	0.314	0.543	0.020	0.029	0.102

^{a,b}: Mean in same row with different superscript letters are significantly different ($p < 0.05$).

Some Blood Parameters: Mean blood parameters of Japanese quail were shown in Table 4. The data obtained from this study indicated oregano oil could not have an effect on triglyceride, cholesterol, HDL, and LDL content ($p > 0.05$). It can be seen that cholesterol and HDL content numerically were higher in group that received 100 mg/kg, and cholesterol and LDL content were lower in group that received 200 mg/kg oregano oil. Corduk et al³⁰ showed that oregano oil did not

have any effect on triglyceride content. Abou-Elkheir et al³¹ explained that supplementing of broilers diet with essential oil had a significant effect on triglyceride and cholesterol contents. Mansoub and Myandoab³² in their study found that adding of oregano oil in broilers diet decreased cholesterol content of broiler. Jawad³³ indicated that essential oil caused the reduction of cholesterol content of blood in broiler chicks.

Table 2. Effects of different levels of oregano oil on blood parameters in Japanese male quail (days 42)

Levels of Oregano oil	Parameters			
	Triglyceride	Cholesterol	HDL	LDL
0 mg/kg	105.38	254.88	55.00	178.80
50 mg/kg	123.00	255.38	58.50	172.28
100 mg/kg	92.75	259.25	63.75	176.95
200 mg/kg	102.38	226.13	56.50	149.13
400 mg/kg	95.88	245.50	57.50	186.83
SED	7.968	16.492	5.205	13.925
P=	0.089	0.627	0.799	0.580

CONCLUSION

The data obtained from this study showed that adding of oregano oil in quails diet had a significant effect on quails final body weight ($p>0.05$).

The results of this study suggested that the inclusion of different levels of oregano oil could have different effect on thighs and neck weights of quails ($p<0.05$).

The results with respect to oregano oil did not have any differences on triglyceride, cholesterol, HDL, and LDL amounts of blood in quails ($p<0.05$).

REFERENCES

1. Chouliara, E., Karatapanis, A., savvaidis, I.N., Kontominas, M.G., Combined effect of oregano oil and modified atmosphere packaging on shelf-life extension of fresh chicken breast meat, stored at 4 degrees C. *Journal of food Microbiology.*, **24(6)**: 607-17(2007).
2. Castanon, J.I., History of the use of antibiotics as growth promoters in European poultry feeds. *Poultry Science.*, **86**: 2466-2471 (2007).
3. Adil, S., Banday, T., Ahmad Bhat, G., Salahuddin, M., Raquib, M., and Shanaz, S., Response of broiler chicken to dietary supplementation of organic acids. *Journal of Central European Agriculture.*, **12**: 498-508(2011).
4. Khan, R.U., Naz, S., Nikousefat, Z., Tufarelli, V., and Laudadio, V., Thymus vulgaris: alternative to antibiotics in poultry feed. *World's Poultry Science Journal.*, **68**: 401-408 (2012).
5. Cowan, M.M., Plant products as antimicrobial agents. *Clin. Microbiol. Rev.* **12**: 564–582 (1999).
6. Lee, K.W., Everts, H., and Beynen, A.C., Essential oils in broiler nutrition. *International journal of Poultry Science.*, **3**: 738–752 (2004).
7. Botsoglu, N.A., Christaki, E., Fletouris, D.J., Florou-Panneri, P., Spais, A.B., The effect of dietary oregano essential oil on lipid oxidation in raw and cooked chicken during refrigerated storage. *Meat Science.*, **62**: 259-256 (2002).
8. Dorhoi, A., Dobrean, V., Zahan, M., and Virag, P., Modulatory effects of several herbal extracts on avian peripheral blood cell immune responses. *Phytother. Res.*, **20**: 352–358 (2006).
9. Williams, P., and Losa, R., The use of essential oils and their compounds in poultry nutrition. *World Poultry.*, **17**: 14-15 (2001).
10. Kamel, C., Tracing mode of action and the roles of plant extracts in non-ruminants. Pages 135–150 in Recent Advances in Animal Nutrition. P. C. Garnsworthy and J. Wiseman, ed. Nottingham University Press, Nottingham, UK (2001).
11. Jamroz, D., Orda, J., Kamel, C., Wiliczekiewicz, A., Wertelecki, T., and Skorupinska, J., The influence of phytogetic extracts on performance, nutrient digestibility, carcass characteristics and gut microbial status in broiler chickens. *Journal of Animal and Feed Sciences* **12**: 583-596 (2003).
12. Hernandez, F., Madrid, J., García, V., Orengo, J., and Megías, M.D., Influence of two plant extracts on broilers performance, digestibility, and digestive organ size. *Poultry Science.*, **83**: 169-174 (2004).
13. Brenes, A., and Roura, E., Essential oils in poultry nutrition: Main effects and modes of action. *Animal Feed Science and Technology.*, **158**: 1-14 (2010).
14. Franz, C., Baser, K.H.C., and Windisch, W., Essential oils and aromatic plants in animal feeding - a European perspective. A review. *Flavour Frag. J.*, **25**: 327-340 (2010).
15. Symeon, G.K., Zintilas, C., Demiris, N., Bizelis, L.A., and Deligeorgis, S.G., Effects of oregano essential oil dietary supplementation on the feeding and drinking behaviour as well as the activity of broilers. *International journal of Poultry Science.*, **9**: 401-405(2010).
16. Windisch, W., Schedle, K., Plitzner, C., and Kroismayr, A., Use of phytogetic products as feed additives for swine and poultry. *Journal Animal Science.*, **86**: 140-148 (2008).

