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Evaluation of herbal plant on different parameters of Laying Hens

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ABSTRACT

In this study we tried to investigate the effect of chicory(Cichoriumintybus L.)on performance, egg quality, blood biochemical and immunity parameters of laying hens. This study was carried out with 500of Hy- line (W36) hens in 5 treatment groups,5 repetitions and 20 hens for each group. The groups were T1) Control group, T2, T3, T4, and T5 0.75%, 1%, 1.5%, and 2%chicory(Cichoriumintybus L.)powder respectively. The results showed that using this medicinal plant with different level had significant effects on performance, blood parameters and egg quality characters also show significantly effects on the immune system of laying hens.The best result for food intake and the highest production percent and shell weightwere seen in the group5. Alsothe serum total cholesterol,Triglycerides and LDL concentration were significantly reduced in groups of 4 and 5 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.

Key words: Laying Hens, chicory(Cichoriumintybus L.), Blood parameters, Egg quality.

INTRODUCTION

Due to growing concerns about antibiotic resistance and the potential for a ban for antibiotic growth promoters in many countries, there is an increasing interest in finding alternatives to antibiotics in poultry production because of some negative effects of these products like microbial resistance and increase of the blood cholestrol level in the poultry lead to the ban of these commercial antibiotics [1-3]. 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].

There are a lot of reports indicating the positive effects of herbs like anti-coccidial, 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 [4]. Herbs have been used for some disease since long time ago because of availability, easy usage, non side effects. Many herbs have a long history of use even prehistoric use, in preventing or treating human and animal diseases. Aromatic plants have been used traditionally in therapy of some diseases worldwide for a long time. Research on the use of herbal mixtures in poultry diets has produced inconsistent results [5]. There are a lot of evidences about the benefits of herbs on hens and chickens.

Cabuk *et al.* [6] proved that Thymol and Carvacrol can improve the digestion of nutrients. Modiry *et al* [7] reported that the use 1.5% of different mixtures of *Urticadioica*, *Menthapulegium* and *Thymus vulgaris* medicinal plants in broiler diets improved their performance and carcass quality. Adding Chicory Fructans in broiler feed significantly decreased their abdominal fat pad [8]. The main components those find in *Cichoriumintybus* L. are inulin and oligofructose. Reported that feeding male broilers a 0.375% level of oligofructose improved per cent hot carcass weight and per cent breast weight while per cent fat pad was lowered [8].

In this study, we investigated the effect of chicory on performance, quality of eggs, blood biochemical and immunity parameters of laying hens.

MATERIALS AND METHODS

In this experiment that there are four treatments, at first 300 laying hens Hy-line strain (W36) were divided to 12 groups of 20 chicks each. Each 5 groups randomly assigned to one of the 5 treatments. control group with no nettle supplement, T2, T3, T4, and T5 and received 0.75%, 1%, 1.5%, and 2% nettle powder respectively. The hens were 60 to 70 weeks old and basal diet were based on corn – soybean meal considering the necessary nutrients were recommended 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 49th day of experiment.

Blood samples were obtained from brachial vein and centrifuged in order to getting serum, after 12 hours of fasting 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

5eggs 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 (%)	Control	Experienced groups
Corn	53.65	51.75
Wheat	21.5	21.5
Soybean meal	17.15	17.25
Soybean oil	0	1.2
Limestone	0.2	0.2
Oyster shell	6.2	6.8
Dicalcium phosphate	0.5	0.5
Vitamin-mineral mix ¹	0.5	0.5
dl-methionine	0.1	0.1
Sodium chloride	0.2	0.2
Analyzed chemical composition (%)		
Dry matter	89.2	89.5
Crude protein	14.5	14.5
Fat	6.2	6.2
Fiber	3.6	3.5
Ash	6.1	5.7
Calcium	0.8	0.8
Phosphorus	0.5	0.5
ME by calculation (MJ/kg)	12.78	12.91

¹Provides 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. ²T2=1%, T3=1.5%, and T4 =2% nettle powder

