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IMPACT OF BEE POLLEN SUPPLEMENTATION ON PRODUCTIVE PERFORMANCE, SOME HEMATOLOGICAL PARAMETERS, BLOOD CONSTITUENTS AND SEMEN PHYSICAL CHARACTERISTICS OF SINAI CHICKENS

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ABSTRACT: This study evaluated the impact of supplementing diets of Sinai cockers with bee pollen on the productive performance, some hematological parameters and semen physical characteristics. Sixty Sinai cockers (4 groups × 3 replicates × 5 cockers), 28 weeks old, were equally classified into four groups. In the first group (control), cockers were fed on the commercial ration, while those in the 2nd, 3rd and 4th groups were fed on the same diet and supplemented with 500, 1000 and 1500mg bee pollen/kg diet, respectively. The achieved findings showed that the final body weight (FBW) and total weight gain (TWG) in the treated groups were significantly (P≤0.01) increased, while the total feed intake (TFI) was insignificantly affected as compared with control. The red blood cell and white blood cell counts as well as hemoglobin level for treated cockers were significantly (P≤0.01) increased, while the heterophils/lymphocytes ratio was significantly decreased compared with control group. The means of blood proteins for treated cockers were insignificantly differed, while the cholesterol and triglycerides concentrations were significantly (P≤0.05) decreased as compared with cockers in control group. The means of ejaculate volume and the percentages of advanced motility and live sperms, as well as the concentrations per ml and per ejaculate of cockers in the treated groups increased significantly (P≤0.01) compared with control group. Also, the percentages of dead sperms and sperm abnormalities for treated cockers were significantly (P≤0.01) decreased compared with control.

From the obtained results, could be concluded that, the supplementation of the diet with bee pollen at different levels improved the total weight gain and semen physical properties compared with control. Thus, from these results could be recommended to use BP in Sinai chicken diets at 1000mg/kg diet to improve the ejaculate volume, advanced motility, live sperms, concentrate per ejaculate, which amounted 34.13, 26.32, 7.17, 43.62%, respectively, while the sperm abnormalities was significantly decreased by about 36.28% compared with control group.

Keywords: Sinai cockers - Bee pollen - Blood constituents - Semen physical properties

INTRODUCTION

In Egypt, the local chickens are classified according to the morphological appearance into pure native breeds as Dandarawy and Fayoumi as well as mongrel fowls as Sinai and Baladi strains, which originated from hybridization among exotic types and old local strains as well as improved native breeds, which produced from the crossing pure and local exotic chicken strains such as Golden Montazah, Bandarah, and Doki-4 (Mahmoud et al., 1974, 1989; El-Itriby and Sayed, (1966). Generally, there are many environmental and nutritional factors such as ambient temperature, lighting programs, feed additive supplementation, that affect the productive as well as reproductive performance of the local Egyptian chicken breeds (Marie et al., 2009, Abdallah et al., 2016 and Rizk et al., 2017).

Therefore, several studies were designed to improve the productive and reproductive efficacy of chickens by adding some natural product as antibiotic substitutes such as bee pollen (Sulcerova et al., 2011), propolis (Abdel-Kareem and El-Sheikh 2017), royal jelly (Elnagar 2010) and consequently minimize the use of antibiotics in the poultry farms. The findings of Sulcerova et al., (2011) indicated that the bee pollen is rich in the proteins, minerals, trace elements, carbohydrates, vitamins, enzymes or coenzymes as well as fatty acids which contains about 25, 25, 59, 11, 18, 11and 14%, respectively. In addition to the flavonoids (Moradian et al., 2005), that play an important role to inhibit the adverse effect of free radicals (Hejinen et al., 2002).

Referring to the impact of honey bee product supplementation on the heterophil, lymphocyte, eosinophil, monocyte, basophil and H/L ratio of the birds, the findings of Babaei et al., (2016), indicated that the H/L ratio of Japanese quails treated with bee products were treated groups with bee products decreased significantly, that reflecting the lymphocytes proliferation in the quails receiving bee products than quails in the control. Similar findings were found by Wang et al., (2005), who found that adding bee pollen to the chicken diets boosted the early thymus development, in addition to retard the bursa degeneration, and consequently improved the immune response of spleen. Also, the findings of Akibo (2006) illustrated that the bee products stimulates immune functions and consequently improved the immune competence of the broilers broiler chicks.

