Egypt. Poult. Sci. Vol. (38)(II): (427-438)(2018) (1803-1009)

Egyptian Poultry Science Journal

http://www.epsj.journals.ekb.eg/

ISSN: **1110-5623** (**Print**) **– 2090-0570** (**Online**)

EGG PRODUCTION, EGG QUALITY TRAITS AND SOME HEMATOLOGICAL PARAMETERS OF SINAI CHICKEN STRAIN TREATED WITH DIFFERENT LEVELS OF BEE POLLEN

Y.S. Rizk[1]., A.A. Abuoghaba[2], Inas I. Ismail[1]; and Nasra. B. Awadien[1]

[1]Poult. Breed Dep., Anim. Prod. Res. Ins., Agric. Res. Center, Dokki, Giza, Egypt.

[2]Dep. of Poult. Prod., Fac. of Agric., Sohag Univ., 82524 Sohag, Egypt.

[1]Corresponding author: E-mail: Abuoghaba@yahoo.com

Received: 09/04/2018 Accepted: 09/05/2018

ABSTRACT: The current study aimed to investigate the effect of bee pollen (BP) supplementation of Sinai chicken hen diets on the egg production, egg quality traits, some hematological parameters. A total of 120 Sinai hens, 26 weeks old were randomly divided into 4 equal experimental groups (30 hens with 3 replicates, 10 hens each). In the 1st group (control), hens were fed on a basal diet without any treatment, while those in the 2nd, 3rd and 4th groups were fed on the same basal diet and supplemented with bee pollen (BP) at 500, 1000 and 1500 mg/kg diet throughout 12 successive weeks.

The obtained results indicated that:

The live body weight and total weight gain in the 3rd group (1000 mg bee pollen/ kg diet) was significantly (P≤0.05) improved as compared with the other groups. The means of laying rate and egg mass in 2nd group were significantly (P≤0.05) improved than that of the control group. The highest mean of feed consumption (FC) was recorded in the 2nd group, while the lowest one was obtained in the 4th group with significant differences. The feed conversation ratio for hens in the 3rd group was significantly decreased compared with those of control, 2nd and 4th groups. Egg weight, exterior and interior egg quality were not affected by BP supplementation.

The means of red blood cells (RBCs) and white blood cells (WBCs) were significantly increased in the treated groups, while the H/L ratio was significantly decreased as compared with control. Serum total cholesterol and triglycerides values were significantly (P≤0.05) decreased, while serum total protein, albumin, and globulin were not affected in the treated groups compared with those in the control group. From these findings could be concluded that, the supplementation of bee pollen at 500mg/kg of Sinai hen diets improved the production performance, some hematological and parameters during egg production period. It is worth to mention that the treating Sinai chicken hens with 500 mg BP/kg diet is more economical and cheaper compared with 1000 and 1500mg BP/kg diet.

Key words: Sinai chicken - laying hens - bee pollen- egg quality- hematological parameters

INTRODUCTION

Several modern strategies in poultry production are directed to improve egg production. A ban on the use of antibiotics as growth promoters has led to a need for finding yet safe additives for improving production performances without adverse effects on poultry health and welfare, quality animal meat, human health and the environment (European Commission, 2003). As a replacement for antibiotics, most frequently used alternative growth stimulators in poultry production are probiotics, prebiotics, enzymes, acidifiers, antioxidants and phytogenic additives (Peric et al., 2009). Phytogenic additives have been used as a promising alternative solution, which play an important role to meet the consumer's requirements in terms of food safety and solve the problem of bacterial resistance that occurs as a result of using antibiotics as growth promoters (Silva Cardoso et al., 2012). Bees are among the beneficial insects that produce mainly the honey, and also byproducts such as royal jelly, bee wax, propolis and bee pollen (Hascik et al., 2012). Bee pollen contains at least 22 amino acids, 18 vitamins, 25 minerals, 59 trace elements, 11 enzymes or coenzymes, 14 fatty acids, 11 carbohydrates (35- 61% glucose, fructose and sucrose) and approximately 25% protein. Bee pollen is extremely rich in vitamin A, B complex and vitamins C, D, E and Lecithin (Sulcerova et al., 2011). Bee pollen has recently received an increased attention for its antibacterial and antifungal effects (Carpes et al., 2007). Relevant is also the quantity of polyphenolic components, mainly flavonoids, that prevent the negative effect of free radicals (Hejinen et al., 2002). Therefore, the present study was designed to investigate the effect of bee pollen supplementation on the egg production, egg quality traits and some hematological parameters of Sinai chicken strain.