17. NRC., Guide for the Care and Use of Laboratory Animals. Institute of Laboratory Animal Resources. Commission on Life Sciences, National Research Council, National Academy Press, Washington, D.C., USA (1996).
18. SAS Institute. JMP Design of Experiments. Version 4. SAS Inst. Inc., Cary, NC. (2000).
19. Roofchae, A., Irani, M., Ebrahimzadeh, M.A., and Akbari, M.R., Effect of dietary oregano (*Origanum vulgare* L.) essential oil on growth performance, cecal microflora and serum antioxidant activity of broiler chickens. *African journal of Biotechnology.*, **10(32)**: 6177-6183 (2011).
20. Fotea, L., Costachescu, E., Hoha, G., Leonte, D., The effect of oregano essential oil (*Origanum vulgare* L.) on broiler performance. *Luceari Stiintifice.*, **53**: (2010).
21. Alp, M., Middilli, M., Kocabagli, N., Yilmaz, H., Turan, N., Gargili, A., and Acar, N., The effects of dietary oregano essential oil on live performance, carcass yield, serum immunoglobulin G level, and oocyst count in broilers. *Poultry Science Association.*, **21**: 630-636 (2012).
22. Skoufos, I., Giannenas, I., Tontis, D., Bartzanas, T., Kittas, C., Panagakis, P., and Tzora, A., Effects of oregano essential oil and attapulgit on growth performance, intestinal microbiota and morphometry in broilers. *South African Journal of Animal Science.* **46(1)**: (2016).
23. Giannenas, I., Tzora, A., Sarakatsianos, I., Karamoutsios, A., Skoufos, S., Papaioannou, N., Anastasiou, I., Skoufos, I., The effectiveness of the use of oregano and laurel essential oils in chicken feeding. *Anal Animal science.*, **16(3)**: 779-796 (2016).
24. Ather, M.A.M., Polyherbal additive proves effective against vertical transmission of IBD. *Worlds Poultry Science. Elsevier.* **16**: 50-52 (2000).
25. Bassett, R., Oreganos positive impact on poultry production. *Worlds Poultry-Elsevier.* **16**: 31-34 (2000).
26. Alcicek, A., Bozkurt, M., and Cabuk, M., The effect of essential oil combination derived from selected herbs growing wild in turkey on broiler performance. *South African Journal of Animal Science.* **33**: 89-94 (2003).
27. Hertrampf, J.W., Alternative antibacterial performance promoters. *Poultry International.* **40**: 50-52 (2001).
28. Botsoglou, N. A., Florou-Paneri, P., Christaki, E., Fletouris, D.J., and Spais, A.B., Effect of dietary oregano essential oil on performance of chickens and on iron-induced lipid oxidation of breast, thigh and abdominal fat tissues. *British Poultry Science.*, **43**: 223-230 (2002).
29. Hosseini Mansoub. N., Performance, carcass quality, blood parameters and immune system of broilers fed diets supplemented with oregano oil (*Origanum* sp). *Scholars Research Library.*, **2 (6)**: 652-656 (2011).
30. Corduk, M., Sarica, S., and Yarim, G.F., Effects of oregano or red pepper essential oil supplementation of diets for broiler chicks with delayed feeding after hatching.1 performance and microbial population. *Poultry Science Association.* **22**: 738-749 (2013).
31. Abou-Elkhair, R., Gaafar, K.H.M., and Elbahi, N.M., Bioactive effects of dietary supplementation with essential oils blend of oregano, thyme and garlic oils on performance of broilers infected with eimeria species. *Global Veterinaria*, **13 (6)**: 977-985 (2014).
32. Mansoub, N.H., and Myandoab, M.P., The effects of different levels of thyme on performance, carcass traits, blood parameters of broilers. *Annals of Biological research.*, **2(4)**: 379-385 (2011).
33. Jawad., H. Ala-Al Deen., Some hematological and biochemical effect of garlic in broiler chickens. *Basrah journal of veterinary research.*, **6 (2)**: 56-63 (2007).