Regarding bee pollen effects on semen quality, the findings of Wang et al., (2002) stated that the sperm quality, density, and activity of breeder cocks treated with at 1 and 1.5% pollen levels significantly increased ($P \leq 0.05$) under heat stress conditions than those of the cocks in the control group. Similarly, Abou El-Naga (2014) reported that the semen volume, sperm concentration, and the livability of Norfa cockers treated with 1 or 2% bee pollen improved significantly ($P \leq 0.05$) than those of the control cockers. Also, the results of Kughn (2010), illustrated that the serum total protein, globulin and albumin of Yangzhou cocks administered with bee pollen were positively influenced than that of the control group.

Therefore, the current experiment was designed to evaluate the impact of treating the experimental diets with 500,

1000 and 1500mg/kg diet on the productive performance, hematological parameters, blood constituents and semen physical characteristics of Sinai cockers.

MATERIALS AND METHODS

The current experiment was conducted at El-Serw Poultry Research Station, Animal Production Research, Agricultural Research Center, Egypt.

Experimental design and treatment:

This experiment included 60 Sinai cockers (4 group's × 3 replicates × 5 cockers), 28 weeks old, were equally divided into 4 groups according to bee pollen supplementation throughout the experiment (8 weeks) from 28 up to 36 weeks of age, during the period from 9 September up to 4 November (Summer-Autumn) season. In the **1st group**, cockers were daily fed on the commercial ration without and supplementation, while those in the 2nd, 3rd and 4th groups, cockers were fed on the same commercial diet and supplemented with 500, 1000 and 1500mg bee pollen/kg diet, respectively. The cockers were housed in the individual battery cages with the same diminutions and fed the basal diet as presented in Table 1. All cockers were housed under the same managerial and environmental conditions (20-26ºC) and given both of feed and water ad libitum as well as daily exposed to 16 continuous light hours throughout the experimental period.

Studied traits:

Productive performance:

At 28 and 36 weeks of age, the initial and final body weight for male chicks were weighed by using a digital balance ±0.5 g precision, while the total weight gain (TWG) was calculated by subtracting final body weight from initial body weight. The averages of feed intake (g) for cockers were weekly recorded and then the total feed intake was calculated all-over the experiment.

Hematological parameters:

At 36 weeks of age (end of the experiment), 36 blood samples, 3.0 ml each, were collected at 11.0AM from the wing veins in heparinized and non-heparinized tubes to measure the biochemical analysis. The blood sample was centrifuged at 3000 rpm for 15 minutes to separate serum samples, and then stored at -20°C in plastic vials until biochemical analysis. The blood samples in the non-coagulated tubes were used to count both of red blood cells/RBCs, 10^6 as well as white blood cells/WBCs, 10^3 by using hemocytometer, while subclasses percentages of WBC's differentia as heterophils, lymphocyte, monocytes, eosinophils, and basophils were measured. The hemoglobin concentration (Hb, g/100ml) was measured according to Drew et al., (2004).

Blood biochemical analysis:

The total protein and albumin concentrations in the serum were estimated by using the commercial kits by the methods according to Armstrong and Carr (1960) as well as Doumas et al., (1971), while serum globulin concentration was measured by subtracting albumin concentrations from the total protein concentrations. The concentrations of cholesterol and triglycerides in the serum were measured by using the specialized commercial kits according to Diamond Diagnostic, Egypt.

Semen samples:

Semen samples were weekly collected on the individual basis from each cocker using abdomen massage method squeezing thorough the copulatory organs according to Kalamah et al. (2002). Semen volume was measured per ml by using a graduated collection tube with the

nearest 0.1 ml. The sperm concentration in the semen sample was measured by using hemocytometer slide (Peters et al., 2008), while the percentages of the live, and dead sperms as well as sperm abnormalities were estimated by using eosin-nigrosin stain technique according to Blom, (1983) and Kalamah et al., (2002). The sperm mass motility score was measured by applying the arbitrary scheme, which classified in the range from 1-5 grades by using the method described by Nagae et al., (1987).

Statistical analysis:

The obtained data were statistically analyzed by using GLM, produced by the statistical analysis systems (SAS, 2004). The significant differences among treatment means were determined by Duncan's new multiple ranges tests (Duncan, 1955). The percentages were transformed before statistical analysis to the corresponding arcsine values. The following linear model was applied: $Yij = \mu + Ti + eij$ Where, Yij= Observation measured, μ= Overall mean, Ti= Effect of bee pollen su (jpplementation = 1, 2, 3 and 4), Eij= Random error component was normally distributed assumed.

RESULTS AND DISCUSSIONS

Productive performance:

The impact of bee pollen supplementation on the live body weight, total weight gain and total feed intake of Sinai cockers are presented in Table 2.