MATERIALS AND METHODS

Experimental design and bird's management:

The present study was conducted at EL-Serw Poultry Research Station, Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt. It lasted 12 weeks from 26 to 38 weeks of age, during the period from 14 August up to 6 November (Summer-Autumn) season. A total of 120 Sinai hens (4 groups × 3 replicates × 10 hens), 26 weeks old, were weighed and randomly distributed into 4 experimental groups. In the first group (control) the hens were fed on a basal diet without any supplementation, while those in the 2nd, 3rd and 4th groups were fed on the basal diets supplemented with bee pollen at 500, 1000 and 1500 mg/kg diet, respectively. All hens were housed in the littered floor under the same managerial, hygienic and environmental conditions (20-22ºC and 60-65%RH). The feed and water were available ad-libtium throughout the experimental period, and the birds were exposed to 16 lighting hours daily. The composition and calculated analysis of the basal diet are shown in Table 1.

Measured Traits:

1. Productive performance:

The initial and final body weight were measured at 26 and 38 weeks of age for each replicate per treatment by using a digital balance at ±0.5 g precision, while the total weight gain (TWG) was calculated during the same periods. Also, egg number was daily recorded and weighed by using a balance at ±0.1 g

precision throughout the experimental period, while egg mass was calculated by multiplying the egg numbers and weight (g) for different replicates within each group. The averages of feed consumption (g) and feed conversion (g feed/g egg) were weekly measured.

2. Egg quality parameters:

At 32 weeks of age, 36 fresh eggs (4 group's × 3 replicates × 3 eggs) were randomly collected to determine external and internal egg quality traits as follow:

Egg weight, egg shape index, shell weight and percentage were tested and determined to estimate the external egg quality traits. The electronic caliper was used to measure both egg length and width. Yolk index (%) was estimated by the following equation of (yolk height/ yolk diameter) × 100, while the shape index (%) was determined by the following equation of {Egg width (cm)/ Egg height (cm) × 100, shell percentage (%) = {Shell weight (g)/ Egg weight} × 100, according to Carter (1975) and Kul and Seker (2004).

3. Blood metabolites analysis:

At the end of the experiment (38 weeks of age), 72 blood samples (4 groups × 3 replicates × 6 hens) were drawn from the wing veins in two parts. The first one was collected in heparinized tube for the estimation of hematological parameters (Red blood cells /RBCs), white blood cells (WBCs), differential count of WBCs, hemoglobin (Hb) and H/L ratio were measured. The second part was collected in the dry tube and putted horizontally to clot, then centrifuged at 3500 rpm for 15 min to separate blood serum. The concentrations of serum total protein (TP), albumin (Alb) were determined by using commercial kits, while the globulin (Glb) concentration was calculated by subtracting the level of albumin from the total protein content according to **Coles, (1974),** also albumin/ globulin ratio (A/G ratio) was calculated. Also, the concentrations of total cholesterol and triglycerides in the serum were determined by using commercial kits.

4- Economical efficiency:

During the experimental period, the economical efficacy for egg production of Sinai hens fed the diet containing BP at 500, 1000 and 1500mg/kg diet (Table 5).

5- Statistical analysis:

Data were statistically analyzed by the completely randomized design using SPSS (2008) program in one way analysis of variance and the differences among means were determined using Duncan's multiple range test (Duncan, 1955). The model applied was: $Yij = \mu + Ti + eij$

Where: Yij = an observation; μ = overall mean; Ti = effect of treatment (i= 1, 2, 3), and eij = experimental random error.

RESULTS AND DISCUSSIONS

Productive performance:

The obtained findings showed that the final body weight (FBW) and the total weight gain (TWG) of Sinai hens during 26-38 weeks of age, were significantly differed ($P \leq 0.05$) among treatment groups (Table 2). The lowest FBW was recorded in the hens fed the diet contained BP at 1500 mg/kg diet compared with other treatments, while, those fed diet supplemented with BP at 1000 mg/kg diet had the best FBW and positive TWG comparing with control and other treatments. This improvement in final body weight and weight gain could be attributed to the nutritive value of BP, which increased the intestinal absorptive capacity through the longer and thicker villi and consequently

stimulates the digestive and absorptive function of hens (Wang et al., 2007).

