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EVALUATION OF SOME NATURAL FEED ADDITIVE IN LAYER DIETS

BY

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Abstract: *The objective of this work was to study the impact of addition of natural feed additives as dinaferm* (*Saccharomyces Cerevisiae), biotop* (*Bacillus Subtilis and Bacillus Licheniform*) *and black seed oil versus***,** *some antibiotics as amoxicillin and zinc bacitracin to laying hen diets on productive performance, serum components, digestibility, semen quality, fertility, hatchability and economical efficiency. A total number of 180 layer hens and 24 cockerels of local strain "Al - Salam" were fed the experimental diets from 32 to 43 weeks of age. Layer hens and cockerels were divided into 6 treatment groups in individual cages in open system. The first group were used as control (fed without any additives), while the other five groups were fed the same control diet supplemented with dinaferm, biotop, black seed oil, Amoxicillin and Zinc bacitracin at levels of 0.1, 0.1, 0.1, 0.02% and 0.05%, respectively. The results showed that, addition of different feed additives significantly (P <0.05) improved egg number (EN), egg mass (EM) and feed conversion (FC) while, insignificantly affected egg weight (EW) as compared to the control group. Addition of dinaferm was increased significantly (P<0.05) EN and EM than control and other treated groups. The highest values of EN and the best FC were recorded by dinaferm addition. Addition of dinaferm increased significantly (P<0.05) feed intake (F1), while, amoxicillin and zinc bacitracin addition decreased significantly (P<0.05) FI as compared to the control group. Addition of different feed additives to laying hen diets insignificantly affected on globulin, globulin / albumin ratio and cholesterol as compared to the control group. Addition of dinaferm, amoxicillin and Zinc bacitracin increased significantly (P<0.05) total protein and albumin while, biotop and black seed oil addition insignificantly affected total protein and albumin as compared to the control group. The Addition of feed additives insignificantly affected most digestibility coefficient parameters while, amoxicillin and Zinc bacitracin addition decreased significantly (P<0.05) digestion coefficients of dry matter (DM), organic matter (OM) and crude protein (CP) as compared to* *the control group. Addition of different feed additives improved significantly (P<0.05) semen- ejaculate value, sperm – cell concentration (x10^6/ml.) and sperm motility % while, decreased significantly (P<0.05) dead spermatozoa and sperm abnormalities as compared to the control group. Addition of dinaferm and Zinc bacitracin improved significantly (P<0.05) fertility and hatchability percentage, as compared to control group. The best relative economical efficiency was recorded by dinaferm flowed by black seed oil addition compared to the control and other treated groups.*

It was concluded that natural feed additives dinaferm, biotop and black seed oil could serve in laying hens diets. However, further research is required to better understand the role of natural feed additives in poultry nutrition and their implications in human health.

INTRODUCTION

Many additives are recently used in poultry diet to enhance productive performance and immune response of birds. The most common recent definition for probiotics is organisms (bacteria or fungi) which contribute in the intestinal microbial balance. Probiotics are bacteria or yeast in origin, these viable organisms could be fed either alone or in combination. The addition of probiotic preparations in layer and quail diets improved feed conversion (Sellars, 1991) egg number, egg weight (Siam et al., 2004) and egg mass (Haddadin et al ., 1996). The use of natural feed additives as substitute for antibiotics in poultry production has become an area of great interest (Kumar et al .,2003) Probiotics regulate microbial environment of the intestines, decrease digestive disturbances, inhibit pathogenic intestinal microorganisms and improve feed conversion ratio (FCR) (Dhingra, 1993). Many attempts have been undertaken to improve the growth rate and (FCR) to reduce the cost of diets by addition of dietary supplementation such as, antibiotics (Abdel Azeem, 2002) , probiotic (Sherif, 2000). Francis et al. (1978) noted that the performance of laying hens was improved with the dietary inclusion either of lactobacillus acidophilus or zinc bacitracin, but not when the two components were fed together. Improving the rate of laying and (FCR) as a result of addition of different feed additives to layer diets were observed (Nahashon *et al*., 1993; Dorgham *et al*., 1994 and Fayek *et al*., 1995). Some investigators demonstrated that growth performance and nutrient digestibility of birds improved by feeding diets containing active dried yeast (Bintvihok, 2001; Abd El Wahed et al., 2003 and Soliman et al., (2003). On the other hand, Daniel (1990) found significant improvement in sperm cell production due to feeding diets supplemented with Yea sac. Due to the growing public concerns about residuals of antibiotics in animal products (Heitzman, 1986) and despite the lack of empirical evidence, many restrictions and bans have been placed on the use of antibiotics in livestock feeding in Europe. Antibiotics may accumulate in the tissues of animals and be ingested by consumers whose own resident microflora may become antibiotic resistant (Kobe et al., 1995 and Richter et al., 1996). This antibiotic resistance may lead to problems with antibiotic therapy in humans and other animals (Corpet, 1996 and Kolawole and Shittu, 1997). Therefore, many scientists are searching alternatives to antibiotics for commercial use in animal nutrition (El Husseiny *et al*., 2002).