The means of initial body weight for Sinai cockers were insignificantly differed, while the final body weights amounted 1938.33, 1972.33 and 1823.33g for cockers in the 2nd, 3rd and 4th groups increased significantly ($P<0.001$) than that of the cockers in the 1st group (control). Also, the total weight gain for Sinai cockers treated with 500, 1000 and 1500mg BP increased significantly than that of the cockers in the control group. The increased body weight and weight gain in the treated cockers could be attributed to the properties of bee pollen as antioxidant, gut microflora manipulation, nutrigenomics effect and immune enhancement (Hashemi et al., 2009; Franco-Jimenez et al., 2007 and Guo et al., 2004), which positively reflects on the growth performance. The achieved results agree with those of Kughn (2010), who found that growth performance of Yangzhou cocks supplemented with bee pollen increased significantly compared with those in control group. Similarly, the findings of Hascik et al., (2012) indicated that the body weight for broiler chicks fed the diet containing bee pollen extract at 400 and 800mg kg diet was increased than those of broilers in the control. In contrast, the results of Abou El-Naga (2014), showed no significant differences in the growth performance among the Norfa cocks treated with 1 and 2% bee pollen at 72 weeks of age.

Referring to bee pollen supplementation effects on feed intake, the achieved results illustrated that the total feed intake (g) for cockers in the treated groups were insignificantly decreased by about 1.2, 1.34 and 1.84% than that of the control group. The improved feed intake of treated cockers may be due to the flavonoids beneficial effects in the bee pollen, which improved the digestion and absorption of protein and consequently feed utilization. These results are in agreement with those of Bozhurt et al., (2012), who reported that the feed consumption of laying hens supplemented with mannan-oligosaccharide in the diets or an essential oil mixture under moderate and hot environmental conditions have insignificantly differed than that of the

control. Similarly, the findings of Abou El-Naga (2014) showed that the daily feed intake of Norfa cocks treated with 1 or 2% bee pollen amounted 97.33 and 92.23g, which insignificantly decreased than 99.83g of the cocks in the control group. Regarding BP supplementation effects on livability, the obtained results showed no mortality cases for Sinai cockers were recorded in different groups throughout the experimental period.

Hematological parameters:

The findings in Table 3, revealed that the means of RBCs (10^6), WBCs (10^3) and Hb (g/dl) for treated cockers increased significantly ($P \leq 0.01$) than those of cockers in the control. The increased hemoglobin level and RBCs count in the treated cockers could reflect the beneficial role of mineral as iron and copper, in addition to vitamin C and folic acid in the bee pollen, which play an impertinent role to stimuli the formation and maturation of red blood cell, caused an increase in hemoglobin concentration (El-Wafa et al., 2002). These results are in agreement with Farag and El-Rayes (2016), who found that the hemoglobin concentration and red blood cells of broilers fed the diets containing bee pollen at 0.2, 0.4 or 0.6% were significantly increased than those of the broilers in the control group.

Referring to BP effects on WBCs subclass, the obtained results indicated that the lymphocyte percentages of the treated cockers were significantly increased, while the heterophils percentages were significantly decreased than those of the controlled cockers. The percentages of monocyte, eosinophil, basophile for cockers treated with different levels of bee pollen were not affected than that of the control group. The increased lymphocyte percentages in the treated cockers could be attributed to increased immune efficiency, since the lymphocyte is a good indicator to improved immune efficiency (Swiderek et al., 2006). Similar results were also achieved by El-Neney and El-Kholy (2014), who noticed that lymphocytes type of the rabbits daily treated with 200, 300 and 400 mg bee pollen/kg BW increased significantly compared with rabbits in the control group.

The achieved findings indicated that the H/L ratio for cockers treated with bee pollen at different levels were significantly decreased than that of the control. The decreased H/L ratio in the treated cockers may be due to improved immune functions (Shini, 2003) as well as cellular immunological responses (Song et al., (2005), through the enhanced antibodies production and increased acquired immunity of cockers. Similar results were also found by Khojasteh and Shivazad (2006), who reported that the supplementing propolis resulting in an increase the lymphocyte cell count as antioxidant materials, which positively affect antioxidative processes and immunity.

Contrarily, the obtained findings agree with those of Farag and El-Rayes (2016), who found that the H/L ratio of broiler chicks fed the diets containing bee pollen at 0.2, 0.4 or 0.6% were insignificantly decreased than those of broilers fed the control diet.

Blood constituents:

The impact of bee pollen supplementation at different levels on the blood constituents of Sinai cockers are presented in Table 4. The achieved findings indicated that the means of total protein, albumin, globulin (g/dl) for Sinai cockers treated with bee pollen at different levels were insignificantly

increased than that of the control. These findings agree with those of Kughn (2010), who found a positive effect on the serum total protein, albumin, and globulin of Yangzhou cocks administered with pollen than that of cocks in the control group. Similar results were also found by Abou El-Naga (2014), who found no significant differences in serum total protein, albumin, globulin for Norfa cocks treated with 1 and 2% bee pollen. Similarly, the obtained results are in harmony with those of Attia et al., (2014), who stated that the serum total protein, albumin and globulin of broiler chickens were positively affected by bee pollen administration.

