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THE PRODUCTIVE PERFORMANCE OF LAYERS FED DIETS SUPPLEMENTED WITH SOME COMMERCIAL FEED ADDITIVES

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SUMMARY

The present study aimed to evaluate three different additives Diamond V "XP" (DV), Lacto-sacc (LS) and Gentian Violet (GV) on the productive performance of El-Salam laying hens. The study involved 144 hens of 28 week old to be in a factorial design, 3 additives X 3 levels. Lacto-sacc (LS) and (GV) were used at 0.0, 750 and 1500 gm / ton feed, whereas, (DV) was used at 0.0, 1500, 3000 gm/ton feed. A commercial layer diet was used as a basal diet to be supplemented with each of the three products. Each treatment included four replicates, 4 hens each. The experiment extended for 20 weeks (28 to 48 week of age) classified into 5 intervals.

At the end of each interval, egg number (EN), egg weight (EW), egg mass (EM), feed intake (FI) and feed conversion (FC) were determined. Also, albumin weight (AW), Yolk weight (YW), shell weight (SW) as percentage of egg weight and shell thickness (ST) were measured. Results obtained were as follows :-

The level of 1500 gm DV, 750 gm LS and 1500 gm GV/ton feed gave significantly higher improvement in the egg production as compared to the basal.

No significant effect could be obtained in egg traits with the use of DV. Whereas, the use of LS significantly affected (AW) and (ST). Also, the use of GV gave a significant effect on (ST).

Economic efficiency study indicated that the level of 1500 gm GV, 1500 gm DV and 750gm LS / ton feed were economically superior than other experimental levels.

Key words : Hen, egg, Diamond V"xp", Lactosacc, gentian violet, production.

INTRODUCTION

Microbial products are often fed to animals. The term which has commonly used to describe these products is "probiotics". Yeast is also considered as a probiotic. It can be added to the diet as "Yeast culture", which is defined as being the dried product composed of yeast and the media on which it is grown and dried in such a manner as to retain the fermenting activity of the yeast. This type of yeast culture is usually considered a source available which have undergone controlled fermentation. In this case, the yeast culture contains large amount of the yeast metabolites. These metabolites colony with some viable yeast cells are the principle functional components of this type of cultures used as a probiotic (Miles and Boot Wella, 1991).

Yeast has been shown to be responsible for improved feed efficiency, organic phosphorus utilization, egg quality and better conditions in poultry (Lyons, 1986).

Kruger *et al.* (1977) conducted a study with young White Leghorn hens to investigate the possibility of an interaction between gentian violet and a Lactobacillus culture in the diet, when compared to a control diet. The addition of gentian violet or the direct feed microbial (DFM) to the diet increased egg production by 3.27 and 3.03% respectively. Feed efficiency improved by 3.46 and 7.42% for gentian violet and DFM, respectively. Improvement in egg production by 9.02% and in feed efficiency by 10.51% was noticed when both gentian violet and DFM were fed in combination.

Regarding the use of Lacto-sacc product for New Hampshire parent stock of fowls, Gerendai and Gippert (1992) found that, as the fowls were fed Lacto-sacc (1kg/1000 kg feed), the mortality rate was 1% less, egg production was 0.4% higher, and feed consumption / egg produced was 7 gram less in the experimental groups when compared to controls. In this connection, Radwan *et al.*, 1995, used Lacto-sacc (LS), Prozyme or egg plus, separately or in combination of two or three of them in Matrouh layer hens diet. They found that, the egg mass had been improved by 25.09% for lacto-sacc + proyme and 9.84% for lacto-sacc + prozyme + egg plus, compared with the control diet. While the feed conversion values were 3.91 and 4.04 for the two mentioned treatments respectively, compared with 6.60 for the control diet.

A selected strain of Lactobacillus acidophilus at levels up to four million viable cells per gram of feed for laying hens had been used by Haddadin *et al.*, 1996. The laying hens were fed for a 48-wk period on a basal diet supplemented with the tested material. The authors found that the level of egg production and feed conversion were significantly higher 8.0 and 14.8%, respectively, than the control, the cholesterol values in yolk were decreased by 18.8%.

Pollman, 1986 and Fuller, 1989 suggested that, feeding a DFM results in a beneficial changes in the gut microflora with a reduction in population of E.coli and change in the intestinal pH. Feeding a DFM results in stimulation of immunity through increasing antibiotics and macrophages activity.

The present study was carried out to compare the effect of three commercial additives known as Diamond V "XP" (yeast culture), Lacto-sacc and Gentian violet on the egg performance and egg traits of laying hens.

MATERIALS AND METHODS

The present study was carried out at Seds Poultry Research Farm, Animal Production Research Institute, Agricultural Research Center, Egypt. One handered and forty four El-Salam local laying hens (28 weeks old) having uniform weight were selected from the farm flock to be used in the present experiment. El-Salam is a new local strain of chickens and was originated from a cross between Nicholes sires (parent line) and Mamourah females (Abd-El-Gawad *et al.*, 1983). The birds were randomly distributed into 36 layer cages, each of four hens. Nine experimental feeding treatments were used in 4 replicates per treatment. The experimental diets were based on a commercial layer diet without supplements (Table 1). The basal diet was supplemented with one of the three tested products, Diamond V "XP", Lacto-sacc or Gentian violet at three levels each. The composition of these products are as follows :

Diamond V "XP" yeast culture (Diamond V Mills, USA.): is a dried product composed of yeast and the media on which it was grown, dried in such a manner as

to preserve the fermenting activity of the yeast. The ingredient are Saccaromyces serevisia yeast grown on a media of ground yellow corn, hominy feed corn gluten, wheat middling, rye middling, diastatic malt and corn syrup and corn molasses.

