J. Agric. Sci. Mansoura Univ., 28(12): 8041 - 8052, 2003

THE INFLUENCE OF HERBS MIXTURE ON THE PRODUCTIVE PERFORMANCE OF LOCAL LAYERS

Abd El-Meged, A. H. and Mona M. Ahmed
Poultry Nutrition Department, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Dokki, Egypt.

ABSTRACT

One hundred and twenty laying hens (BAHEIJ local strain) 12-months old were reared in egg production batteries to examine the effect of inclusion levels of herbs mixture as a feed additive on laying hens performance and egg quality traits. Hens were randomly divided into four equal groups with three replicates of 10 hens each and assigned randomly for one of the experimental diets which varied in inclusion level of herbs mixture supplementation. The basal diet was formulated to meet the nutrient requirements of BAHEIJ local strains. The first group received the basal diet without any supplementation, whereas other groups were given the basal diet with herbs mixture supplementation at levels 0.125%, 0.250% and 0.500% of herbs mixture. The results obtained during the experimental period (12 weeks old) could be summarized as follow:

The overall results showed that feeding laying hens on diets supplemented with herbs mixture at levels 0.125%, 0.250% and 0.500% recorded significantly ($p<0.05$) higher egg production(%), egg weight (g) and egg mass(g). However, feed consumption was not affected in the studied groups. Feed conversion significantly ($p<0.05$) improved with herbs mixture diet as compared with that of the control group. Herbs mixture significantly increased shell thickness, shell weight, yolk albumin weight, and egg shape index. While, yolk color scores did not significantly affected. Herbs mixture significantly reduced egg yolk cholesterol and total lipids in addition to cholesterol and trigelycerides in blood. Also, significantly ($p<0.01$) increased globulin in blood.

Key words: laying hen, herbs, egg quality, egg production.

INTRODUCTION

The use of feed additives has greatly increased, although it contains chemical components, hence the cumulative effect of these components induced detrimental effects on human health. It is indispensable to minimize these components, and deals with replacers without any adverse effect on production, so it is preferable to use a natural growth promoter. Herbs and herbal extracts contain different photochemical compounds with biological activity that may provide therapeutic effects. Several herbs for example help to reduce high blood cholesterol concentrations and stimulate the immune system. Recently, it has been found that the natural additives like herbs and edible plants have some properties as growth enhances to replace synthetic drugs. These additives are given to animals or birds to improve their physiological and productive performance (Craig. 1999).

Chen, (1992) reported that bee-pollen is a kind of powder-like male reproductive cell picked up by bees from the stamens of the blossom plants. Campos *et al.*, (1997) mentioned that bee pollen is a mix of bee-collected floral pollens which varies widely in composition. Flavonoids are normally

found as glycosides in pollens (Table 1). Bacha *et al.* (1997) revealed the chemical analysis of pollen grains of date palm males grown in Saudi Arabia, the average concentrations of moisture, ash, lipids and protein in pollen were 3.6-4.8, 4.7-7.1 , 0.8-1.8 and 15.8-18.0%, respectively. Carbohydrate content ranged from 10.5 to 13.1%. Starch content ranged from 8.1 to 9.2%, and represented 75% of the total carbohydrates. Macronutrients, Ca, P, Mg and Na were present in the highest concentrations. The micronutrients such as Fe was present in the highest concentrations, followed by Zn, Mn and Cu. Ozols *et al.* (1992) observed that pollen waste after extraction, when added to the diet at 0.5%, promoted growth in chickens and rabbits.

Bhatti *et al.* (1996) found that Trigonella foenum-graecum has been used as an antipyretic, diuretic and supportive, and for treatment of dropsy, heart disease, chronic cough and spleen and liver enlargement and showed antibacterial activity when tested against Bordetella bronchiseptica, Bacillus cereus, B. pumilus, B. subtilis, Micrococcus flavus, Staphylococcus aureus, Sarcina lutea, Escherichia coli and Proteus vulgaris. It was suggested (Table1) that the antibacterial activity may be due to flavonoids and steroid saponins (Bhatti *et al.*, 1996; Petit *et al.*, 1995). Rashwan (1998) indicated that when New Zealand White doe rabbits were fed on fenugreek 12 g/kg diet, serum total protein and total lipids decreased ($P<0.01$) with fenugreek addition and feed efficiency values were improved. ElShama *et al.*, (1996) noticed that buffaloes given 40 mg herbal mixture (Reproton: Sesamum indicum, Trigonella foenum, Foeniculum vulgarea, potassium iodide, Nubian bentonite, sesame oil, Nigella sativa, palm pollen grain and sodium dihydrogen orthophosphate) showed increased fertility.