Regarding the egg production, data showed that the laying rate (%) and egg mass (g) were significantly ($P \leq 0.05$) increased as a result of supplementing bee pollen to the diets during the experimental period. These results are in agreement with those of Arpasova et al. (2013) and Wang et al. (2007) who found a slight increase in the egg production and egg mass for laying hens fed diet supplemented with pollen extract. Also, laying rate was improved by 6.9% for hens fed diet supplemented with 500 mg BP/kg diet, while it significantly decreased by about 9.79% for hens fed diet supplemented with 1000 mg BP/kg diet during the period from 26 to 38 weeks of age comparing with control diet. Egg weight didn't significantly affect by treatments. Similar results were found by Arpasova et al. (2012 and 2013). The performance improved may be due to the beneficial effects of Bb components which used as a phytogenic additives and has many properties such as; antimicrobial (Guo et al. 2004a), antioxidant (Hashemi et al. 2009) and immune enhancement (Guo et al. 2004b) probably are the main roles by which herbal plants exert positive effects on the growth performance. In contrary, the results of Wang et al. (2007) declared that the egg weight in laying hens fed diets supplemented with 1.5% BP was significantly increased compared with control group.

Referring to feed consumption, the results showed that feed consumption of treated hens were significantly affected during 30-34 and 34-38 weeks of age, respectively. The hens fed diet contained 1500 mg BP/kg diet consumed less feed as compared with control. Also, the findings showed that the feed conversion ratio was significantly decreased by BP supplementation (1500mg/kg), this improvement could be attributed to the reduction in feed consumption. In this connection, Wang et al. (2006) noted that diet supplemented with 1.5 % bee pollen could improve the structure of the tissues of the digestive organ, and then the digestion and absorption function of the body were increased.

Egg quality traits:

The effect of bee pollen supplementation on egg quality traits of Sinai hens are presented in Table 3. The supplementing diets with all experimental levels of BP had no significant influence on exterior egg quality (shell percent and egg shape index) and interior egg quality (albumen percent, yolk percentage and yolk index percent). These results are in agreement with those of Arpasova et al. (2012), who observed that the most qualitative traits of egg internal content were insignificantly affected by the addition of bee pollen product. On the other hand, Wang et al. (2007) found that the laying hens supplemented with 1.5% BP significantly increased shell thickness yolk weight by about 9.22 and 6.89%, respectively than that of the control group.

Hematological and biochemical traits:

The results in Table 4 indicated that the supplementation of laying hens with BP in the diets at different levels significantly ($P \leq 0.05$) increased the RBCs count compared with control group. The highest value of RBCs count was recorded in hens supplemented with 500 mg BP/kg diet. This improvement could be attributed to its effect as a growth promoter on the hematopoietic tissues, through the stimulating effect on the liver exhibiting an anabolic action, which

promotes protein synthesis as well as preserving the degeneration of body protein (Bonomi et al. 2002). The WBC count was significantly ($P \leq 0.05$) increased for treated groups (1000 and 1500mg BP/kg) than that of control group. The increased WBC's is a good indicator of immune status, this result was confirmed by findings of Attia et al. (2014), who mentioned that for broiler chicks. Regarding WBC's differential counts indicate that the supplementation of diets with BP at different levels significantly decreased the heterophils and increased the lymphocytes percentages, while the lymphocytes percentage for hens supplemented with BP at 1500 mg/kg was significantly decreased as compared with the other groups. The increased of lymphocytes % in hens fed diets supplemented with BP may be attributed to its effects as antibody producers, antibacterial, antiviral and antifungal, which remarkably improve their immune system (El-Bassuony, 2009 and Velikova et al. 2000).

Regarding H/L ratio, the achieved results indicated that the supplementation levels of bee pollen at 500, 1000 and 1500 mg/kg diet significantly ($P \leq 0.05$) decreased H/L ratio compared to control. The H/L ratio is a recognized measure of stress in the birds (Maxwell, 1993 and Davison et al. 1983). On the other hand, differential leucocyte counts indicated that no significant differences in monocytes, basophils and eosinophils percentages in hens fed diets with BP than those of the control.

The obtained results showed no significant differences were observed among treatments groups in serum total protein, albumin, globulin and A/G ratio of Sinai laying hens. These findings agree with those of Attia et al., (2009), who indicated that the BP supplementation of rabbits at 100, 200 and 300 mg/kg BW decreased biochemical blood parameters, indicating an enhancement of renal and liver functions, which could be reflected the balanced nutrient profiles and antioxidant prosperities of bee pollen (Leja et al., 2007 and Saric et al., 2009). Similarly, Kughn (2010) cleared that the pollen has a positive effect on serum total protein, albumin and globulin. The results in Table 4, showed that the diet supplemented with BP at different levels significantly decreased total cholesterol and triglycerides compared to control group. The decreased serum cholesterol and triglycerides values may be due to unsaturated acids, oleic, linoleic and linolenic of fatty acid in bee pollen that inhibits the accumulation of lipid peroxidation product (Xu et al., 2009).

