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ORIGINAL ARTICLE

Effects of Oregano and Thyme on Hatchability of Stored Eggs of Japanese quail

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ABSTRACT
The objective of this experiment is to compare the effects of various amounts of oregano and thyme in hatchability of eggs of Japanese quail stored for various time intervals. A total of 420 two months old laying quails were randomly divided into seven groups; each with 4 replicates of 15 quails (3males and 12 females) per cage. The dietary treatments were: control diet (using regular feed), thyme diet (adding 1.5%, 3% or 4.5% thyme to regular feed), and oregano diet (adding 1.5%, 3% or 4.5% oregano to regular feed). Each group was fed their experimental diet for 45 days. The eggs were collected at the end of last week of the experiment, and divided into 3 groups: group 1 included eggs to be stored for one week; group 2 included eggs to be stored for two weeks; and group 3 were eggs to be stored for three weeks, (all eggs were stored in the same condition: (14-17 ^{0}C, 70% wet, with two 45 degree rotations per day). The eggs were then moved to the incubator to hatch. The results showed that the hatchability was significantly different for each group (P<0.01). Eggs from the thyme group with 1.5% thyme that was stored for one week produced the highest hatching in that group; whereas the eggs from the control group as well as from the oregano group with 1.5% oregano produced the lowest hatching in the store group. Among the eggs that stored for two and three weeks, higher hatchability resulted for the thyme group with 3% thyme and lower hatchability resulted from the oregano group with 1.5% oregano. This study suggests that adding 3% thyme to quails' diet could improve the hatchability of quails' eggs in various storing intervals, and helps to prevention lipid peroxidation.
Key Words: Oregano, thyme, storage, hatchability, laying quail

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INTRODUCTION

In light of increase in the amount of production of birds in recent years, today, more attention is being paid to the health of these products. Taste, flavor, the amount of vitamins, and other beneficial nutrients available in eggs, are the reasons why eggs have become a major source for consumption in humans [1].
Intestinal diseases in humans are viewed as the side effects of production methods, mortality rates, and sanitation in poultry production; and this is a major concern of the poultry industry [2].
Use of antibiotics in stimulating growth has been common for 5 decades because of its positive effects on balance of microbial population and prevention of disease–causing bacteria [3]. Despite all the positive effects of such antibiotics, research shows that the residue from antibiotics in poultry causes the creation of resistant strains in human body which prevents the treatment of many illnesses using the same kind of antibiotics. Therefore it is recommended in many countries, that such additives should not be used in foods for livestock or poultry [1]. For this reason, specialists in this industry have experimented with multiple combinations of organic acids, plant extracts, probiotics, enzymes, and perybiotics in poultry diets as a replacement for antibiotics [4].
Because of their antibacterial and antioxidant properties, plant extracts are traditionally used for treatment and control of some diseases [5]. Herbal plants like thyme and oregano stimulate digestive enzymes such as amylase, protease, and lipase, and consequently improve digestibility of food elements [6].
Thyme and Oregano have been used in traditional medicine as disinfectants of digestive tracts, and as digestion and absorption assistants due to presence of Thymol and Mentol in these herbs. Use of herbs of the mint family increases the length, depth, and width of intestines resulting in better digestion and better absorption of nutrients [7].

Gezantofils are natural colorants in vegetables that cause the formation of pigments in the yolk and intensify its color [1].
Internal egg quality is frequently assessed by measurements of the height of the inner thick albumen or a function of this, such as the Haugh unit score (HU), which dependent to the egg freshness. Major influences on albumen quality are the strain, age and nutrition of laying hen, egg shell quality, storage time and conditions [8].
In other cases the egg yolk to albumen ratio is important. Factors such as the ratio of total dry matter of egg white and yolk to albumen, yolk dry matter content, nutrition, size and age of chicken eggs are effective [9].
An egg has more than 11 percent fat of which 33-35% is in the yolk and most of it is unsaturated. Its dual band is sensitive to oxidation and spoilage that causes peroxidation, change in odor, texture, loss of nutrients and creation of toxic combination that necessitates quality control and use of antioxidants [10].
During the metabolism and interaction with oxygen, free radicals are created that attack the electrons causing spoilage of molecules and erosion of cellular walls. The anti oxidants neutralize these radicals preventing spoilage [11].
Synthesized antioxidants have caused negative nutritional effects including cancer, and today, tremendous effort is made to find natural anti oxidants from sources such as plants.
Thyme and oregano are both from the labiates family and are herbal plants with antioxidant properties. They improve egg production and egg quality, and prevent food spoilage [12].
Research shows that formation of embryonic tissue in incubation period is affected by fat oxidation by free radicals; so, antioxidants protect unsaturated fatty acids, protein and DNA from free radicals [11].
Although scientific reports indicate positive effects of these additives on improvement of performance and reduction of production cost but there are a few research on effect of these plants on Japanese quail performance so, comparison of the effects of thyme and oregano on hatchability at different times of egg storage capacity was conducted.