Table 1: Effective components of various herbs and tafla:

Ingredients	Pharmaceutical Components	Pharmaceutical effect	References
Trigonella foenum	Flavonoids Steroid saponins Increasing sucrose and phosphatases Linolenic acid	antibacterial hypocholesterolaemia stimulates digestion determined essential for egg production\+	Bhatti *et al.*, (1996) Petit *et al.*, (1995) (Kalpana *et al.*, 1996) Nazir *et al* .,1983
Foeniculum vulgarea	Antioxidant. Flavonoids rich in mineral elements fatty acid	increasing digestive enzymes activities antibacterial increased egg shell intensities determined essential for egg production	Abu-Raiia *et al.*, (1991) Oktay *et al.*, (2003) Abu-Raiia *et al.*, (1991) Abu-Raiia *et al.*, (1991)
Pollen grains	Flavonoids highest concentrations of minerals	antibacterial growth promoter increased egg shell	Campos *etal.*,(1997) Ozols *et al.*, (1992) Bacha *et al.*, (1997)
Nubian clay(tafla)		Increased each of ion exchange capacity of digestible nutrients and prevention effect on the mold growth	(EL-Hakim *et al.*, 1994)

Abu-Raiia *et al.* (1991) found that fennel seeds were rich in total carbohydrates (61.0%) and low in total soluble sugars (7.6%). The seeds were rich in Ca, P and Mg and contained considerable amounts of K, Fe and Zn and trace amounts of Mn. The major fatty acid components of fennel seeds were 18:1 (71.31%), and 18:2 (11.66%).Fennel seeds were characterized by high concentrations of C13 and C23 hydrocarbons. Only 3 sterols being campesterol, stigmasterol and beta-sitosterol were identified Amino acid analysis showed the seeds to be low in methionine Fennel seeds were high in isoleucine and histidine. Uma *et al.* (1998) observed that the Trigonella foenum-graecum officinal extracts in rabbits significantly reduced the deposition of cholesterol in aorta walls. Gomez *et al.* (1998) indicated that fenugreek seed extract by intramuscular injection significantly increased liver and muscle glycogen contents. Al-Habori and Raman (1998) found that hypocholesterolaemic of Trigonella foenum-graecum is attributed to increased conversion of hepatic cholesterol to bile salts due to loss in the feces. Lanksy *et al.* (1993) noticed that Trigonella foenum-graecum, may compete with cholesterol at binding sites. Kalpana *et al.* (1996) reported that rats which was fed on the fenugreek brought about increases in the activity of phosphates and surcease and digestion had been stimulated. Petit *et al.*, (1995) found that a fenugreek seed extract containing steroid saponins increased food consumption and induced hypocholesterolaemia in rats. Oktay *et al.* (2003) revealed that fennel (F.vulgare) seed is a potential source of natural antioxidant (Table 1).

Vasilev and Mirzaliev, (1989) found that with 2.5% bentonite, egg yield was the highest, feed intake was less and egg-shell weight was 12-13% more than with the basal diet given alone. Kalyuzhnov *et al.* (1988) also reported that with zeolite dietary supplement, hens egg yield increased by 3 to 6%. On the other hand, Al-Zubaidy, (1992) indicated a negative effect on egg production, kg feed/kg eggs, egg weight and egg component yields with bentonite, while egg shell thickness was slightly reduced with 5.0,7.5 or 10% bentonite levels. Similarly, Berrios *et al.* (1983) reported that number of eggs per hen, average egg weight and shell resistance did not differ significantly among treatments (0, 2.5, 5 or 10% zeolite). This indicate that natural clays could be included in layer diets up to 10% without deleterious effects on productivity and egg quality. The objective of the current trial was to study the probable effect of the inclusion levels of herbs mixture supplementation in diets on the productive performance, some traits of egg quality of BAHEIJ local strain laying hens.

MATERIALS AND METHODS

The experimental work was carried out at El-Sabahia Poultry Research Station, Animal Production Research Institute, Agricultural Research Center. One hundred and twenty BAHEIJ laying hens12-months old (as a local egg strain) was used in this experiment. The birds were taken at the end of egg production curve where production was low (about 20% egg production) in order to appear the beneficial effect of the used herbs mixture in improving

egg production, as well as productive performance and some traits of egg quality. Equal numbers of hens were randomly distributed into control and three treatment groups. Each group contained 30 birds divided into 3 replicates (10 hens each) and raised in wire cages. A corn- soybean basal diet (Table 2) according to requirements of BAHEIJ (local strain) was fed to hens of the control group without any supplementation. The basal diet was mixed with 0.125%, 0.250% and 0.500% of herbs mixture [Fennel 15%, Fenugreek 15%, pollen 10% and tafla 60%] and fed to the groups 2,3 and 4, respectively.