Regarding to economical efficacy (EE), the findings in Table 5 showed that the egg production for Sinai hens fed the diet containing BP at 500mg/kg diet remarkably improved throughout the experimental period by about 6.9% compared with control group.

CONCLUSION

Bee pollen is confirmed as an interesting resource, able to improve the productive performance of Sinai hens. Standing on our results, the best concentration of bee pollen in Sinai diets seems to be 500mg/kg diet for improving egg production, and some blood biochemical parameters of laying hens. Thus, the net income for hen treated with 500mg/kg diet remarkably increased by about 22% compared with control.

Table (1): Composition and calculated analysis of the experimental layer diet

Ingredients %	**%**	**Calculated Analysis**	**Level**
Yellow corn	61.57	Crude protein (%)	16.5
Soy bean meal (44%)	17.00	ME(Kcal/Kg)	2700
Wheat brain	6.70	Ether extract (%)	3.0
Corn gluten 60%	4.50	Crude fiber (%)	3.5
Di- calcium phosphate	1.39	Calcium (%)	3.4
Limestone	8.16	Av. phosphorus (%)	0.40
* Vit & Min. premix	0.30	Lysine (%)	0.70
Na Cl	0.37	Methionine (%)	0.34
DL-Methionine	0.01	Methio+ Cys (%)	0.62
Total	100.00	Sodium (%)	0.16

*premix added to the 1 kg of diet including Vit.A 10000 I.U; vit. D3 2000 I.U;vit. E 15mg; vit. K3 1 µg; vit B1 1mg; vit. B2 5mg; vit. B12 10 µg; vit B6 1.5mg; Niacin 30mg; Pantothenic acid 10mg; folic acid 1mg; Biotin 50 mg; choline 300mg; zinc 50mg; copper 4mg; iodine 0.3 mg; iron 30mg; selenium 0.1mg; manganese 60mg; cobalt 0.1mg and carrier, CaCo3 up to 1kg

Table (2): Effect of bee pollen supplementation on the productive performance of Sinai laying hens

Parameters	Bee pollen (mg/kg diet)				SEM	Sig.
	Control	500	1000	1500		
Body weight (g)						
Initial	1255.00	1248.30	1255.00	1256.60	1.75	NS
Final	1443.30^{ab}	1425.00^{bc}	1498.30^{a}	1376.60^{c}	15.38	*
TWG (g)	188.30^{b}	176.60^{b}	243.30^{a}	120.00^{c}	14.98	*
Egg number (no.)						
26-30wks	12.03^{b}	15.90^{a}	12.70^{b}	15.20^{a}	0.51	*
30-34wks	18.03^{a}	18.30^{a}	15.90^{b}	17.10^{c}	0.33	*
34-38wks	18.00^{a}	17.06^{ab}	14.70^{c}	16.20^{b}	0.38	*
26-38wks	48.07^{b}	51.26^{a}	43.30^{c}	48.50^{b}	0.90	*
Egg weight (g)						
26-30wks	40.50	38.70	39.80	39.10	0.32	NS
30-34wks	42.90	41.60	45.40	42.70	0.37	NS
34-38wks	46.20	43.40	46.00	45.90	0.55	NS
26-38wks	43.50	41.60	43.90	42.60	0.47	NS
Egg mass (g)						
26-30wks	487.50^{b}	616.50^{a}	506.60^{b}	595.80^{a}	17.8	*
30-34wks	772.70	764.80	723.30	730.80	12.9	NS
34-38wks	831.80^{b}	742.80^{b}	679.30^{b}	745.50^{a}	19.7	*
26-38wks	2092.10^{a}	2124.20^{a}	1909.30^{b}	2072.20^{ab}	32.9	*
Egg production (%)						
26-30wks	42.90^{b}	56.90^{a}	45.30^{b}	54.40^{a}	1.80	*
30-34wks	64.40^{a}	65.50^{a}	56.90^{c}	61.07^{ab}	1.18	*
34-38wks	64.20^{a}	60.90^{ab}	52.70^{c}	57.90^{b}	1.37	*
26-38wks	57.20^{b}	61.15^{a}	51.60^{c}	57.80^{b}	1.07	*
Feed consumption (g)						
26-30wks	2335.20^{b}	2407.10^{a}	2317.60^{b}	2291.10^{b}	15.9	*
30-34wks	2738.40	2744.00	2763.60	2605.80	23.2	NS
34-38wks	2769.70	2779.40	2804.60	2805.60	15.5	NS
26-38wks	7843.4^{ab}	7930.50^{a}	7885.90^{ab}	7702.50^{b}	37.2	*
Feed conversion ratio(g feed/g egg)						
26-30wks	4.79^{a}	3.9^{b}	4.58^{a}	3.85^{b}	0.13	*
30-34wks	3.55	3.59	3.57	3.57	0.07	NS
34-38wks	3.33^{b}	3.76^{ab}	4.13^{a}	3.77^{ab}	0.1	*
26-38wks	3.75^{b}	3.74^{b}	4.13^{a}	3.72^{b}	0.06	*