Referring to bee pollen supplementation effects on cholesterol (mg/dl) and triglycerides (mg/dl) concentrations of Sinai cockers (Table 4). The obtained results showed that the concentrations of cholesterol and triglycerides of Sinai cockers treated with bee pollen at 500, 1000 and 1500mg/kg diet were significantly decreased than those of cockers in the control group. The decreased serum cholesterol and triglycerides concentrations may be due to unsaturated fatty acids contents as oleic, linoleic and linolenic in bee-pollen, that play an important role to inhibit the accumulation of the lipid peroxidation product. These results agree with those of Farag and El-Rayes (2016), which indicated that the concentrations of cholesterol and triglycerides of broilers treated with bee pollen were significantly ($P \leq 0.001$) decreased than those of broilers in the control group. Similarly, the results of Attia et al. (2014), showed that the concentration of cholesterol and triglycerides in the broiler chickens administering with bee pollen were significantly decreased than that of the chickens in the control group.

Semen physical characteristics:

The means of ejaculate volume (ml), mass motility (0-5d), advanced motility (%), live sperms (%), dead sperms (%), concentrate per ml ($\times 10^6$), concentrate per ej. ($\times 10^6$) and sperm abnormalities (%) are presented in Table 5. The obtained results showed that the highest ejaculate volume (ml) were recorded in the cockers treated with different levels of bee pollen, while the lowest one was estimated in the controlled cockers. The increased semen volume in the treated cockers may be due to improved seminiferous tubules activity, which stimuli sperm production, lead to increase sperm density and semen volume. These results agree with Ling et al. (2004), who stated that the quality of semen as well as the activity, density and availability of sperm for breeder cocks treated with 2% bee pollen improved significantly than that of the bird in the control group.

Regarding the percentages of advanced motility and live sperms as well as the concentrations per ml and per ejaculate (10^6), the result showed that the bee pollen treatments of 500, 1000 and 1500mg BP/kg diet increased significantly ($P \leq 0.01$) compared with control group.

The increased sperm concentrations of the treated cockers could be attributed to increased luteinizing hormone concentration to promotes the secretion of testosterone hormone from the leydig cells, which stimulating the production of sperm from the germinal cells.

These findings agree with those of Liu et al., (2009) who found that the reproductive performance of cocks fed the diets containing pollen at 0.5, 1, 1.5, 2 and 2.5% significantly improved

compared with control group. Also, Kughn (2010) found that the reproductive efficacy of Yangzhou cocks treated with 1 and 2% bee pollen was significantly improved than that of the control. Similar results were also found by Abou El-Naga (2014), who noted that the semen volume and concentration, as well as the livability and motility percentages of Norfa chicken, fed the diet containing pollen at 1 or 2% significantly ($P \leq 0.05$) higher than those of the control group.

In this study, the percentages of dead sperms and sperm abnormalities for cockers daily treated with 500, 1000 and 1500mg BP were significantly decreased than that of the control.

The decreased dead and abnormal sperm percentages in the treated cockers may be due to improved sperm viability and movement, which reflected the role of bee pollen supplementation on the semen quality. These results agreed with those of Wang et al., (2002), who stated that the activity and quality of sperm, as well as sperm density in the breeder cocks treated with pollen at 1 and 1.5% levels under heat stress conditions were significantly ($P \leq 0.05$) increased than those of the control group.

Economical efficiency:

From data presented in Table 6, could be noted that the use of bee pollen at 500mg/kg diet is more cheaper and economic, while the optimal results were recorded in the cockers fed the diet containing BP at 1000mg/kg diet, since the cost to use 1000mg/kg diet amounted 33.46LE increased slightly by about 1.12% compared with control group.

CONCLUSION

These findings could be summarized as follows:

(i) Based on these results, could be recommended to use bee pollen as a good natural product at 500 or 1000mg/kg diet to improve the productive performance and some hematological parameters of Sinai cockers.

(ii) The treated Sinai cockers with BP had significantly ($P<0.001$) increased semen volume, sperm concentrations and motility as well as decreased dead sperms and sperm abnormalities.

(iii) Using BP at 500 or 1000mg/kg diet is more economic, especially for small farmers and small producers.