Moreover, Ghazalah and Ibrahim (1996) showed that black seed oil is preferable as flavoring agent to the consumer and is the best from the economical point of view. Osman (2002) indicated that using black seed oil as a biological feed additive enhanced productive performance and economical efficiency inclusion with no adverse effect on carcass and blood constituents of broiler chicks. The use of medicinal plants as feed additives such as black seeds (Nigella sativa), garlic (Allium sativum) and fenugreek (Trigonella foenum greaecum) improved the productive performance, health and immunity in poultry (Mohamed et al., 2000 and El Ghamry et al., 2002).

The present study aimed to define the effect of natural feed additives as dinaferm, biotop and black seed oil versus, some antibiotics as amoxicillin and zinc bacitracin in layer diets on productive performance, serum blood constituents, digestibility, semen quality, fertility, hatchability and economical efficiency of laying hens.

MATERIALS AND METHODS

The present study was carried out at the Poultry Research Center, Faculty of Agriculture Alexandria University. A total number of 180 layer hens and 24 cockerels of local strain "Al – Salam" (32Week of age) were housed in open system and randomly distributed in individual Oreplicates of 10 hens. The first group was used as control (fed without any additives), while the other five groups were fed the same control diet supplemented with natural feed additives as "Dinaferm"[a] a commercial form guaranteed at {minimum of 1000 million, Colony Forming Units (CFU) active yeast Saccharomyces Cerevisiae}, "Biotop"[b] that contains {4×10^{10} CFU Bacillus Licheniform and 4×10^{10} CFU Bacillus Subtilis} and black seed oil versus, some antibiotics as Amoxicillin[c] (each 100 g. contain 20 g. Amoxicillin trihydrate) and Zinc bacitracin[c] (each 100 g. contain 10 g. Zinc bacitracin) were Purchased from Alex. Local market. The dietary treatments were as follow:

[a] Dinafirm a product of Dinatec Inc. Co. P.O. Box 226 U.S.A

[b] Biotop a product of Shin – IL. Chemical & Livestock Co. Korea.

[c] Amoxicillin and Zinc bacitracin a products of Adwia Co. Egypt.

Diet 1) Basal diet (Control).

Diet 2) Basal diet + 0.02% Amoxicillin.

Diet 3) Basal diet + 0.05% Zinc bacitracin.

Diet 4) Basal diet + 0.1% Dinaferm.

Diet 5) Basal diet + 0.1% Biotop.

Diet 6) Basal diet + 0.1% black seed oil.

The experimental diets were supplied to meet the nutrient requirements of the Ministry of Agriculture Decree (1996). The ingredients and chemical composition of the experimental basal diets are shown in Table 1. All birds (females and males) were individually housed in cages and provided with water and feed *ad-libitum* and kept under similar conditions of management and were artificially inseminated during the experimental period. Artificial light was used to provide 16 hour daily photoperiod. During the experimental period (32 – 43 weeks of age), Egg number and egg weight were recorded daily while, feed intake was recorded weekly for each hen. Egg mass and feed conversion was also calculated.

At the end of the experimental period, blood samples were withdrawn from the wing vein of four birds from each treatment. Serum was separated for determination total protein, albumin and cholesterol which were calorimetrically determined using Commercial Kits, following the same steps as described by the manufacture. The digestibility coefficients of nutrients of experimental diets were examined using four cockerels from each treatment at the end of the experimental period. Facal nitrogen was determined according to the method outlined by Jakobson et al. (1960), while the urinary organic matter fraction was calculated according to Abou Raya and Galal (1971). The proximate analyses of feed and dried excreta were carried out according to Official Methods [AOAC, 1990]. Semen samples were collected between 10 and 11 AM at 43 weeks of age from four cockerels within each treatment individually by abdominal massage technique according to the method of Burrows and Quinn (1937). Semen - ejaculate volume was measured by tuberculin syringe graduated to nearest 0.01 ml according to Allen and Champion (1955). Advanced motility recorded according to percentage of sperm forward motion .Sperm abnormalities were determined according to Vontienhoven and Steel (1957).Fertility and hatchability “scientific and commercial hatchability” were calculated utilizing artificial insemination using semen provided from 4 cockerels for each treatment during the incubation period. Fertility percentage = [(*fertile* *eggs/ total eggs*) x 100], and hatchability percentage = [(*hatched chicks/ fertile eggs*) x 100].