Table 2:Composition and their chemical analysis of the basal diet

Ingredients	%
Corn yellow	53.000
Soybean meal (44%)	31.700
Vegetable oil	3.960
Bone meal	3.500
Limestone	6.883
DL-Methionine	0.158
Premix*	0.300
NaCl	0.300
Sand	0.199
Total	100
chemical analysis (%)	
Crude protein	18.51
Crude Fiber	2.96
Ether extract	6.31
ME. Kcal/kg	2850.6
Ca	3.53
Av P	0.83
Methionine	0.46
Lysine	1.03

Each 3 Kg of vitamin and mineral mixture contain: vit. A, 12000 IU; Vit.D3, 2000 IU ; Vit. E, 10 mg Vit.K3 2 mg; Vit B1 1 mg; Vit B2, 5mg; Vit B6, 1.5mg; Vit.B12 10 mcg; Pantothenic acid,10 mg; Nicotinic acid,30 mg; Folic acid,1 mg ; Biotin, 50 mcg; Choline, 250 mg; Copper, 10 mg, Iodine,0.3mg; Iron,30 mg; Manganese, 60mg; Zinc, 55mg; Selenium, 0.1mg and Cobalt, 0.1 mg.

The proximate analysis of the experimental diet was carried out according to A.O.A.C (1990). Feed was given according to strain management guide. During the experimental period (12 weeks), eggs were collected and weighed. The average daily egg production was calculated per hen every three weeks interval. Also, daily feed consumed per hen was calculated. Records of egg production, egg weight, egg mass and feed consumption were used to calculate the values of feed conversion ratio.

A total of 15eggs were taken from each treatment (5 eggs from each replicate) every three weeks, then weighed and cracked to measure egg quality characteristics. Egg shape index, shell weight, yolk weight, yolk height, albumin height and albumin weight were determined. Yolk color was

measured using the Roche color fan. Shell thickness was measured using a micrometer to the nearest 0.01mm at the equator. Yolk cholesterol and lipids were determined according to the procedures of Fisher and Leveille (1957) and Allain *et al.* (1974). At the end of the experiment, the data obtained were examined statistically by using SAS program (SAS, 1995). Significant differences among treatment means were separated using Duncan's multiple range procedure (Duncan, 1955).

RESULTS AND DISCUSSION

Performances of laying hens

1- Egg production

The effects of inclusion levels of herbs mixture on egg production are illustrated in Table(3). The results show a significantly ($p<0.05$) higher egg production through experimental period for hens fed diets containing herbs mixture at levels of 0.125%,0.250% and 0.500% diet, than their counterparts in the control group. The highest value was for the birds given 0.500g % of herbs mixture. However, no significant differences were recorded among birds given herbs mixture. Increasing egg production for layers given the diets containing herbs mixture would suggest an improvement in digestive efficiency. Such improvement could be attributed to the fenugreek in the mixture, which stimulates digestion by increasing levels of phosphates and sucrose (Kalpana *et al.*, 1996). Also the improvement may be due to the mode of action of herbs mixture in bird utilization of ingredients of herbs mixture, suggesting that it acts as an antibacterial owing to flavonoids in Pollen (Campos *et al.*, 1997) in fenugreek (Bhatti *et al.*, 1996) and in fennel (Abu-Raiia *et al.*, 1991) that led to: maintaining normal intestinal microflora by competitive exclusion and antagonism, altering metabolism by fenugreek (incorporated in the composition of herbs mixture)and increased liver and muscle glycogen contents (Gomez *et al.*,(1998). Oktay *et al.* (2003) indicated that the fennel (F.vulgare) seed (incorporated in the composition of herbs mixture) is a potential source of natural antioxidant due to increasing digestive enzymes activities and decreasing bacterial enzyme activity. It is clear that results of egg weight and egg mass are in agreement with the previously mentioned results of egg production. For the overall period, the inclusion of herbs mixture recorded significant highest values in this respect. This increase in egg mass values may be due to the increase in egg weight laid by hens of these groups. In connection, EL-Kaiaty *et al.*,(2002) indicated that 2% of fenugreek supplementation increased egg weight, egg mass and egg number in white Bovans pullets.

Increment in egg weight and egg mass may be due to the fact that herbs mixture improved the utilization of ingredients of chicken diets. Moreover, ElShama *et al.* (1996) noticed that adding herbal mixture (Trigonella foenum, Foeniculum vulgarea, nubian bentonite, palm pollen grains) in Reproton compound showing increased fertility which reflect on increasing egg production. In connection, similar results were confirmed by Vasilev and Mirzaliev, (1989) and Kalyuzhnov *et al.* (1988) who found that egg yield

increased with bentonite, and zeolite .In contrast, the conflicting reports of Berrios *et al.* (1983) and Al-Zubaidy (1992) did not find any significant effect of clay (zeolite and bentonite) respectiviy on egg production and egg weight.