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

Ingredients	%	Calculated Analysis	%
Yellow corn	61.57	Crude protein (%)	16.5
Wheat brain	6.70	Ether extract (%)	3.0
Soy bean meal (44%)	17.00	Crude fiber (%)	3.5
Limestone	8.16	ME(Kcal/Kg)	2700
Di- calcium phosphate	1.39	Calcium (%)	3.4
Corn gluten meal (60%)	4.50	Available phosphorus (%)	0.40
Sodium chloride	0.37	Lysine (%)	0.70
* Vitamin and Mineral premix	0.30	Methionine +Cysteine (%)	0.62
DL-Methionine	0.01	Methionine (%)	0.34
Total	100	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 chloride 300 mg; Zinc 50mg; Copper 4mg; Iodine 0.3 mg; Iron 30mg; Selenium 0.1mg; Manganese 60mg; Cobalt 0.1mg and carrier CaCO3 up to 1 kg

Table (2): Impact of bee pollen supplementation on the productive performance of Sinai cockers

Parameters	Control	500mg BP/kg	1000mg BP/kg	1500mg BP/kg	SEM	P-Value
Initial body weight (g)	1697.67^{a}	1720.00^{a}	1716.67^{a}	1700.00^{a}	10.39	0.3188
Final body weight(g)	1760.33^{c}	1938.33^{a}	1972.33^{a}	1823.33^{b}	17.87	0.0001
Total weight gain (g)	62.67^{c}	218.33^{a}	255.67^{a}	123.33^{b}	15.16	0.0001
Total feed intake (g)	5515.00^{a}	5448.33^{a}	5440.67^{a}	5413.33^{a}	47.43	0.4844

^{A,b,c} Means followed by different lowercased letters in the same column are significantly different (P≤0.05), SEM= Standers error of mean.

Table (3): Impact of bee pollen supplementation on the hematological parameters of Sinai cockers

Parameters	Control	500mg BP/kg	1000mg BP/kg	1500mg BP/kg	SEM	P-Value
Red blood cells ($\times 10^6$)	4.02^b	4.12^{ab}	4.44^a	4.35^{ab}	0.11	0.0003
White blood cells ($\times 10^3$)	13.44^b	16.28^a	18.11^a	16.22^a	0.71	0.0010
Hemoglobin (g/dl)	10.94^b	12.00^{ab}	12.44^a	12.33^a	0.41	0.0056
Heterophils (H/%)	27.89^a	24.33^b	24.77^b	23.00^b	0.67	0.0001
Lymphocyte (L/%)	67.89^b	72.22^a	73.55^a	72.33^a	0.72	0.0001
Monocyte (%)	2.00^a	1.78^a	1.44^a	1.22^a	0.32	0.2458
Eosinophil (%)	1.55^a	1.11^a	1.22^a	0.78^a	0.32	0.5926
Basophile (%)	0.67^a	0.55^a	1.00^a	0.67^a	0.23	0.2289
H/L ratio	0.412^a	0.338^b	0.337^b	0.318^b	0.01	0.0001

^{A,b} Means followed by different lowercased letters in the same column are significantly different ($P \leq 0.05$), SEM= Standers error of mean.

Table (4): Impact of bee pollen supplementation on the blood constituents of Sinai cockers

Parameters	Control	500mg BP/kg	1000mg BP/kg	1500mg BP/kg	SEM	P-Value
Total protein (g/dl)	4.463^a	4.802^a	5.029^a	4.886^a	0.235	0.3054
Albumin (g/dl)	2.419^a	2.527^a	2.647^a	2.551^a	0.179	0.8808
Globulin (g/dl)	2.044^a	2.275^a	2.382^a	2.335^a	0.246	0.7929
Cholesterol (mg/dl)	129.13^a	121.42^b	113.44^b	120.91^b	2.637	0.0016
Triglycerides (mg/dl)	122.89^a	100.29^b	87.18^b	97.42^b	6.697	0.0020

$^{A, b}$ Means followed by different lowercased letters in the same column are significantly different ($P \leq 0.05$), SEM= Standers error of mean

Table (5): Impact of bee pollen supplementation on semen physical characteristics of Sinai cockers

Parameters	Control	500mg BP/kg	1000mg BP/kg	1500mg BP/kg	SEM	P-Value
Ejaculate volume (ml)	0.334^{d}	0.364^{c}	0.448^{a}	0.4028^{b}	0.008	0.0001
Mass motility (0-5d)	3.84^{d}	4.05^{c}	4.70^{a}	4.53^{b}	0.055	0.0001
Advanced motility (%)	69.29^{c}	78.88^{b}	87.53^{a}	86.59^{a}	0.930	0.0001
Live sperms (%)	82.17^{c}	82.82^{c}	88.06^{a}	86.46^{b}	0.462	0.0001
Dead sperms (%)	17.83^{a}	17.18^{a}	11.94^{c}	13.64^{b}	0.460	0.0001
Concentrate per ml ($\times 10^{6}$)	335.56^{b}	353.51^{a}	358.72^{a}	357.95^{a}	2.032	0.0001
Concentrate per ej. ($\times 10^{6}$)	112.15^{d}	129.00^{c}	161.07^{a}	144.69^{b}	2.988	0.0001
Sperm abnormalities (%)	16.62^{a}	15.73^{a}	10.95^{c}	12.18^{b}	0.355	0.0001