$^{A, b,c}$ Means followed by different lowercased letters in the same row are significantly different (P≤0.05), SEM= Standers error of mean, TWG = Total weight gain, Sig.= Significance.

Table (3): Effect of bee pollen supplementation on the egg quality traits of Sinai laying hens

Parameters	Control	Bee pollen levels (mg/kg diet)			SEM	Sig.
		500	1000	1500		
External egg quality						
Egg weight (g)	46.33	45.80	46.12	45.64	0.70	NS
Egg length (cm)	5.26	4.93	5.15	5.11	0.10	NS
Egg width (cm)	4.10	4.16	4.13	4.15	0.09	NS
Egg shape index (%)	77.94	84.38	80.38	81.10	0.05	NS
Shell weight (g)	5.74	5.49	5.61	5.81	0.19	NS
Shell thickness (mm)	0.305	0.305	0.308	0.298	0.007	NS
Shell (%)	12.39	11.99	12.17	12.72	0.42	NS
Internal egg quality						
Albumen height (mm)	9.57	8.66	9.15	8.65	0.29	NS
Albumen weight (g)	27.67	27.48	27.26	27.65	0.46	NS
Albumen index (%)	0.78	0.81	0.91	0.81	0.04	NS
Albumen (%)	59.82	60.02	59.09	60.58	0.46	NS
Yolk weight (g)	12.92	12.82	13.26	12.18	0.37	NS
Yolk height (mm)	17.89	17.54	17.47	17.04	0.19	NS
Yolk diameter (mm)	3.87	3.74	3.73	3.84	0.16	NS
Yolk index (%)	4.64	4.70	4.72	4.45	0.07	NS
Yolk (%)	27.89	27.99	28.74	26.70	0.60	NS

SEM= Standers error of mean, Sig.= Significance.

Table (4): Effect of bee pollen supplementation on the hematological and biochemical parameters of Sinai laying hens

Parameters	Bee pollen (mg/kg diet)				SEM	Sig.
	Control	500	1000	1500		
Hematological parameters						
Red blood cells (10^6/ul)	2.17^{b}	2.96^{a}	2.70^{a}	2.78^{a}	0.16	*
Hemoglobin (g/dl)	7.00	8.12	8.12	8.06	0.41	NS
White blood cells(10^3/ul)	11.11^{b}	12.59^{ab}	13.55^{a}	12.70^{a}	0.53	*
Heterophils (%)	35.11^{a}	31.06^{b}	27.11^{c}	29.23^{bc}	0.91	***
Lymphocytes (%)	60.23^{c}	64.89^{b}	62.12^{b}	55.88^{a}	0.79	***
Monocytes (%)	7.33	6.94	6.67	7.00	0.60	NS
Eosinophil's (%)	1.67	1.76	1.33	1.65	0.23	NS
Basophils (%)	0	0	0	0	0	NS
H/L ratio	0.63^{a}	0.52^{b}	0.42^{c}	0.47^{bc}	0.02	***
Biochemical parameters						
Total protein (mg/dl)	4.78	5.22	5.50	5.12	0.22	NS
Albumin (mg/dl)	2.29	2.67	2.59	2.39	0.21	NS
Globulin (mg/dl)	2.48	2.55	2.90	2.72	0.26	NS
Albumin/Globulin ratio	1.90	1.12	1.30	1.07	0.31	NS
Cholesterol (mg/dl)	180.55^{a}	154.47^{b}	156.22^{b}	151.18^{b}	6.62	*
Triglycerides (mg/dl)	179.44^{a}	157.94^{ab}	142.88^{b}	147.56^{b}	9.1	*

$^{A, b}$ Means followed by different lowercased letters in the same row are significantly different ($P \leq 0.05$), SEM= Standers error of mean, H/L ratio= Heterophils (%)/Lymphocytes (%) ratio, Sig.= Significance.