MATERIAL AND METHOD

In this research 420 two months old laying Japanese quails were experimented in a completely randomized grouping with 7 treatments and 4 replications (every replication with 12 female and 3 male quails) in 28 experimental units for 45 days in the same environment. Experimental groups included: 1) control diet (without thyme and oregano), 2) control diet + thyme 1.5%, 3) control diet + thyme 3%, 4) control diet + thyme 4.5%, 5) control diet + oregano 1.5%, 6) control diet + oregano 3%, 7) control diet + oregano 4.5%, were set according to (NRC, 1994) (Table 1).

Table. 1: Composition of the experimental laying Japanese quail basal diet.

Ingredients	Control	Thyme 1.5%	Thyme 3%	Thyme 4.5%	Oregano 1.5%	Oregano 3%	Oregano 4.5%
Yellow corn	55.33	53.52	51.68	50	53.52	51.68	50
Soybean meal (%44)	34.25	34.1	33.94	33.7	34.1	33.94	33.7
Vegetable oil	2.45	2.9	3.39	3.8	2.9	3.39	3.8
Thyme	-	1.5	3	4.5	-	-	-
Oregano	-	-	-	-	1.5	3	4.5
Oyster powder	5.3	5.3	5.3	5.3	5.3	5.3	5.3
Di calcium phosphate	1.7	1.7	1.7	1.7	1.7	1.7	1.7
Lysine	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Dl-Methionine	0.27	0.28	0.29	0.3	0.28	0.29	0.3
Vitamins mixture*	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Minerals mixture*	0.25	0.25	0.25	0.25	0.25	0.25	0.25
NaCl	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Total Calculated analysis	100	100	100	100	100	100	100
Metabolism Energy (kcal/kg diet)	2882	2880	2882	2880	2880	2882	2880
Crude protein	19.94	19.93	19.94	19.93	19.93	19.93	19.92
Ether extract	5.32	5.67	6.11	6.46	5.67	6.1	6.45
Crude fiber	3.17	3.3	3.65	3.89	3.34	3.67	4.00
Available phosphorus	0.55	0.55	0.55	0.55	0.55	0.55	0.55
Calcium	2.5	2.5	2.5	25	2.5	2.5	25
Lysine	1.15	1.15	1.15	1.15	1.15	1.15	1.15
Methionine + Cystine	0.76	0.76	0.76	0.76	0.76	0.76	0.76

Each 3 kg of Vitamins and Minerals mixture* contains: Vit. A10000,000 IU; Vit. D3 2000,000 IU ; Vit. E 10,000 mg ; Vit. k31000 mg ; Vit. B1 1000 mg; Vit. B2 5000 mg ; Vit. B6 1500 mg ;Vit. B12 10 mg; Pantothenic acid 10,000 mg; Niacin 30,000 mg; Folic acid 1000 mg; Biotin 50 mg; Choline 300,000 mg;Manganese 60,000 mg; Zinc 50,000 mg;Copper 10,000 mg; Iron 30,000mg; Iodine 1000 mg; Selenium 100 mg; Cobalt 100 mg ; CaCO3 to 3,000 gm.

Required amounts of the herbs were ground, measured, and added to the base feed for each group. The condition of the experiment was the same for all groups. Each group was exposed to 17 hours of light and 7 hours of darkness per day, and the temperature was controlled day and night, Water and feed were provided ad libitum. Quail eggs produced at the end of the experiment were collected and all of the groups' eggs were stored in the same conditions: 14-17 ^{0}C, 70% wet and two 45 degree rotations per day for 1, 2, and 3 weeks. They were then transferred to the incubation system, and their hatchability was obtained using the following formula:

$$Percentage\ of\ chicks\ hatched\ from\ fertile\ eggs = \frac{total\ chicken}{The\ number\ of\ \ fertilized\ eggs} \times 100$$

The data was analyzed in completely randomized design by SAS [14] and for comparison of average Duncan multiple range tests [15] were used.

RESULT

The results showed that thyme and oregano had significant affect ($P<0.01$) on hatchability of stored eggs. Eggs from the 1.5% thyme feed that stored for one week resulted in higher hatchability. Lower hatchability was observed in the control group and the 1.5% oregano group. Meanwhile, eggs stored for two and three weeks, showed higher hatchability in the group with 3% thyme; and lower hatchability in the group with 1.5% oregano (Table.2).