Economical efficiency for egg production was calculated from the input/ output analysis according to the price of experimental diets and eggs produced. Values of economical efficiency were calculated as the net revenue per unit of total costs (Osman, 2003 and Soliman, 2003).

Data were subjected to one-way analysis of variance applying SAS program (SAS, 1996) using general linear model GLM. Significant differences among treatment means were separated using Duncan's multiple range procedure (Duncan, 1955) at 5% probability.

RESULTS AND DISCUSSION

Performances of laying hens

The effect of feed additives supplementation on egg number EN, egg weight EW and egg Mass EM is presented in Tables (2, 3 and 4). There were significantly differences ($P<0.05$) among treatments in EN and EM values, during the different periods studied. However, no significant differences among treatments in EW during the individual experimental periods. Laying hen fed diets supplemented with dinaferm, biotop and black seed oil had significantly ($P\leq0.05$) higher EN values as compared to the control group or groups fed diets supplemented with amoxicillin and Zinc bacitracin during the experimental periods (32-43 weeks). The group fed the diet supplemented with dinaferm was significantly ($P<0.05$) more eggs as compared to the control and all other treatments during the experimental periods (first, second, third and total period). Addition of amoxicillin, zinc bacitracin, dinaferm, biotop and black seed oil showed increased EN by 5.40, 6.51, 12.36, 7.75 and 9.12 %, respectively as compared the control group. Hen groups fed diets supplemented with dinaferm had significantly ($P \leq 0.05$) EM values as compared to groups fed diets supplemented with amoxicillin, zinc bacitracin and biotop or control groups, while insignificantly with black seed oil during the first and second experimental periods. While, hens fed diets supplemented with dinaferm showed significantly ($P < 0.05$) higher EM values as compared to other treatments or control group during the experimental period of 40– 43 weeks. Laying hens fed diets supplemented with dinaferm showed significantly ($P \leq 0.05$) increased EN and EM values than those fed diets supplemented with Antibiotics as amoxicillin and zinc bacitracin or control group during the experimental periods.

These improvements in EN and EM in the treated groups may be due to their content of feed additives and their antimicrobial, antioxidant and their effect in improving nutrient utilization (Jonas et al., 1997; Miura et al., 2001, El Husseiny et al 2002, Al Harthi, 2004). Dorgham et al. (1994) and Fayek et al. (1995) reported that laying performance was improved in response to diet supplementation with feed additives including, antibiotics, enzymes and direct fed microbial. However, Abdulrahim et al. (1996) found that bacitracin addition had no significant effect on egg production.

Feed intake and feed conversion

As shown in Table 5 there were significant differences among treatments in daily feed intake FI during the experimental periods. Laying hens fed diets supplemented with black seed oil, amoxicillin and Zinc bacitracin were significantly ($P \leq 0.05$) lower in their feed intake as compared to the control group. While, group fed diet supplemented with dinaferm had significantly ($P \leq 0.05$) higher FI as compared to the control group. No significant effect between groups fed diet supplemented with biotop and the control during the experimental periods. These results agree with those obtained by Haddadin et al. (1996) who showed that lactobacillus acidophilus had no significant effect on daily feed consumption in layer diet. Ghazalah and Ibrahim (1996) and Siam et al. (2004) noticed no change in feed Intake for laying hens when fed dietary probiotics as compared to those that fed unsupplemented control diet.

Feed conversion shown in Table 6 indicated that significant differences between treatments in feed conversion ratio during the experimental periods. Laying hens groups fed diets supplemented with natural feed additive as dinaferm and black seed oil were improved significantly ($P \leq 0.05$) as compared with groups fed diets supplemented with antibiotic as amoxicillin, zinc bacitracin and control group during the experimental period of 32– 43 weeks. Regarding all feed additives used in the experiment significantly improved feed conversion ratio as compared to the control group.

These results are similar to those reported in layers by (Nahashon et al., 1993; Dorgham et al., 1994 and Fayek et al., 1995). Huthail (1996) found that the best hen day production and feed conversion values were obtained with 0.3% yeast as feed additives in baladi and 0.2% in white leghorn hens. Abaza et al. (2003) reported that using black seeds at level of 0.25% in broiler diet improved feed conversion.