2- Feed intake and feed conversion:

During the experimental period (48-60 weeks), total feed intake mean values (FI) recorded similar values for the birds given herbs mixture and control diet Table (3).The differences in FI due to these additives effect were non significant. It is clear that the improvement in the FCR was associated with supplemented herbs mixture levels, These results were, statistically, highly significant ($P<0.05$). Similarly, the best FCR was corresponding to 0.500%diet. Birds fed herbs mixture converted their feed into egg more efficiently than the control group during the overall experimental period. Birds fed on diets containing control group recorded the poorest feed conversion ratio. These results hold true with findings of El-Kaiaty *et al.* (2002) who indicated that diets for laying hens containing fenugreek did not have any negative effect on feed intake. Similar patterns were also reported by Rashwan (1998), who revealed that feed efficiency values were improved with fenugreek. In contrast,Petit *et al.* (1995) found significant increased effect on feed intake value as fenugreek extract used. Also, Vasilev and Mirzaliev (1989) found that with bentonite, feed intake was less.

As the basal diet used was formulated to contain all nutrients at the amounts needed by local laying hens, therefore, the improvement in egg production and feed conversion for layer given the diets containing herbs mixture would suggest the potential beneficial effect of these additives on gastrointestinal tract macro–organisms. Similar results were confirmed by Bhatti *et al.* (1996) who revealed that fenugreek has as an antibacterial activity due to flavonoids content which improve the balance of the intestinal flora and metabolites. Moreover herbs mixture improved the utilization of feed by increased activity of phosphates which act as transferring phosphate groups from one system to another in the form of an energy rich phosphate bond (Kalpana *et al.,1996*). In this respect, fennel seeds (FS) showed strong antioxidant activity. The extracts of FS have effective reducing power and saving effect of free radical, superoxide anion radical, hydrogen peroxide, and metal chelating activities (Oktay *et al.*, 2003).

The improvement in performance and feed conversion for layer given the diets containing tafla (incorporated in the composition of herbs mixture) would suggest an improvement in digestive efficiency as a result of tafla addition. Tafla may be increased each of ion exchange capacity and digestible nutrients as reported by (EL-Hakim *et al.*, 1994). Moreover, tafla may be due to its prevention effect on the mold growth can reduce the bioavilability of mycotoxines (Resanovic *et al* ., 1999) and accordingly led to higher utilization efficiency of nutrients in the feed which reflect on increased egg production.

Table 3: Effect of feeding Herbs mixture on performance of lying hens.

Item	Treatment			
	Control	0.125%	0.250%	0.500%
Egg production(%)	20.15±0.28^{b}	22.20±0.30^{a}	24.85±0.29^{a}	30.14±0.29^{a}
Egg weight(gm)	46.27±1.20^{b}	52.79±1.30^{a}	53.89±1.10^{a}	55.51±1.80^{a}
Egg mass(gm)	9.32±1.19^{b}	12.83±2.20^{a}	13.39±1.56^{a}	16.17±1.30^{a}
Feed intake(gm)	45.67±3.89^{a}	48.74±7.50^{a}	60.26±5.45^{a}	60.91±3.30^{a}
Feed conversion	4.90±0.20^{b}	4.50±0.17^{a}	4.50±0.09^{a}	4.50±0.17^{a}

a,b,c means within rows with different superscripts are significantly differed ($p<0.05$).

3- Egg quality

Results in Table (4) show that the inclusion levels up to 0.500% of herbs mixture had a significant increase in shell thickness, shape index and shell weight. These results are correlated with those of Vasilev and Mirzaliev (1989) who found that with bentonite egg-shell weight was 12-13% more than with the basal diet given alone. Such increment in egg shell could be attributed to that about 7% of the dietary zeolite passed through the digestive system in its original form that suggests a possible ion-exchange mechanism of zeolite for improvement of egg shell quality (Roland *et al.*, 1993). In contrast, the conflicting reports of Berrios *et al.*, (1983) and Al-Zubaidy (1992) revealed that addition of clay (bentonite and zeolite) did not improve or adversely affect egg shell quality.