Table (5): Economical comparison between the egg production traits of Sinai chicken treated with different levels of bee pollen.

Traits↓		Control	500mg	1000mg	1500mg
TEN (26-38wks)		48.07	51.26	43.30	48.50
TFC (26-38wks)		7.8434	7.9305	7.8859	7.7025
Costs/LE	Feed	7.8434 kg ×6.0 LE = 47.06 LE	7.93050 kg × 6.0LE = 47.58 LE	7.8859 kg × 6.0LE = 47.31 LE	7.7025 kg × 6.0LE = 46.21 LE
	BP price/ LE	0	4.0 g × 0.15 LE = 0.60 LE	7.88g × 0.15 LE = 1.182 LE	11.55g × 0.15 LE = 1.73LE
	Total	47.06 LE	48.18 LE	48.49 LE	47.94 LE
Total revenue /hen		48.07 egg× 1.25LE = 60.08 LE	51.26 egg× 1.25LE = 64.07 LE	43.30 egg× 1.25LE = 54.125 LE	48.50 egg× 1.25LE = 60.62 LE
Net income (LE)		13.02 LE	15.89 LE	5.635 LE	12.68 LE
RD %		100	122.04 (+22.04%)	43.27 (-56.72%)	97.38 (-2.62%)

TEN= total egg number, TFC= Total feed consumption, Total revenue/hen = (Egg number × egg price), Net income (LE)= Total revenue - Total cost, RD%= Relative deference, LE= Egyptian pound. One Kg of bee pollen = 150LE, egg price at marketing = 1.25LE. Total revenue/hen = (Egg No.×Egg price), Net income (LE)= Total revenue - Total cost, RD%= Relative deference, LE= Egyptian pound.

REFERENCES

Arpasova, H.; M. Kacaniova; P. Hascik and V. Sidlova 2012. Effect of selected feed additives on internal quality parameters of table eggs. Potravinarstro, vol. 6, no- 4, p. 50-52.

Arpasova, H.; M. Kacaniova and B. Galik 2013. The effect of oregano essential oil and pollen on egg production and egg yolk qualitative parameters. Anim. Sci., and Biotecch. 46 (1).

Attia, Y.A.; A.E. Abd El Hamid; F. Bovera and M.I. El- Sayed 2009. Reproductive and productive performance of rabbit does submitted to an oral glucose supplementation. L. Anim. Phys. and Anim. Nutri.3, 1401-1407.

Attia, Y. A.; A. E. Abd El Hamid, M.S. Ibrahim, M. A. AL-Harth, F. Bovera and A. EL-Naggar. 2014. productive performance, biochemical and B.Hematological traits of broiler chickens supplemented with propolis, bee pollen and mannan oligosaccharides continuously or intermittently. Livest. Sci., 164:87-95.

Bonomi, A.; Bonomi, B. M.; Quarantellia, A.; Sabbioni, A.; Superchi, P. 2002. The use of propolis in ducks feeding. Rivista di Scienza dell'Alimentazione (Italy) 31, 15–28.

Carpes, S. T.; R. Begnini; S. M. De Alencar; M. L. Masson 2007. Study of preparations of bee pollen extract, antioxidant and antibacterial activity. ciência e tecnologia de alimentos.

Carter, T. C., 1975. The hen's egg: a rapid method for routine estimation of flock means shell thickness. British Poultry Science. 16: 131-143.

Coles, E. H. 1974. Veterinary clinical pathology. PP. 211- 213, W. B. Saunders, Company, Philadelphia, London, Toronto.

Davison, T. F.; Rowell, L. G.; Rea, J., 1983. Effects of dietary corticosterone on peripheral blood lymphocyte and granulocytes populations in immature domestic fowl. Research in Veterinary Science 34, 236–239.

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

El-Bassuony, A. A. 2009. New prenilated compound from Egyptian propolis with Anti-bacterial activity. Revista Latino Americana de Qu_ımica. 37, 85-90.

European Commission 2003. Regulation of the European Parliament and of the Council of 22 September 2003on additives for use in animal nutrition. Off. J. of European Union L 268-29-43.

