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# Influence of different level of Spearmint (*Mentha spicata*) extract on different parameters of Laying Hens

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## ABSTRACT

The research was conducted to examine the effects of supplementation of spearmint (*Mentha spicata*) extract to laying hens' diet on the performance, egg quality, blood biochemical and immunity parameters of laying hens. In the experiment, a total of 300 of Hy-line (W36) laying hens of 34 weeks of age were used. Hens were divided randomly into five groups and 3 repetitions and fed different level of spearmint as follows for eight weeks. The best result for production percent, FCR, shell thickness and yolk weight were seen in the group 5. Also the serum total cholesterol, Triglycerides and LDL concentration were significantly reduced in groups of 4 compared to the control group ( $P < 0.05$ ). But the concentration of serum HDL and glucose were not significantly reduced in groups compared to the control group also using this herb did not show significantly effects on the immune system of laying hens.

**Key words:** Spearmint (*Mentha spicata*), Laying hens, performance, Egg quality.

## INTRODUCTION

There is need to find more efficient alternatives or combinations of different alternatives for maintaining health and improving performance of poultry and other livestock species. Phytochemical compounds are the groups of feed additives that have been reported to possess a potential for growth enhancement of livestock species due to presence of a number of pharmacologically active substances. They are supposed to enhance feed intake, activate digestive enzymes and stimulate immune function [1].

There is an increasing trend in the prevalence level of disease, by industrialization of poultry science and breeding chickens in a large scale. To cope with this problem and improve the biological and nutritional characters of chickens, chemical compounds like antibiotic have been

used highly in poultry industry [1]. After many years, the long term side effects of these products like microbial resistance and increase of the blood cholesterol level in the livestock lead to the ban of these commercial antibiotics[1-3].

Organic poultry is a relatively new expression in western countries which is going to expand in other countries. In this kind of poultry method, farmers do not use chemical compounds at all or in a very low level for sake of costumers, instead they use alternatives like organic acids, probiotics, and medicinal plants, and despite of higher prize of this method, these products have more fans in the costumers [4-6]. There are a lot of reports indicating the positive effects of herbs like anti-coccidal , anti-oxidant, anti-fungi and etc. Some of medical effects of herbs are related to their secondary metabolites such as phenols, necessary oils, saponins and etc [6-7]. There is need to find more efficient alternatives or combinations of different alternatives for maintaining health and improving performance of poultry and other livestock species. Phytogenic compounds are the groups of feed additives that have been reported to possess a potential for growth enhancement of livestock species due to presence of a number of pharmacologically active substances. They are supposed to enhance feed intake, activate digestive enzymes and stimulate immune function [1]. So it is needed to run these kinds of experiments, that in this experiment we tried to investigate the effects of different level of spearmint (*Menthaspicata*) extract on performance, immune system and quality of eggs in laying hens.

## MATERIAL AND METHODS

300 of Hy- line (W36) laying hens of 34 weeks of age were used. Hens were divided randomly into five groups and 3 repetitions and fed different level of spearmint as follows for eight weeks.

G1, First group as control group did not receive any herbal plant extract,

G2, 100 ppm of spearmint (*Menthaspicata*) extract,

G3, 150 ppm spearmint (*Menthaspicata*) extract,

G4, 200 ppm spearmint (*Menthaspicata*) extract,

G5, 250 ppm spearmint (*Menthaspicata*) extract,

by NCR (1994)(table 1)

Three hens were chosen from each group and inoculated from brachial vein by 0.1 ml ( 5 % ). Heterophils to Lymphocytes ratio were determined and Globulin and Albumin proportion in blood were counted from blood samples which had been obtained from brachial vein of three randomly chosen chicks from each group in the 49<sup>th</sup> day of experiment. Serums have been analyzed for glucose, Cholesterol, Low-density lipoprotein (LDL), High-density lipoprotein (HDL) and Triglyceride by ELISA set. The amounts of intake food, egg production, egg mass and feed conversion were measured weekly. At the end of experiment, 5 eggs from each repetition were randomly chosen and weighted, and their mass was determined by sinking them into the water and salt soluble with different concentrations.