Blood serum constituents

Results in Table 7 indicated that serum globulin and cholesterol were not significantly influenced by feed additives supplementation in the laying diets. These results are in agreement with (Osman, 2002 and Al Harth, 2004) who found that cholesterol decreased significantly when addition of Amoxicillin at level of 40 mg./Kg to laying hen diet and any tested level of hot pepper or green tea was included in the laying hens diets. There were significant differences between treatments in serum total protein and albumin. Laying hens group fed diets supplemented with dinafirm, amoxicillin or zinc baci racin had significantly ($P<0.05$) higher serum total protein and albumin as compared to the control group. Regarding, all feed additives amoxicillin, zinc bacitracin, dinaferm, biotop, and black seed oil significantly increased serum total protein values by 11.56, 13.87, 21.68, 0.87, 3.47% and albumin values by 11.50, 13.72, 21.24, 0.44, 2.65%, respectively as compared to the control group. These results are agreement with those of Zeweil et al.(1993) and Abdel Azeem et al. (2001) with Japanese quail and Tollba et al. (2004) with broiler chicks, they reported significant increases in the values of total protein and albumin as a result of feeding microbial probiotics.

Digestibility coefficient of nutrients

Digestibility coefficient of nutrients of the experimental diets is presented in Table 8. Results indicated that supplementation of natural feed additives as dinaferm, biotop and black seed oil to cockerels diets significantly ($P < 0.05$) improved digestibility coefficient of dry matter DM and organic matter OM. The digestibility values of CP, CF, EE and NFE were increased significantly ($P < 0.05$) due to the supplementation of dinaferm to the cockerels diets as compared to antibiotics as amoxicillin and zinc bacitrcin. However addition of dinaferm, biotop and black seed oil to cockerels diets had no significant effect on digestibility coefficient of DM ,OM , CP , CF and EE , while the values of NFE digestibility were increased significantly ($p < 0.05$) due to the supplementation of dinaferm only as compared to the control group. Results showed that supplementation of amoxicillin to cockerels diets decreased significantly ($P < 0.05$) the digestibility coefficient of DM, OM and CF, while, the digestibility values of DM, OM, CP and EE were decreased significantly ($P \leq 0.05$) due to the supplementation of zinc bacitracin as compared to control group . These results are agreement with Abaza (2001) who found that mixture of two or three of medicinal plants improved digestibility of nutrients compared to the control group, while, zinc bacitracin or viriginiamycin had no effect on digestibility of nutrients compared to the control group.

Semen quality measurements

Results in Table 9 showed that feed additives significantly improved semen quality. Supplementation of zinc bacitracin or dinaferm showed increased semen-ejaculate volume, percentage of sperm motility and sperm-cell concentration ($x10^6$/ml) while, decreased dead spermatozoa and sperm abnormalities as compared with unsupplemented control diet Similarly Daniel (1990) found a significant improvement in sperm cell production due to feeding diets supplemented with Yea sacc.

Fertility and Hatchability

Data presented in Table 10 showed that addition of dinaferm and zinc bacitracin significantly increased ($P < 0.05$) fertility and hatchability percentages compared to control diet. While, there were no significant differences between treatments in chicks weight (g.).

The best vale of fertility (87.72%) and hatchability (77.83 %) percentages with eggs from layer hens fed diets supplemented with disaffirm, while, the lowest fertility rate (85.02%) and hatchability (73.37%) were recorded with eggs produced by hens fed the control diet. Similarly, Abdel Azeem et al., (2005) found a significant improvement of fertility and hatchability due to feeding diets supplemented with natural biological feed additives.

Economical efficiency

Results in Table 11 indicated that feeding dinaffirm at level 0.1% improved economic efficiency (E.EF.) and relative economic efficiency values followed by hens fed diet included 0.1% black seed oil as compared with that of the control group. This improvement could be due to improving the feed conversion or reducing the amount of feed required to produce one unit of egg mass. In this respect, Soliman (2002) indicated that the addition of live yeast as a probiotic in laying hen diets gave the best economical efficiency values.

In conclusion, The results of this study indicated that feeding laying hens on diets containing natural feed additives as dinaferm, biotop and black seed oil improved the productive, reproductive performance and relative economic efficiency values of laying hen at reflected by fertility, hatchability and semen quality. Further research is needed to get better understanding of the effect of natural feed additives in poultry production and their beneficial impact on human health.