Xu,X.,L.Sun,J.Dong and H.Zhang. 2009. Breakind the cells of rape bee pollen and consecutive extraction of functional oil with supercritical carbon dioxide. Innov. Food Sci. Emerg. Technol.,10:42-46.

Guo, F. C.; B. A. Williams; R. P. Kwekkel; H. S. Li and X. P. Li 2004a. Effects of mushroom and herb polysaccharides, as alternatives for antibiotic, on the cecal microbial ecosystem in broiler chickens. Poult. Sci., 83: 175-182 .

Guo, F. C.; R. P. Kwakkel; B. A. Williams; H. K. Parmentier; W. K. Li ; Z. Q. Yang and M. W. Verstegen 2004b. Effects of mushroom and herb Polysaccharides on cellular and humoral immune responses of Eimeria tenella-Infected chickens. Poult. Sci., 83: 1124-1132.

Hashemi, S. R.; I. Zulkifli; M. Hair-Bejo; M. Karami and A. F. Soleimani 2009. The effects of

Euphorbia hirta and acidifier supplementation on growth Performance and antioxidant activity in broiler chickens. Proceedings of the 21st Veterinary Association Malaysia (VAM) Congress, Aug. 7-9, Port Dickson, Malaysia, pp: 215- 217.

Hascik, P; I.O.E. Elimam; J. Garlik; M, Kacaniova; M, Bobko; V .Knazovicka; K. Vavrisinova; H. Arpasova and M. Bobko 2012. Chemical composition of muscle after pollen application in nutrition of broiler chickens. In Potravinarstvo, vo; 6, no. 2, p. 26-32.

Hejinen, C. G.; R. G. Haenen; M. R. Oostveen; M. E. Stalpers and A .Bast 2002. Protective of flavonoids against lipid peroxidation: the structure activity Relationship revisited. Free radical. Res. 36, (5): 575- 581.

Kughn 2010. Effect of bee pollen additive on the sperm quality and bloods Biochemical indexes of Yangzhou cocks. J. of Beijing University of Agriculture.

Kul, S. and Seker, I. 2004. Phenotypic correlation between some external and Internal egg quality traits in the Japanese quail (Coturnix coturnix japonica). International Journal of Poultry Science 3, 400–405.

Leja, M.; A. Mareczek; G. Wyzgolik; J. Klepacz- Baniak; K. Czekonska 2007. Antioxidative properties of bee pollen in selected plant species. Food Chem. 100- 237-240.

Maxwell, M. H., 1993. Avian blood leukocyte responses to stress. World's Poultry Science Journal 49, 34–43.

Peric, L.; D. Zikic and M. Lukic 2009. Application of alternative growth promoters in broiler production. Biotechnology in Anim. Husb. 25, 5-6, 387-397

Saric, A.; T. Balog; S. Sobocanec; B. Kusic; V. Sverko; G. Rusak; S . Likic; D. Bubalo; B. Pinto; D. Reali and T. Marotti 2009. Antioxidant effects of Flavonoid from Croatian cystus incanus L. rich bee pollen. Food and Chem. Toxic. 47, 547- 554.

Silva Cardoso, V.; C.A. Rineiro de Lima; M. E. Freire de Lima; L. E .Gomes Dorneles; D. M. Gracas 2012. Piperine as a phytogenic additive in broiler Chickens. Pesqisa Agropecuaria Brasileira, 47, 4.

SPSS 2008. SPSS x for Windows. Release 18, copyright SPSS Inc., 1989- 2008, New
York, USA.

Sulcerova, H.; M. Mihok; M. Juzl and P. Hascik 2011. Effect of addition of pollen and propolis to feeding mixtures during the production of broiler chickens Ross 308 to the color of thigh and breast muscle and pH determination. Acta Unvi agric.et silvic. Mendel. Burn. 2011, LIX, No. 6, pp. 359–366.

Velikova, M.; Bankova, V.; Tsvetkova, I.; Kujumgiev, A.; Marcucci, M. C. 2000. Antibacterial ent-kaurene from Brazilian propolis of native stingless bees. Fitoterapia 71, 693–696.

Wang, J., G. U. You-fang; L. I. Sheng-he; F. A. N. G. Zhang- sheng; F.E.N.G. Bao-ming 2006. Effect of the bee pollen on histological structure of digestive Organs of layer. en.cnki.com.cn/Article_en/CJFDTOTAL-ANJS200606000.htm.