The shells were weighted by weighing machine which had 0.01g accuracy. The thickness of the shell was measured by micrometer with the accuracy of 0.001mm in the middle and 3 points of egg shell and the average was considered as the shell thickness. This process was taken on each 5 eggs and the averages of them were considered as the final result for each group. The strength of the shell was determined by the mg weight of shell to every cm of the surface of it.

Table 1- Ingredients and chemical analyses composition of groups

Ingredients	(%)	%
Com53.65		
Wheat	21.5	
Soybean meal	17.15	
Soybean oil	0	
Limestone	0.2	
Oyster shell	6.2	
Dicalcium phosphate	0.5	
Vitamin-mineral mix <sup>1</sup>	0.5	
dl-methionine	0.1	
Sodium chloride	0.2	
Nettle --		
<b>Analyzed chemical composition (%)</b>		
Dry matter		89.2
Crude protein		14.5
Fat		6.2
Fiber		3.6
Ash		6.1
Calcium		0.8
Phosphorus		0.5
ME by calculation (MJ/kg)		12.78

<sup>1</sup>Provides per kilogram of diet: vitamin A, 9,000 IU; vitamin D3, 2,000, IU; vitamin E, 18 IU; vitamin B1, 1.8 mg; vitamin B2, 6.6 mg; vitamin B3, 10 mg; vitamin B5, 30 mg; vitamin B6, 3.0 mg; vitamin B9, 1 mg; vitamin B12, 1.5 mg; vitamin K3, 2 mg; vitamin H2, 0.01 mg; folic acid, 0.21 mg; nicotinic acid, 0.65 mg; biotin, 0.14 mg; choline chloride, 500 mg; Fe, 50 mg; Mn, 100 mg; Cu, 10 mg; Zn, 85 mg; I, 1 mg; Se, 0.2 mg.<sup>2</sup>T2=1%, T3=1.5%, and T4 =2%nettle powder

## RESULT AND DISCUSSION

The effect of extract derived from spearmint (*Menthaspicata*) on performance of laying hens (FCR, Intake food, Mass production, Production percent, Egg's weight) is presented in Table 2. According to comparisons of this table it has been proven that the best result for production percent, egg's weight and FCR were seen in the group 5. Increase in the weight of eggs and improve in the feed conversion ratio in the treated groups with the spearmint (*Menthaspicata*) could have been due to its antibacterial and antifungal effects which can lead to decrease in the amount harmful microbes of digestive system and performance. Effects of phytochemical compounds and their active ingredients are not always observed in terms of performance parameters, as they also affect different metabolic pathways and activity of different body systems. pharmacologically active substances (phenolic compounds and alkaloids) that are supposed to enhance feed digestion and absorption by stimulating secretion of digestive enzymes leading to better feed utilization and assimilation [8].

The effect of spearmint (*Menthaspicata*) on quality of eggs are showed in table 3. The highest shell thickness, yolk weight and yolk index were seen in the 5<sup>th</sup> group. There were no significant differences in the other parameters. The enhance in the yolk index is related to stability of yellow pigments in the membrane of the yolk among the lipid molecules, the antioxidants can prevent these molecules from oxidative stress [9]. There can be another scenario too, some carotenoids in these plants like xanthophylls transferred to the yolk and increase its yellowish, as this item is

related to the compounds of diet like corn and wheat. Farkhoy, M. *et al.* [10] indicated that by depositing pigments of plants into the yolk, this makes them more colorful.

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**Table 2:**The effect of different levels of spearmint (*Menthaspicata*) extract on performance of laying hens.

Treatments	FCR	Intake food(g)	Mass production(g)	Production percent	Egg's weight(g)
T1	<sup>a</sup> 2.81	<sup>a</sup> 105.35	<sup>a</sup> 36.80	<sup>a</sup> 54.63	<sup>a</sup> 61.12
T2	<sup>a</sup> 2.73	<sup>a</sup> 106.02	<sup>a</sup> 36.92	<sup>a</sup> 54.72	<sup>a</sup> 61.23
T3	<sup>a</sup> 2.70	<sup>a</sup> 106.10	<sup>a</sup> 37.01	<sup>a</sup> 54.97	<sup>a</sup> 61/41
T4	<sup>ab</sup> 2.51	<sup>a</sup> 106.06	<sup>a</sup> 37.14	<sup>ab</sup> 55.78	<sup>a</sup> 61.63
T5	<sup>ab</sup> 2.50	<sup>a</sup> 106.02	<sup>a</sup> 37.21	<sup>ab</sup> 55.92	<sup>ab</sup> 62/44
SEM	0.28	2.34	1.18	2.31	2.42

<sup>a-c</sup>Means with different subscripts in the same row differ significantly (  $P < 0.05$  ).