RESULTS AND DISCUSSION

The data which obtained from performance of hens fed by chicory are shown in Table 2. According to comparisons of this table it has been proven that the highest results were in groups 4 and 5. Increase in the food intake and production percent in the treated groups with the chicory could have been due to its antibacterial and antifungal effects which can lead to decrease in the amount harmful microbes of digestive system, improve their immunity and performance. This is possible that it is result of synergetic influence of effective substances in increasing antimicrobial activity. There is a possibility of gathering these to antimicrobial herbs made a remarkable decrease in the amount of intestine microbial colony and this prevented from lysis of amino acids and they used in formation of proteinic tissues and increased the breast percentage. Lee *et al* [10] found that the existence of harmful microbes in digestive system causes an increase in the lysis of protein and amino acids of nutrients, di-amination activity of proteins and amino acids and rapid decomposition of these molecules due to secretory substances from bacteria like urease. Considering this fact and antimicrobial activity of these herbs, the whole matter seems sensible. Chicory possibly promotes fat deposition along with live weight gain or since the increase in live weight gain is possibly by increased fat deposition. Increased abdominal fat in broilers fed by thyme leaves, is previously reported [11]. On the contrary,

Yusrizal and chen[12] observed that dietary inclusion of chicory fructans in broiler feed had significantly decreased the abdominal fat pad size.

The quality of eggs significantly affected by chicory ($P < 0.05$) (Table 3). The highest Shell weight and yolk index were seen in the 5th 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 [13]. 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.*[13] indicated that by depositing pigments of plants into the yolk, this makes them more colorful.

The use of different levels of chicory have any significant effects on immunity parameters of hens and it can be seen the highest level of globulin in groups 4 and 5 (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 and 5 compared to the control group ($P < 0.05$) but The concentration of serum HDL and Glucose were not significantly reduce in groups compared to the control group.

Table 2: The effect of different levels of chicory on egg quality characters and performance of laying hens

Treatments	FCR	Intake food(gr)	Mass production(gr)	Production percent	Egg's weight(gr)
T1	^a 2/82	^a 104/78	^a 37/88	^a 54/11	^b 61/12
T2	^a 2/79	^a 105/01	^a 37/98	^a 54/26	^b 61/64
T3	^{ab} 2/54	^a 105/14	^a 37/91	^a 54/38	^b 61/32
T4	^{ab} 2/50	^{ab} 108/06	^a 38/01	^{ab} 55/89	^b 61/42
T5	^{ab} 2/43	^{ab} 108/22	^a 38/13	^a 55/98	^b 61/60
SEM	0/31	0/46	5/18	2/11	0/42

^{a-c}Means with different subscripts in the same row differ significantly ($P < 0.05$)

Table 3: The effect of different level of chicory on egg quality characters of laying hens

Treatment	Weight of Each mg of shell	Shell thickness(mm)	Yolk weight (gr)	White weight (gr)	Shell weight (gr)	Yolk index (%)	Special weight (mg/cm ²)
T1	84	^a 0/329	19/98	37/12	^a 5/77	^a 41/72	1/36
T2	84	^a 0/332	19/90	37/16	^a 5/89	^a 41/98	1/22
T3	85	^a 0/339	20/01	37/26	^a 5/91	^a 41/92	1/32
T4	85	^{ab} 0/361	20/22	37/21	^a 6/59	^{ab} 42/98	1/21
T5	86	^{ab} 0/368	20/13	37/31	^{ab} 6/64	^{ab} 43/01	1/23
SEM	1/11	0/013	0/22	0/29	0/43	2/87	0/21

^{a-c}Means with different subscripts in the same row differ significantly ($P < 0.05$)

Table 4: The effect of different level of chicoryon immunity system of laying hens

Parameters	T1	T2	T3	T4	T5SEM
Heterophils to Lymphocytes ratio	0.21	0.23	0.230	0.25	0.24 0.03
Globulin	1.41	1.40	1.42	1.71 ^{ab}	1.70 ^{ab} 0.24
Albumin	1.42	1.50	1.49	1.55	1.60 0.17

^{a-c}Means with different subscripts in the same row differ significantly ($P < 0.05$)

Table 5. The effect of different levels of chicory on blood biochemical of hens

Blood Parameter	Treatments					SEM
	T1	T2	T3	T4	T5	
Glucose (mg/dl)	174.33	174.40	174.97	175.36	175.64	2.02
Cholesterol (mg/dl)	134.06 ^a	133.98 ^a	133.23 ^a	128.96 ^{ab}	128/65 ^{ab}	14.12
Triglyceride (mg/dl)	42.12 ^a	42.01 ^a	40.29 ^{ab}	40.19 ^{ab}	40.22 ^{ab}	4.11
LDL	33.92 ^a	33.63 ^a	32.86 ^a	31.18 ^b	31.11 ^b	1.61
HDL	84.11	83.99	84.26	84.21	84.20	0.99

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

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