On the other hand, internal egg quality parameters of albumen weight, albumen height and albumen percentage showed a significant increase. Also, values of yolk weight and yolk height of egg produced by layers fed diets supplemented with herbs mixture differed significantly compared with the control. While the inclusion levels of herbs mixture had no significant effect on yolk color scores. These results are in agreement with EL-Kaiaty *et al.*, (2002) indicated that fenugreek (incorporated in the composition of herbs mixture) had a significant increase in yolk and albumen weight, but no significant differences were recorded for yolk color scores. Also pollen and fennel (incorporated in the composition of Herbs mixture) were rich in mineral elements (Bacha *et al.*, 1997 and Abu-Raiia *et al.*, 1991) which play an important role in increased egg shell intensities. Significant increase in internal eggs may be due to the presence of a fat soluble unidentified factors and vitamin F group (a mixture of unsaturated fatty acids including linoleic, linolenic and arachidonic acids) in herbs mixture, which have been determined essential for egg production (Murray *et al.*, 1991). Furthermore, fenugreek (incorporated in the composition of Herbs mixture) contains linolenic acid (C 18:3 w3) (Nazir *et al* .,1983 and Sood and Rathor,1984) which is the richest terrestrial source of w3 fatty acids. Klatt (1986) showed that, dietary w3 fatty acids are the subject of current interest because they have been credited with a number of beneficial effects. In addition, Herbs mixture contains some minerals and elements; consequently, it activated some enzymes. Therefore, this response may be attributed to the mode of action of the herbal ingredients.

Table 4: Effect of feeding herbs mixture on external and internal egg quality parameters of laying hens.

Traits	Treatments			
	Control	0.125%	0.250%	0.500%
Egg weight(gm)	38.88±2.07^{b}	43.33±1.72^{a}	43.33±2.33^{a}	44.88±2.86^{a}
Albumen weight(gm)	22.13±1.36^{b}	23.90±1.77^{a}	24.00±1.13^{a}	26.63±2.56^{c}
Albumen height(mm)	4.25±0.56^{b}	4.76±0.54^{a}	4.88±0.78^{a}	4.88±0.71^{a}
Albumen percentage(%)	56.90±2.70^{b}	55.20±2.70^{b}	55.40±2.70^{b}	59.34±2.70^{a}
Yolk weight(gm)	12.50±0.76^{b}	14.55±1.28^{a}	14.33±1.81^{a}	14.25±1.58^{a}
Yolk height(mm)	14.38±0.44^{b}	14.49±0.76^{a}	14.58±0.93^{a}	14.66±0.43^{a}
Yolk percentage(%)	32.20±2.11^{a}	33.60±2.11^{a}	33.10±2.11^{a}	31.80±2.11^{a}
Yolk color	7.25±1.16^{a}	6.25±0.46^{a}	6.88±0.83^{a}	6.75±0.71^{a}
shell weight(gm)	4.25±0.46^{b}	4.88±0.83^{a}	5.00±0.53^{a}	5.00±0.52^{a}
Shell percentage(%)	10.90±0.42^{a}	11.30±0.42^{a}	11.50±0.42^{a}	11.10±0.42^{a}
Shell thickness(mm)	0.17±0.02^{b}	0.27±0.04^{a}	0.28±0.02^{a}	0.28±0.02^{a}
Egg shape index(%)	72.95±1.3^{b}	75.60±1.5^{a}	75.61±1.40^{a}	76.54±1.20^{a}

a,b,c means within rows with different superscripts are significantly differed (p<0.05).

4- Blood parameters:

Results in Table (5) declared that supplementing layer diet with different levels of herbal mixture decreased significantly (p<0.05) the plasma cholesterol level during experimental period compared with those of the control.The result agrees with that reported by Uma *et al.* (1998) who showed that extracts of Trigonella foenum-graecum (incorporated in the composition of herbs mixture) in rabbit diet significantly reduced the deposition of cholesterol in aorta walls and reduced the number of aortic lesions. Also Petit *et al.* (1995) found that a fenugreek seed extract containing steroid saponins induced hypocholesterolaemia in rats. Similar results were obtained by EL-Kaiaty *et al.* (2002). Such reduction is often related to the mode of action of fenugreek in bird metabolism, which include competition with cholesterol at binding sites or interfere with cholesterol biosynthesis in the liver. Also, soluble fibers like gums, pectin and mucilage in fenugreek seed may block cholesterol absorption from the intestine, then stimulates bile flow (Lanksy *et al.*,1993). Hypocholesterolaemic effects of Trigonella foenum-graecum is owing to increased conversion of hepatic cholesterol to bile salts due to loss in the faeces, of complexes of these substances with Trigonella foenum-graecum fiber and saponins. Trigonella foenum-graecum treatment selectively reduces the LDL and VLDL fractions of total cholesterol (Al-Habori and Raman, 1998). Mean while, yolk cholesterol significantly (p<0.05) followed the same trend. This reduction in yolk cholesterol might be a direct response to the lower cholesterol in plasma, as reported by Badawy (1997) that there is a positive correlation between lipids and cholesterol levels in female blood. The same effect obtained by EL-Kaiaty *et al.* (2002) found that adding fenugreek seeds to laying hen diets decreased cholesterol in blood and egg yolk. Data of plasma hematological parameters are presented in (Tables 5). Plasma triglycerides was significantly (p<0.05) reduced by the elevated herbs mixture levels, especially with 0.500% level as compared with another levels and control, this was associated with a significant reduction of plasma total lipids following the same trend. These findings are correlated