**Table 3:**The effect of different level of spearmint (*Menthaspicata*) extract on egg quality characters of laying hens

Treatment	Weight of Each mg of shell	Shell thickness(mm)	Yolk weight (gr)	White weight (g)	Shell weight (g)	Yolk index (%)	Special weight (mg/cm2)
G1	84	<sup>a</sup> 0.318	<sup>a</sup> 19.87	36.81	<sup>a</sup> 5.99	<sup>a</sup> 41.75	1.10
G2	84	<sup>a</sup> 0.320	<sup>a</sup> 19.91	36.89	<sup>a</sup> 6.09	<sup>a</sup> 41.98	1.12
G3	85	<sup>a</sup> 0.325	<sup>a</sup> 20.11	36.98	<sup>a</sup> 6.11	<sup>a</sup> 42.42	1.13
G4	85	<sup>ab</sup> 0.343	<sup>a</sup> 20.13	37.01	<sup>a</sup> 6.19	<sup>ab</sup> 43.86	1.16
G5	85	<sup>ab</sup> 0.358	<sup>ab</sup> 20.55	37.03	<sup>ab</sup> 6.49	<sup>ab</sup> 44.11	1.20
SEM	1.08	0.011	0.42	1.09	0.16	1/80	0/08

<sup>a-b</sup>Means with different subscripts in the same row differ significantly (  $P < 0.05$  ).

**Table 4:** The effect of different level of spearmint (*Menthaspicata*) extraction immunity system of laying hens.

Parameters	G1	G2	G3	G4	G5	SEM
Heterophils to Lymphocytes ratio	0.23	0.24	0.24	0.25	0.26	0.03
Globulin	1.40	1.42	1.41	1.46	1.50	0.08
Albumin	1.40	1.50	1.53	1.54	1.53	0.15

The use of different levels of spearmint (*Menthaspicata*) did not have any significant effects on immunity parameters of hens (table 4). The mean values of serum constituents in laying hens fed different level of nettle are shown in table 5. The serum total cholesterol, Triglycerides and LDL concentration were significantly reduced in group of 4 compared to the control group ( $P < 0.05$ ) but The concentration of serum HDL and Glucose were not significantly reduced in groups compared to the control group. The low level of blood biochemical parameters can be due to

substances like carvacrol and thymol in herbal plants which have reducing effects on cholesterol, LDL and triglyceride of blood. Heydari, A. and coworkers obtained the same results in 2010 as we did, they found that cholesterol and triglyceride level reduces by using thyme, ziziphora and nettle.

**Table 5. The effect of different levels of spearmint (*Menthaspicata*) extract on blood biochemical of laying hens.**

Blood Parameter	G1	G2	G3	G4	G5	SEM
Glucose (mg/dl)	173.62	175.40	172.31	175.68	178.29	3.64
Cholesterol (mg/dl)	132.43 <sup>a</sup>	133.41 <sup>a</sup>	130.36 <sup>a</sup>	128.02 <sup>ab</sup>	128.21 <sup>ab</sup>	4.75
Triglyceride (mg/dl)	43.13 <sup>a</sup>	43.06 <sup>a</sup>	39.11 <sup>ab</sup>	38.53 <sup>ab</sup>	38.94 <sup>ab</sup>	2.03
LDL	32.68 <sup>a</sup>	32.53 <sup>a</sup>	32.08 <sup>a</sup>	31.03 <sup>ab</sup>	31.07 <sup>ab</sup>	1.59
HDL	85.12	84.38	85.68	85.98	86.26	1.23

*a-b*Means with different subscripts in the same column differ significantly (  $P < 0.05$  )

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