$^{A,b,c,\ d}$ Means followed by different lowercased letters in the same column are significantly different ($P \leq 0.05$), SEM= Standers error of mean

Table (6): Economical efficiency of Sinai chicken affected by bee pollen supplementation

Traits		Control	Bee pollen supplementation/kg diet		
			500mg	**1000mg**	**1500mg**
Initial body weight		1697.67	1720.00	1716.67	1700.00
Final body weight		1760.33	1938.33	1972.33	1823.33
Total weight gain (g)		62.67	218.33	255.67	123.33
TFI (g)/cocker		5515.00	5448.33	5440.67	5413.33
Costs /LE	Feed	5.515kg × 6.0LE = 33.09 LE	5.4483kg × 6.0LE = 32.69 LE	5.44067kg × 6.0LE = 32.64 LE	5.41333kg × 6.0LE =32.48LE
	Bee pollen price/ LE	0	2.72g×15 Piaster =0.41 LE	5.44g×15 Piaster =0.816 LE	8.12g×15 Piaster =1.12 LE
	Total	33.09 LE	33.10 LE	33.46 LE	33.60 LE
Relative deference (%)		0	+0.03%	+1.12%	+1.54%

One Kg of diet = 6.0 LE, LE= Egyptian pound, One Kg of bee pollen = 150 LE, TFI (g)/ cocker = Total feed intake per cocker

REFERENCES

Abdallah, A.G.; Beshara, M.M.; Rizk, Y.S. and Ibrahim, A.F. 2016. Effect of different dietary fiber levels on reproductive and economic performance of Sinai local strain cocks. Egypt. Poult. Sci. 36: 449-464.

Abdel-Kareem, A.A.A. and El-Sheikh, T.M. 2017. Impact of supplementing diets with propolis on productive performance, egg quality traits and some haematological variables of laying hens. J Anim. Physiol. Anim. Nutr. 101: 441-448.

Abou El-Naga. and Manal. K. 2014. Effect of bee pollen supplementation on productive and reproductive performance of Norfa chicken. Egypt. Poult. Sci. 34: 119-132.

Akibo, T.E. 2006. Physiological response of broilers to honey and vitamin C in drinking water during hot-dry season. Project report submitted to the Department of Animal Physiology College of animal science and livestock production, University of Agriculture, Abeokuta, Nigeria, 522.

Armstrong, W.D., and Corri, C.W. 1960. Physiological Chemistry. Laboratory Diction, 3rd Edition, P. 75 Punges publishing Co., Minneapolis, USA.

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

Babaei, S.; Rahimi, R.; Torshizi, M.A.K.; Tahmasebi, G. and Miran, S.N.Kh..2016. Effects of propolis, royal jelly, honey and bee pollen on growth performance and immune system of Japanese quails. Vet. Res. Forum. 7: 13-20

Blom, E. 1983. Pathological conditions in the genital organs in the semen as grounds for rejection of breeding bulls for import or export to or from Denmark. In: Nordisk Veterinaermedicin, 35: 105-130.

Bozhurt, M.; Kucukyilmaz, K.; Catli, A. U.; Cinar, M.; Bintas, E.. and Covent, F. 2012. Performance, egg quality and immune response of laying hens fed diets supplemented with mannan-oligosaccharide or an essential oil mixture under moderate and hot environmental conditions. Poult. Sci. 91: 1379-1386 .

Doumas, B.; Wtson, W. and Biggs, H. 1971. Albumin standers measurements of serum with bromocresol green. Clinic. Chemis. Acta, 31-37.

Drew, P., Harles, C.R.J.S.; Trevor, B. and John, L. (2004). Oxford Handbook of Clinical Haematology. 2th Edition, Oxford University Press, USA.

Duncan, D.B. 1955. Multiple Range and Multiple F-Test. Biometrics. 11: 1- 42.

El-Itriby, A.A. and Sayed, I.F. 1966. Dokki-4 a new breed of poultry. Agric. Res. Rev. Cairo. 44: 102-109.

Elnagar, Samar, A. (2010). Royal jelly counteracts bucks" summer infertility". Anim. Rep. Sci. 121: 174-180.