Wang, J.; Y. Zheng; W. Wu; W. Ban; D. Tang and Q. He Qian 2007. Effect of Supplementing bee pollen to diet on egg quality. J. of Anhui Sci. and Tech Univ.

الملخص العربي

انتاج البيض، صفات جودة البيض وبعض مقاييس الدم لدجاج سينا المعامل بمستويات مختلفة من حبوب اللقاح

ياسر صديق رزق[1]، أحمد عبدالكريم ابوغابة[2]، ايناس ابراهيم اسماعيل[1]، نصرة بدير عوضين[1]

[1] قسم تربية الدواجن - معهد بحوث الانتاج الحيواني - مركز البحوث الزراعية - الدقي - الجيزة - مصر

[2] قسم انتاج الدواجن - كلية الزراعة - جامعة سوهاج- سوهاج - مصر

هدفت التجربة الحالية الي دراسة تأثير إضافة حبوب اللقاح لعلائق دجاج سينا على انتاج البيض، صفات جودة البيض، بعض المقاييس الهيماتولوجية. اشتملت هذه التجربة على عدد 120 دجاجة سينا، عمر 26 اسبوع، والتي قسمت بالتساوي لأربع مجموعات بكل منها ثلاث مكررات وبكل مكررة 10 دجاجات. غذيت إناث المجموعة الأولي (الكنترول) على العليقة الأساسية بدون اي اضافات، بينما غذيت مثيلاتها بالمجموعة الثانية والثالثة والرابعة علي نفس العليقة الأساسية مضافاً اليها 1000،500 و1500 ملجم حبوب لقاح/ كجم عليقة وذلك لمدة 12 أسبوع متواصلة.

أوضحت النتائج المتحصل عليها ما يلي: وجود تحسن معنوي (عند مستوي معنوية 5%) بوزن الجسم ومعدل الزيادة الكلية بوزن الجسم بإناث الدجاج بالمجموعة الثالثة المعاملة بحبوب اللقاح عند مستوى (1000ملجم /كجم عليقة) مقارنة بباقي المجاميع الأخرى. كما لوحظ تحسن معنوي (عند مستوي معنوية 5%) بمعدل انتاج البيض وكتلة البيض بالمجموعة الثانية المعاملة بحبوب اللقاح عند مستوى (500 ملجم/كجم عليقة) مقارنة بمجموعة الكنترول.

سجلت أعلى المتوسطات في استهلاك الغذاء بالمجموعة الثانية، بينما سجلت اقل المتوسطات بالمجموعة الرابعة مع وجود فروق معنوية بينهما. أوضحت النتائج انخفاض معنوي (عند مستوي معنوية 5%) بمعدل التحويل الغذائي للإناث بالمجموعة الثالثة (1000 ملجم حبوب لقاح/ كجم عليقة) بالمقارنة بمجموعة الكنترول و الثانية والرابعة.

وأشارت النتائج الى عدم وجود فروق معنوية بوزن البيضة ومقاييس جودة البيضة الداخلية والخارجية نتيجة لتغذية الدجاج على علائق مضاف اليها حبوب اللقاح. أوضحت النتائج وجود زيادة معنوية (عند مستوي معنوية 5%) بمتوسطات كرات الدم الحمراء والبيضاء، بالإضافة الى انخفاض معنوي (عند مستوي معنوية 5%) في نسبة H/L بمجموعات الدجاج المعامل بحبوب اللقاح مقارنة بمجموعة الكنترول. انخفض معنوياً (عند مستوي معنوية 5%) مستوى تركيز الكوليسترول الكلى والجليسريدات الثلاثية بسيرم الدم ، بينما لم توجد هناك اختلافات معنوية بمستوى البروتين الكلى والألبيومين والجلوبيولين بمجموعات المعاملة مقارنة بمجموعة الكنترول.

الخلاصة: من هذه النتائج يمكن ان نخلص الي أن اضافة حبوب اللقاح لعلائق دجاج سينا البياض وخاصة عند مستوي 500 ملجم/ كجم عليقة ادى الى تحسن انتاج البيض، وبعض المقاييس الهيماتولوجية خلال فترة إنتاج البيض. و جدير بالذكر ان معاملة اناث دجاج سينا بحبوب اللقاح عند مستوى 500ملجم/كجم عليقة يعد أرخص واكفأ اقتصادياً من استخدام المستويات الأخرى 1000 و 1500ملجم/كجم عليقة.

مفاتيح البحث: دجاج سينا، الدجاج البياض، حبوب اللقاح، جودة البيض، المقاييس الهيماتولوجية