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

Ingredients %	basal diet
Yellow corn	64.00
Soybean meal (44%)	24.50
Wheat bran	01.50
Limestone	07.70
Vitamins and minerals *	00.30
Salt	00.40
Di calcium phosphate	01.50
DL methionine	00.10
Total	100
Calculated analysis**	
Crude protein,%	15.99
ME (Kcal /kg)	2713.50
Crude fiber,%	3.43
Crude fat, %	2.86
Calcium, %	3.30
Available phosphorus, %	0.41
Lysine, %	0.88
Methionine ,%	0.39
Methionine + cystine,%	0.66
Sodium,%	0.17
Cost /100 Kg (L.E)	75.80

* Vitamins and minerals premix provides per 3kg vit A 10 000 000 IU, vit D3 2000 000 IU, vit E 10000mg, Vit K3 1000mg, vit B1 1000mg, vit B2 5000mg, vit B6 1500mg, vit B12 10mg, pantothenic acid 10000mg,Niacin 30000mg, Biotin 50mg,Folic acid 1000mg, Choline 250gm, Selenium 100mg, Copper 4000mg, Iron 30000mg, Manganese 60000mg و Zinc 50000mg, Iodine 1000mg, Cobalt 100mg and $CaCO_3$ to 3000g.

** According to Feed Composition Tables for animal and poultry feedstuffs used in Egypt (2001).

Table (2): Egg number of Al-Salam hens fed the experimental diets.

Treatments	Egg number (egg/hen)			
	32-35 wks	36-39 wks	40-43 wks	32-43 wks
Control	$16.98^{c} \pm 0.15$	$14.55^{c} \pm 0.14$	$15.15^{d} \pm 0.12$	$46.69^{e} \pm 0.41$
Amoxicillin	$16.99^{c} \pm 0.12$	$15.56^{b} \pm 0.18$	$16.65^{c} \pm 0.15$	$49.21^{d} \pm 0.30$
Zinc bacitracin	$17.49^{c} \pm 0.14$	$15.76^{b} \pm 0.13$	$16.92^{bc} \pm 0.12$	$49.73^{cd} \pm 0.24$
Dinaferm	$18.49^{a} \pm 0.15$	$16.26^{a} \pm 0.17$	$17.69^{a} \pm 0.18$	$52.46^{a} \pm 0.35$
Biotop	$17.85^{b} \pm 0.18$	$15.65^{b} \pm 0.15$	$16.81^{bc} \pm 0.14$	$50.31^{bc} \pm 0.29$
Black seed oil	$17.99^{b} \pm 0.15$	$15.86^{b} \pm 0.16$	$17.09^{b} \pm 0.15$	$50.95^{b} \pm 0.23$

a,b,c.. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).

Table (3): Average Egg weight of Al-Salam hens fed the experimental diets.

Treatments	Egg weight (g.)			
	32-35 wks	36-39 wks	40-43 wks	32-43 wks
Control	52.90 ± 0.27	54.52 ± 0.27	54.64 ± 0.29	$54.02^{b} \pm 0.19$
Amoxicillin	52.66 ± 0.26	54.67 ± 0.29	55.71 ± 0.29	$54.35^{ab} \pm 0.12$
Zinc bacitracin	52.75 ± 0.25	54.71 ± 0.29	55.75 ± 0.28	$54.40^{ab} \pm 0.11$
Dinaferm	52.66 ± 0.27	54.97 ± 0.28	55.93 ± 0.29	$54.52^{a} \pm 0.12$
Biotop	52.67 ± 0.25	54.77 ± 0.29	55.81 ± 0.27	$54.42^{ab} \pm 0.15$
Black seed oil	52.69 ± 0.27	54.82 ± 0.27	55.86 ± 0.27	$54.46^{ab} \pm 0.14$

a,b.. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).

Table (4): Egg mass of Al-Salam hens fed the experimental diets.

Treatments	Egg mass (g./hen/day)			
	32-35 wks	36-39 wks	40-43 wks	32-43 wks
Control	$29.98^{c} \pm 0.38$	$26.46^{c} \pm 0.35$	$27.59^{d} \pm 0..30$	$28.04^{e} \pm 0.32$
Amoxicillin	$29.87^{c} \pm 0.38$	$28.36^{b} \pm 0.32$	$30.93^{c} \pm 0.35$	$29.71^{d} \pm 0.19$
Zinc bacitracin	$29.97^{c} \pm 0.29$	$28.72^{b} \pm 0.22$	$31.43^{bc} \pm 0.24$	$30.06^{cd} \pm 0.16$
Dinaferm	$32.50^{a} \pm 0.39$	$29.80^{a} \pm 0.33$	$32.99^{a} \pm 0.23$	$31.78^{a} \pm 0.23$
Biotop	$31.36^{b} \pm 0.37$	$28.59^{b} \pm 0.34$	$31.26^{bc} \pm 0.24$	$30.42^{bc} \pm 0.22$
Black seed oil	$31.59^{ab} \pm 0.23$	$28.98^{ab} \pm 0.30$	$31.83^{b} \pm 0.33$	$30.83^{b} \pm 0.14$

a,b,c,d.. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).