with those of Rashwan (1998) who indicated that total lipids decreased in New Zealand White doe rabbits fed on diets with fenugreek addition. Similar results were confirmed by Gomez *et al.* (1998) and EL-Kaiaty *et al.* (2002) who revealed significant effect of fenugreek on plasma total lipids. Plasma createnine, GOT and GPT were not affected by different levels of herbs mixture, indicating no adverse effects of herbs mixture, on kidney and liver functions respectively. Results in Table(5) showed that the inclusion levels of herbs mixture up to 0.500% had no significant effect on either total plasma protein or albumin. On the other hand, conflicting reports of Rashwan (1998), Gomez *et al.* (1998) and EL-Kaiaty *et al.* (2002) found that serum total protein decreased with fenugreek addition. In contrast, Yang *et al.* (1999) reported that Zeolite significantly increased contents of serum total protein. Globulin was significantly ($p<0.05$) increased by incremented herbs mixture levels. This increase may be attributed to the increase which occurred in the level of metabolic processes. The values of A/G ratio indicated that immunity of birds was increased by inclusion of herbs mixture as a result of increasing globulin levels.

It can be concluded that herbs mixture (fenugreek, fennel, pollen grains and tafla) gave better egg weight, egg production without any harmful effects on laying hens performance, egg quality characteristics and the functions of liver and kidney.

Table 5: Effect of feeding herbs mixture on blood parameters of laying hens.

Parameters	control	0.125%	0.250%	0.500%
Cholesterol mg/dl	186.30±2.05^{a}	147.20±2.07^{b}	137.20±2.35^{c}	136.10±2.43^{c}
Total lipids mg/dl	328.30±8.68^{a}	303.20±2.50^{b}	302.20±8.60^{b}	301.10±3.3^{b}
Trigelycerides mg/dl	109.75±1.50^{a}	103.50±2.01^{b}	102.40±1.90^{b}	101.00±1.58^{b}
Createnine mg/100ml	0.86±0.01^{a}	0.87±0.02^{a}	0.88±0.03^{a}	0.90±0.02^{a}
Total protein g/100ml	3.97±0.07^{a}	3.86±0.62^{a}	3.97±0.55^{a}	3.97±0.60^{a}
Albumen g/100ml	2.40±0.08^{a}	2.06±0.08^{a}	2.15±0.11^{a}	2.07±0.15^{a}
Globulin G/100ml	1.57±0.26^{b}	1.80±0.20^{a}	1.82±0.10^{a}	1.90±0.30^{a}
A/G	1.53±0.02^{a}	1.14±0.01^{b}	1.16±0.02^{b}	1.09±0.03^{b}
GOTu/ml	113.95±0.90^{a}	114.30±5.30^{a}	113.88±0.80^{a}	114.40±2.49^{a}
GPTu/ml	18.50±0.01^{a}	18.80±1.20^{a}	18.70±0.02^{a}	19.10±0.03^{a}
Egg yolk Cholesterol mg/dl	265.30±3.70^{a}	255.40±4.70^{b}	250.70±3.70^{bc}	248.20±3 20^{c}

a,b,c means within rows with different superscripts are significantly differed ($p<0.05$).

REFERENCES

Abu-Raiia,S.H.; N.MAbdel-Moein and M.Y.Khalil (1991).Chemical evaluation of common dill and bitter fennel seeds.Bulletin of Faculty of Agriculture. Cairo University. 42 (4):1133-1148.

Al-Habori,M. and A. Raman (1998). Antidiabetic and hypocholesterolaemic effects of fenugreek. Phytotherapy Research, 12: (4) 233-242.

Allain,C.C.; L. S. Poon; C. S. Chan and W.Richmond (1974). FU. P.C Clin Chem, 20;470.

Al-Zubaidy,S.S. (1992). Evaluation of spent bleaching and filtering clay-a bentonite product from palm oil refining as a potential feed ingredient in layer diets. Animal Feed Science and Technology, 40 (1): 13-19.

A.OA.C. (1990). Association of Official Analytical Chemists. Official methods of Analysis, 15th Edition, Washington, D.C,USA.

Bacha,M.A.; M.A. Ali and F.A. Farahat (1997).Chemical composition of pollen grains of some date palm males grown in Riyadh, Saudi Arabia. Arab Gulf Journal of Scientific Research, 15(3) : 783-803.

Badawy, Neamat A. (1997).Influnce of ditetary oils on performance, blood lipids and immune response of Japanese quail. Egypt Poult.Sci.,17(2):53-75.

Berrios, I.; M. Castro and M. Cardenas (1983). Zeolite inclusion in feeds for laying hens fed ad libitum.Cuban Journal of Agricultural Science. 17(2): 169-174.