El-Neney, B.A. and El-Kholy, K.H. 2014. Effect of natural additive (bee pollen) on immunity and productive and reproductive performances in rabbits. 1- Growth performance, digestive and immune responses in growing rabbits. Egypt. Poult. Sci. J. 34: 579-606.

El-Wafa, S.A.; Sedki, A.A. and Ismail, A.M.2002. Response of growing rabbits

to diets containing black seed, garlic or onion as natural feed additives. Egypt. J. Rabbit Sci. 12: 69-83.

Farag, Soha. A. and T.K. El-Rayes. 2016. Effect of bee-pollen supplementation on performance, carcass traits and blood parameters of broiler chickens. Asian J. Anim. Vet. Adv. 11: 168-177.

Franco-Jimenez, D.J.; Scheideler, S. E.; Kittok, R. J.; Brown Brandl, T.M.; Robeson, L.R.; Taira, H. and Beck M.M. 2007. Differential effects of heat stress in three strains of laying hens. Applied Poult. Res. 16: 628- 634.

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

Hascik, P., Elimam, I.O.E. and Garlik, J. 2012. The effect of addition bee pollen to feed mixtures on internal fat of broiler Ross 308. J. Microb. Biotech. Food. Sci. 2: 246-252.

Hashemi, S.R., Zulkifli, I.; Hair Bejo, M.; Karami, M. and Soleimani, A.F. 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

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

Kalamah, M.A.A.; El-Nady, M.M.; Abdou, F.H. and Esa, E.K. 2002. Effect of heat stress and vitamin C on some productive traits and physiological aspects in chickens. Minufiya Agric. Res. 27: 57-74.

Khojasteh, S. and Shivazad, M. 2006. The effect of diet propolis supplementation on Ross broiler chicks performance. Int. J. Poult. Sci. 5: 84-88.

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

Ling, Z.; Zhiyue, W.; Xiuli, Z.; Bing, Z. and Chanjuan, Z. 2004. Research of adding pollen in diets on the effect of breeder cocks.en. cnki. Com.cn. Feed industry.

Liu, H. H.; Wang, X.; Yu, X.; Yao, H. and Zhao, Q. 2009. Effect of supplementation bee pollen in the diet on sperm quality and plasma concentration of reproductive hormones in hy-line breeder cocks. J. of Beijing University of Agriculture. S831.5.

Mahmoud, T.H.; Sayed, I.F. and Madkour, Y.H. 1974. "The Golden Montazah" a new variety of chickens. Agric. Res. Revol. Cairo 52:97-105

Mahmoud, T.H.; Abd El-Hameid, J.E. and El-Turkey, A.I. 1989. "Bandarah" a new breed of chickens. Agric. Res. Revol. Cairo. 67:229.

Marie, Y.A., Ibrahim, M.A.; Mahmoud, M.A. and Abou Khashaba, H.A. 2009. Influence of nutrient density on productive and reproductive performance of some local laying hen strains. Egypt. Poult. Sci. 29: 527- 564.

Muradian, L.B.; Pamplona, L.C.; Colmbra, S. and Berset, O.M. 2005. Chemical composition and botanical

evaluation of dried bee pollen pellets. J. F. Comp. Anal., 18: 105- 111.

Nagae, T.; Nobukuni, K. and Nishiyama, H. 1987. Effect of thyroid hormone deficiency after sexual maturity on weights of male genital organs and semen quality in domestic fowls. Japanese Poult. Sci. 24: 28-72.

Peters, S.O.; Iiori, B.O.; Ozoje, M.O.; Ikeobi, C.O.N. and Adebambo, O.A. 2008. Semen quality traits of seven strain of chickens raised in the humid tropics. Inter. J. of Poult. Sci. 7: 949-953.

Rizk, Y.S.; Ibrahim, A.F.; Mogda. K. Mansour.; Hanan S. Mohamed.; A. E. ElSlamony., and Soliman, M.A.A. 2017. Effect of dietary source of selenium on productive and reproductive performance of sinai laying hens under heat stress conditions. Egypt. Poult. Sci. 37: 461-489.

SAS. 2004. Statistical Analysis Systems Institute. 2004. SAS/STAT User's Guide: Release 6.03. SAS institute Inc., Cary, NC. USA.

Shini, S. 2003. Physiological responses of laying hens to the alternative housing systems. Int. J. Poult. Sci. 2: 357-360.

Song, Y.F., Wang, J., Li, S.H.. and Shang, C.F. 2005. Effect of bee pollen on the development of digestive gland of broilers. Anim. Husb. Vet. Med. 37: 14-17.