Table (5): Feed intake of Al-Salam hens fed the experimental diets.

Treatments	Feed intake (*g./hen/day*)			
	32-35 wks	36-39 wks	40-43 wks	32-43 wks
Control	$128.45^{b} \pm 0.42$	$128.49^{b} \pm 0.42$	$129.63^{b} \pm 0.42$	$128.85^{b} \pm 0.24$
Amoxicillin	$126.01^{c} \pm 0.42$	$126.05^{d} \pm 0.44$	$127.44^{cd} \pm 0.41$	$126.49^{d} \pm 0.32$
Zinc bacitracin	$127.03^{c} \pm 0.44$	$127.13^{cd} \pm 0.42$	$128.45^{bc} \pm 0.42$	$127.54^{c} \pm 0.30$
Dinaferm	$130.03^{a} \pm 0.41$	$130.43^{a} \pm 0.42$	$131.19^{a} \pm 0.43$	$130.55^{a} \pm 0.31$
Biotop	$128.33^{b} \pm 0.41$	$127.83^{bc} \pm 0.43$	$129.01^{b} \pm 0.41$	$128.39^{b} \pm 0.30$
Black seed oil	$126.02^{c} \pm 0.42$	$126.03^{d} \pm 0.44$	$127.10^{d} \pm 0.42$	$126.38^{d} \pm 0.29$

a,b,c,d.. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).

Table (6): Feed conversion of Al-Salam hens fed the experimental diets.

Treatments	Feed Conversion[1] (*g./g.*)			
	32-35 wks	36-39 wks	40-43 wks	32-43 wks
Control	$4.30^{a} \pm 0.05$	$4.88^{a} \pm 0.07$	$4.71^{a} \pm 0.05$	$4.61^{a} \pm 0.05$
Amoxicillin	$4.24^{a} \pm 0.05$	$4.46^{b} \pm 0.06$	$4.14^{b} \pm 0.05$	$4.26^{b} \pm 0.03$
Zinc bacitracin	$4.25^{a} \pm 0.04$	$4.43^{b} \pm 0.04$	$4.09^{bc} \pm 0.03$	$4.25^{b} \pm 0.02$
Dinaferm	$4.02^{c} \pm 0.05$	$4.39^{b} \pm 0.05$	$3.98^{c} \pm 0.03$	$4.11^{c} \pm 0.03$
Biotop	$4.11^{bc} \pm 0.05$	$4.49^{b} \pm 0.06$	$4.13^{b} \pm 0.03$	$4.23^{b} \pm 0.03$
Black seed oil	$3.99^{c} \pm 0.03$	$4.36^{b} \pm 0.05$	$4.01^{c} \pm 0.05$	$4.10^{c} \pm 0.02$

a,b,c.. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).
[1]Grams of feed per grams of egg mass

Table (7): Some blood constituents of Al-Salam hens fed the experimental diets.

Treatments	Total protein (mg/100 ml)	Albumin (mg /100 ml)	Globulin (mg /100 ml)	Cholesterol (mg /100ml)
Control	$3.46^{c} \pm 0.09$	$2.26^{c} \pm 0.07$	1.20 ± 0.01	124.25 ± 0.74
Amoxicillin	$3.86^{b} \pm 0.09$	$2.52^{ab} \pm 0.07$	1.34 ± 0.11	120.83 ± 1.24
Zinc bacitracin	$3.94^{b} \pm 0.09$	$2.57^{a} \pm 0.07$	1.37 ± 0.11	122.07 ± 1.04
Dinaferm	$4.21^{a} \pm 0.09$	$2.74^{a} \pm 0.07$	1.47 ± 0.11	121.07 ± 1.04
Biotop	$3.49^{c} \pm 0.08$	$2.27^{c} \pm 0.07$	1.22 ± 0.01	122.38 ± 1.04
Black seed oil	$3.58^{c} \pm 0.08$	$2.32^{bc} \pm 0.07$	1.26 ± 0.11	121.30 ± 1.03

a,b,c.. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).

Table (8): Nutrient digestibility of Al -Salam cockerels fed the experimental diets.