Bhatti,M.A.;KhanM.T.J;Ahmed,B;Jamshaid,MandAhmad,W.(1996).Antibacteri al activity of Trigonella foenum-graecum seeds. Fitoterapia, 67(4): 372-374.

Boswart,J.; P. Kostiuk; J. Hrstka; I. Hrstka and V. Hrstka (1993).Cholesterol and its esters in hen's eggs. Zivocisna-Vyroba, 38 (5) : 471-480.

Campos,M.; K.R. Markham; K.A. Mitchell and A.P. Da-Cunha (1997).An pproach to the characterization of bee pollens via their flavonoid/phenolic profiles. Phytochemical Analysis,8(4):181-185.

Chen, D.(1992).Studies on the "bionic breaking of cell wall" pollen used as the additive of prawn diet. Shandong Fish Qilu Yuye, 5:35-38

Craig, W. J. (1999). Health-promoting properties of common herbs American Journal of Clinical Nutrition, 70 (3):4915-4995.

Duncan,D.B.(1955).Multiple range and multiple test F test Biometrics,11:1-42

El-Hakim, A. M.; H. M. El–Gendy; E. M. Abdel-Raouf; A. M. Allam and M. K. Mohsen (1993). Effect of varous levels of bentonite on mineral availability in sheep diets containing high levels of urea. Egyptian Journal of Applied Sci.,8(2):188-195

El-Kaiaty,A. M.; A. Z. Soliman and M. S. H. Hassan (2002). The physiological and immunological effects of some natural feed additives in Layer hen Diets. Egypt. Poult.Sci., 22 (1): 175-203.

El-Shama,.A.I.S; R.M. Khattab; A.R.M. Ibrahim and M. E. A. El -Gharib (1996). Induction of ovulatory oestrus and fertility in acyclic Egyptian buffaloes using herbal and hormonal treatments, Annals of Agricultural Science, Moshtohor, 34(2) :555-567.

Fisher, H. and G. A. Leveille (1957). Observations on the cholesterol, linoleic and linolenic acid content of eggs as influenced by dietary fats. J .*Nutrition*, 63:119-129.

Gomez, M.P.J.; B. Geetha and G. Bhaskar (1998).Antidiabetic effects of fenugreek seed extract (*Trigonella foenum graecum*) on domestic animal with special reference to carbohydrate metabolism. Journal of Ecotoxicology and Environmental-Monitoring,8(2): 103-106.

Kalpana,P.; K. Srinivasan and K. Platel (1996). Influence of dietary spices or their active principles on digestive enzymes of small intestinal mucosa in rats. International Journal of Food Sciences and Nutrition, 47(1): 55-59.

Kalyuzhnov, V.T.; I.E. Zlobina and L.G. Nikulina (1988). physiological basis of including zeolite in diets of poultry. Spolzovanie Tseolitov Sibirii Dalnego Vostokav Seiskom khozyaistve, pp 15-20. Novosibirsk.

Klatt, (1986). The lure of omega-3- polyunsaturated fatty acids. Food Sci., News L. 16: 1-4(Poult. Sci., 1991,70:1403-1411).

Lanksy,P.S.; H. Schilcher; J.D. Phillipson and D. Loew (1993). Plants that lower cholesterol. First world congress on medicinal and aromatic plants for human welfare (WOCMAP), Maastricht, Netherlands, 19-25 July 1992. Acta-Horticulturae, 332: 131-136.

Murray, I.L.K.; D.K. Granner; P.A. Mayes and V.W. Rodwell (1991). Text book of Harper's biochemistry, twenty second edition, Appleton & Lange, Norwalk, Connecticut/Los Altos, California.

Nazir, M.; M. Riaz; J. Rehman; M.A. Saeed and Bhatty (1983). Neutral lipids from seeds of trigonella corniculata. Pakistan, Journal of Scientific of Industrial Research, 26(1):41-46.

North, M.O.(1984).Commercial chicken production Manual. Avi, Publishing Cominy .I.N.C.West port Connecticut, USA.

Oktay,M.A.; I. Gulcin and O.I. Kufrevioglu (2003).Determination of in vitro antioxidant activity of fennel (*Foeniculum vulgare*) seed extracts. Lebensmittel Wissenschaft and Technologie, 36 (2): 263-271.

Ozols,A.Ya.; I.K. Gozite; Yu.A. Zilbers; S.M. Malei; R.I. Kushak; T.A. Sheshukova and V.K. Tifental (1992).Growth stimulating effect of products of flower pollen processing in chickens and rabbits. Selskokhozyaist vennaya Biologiya, (2) :162-164.