Sulcerova, H.; Mihok, M.; Juzl, M. and Hascik, P. 2011. Effect of addition of pollen and propolise to feeding mixtures during the production of broiler chickens Ross 308 to the color of thigh and breast muscle and pH determination. Actauniv. agric. et silvic. Mendel. Brun. 6: 359-366.

Swiderek, W. P.; Charon, K. M.; Winnicka, A.. and Gruszczynska, J. 2006. Relationship between blood lymphocyte phenotype, DRB1 (MHC class II) gene polymorphism and somatic cell count in ewe milk. Bull. Vet. Inst. Pulawy. 50: 73-77

Wang, Z.; Zhang, L. and Zhou, X. 2002. Effect of adding pollen in diets on the sperm quality and endocrine capacity of breeder cocks under heat stress. CNKI:SUN:ZGJQ.

Wang, J., Jin, G.; Zheng, Y.; Li, S. and Wang, H. 2005. Effect of bee pollen on development of immune organ of animal. Zhongguo Zhong Yao Za Zhi. 30: 1532- 1536.

الملخص العربى

تأثير إضافة حبوب اللقاح على الاداء الإنتاجي، بعض المقاييس الهيماتولوجية ، مكونات الدم والخصائص الطبيعية للسائل المنوي لدجاج سينا

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هدفت هذه التجربة الي تقييم تأثير اضافة حبوب اللقاح لعلائق ديوك دجاج سينا على الاداء الإنتاجي، بعض المقاييس الهيماتولوجية والخصائص الطبيعية للسائل المنوي. اشتملت هذه التجربة على عدد 60 ديك من دجاج سينا (4 مجموعات × 3 مكررات × 5 ديوك)، عند عمر 28 اسبوع، والتي قسمت بالتساوي الى اربعة مجاميع تجريبية، غذيت ديوك المجموعة الأولى (المقارنة) على العليقة التجارية دون أية اضافات، بينما غذيت مثيلاتها بالمجموعة الثانية والثالثة والرابعة على نفس العليقة مع اضافة حبوب اللقاح عند مستوى 500، 1000 و 1500 ملجم حبوب لقاح/ كجم عليقة، على التوالي.
أوضحت النتائج المحققة وجود زيادة معنوية عند مستوى (عند مستوى1%) بوزن الجسم النهائي ومعدل الزيادة الوزنية الكلية بين مجموعة المقارنة ومجموعات المعاملة ، بينما لم يكن للمعاملة بحبوب اللقاح تأثير معنوي علي كمية الغذاء المستهلك. ازداد عدد كرات الدم الحمراء والبيضاء ومستوى الهيموجلوبين معنوياً عند مستوى معنوية (عند مستوى1%) بالديوك المعاملة بحبوب اللقاح ، بينما انخفضت معنوياً نسبة خلايا الهتيروفيل / الخلايا الليمفاوية مقارنة بمجموعة الكنترول. لم تتأثر بروتينات الدم معنوياً بالديوك المعاملة بحبوب اللقاح، بينما انخفض معنوياً (عند مستوى5%) تركيزي الكوليسترول والجليسريدات الثلاثية بالديوك المعاملة بحبوب اللقاح مقارنة بمجموعة الكنترول. إزداد وبصورة معنوية (عند مستوى1%) حجم القذفة، ونسبة الحركة التقدمية و الحيوانات المنوية الحية بالإضافة الى تركيزي الحيوانات المنوية بالمل والقذفة بالديوك المعاملة بحبوب اللقاح مقارنة بمجموعة الكنترول. ايضا، انخفضت معنوياً (عند مستوى1%) نسبتي الحيوانات المنوية الميتة والحيوانات المنوية الشاذة بالديوك المعاملة بحبوب اللقاح مقارنة بمجموعة المقارنة.
من النتائج المحققة ، يمكن أن نخلص الي أن إضافة حبوب اللقاح لعلائق دجاج سينا عند المستويات المختلفة قد حسن معدل الزيادة الوزنية، والخصائص الطبيعية للسائل المنوي مقارنة بمجموعة الكنترول.
لذلك ، من هذه النتائج يمكن أن نوصي باستخدام حبوب اللقاح بعلائق ديوك دجاج سينا عند مستوى 1000ملجم/كجم عليقة لتحسين حجم القذفة، نسبة الحركة التقدمية، نسبة الحيوانات المنوية الحية، وتركيز الحيوانات المنوية بالقذفة والتي بلغت حوالي 34.13، 26.32، 7.17، 43.62% على التوالي، بينما انخفضت معنويا نسبة الحيوانات المنوية الشاذة بحوالي 36.28% مقارنة بمجموعة الكنترول.
مفاتيح البحث: ديوك سينا ، حبوب اللقاح ، مكونات الدم ، الصفات الطبيعية للسائل المنوي.