Treatments	Dry matter (DM)	Organic matter (OM)	Crude protein (CP)	Crude fiber (CF)	Ether extract (EE)	Nitrogen free Extract (N.F.E)
Control	$81.22^{a} \pm 0.81$	$80.84^{a} \pm 1.03$	$79.89^{ab} \pm 0.89$	$23.63^{ab} \pm 0.75$	$81.72^{ab} \pm 0.95$	$81.26^{bc} \pm 0.99$
Amoxicillin	$78.09^{b} \pm 0.81$	$77.73^{b} \pm 1.03$	$78.97^{b} \pm 0.90$	$19.87^{c} \pm 0.66$	$79.58^{bc} \pm 0.98$	$80.26^{c} \pm 1.00$
Zinc bacitracin	$77.09^{b} \pm 0.80$	$76.23^{b} \pm 1.03$	$75.72^{c} \pm 095$	$22.62^{b} \pm 0.75$	$77.98^{c} \pm 0.98$	$79.20^{c} \pm 1.02$
Dinaferm	$83.01^{a} \pm 0.73$	$82.32^{a} \pm 0.97$	$82.46^{a} \pm 0.93$	$25.23^{a} \pm 0.75$	$84.30^{a} \pm 0.97$	$85.28^{a} \pm 0.99$
Biotop	$82.27^{a} \pm 0.58$	$81.94^{a} \pm 1.03$	$80.96^{ab} \pm 0.93$	$23.03^{ab} \pm 0.75$	$79.44^{bc} \pm 0.93$	$81.01^{bc} \pm 0.86$
Black seed oil	$82.82^{a} \pm 0.33$	$82.26^{a} \pm 1.03$	$81.48^{ab} \pm 0.91$	$23.66^{ab} \pm 0.75$	$82.73^{a} \pm 0.98$	$83.42^{ab} \pm 0.86$

a,b,c.. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).

Table (9): Semen quality measurements of Al -Salam cockerels fed the experimental diets.

Treatments	Semen-ejaculate volume	Sperm motility %	Sperm-cell concentration ($x10^{6}$/ml)	Sperm abnormalities (%)	Dead spermatozoa (%)
Control	$0.706^{a} \pm 0..06$	$75.00^{c} \pm 2.09$	$288.06^{c} \pm 4.56$	$29.28^{a} \pm 1.19$	$17.81^{a} \pm 1.0$
Amoxicillin	$0.859^{a} \pm 0.06$	$81.07^{b} \pm 1.05$	$295.07^{c} \pm 4.56$	$25.58^{b} \pm 1.19$	$13.28^{b} \pm 1.2$
Zinc bacitracin	$0.860^{a} \pm 0.06$	$90.67^{a} \pm 1.05$	$310.67^{ab} \pm 4.56$	$20.01^{c} \pm 1.18$	$09.05^{c} \pm 1.3$
Dinaferm	$0.949^{a} \pm 0.01$	$92.07^{a} \pm 1.05$	$315.86^{a} \pm 4.56$	$20.86^{c} \pm 0.39$	$10.26^{c} \pm 1.0$
Biotop	$0.839^{ab} \pm 0.03$	$88.67^{a} \pm 1.05$	$300.61^{bc} \pm 4.46$	$23.36^{bc} \pm 1.18$	$10.73^{c} \pm 1.3$
Black seed oil	$0.831^{ab} \pm 0.00$	$80.47^{b} \pm 1.04$	$292.16^{c} \pm 4.46$	$22.11^{c} \pm 1.18$	$12.39^{bc} \pm 1.1$

a,b,c.. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).

Table (10): Fertility and hatchability values of eggs from Al-Salam hens fed the experimental diets.

Treatments	Fertility (%)	Hatchability (%)	Chick weight (g.)
Control	$85.02^{c} \pm 0.84$	$73.37^{c} \pm 0.64$	35.83 ± 0.41
Amoxicillin	$86.21^{bc} \pm 0.22$	$74.36^{bc} \pm 0.64$	36.09 ± 0.36
Zinc bacitracin	$86.95^{ab} \pm 0.24$	$76.12^{ab} \pm 0.65$	36.09 ± 0.35
Dinaferm	$87.72^{a} \pm 0.64$	$77.83^{a} \pm 0.67$	36.82 ± 0.38
Biotop	$85.89^{bc} \pm 0.35$	$73.86^{c} \pm 1.35$	36.54 ± 0.37
Black seed oil	$85.75^{bc} \pm 0.12$	$73.48^{c} \pm 0.65$	36.89 ± 0.39

a,b,c. Means in the same column in each classification bearing different letter; differ significantly ($p<0.05$).

Table (11): Input/output analysis and commercial efficiency of Al-Salam hens fed the Experimental diets.