Table. 2: Effect of different levels of thyme and oregano on hatchability at different times of egg storage in laying Japanese quail

	Hatchability						
Treat / Time	Control	Thyme 1.5%	Thyme 3%	Thyme 4.5%	Oregano 1.5%	Oregano 3%	Oregano 4.5%
One week stored	59.43^{e}	84.22^{a}	75.26^{b}	70.72^{c}	58.84^{ef}	62.40^{e}	64.60^{d}
Two week stored	31.47^{d}	38.41^{c}	47.48^{a}	41.45^{bc}	30.51^{e}	43.23^{b}	38.26^{c}
Three week stored	12.50^{def}	27.63^{c}	42.66^{a}	38.60^{b}	11.47^{f}	15.01^{d}	13.48^{e}
P. value				0.001			
SEM				0.40			

DISCUSSION

Improved and increased hatchability may be attributed to many properties including the antioxidant properties of thyme [12]. Research has shown that embryonic tissues are affected by fat oxidation by free radicals; so antioxidants protect unsaturated fat, protein and DNA [11].

An egg has more than 11% fat most of which is unsaturated. It is sensitive to oxidation and spoilage, and the spoilage is amplified and peroxidation is increased by storage and formation of toxins which reduce hatchability [10].

Traditional medicine has used thyme to disinfect the digestive system and to improve digestion and absorption of food. This is because of the presence of thymol in thyme. Use of herbs from the mint family increases the length of intestine, depth and width of the villi of the intestine and improves absorption of nutrients resulting in improved egg production, egg quality, and hatchability [16]. Similarly, froctooligosaccharides in herbal plants stimulate stomach, pancreas, and intestine mucous enzymes leading to improved digestibility, increased ileum and pigment absorption thus improving egg quality and hatchability [17].

CONCLUSION

Test results show that adding 1.5% thyme in quails' diet causes eggs stored for 1 week to have higher hatchability, and 3% thyme in quails' diet causes eggs stored for 2 and 3 weeks to have significant positive effects on higher hatchability.

REFERENCE

1. Farkhoy, M., T.KH. Sigarody, and F. Niknafs. (1994). Poultry breeding (Translateed). Coasar Pub.
2. Dahiya, J.P., D. C. Wilkie, A.G. Van kesse, and M.D. Drew. (2006). Potential strategies for controlling necrotic enteritis in broiler chickens in post-antibiotic era. *Animal Feed Sci.* 129:60-88.
3. Patterson, J.A., and K.M. Burkholder. (2003). Application of prebiotics and probiotics in poultry production. *Poult Sci*. 82:627-631.

4. Thomke, S., and K. Elwinger. (1998). Growth promotants in feeding pigs and poultry alternatives to antibiotics grows promotants. *Ann. Zootch*. 47:245-271.
5. Craig, J.W. (1999). Health-promoting properties of common herbs. *American J. Clin Nut.* 70:491-499.
6. Safid Kan, F., L. Sadighzade, and M. Taymori. (2006). The study of antimicrobial effects of essential oils of saturela hortenis. *J. Med. Plants*. 23:174-182.
7. Alcicek, A., M. Bozkurt and M. Cbuk. (2003). The effect of an essential oil combination derived from selected herbs growing wild in Turkey on broiler performance. South *African J. Anim. Sci.* 33: 89-94.
8. Silversides, F. G., and T. A. Scott. (2001). Effect of storage and layer ago on quality of eggs from two lines of hens. *Poult. Sci*. 80: 1240-1245.
9. Ahn, D. U., L. Sell, C. Jo, M. Chamruspollert, and M. Jeffery. (1999). Effect of dietary conjugated linoleic acid on the quality characteristics of chicken eggs during refrigerated storage. *Poult. Sci*. 78: 922-928.
10. Yang, S.C., and K.H. Chen. (2001). The oxidation of cholesterol in the yolk of selective traditional Chinese egg products. *Poult. Sci.* 80:370-375.
11. Surai, A.P.,P. F. Surai, W. Steinberg, W.G. Wakeman, B.K. Speake and N.H.C. Sparks. (2003). Effect of canthaxanthin content of the maternal diet on the antioxidant system of developing chick. *Poult. Sci*. 44: 612-619.
12. Zeyayi, S, and A. Teymouri. (2006). Careful use of herbs and drug interactions. Shiraz university press.
13. NRC.(1994). National Research Council,Nutrient requirements of poultry.9th Ed., National Academy press, Washington, DC.
14. SAS Institute, (2000). SAS SQL Procedure User Guide, Version 9. 1st Edn., SAS, Cary, ISBN: 13:978-158025599X, pp:576.
15. Duncan, D. B. (1955). Multiple ranges and multiple F test. *Biometrics*, 11:1-42.
16. Akaya, D.E., R.M. Hillman, K. Acamovic, and T. Cross. (2007). The effects of herbs and their associated essential oils on laying hen's performance. Poult. Sci. 48: 496-506.
17. Nobakht, A. and Y. Mehmannavaz. (2010). Effects of medicinal herbs thyme, oregano and mint on performance, egg quality, and safety of the blood parameters of laying hens. *Iranian J. Anim. Sci*. 2. P. 136-129.

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