Petit,P.R.; Y. D. Sauvaire ; B. D. M. Hillaire; O. M. Leconte; Y.G. Baissac; G.R. Ponsin and G.R. Ribes (1995). Steroid saponins from fenugreek seeds: extraction, purification, and pharmacological investigation on feeding behavior and plasma cholesterol. Steroids., 60 (10): 674-680

Rashwan, A. A. (1998).Effects of dietary additions of fenugreek on reproductive and productive performance of New Zealand White rabbit does. Egyptian Journal of Rabbit Science, 8 (2): 157-167.

Resanovic,R.; T. Palic; S.Z. Nikolovski; Z. Veljic and J. Rodic (1999). In vivo detoxication of aflatoxin B1 using modified clinoptilolite. Eighth Yugoslav Symposium on Poultry Production. Proceedings II. Sokobanja, Yugoslavia, 5-9 October 1999. Zivinarstvo, 34(8):21-24.

Roland, D.A.; H.W. Rabon; K.S. Rao; R.C. Smith; J.W. Miller; D.G. Barnes and S.M. Laurent (1993). Evidence for absorption of silicon and aluminum by hens fed sodium zeolite A. Journal of Poult. Sci.,72(3): 447-455.

SAS (1995).SAS User, Guide :Statistical Analysis System Institute,Inc., Cary,N.C.

Sharma, R.D.; A. Sarkar; D.K. Hazra; B. Misra; J.B. Singh and B. B. Maheshwari (1996).Toxicological evaluation of fenugreek seeds: a long term feeding experiment in diabetic patients. Phytotherapy Research, 10 (6) :519-520.

Sood, A.R. and R.C.Rathor (1984). Fatty acid composition of seed oil of Trigonella corniculate linn. Journal of Food Science and Technology, India ,21 (1): 42-43.

Uma-Bhandari; J. K. Grover; J. N. Sharma and U. Bhandari (1998).Effectof indigenous drugs on changes in morphology and cholesterol level of aorta in early atherosclerotic progression. A comparative experimental study. Hamdard-Medicus, 41 (4): 56-59.

Vasilev, K. and Y.U. Mirzaliev (1989). A mineral supplement (in the diet for hens). Ptitsevodstvo, 11:30-31

Yang, C. M.; A. G. Chen; C. M. Yang and A. G. Chen (1999): Effects of dietary zeolite on growth performance and the mechanism in yellow feather type broilers. Journal of Zhejiang University Agriculture and Life Sciences, 25 (6): 619-622.

تأثير إضافة مخلوط من الأعشاب على أداء إنتاج الدجاج البياض المحلى

احمد حسين عبد المجيد-منى محمود احمد
معهد بحوث الإنتاج الحيواني-مركز البحوث الزراعية -وزارة الزراعة

استخدم فى هذه الدراسة ١٢٠ دجاجة بياضة عمر ١٢ شهر قرب نهاية موسم الإنتاج حيث كان الإنتاج منخفضا (حوالي ٢٠%) لدراسة تأثير إضافة مخلوط من الأعشاب (حلبة-شمر - حبوب لقاح-طفلة نوبي) على الأداء الإنتاجي للدجاج المحلى البياض (بهيج) وأيضا صفات جودة البيضة وبعض مقاييس الدم حيث وزعت الدجاجات عشوائيا إلى أربعة مجا ميع تجريبية لكل منها ثلاث مكررات بعدد ١٠ دجاجات فى المكررة حيث تمثل الأولى مجوعة المقارنة و غذيت على علف بدون إضافة والثانية والثالثة والرابعة تم إضافة مخلوط الأعشاب بالنسب (٠,١٢٥ %) ، (٠,٢٥٠%)، (٠,٥٠٠%) على الترتيب وكانت النتائج كالتالي:

١-إضافة مخلوط الأعشاب فى عليقه الدجاج البياض ادى الى زيادة معنوية في إنتاج البيض وكتلة البيض ووزنة وأيضا تحسن معامل التحويل الغذائي مقارنة بجموعه المقارنة ولم يكن هناك تأثير فى العلف المستهلك.

٢-تأثرت صفات جودة البيضة بإضافة المستويات المختلفة لمخلوط الأعشاب حيث ازداد سمك قشرة البيض ووزن القشرة معنويا وأيضا وزن الصفار والبياض وكذلك تأثر دليل شكل البيضة بينما لم يكن هناك تأثير للمعاملة على درجة لون الصفار.

٣-إضافة مخلوط الأعشاب أدى إلى انخفاض الكوليسترول فى صفار البيض والدم وأيضا الدهون الكلية والجلسريدات الثلاثية فى الدم ولم يكن هناك تأثير لمخلوط الأعشاب على الكريتينين والبروتينات الكلية والالبيومين و GPT،GOT فى الدم بينما كانت هناك زيادة معنوية فى الجلوبيولين.