Item	Diets					
	Control	Amoxicillin	Zinc bacitracin	Dinaferm	Biotop	Black seed oil
Total feed intake/ hen (kg)	11.59	11.384	11.478	11.749	11.555	11.374
Price/ kg feed (L.E)	0.758	0.772	0.766	0.778	0.777	0.783
Total feed cost/ hen (L.E)	8.790	8.788	8.792	9.141	8.978	8.906
Total number of egg/ hen	46.69	49.21	49.73	52.46	50.31	50.95
Total price of egg/hen(L.E)[1]	16.342	17.224	17.406	18.361	17.609	17.833
Net revenue/ hen (L.E)[2]	7.552	8.436	8.614	9.220	8.631	8.927
Economic efficiency EEF	0.859	0.960	0.980	1.009	0.961	1.002
Relative EE[3] *(%)*	**100**	**111.8**	**114.1**	**117.5**	**111.9**	**116.7**

[1] The price of one egg = 35P.T; the price of test material per Kg. {Amoxicillin = 70 L.E; Zinc bacitracin = 15 L.E.; Dinaferm =20 L.E; Biotop =19 L.E and Black seed oil =25 L.E}.
[2] Net revenue per unit of total feed cost
[3] relative economic efficiency % of the control

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الملخص العربي

تقييم بعض الإضافات الطبيعية في أعلاف دجاج البيض

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أجرى هذا البحث بهدف دراسة مقارنة تأثير استخدام الإضافات الطبيعية (دينا فيرم - بيوتوب – زيت بذور حبة البركة) بالمضادات الحيوية (اموكسيسيللين أو زنك باستراسين) بمعدلات إضافة 0.1%، 0.1% ، 0.1 %، 0.02%، 0.05%، على التوالي مع الاحتفاظ بمجموعة الكنترول بدون اى إضافات، على الأداء الانتاجي ومكونات سيرم الدم ومعاملات الهضم وجودة السائل المنوي والخصوبة والفقس و الكفاءة الاقتصادية0 تم استخدام 180 دجاجة بياضة و 24 ديك من سلالة السلام المحلية قسمت إلى 6 معاملات تجريبية بكل معاملة 3 مكررات وبكل مكرره 10دجاجات في أقفاص فردية وغذيت على ألعلائق التجريبية من عمر 32-43 أسبوع.

ودلت النتائج على الآتي:-

1- أضافه مختلف الإضافات الغذائية حسنت معنوياً عدد البيض وكتله البيض ومعامل التحويل الغذائي بينما لم تؤثر معنويا على وزن البيض مقارنة بمجموعة الكنترول.

2- إضافة دينا فيرم حسن معنوياً عدد البيض وكتله البيض و معامل التحويل الغذائي مقارنة بمجموعة الكنترول وكل المعاملات الأخرى وأقل القيم سجلت مع أضافة اموكسيسيللين، الزنك باستراسين.

3- أصافة دينا فيرم أدى إلى زيادة معنوية في الغذاء المأكول بينما إضافة زنك باستراسين خفضت معنويا الغذاء المأكول مقارنة بمجموعة الكنترول.

4- إضافة مختلف الإضافات لم يؤثر على مستويات الجلوبيولين والكولسترول بمقارنة بمجموعة الكنترول .

5- أصافة دينا فيرم و اموكسيسيللين والزنك باستراسين حسنت معنوياً البروتين الكلى و الالبيومين بينما بيوتوب وزيت حبة البركة لم تؤثر معنويا علىً البروتين الكلى والالبيومين مقارنة بمجموعة الكنترول.

6- أصافة دينا فيرم والبيوتوب وزيت حبة البركة لم تؤثر معنويا علىً معاملات هضم EE, CF, CP, OM, DM بينما أضافة اموكسيسيللين و زنك باستراسين خفض معنوياً معامل هضم CP, OM, OM, DM مقارنة بمجموعة الكنترول.

7- أصافة مختلف الإضافات الغذائية حسنت معنويا % sperm motility بينما قللت معنوياً sperm abnormalities, dead spermatozoa مقارنة بمجموعة الكنترول.

8- أصافة دينا فيرم وزنك باستراسين حسن معنوياً نسبة الخصوبة والفقس العلمي مقارنة بمجموعة الكنترول.

9- مختلف الإضافات الغذائية المستخدمة حسنت الكفاءة الاقتصادية بالمقارنة بالكنترول وسجلت المعاملة بالدينافيرم أعلى كفاءة اقتصادية و تبعها المعاملة بزيت حبة البركة.

من هذه النتائج تتضح أمكانية استخدام الإضافات الطبيعية مثل دينا فيرم و بيوتوب وزيت حبة البركة كإضافات غذائية في علائق دجاج البياض الأمر الذي يشجع على استمرارية البحث عن استخدام إضافات غذائية طبيعية في تغذية الدواجن و تجنب استخدام المضادات الحيوية وتأثيرها السلبي على صحة الإنسان