Lacto-sacc (Nichol Asville, Kentucky, Altech-Biotechnology, USA): A probiotic, as a supplemental source of naturally occuring microorganisms (Lactobacillus and Streptomyces).

Gentian violet (IBEX International Company, Egypt): It is a naturally product, it is a yellow palegenation root. Dried thand roots of Gentiana Lutea L., Gentianaceae. It had been registered in Egypt as mold inhibitor, each 3kg of Gentian violet Contain 8 gm. gentian v. and calcium carbonate as a carrier up to 3kg.

Table 1. Dietary composition and chemical analysis of the commercial layer diet

Ingredient	%
Yellow corn	67.0
Protein concentrate (50%)*	10.0
Lime stone	7.0
Corn gluten (60%)	5.0
Soya bean meal (44%)	5.0
Sun flower meal	3.0
Wheat bran	2.8
L-Lysine	0.2
Total	100.0
Chemical Analysis (calculated)%	
Crude protein, (N x 6.25)	17.0
ME, kcal/kg	2850
Crude fat	3.20
Crude fiber	3.50
Calcium	3.54
Available phosphorus	0.40
Lysine	0.80
Methionine	0.44

* Vitamins and Minerals Per kg of concentrate :
Vit. A 100.000 IU, D_3 30.000 IU, E 100 mg, K_3 30 mg, B1 10 mg, B2 40 mg, B6 30 mg, B12 100 mcg, Biotin 1.5 mg, Pantothenic acid 100 mg, Folic acid 10 mg, Niacin 300 mg,Choline chloride 10.000 mg, B.H.T. 1250 mg, Zinc bacitracine 200 mg, Iron 300 mg, Iodine 50 mg, Zinc 600 mg, Manganese 800 mg, Copper 50 mg, Selenium 1 mg and Cobalt 1 mg.

The supplements as Gentian violet (Gv) and Lacto-sacc (LS) were added at 0, 750 and 1500 gm / ton feed, whereas Diamond v (Dv) was added at 0, 1500 and 3000 gm/ton feed. Birds were fed on the experimental diets *ad lib.* and provided with fresh water all the day, under 16 hours photo period / day. The experiment was extended for 20 weeks (28 to 48 weeks of age) divided into five intervals of 4 weeks each. At the end of each interval, the data of egg number (EN), egg weight (EW), egg mass (EM = EN X EW), feed intake (FI) and feed conversion (FC = FI / kg egg) were measured. Also, at the end of each interval eight eggs from each treatment were

randomly selected to measure albumin weight (AW), yolk weight (YW), shell weight (SW) relative to egg weight and shell thickness (ST).

To study the economic aspects of the experimental diets, feed cost to produce kg egg for each treatment, were calculated. While the price of birds, veterinary services, housing, handling .....etc. were not included because they were considered as constant for all treatments.

A factorial design 3x3 was conducted for the experiment, and the data obtained were analyzed by ANOVA, using the general linear models procedure of SAS (R) software (SAS institute, 1986). When significant ($P<0.05$) differences were obtained, Duncan's new multiple range test (1955), was used to separate treatment means.

RESULTS AND DISCUSSION

1-The Productive Performance of Layers

Results of egg number (EN), egg weight (EW), egg mass (EM), feed intake (FI) and feed conversion (FC) as affected by Diamond v (DV), Lacto-sacc (LS) and Gentian violet (GV) for the overall period (28-48 week of age) are presented in Table (2).

Differences between the three levels of DV were found to be significant in all productive performance parameters except FI. The second and the third levels of DV increased the previous parameters. The second level increased EN, EM and FC 20.80, 23.51 and 23.34%, respectively, whereas, the third level of DV increased EN, EM and FC 10.03, 15.44 and 13.73%, respectively, as compared to the first level. The second level showed an increase of 9.79, 6.99 and 11.14% in EN, EM and FC, respectively as compared to the third level.

The improvement in productive performance resulted from the beneficial changes in the gut micro flora with a reduction in population of E.coli and change in the intestinal pH had been reported by Pollman (1986) and Fuller (1989). In this connection Tonkinson *et al.* (1965) with market turkeys, Savage *et al.* (1985) with turkey breeder hens, Thayer *et al.* (1978), Savage and Mirosh (1990 a and b) have shown that the incorporation of a yeast culture into the feeds resulted in enhanced performance. In addition, dietary supplementation with yeast culture has been reported to increase feed efficiency in growing chickens and breeder turkeys (Thayer and Jakson, 1973 and Thayer *et al.*, 1978). Morever, Hayat *et al.* (1992 and 1993) by using two genetically divergent lines of Medium White turkey, suggested that there is a genetic factor associated with the feeding of a diet containing a yeast culture to turkey breeder hens.

Regarding Lacto-sacc (LS), the differences between the second and the third levels was significantly ($P<0.05$) as compared to the first level for all the productive performance parameters (Table 2). Moreover, there was no significant effect for all the different parameters between the second and the third levels. It could be noticed that the second level of LS increased EN, EM and FC 17.79, 21.63 and 23.57% respectively, whereas the third level increased EN, EM and FC 10.50, 14.54 and 18.50% respectively, as compared to the first level. The second level was better than the third level by 6.60, 6.19 and 6.22% for EN, EM and FC, respectively.

In this aspect Boulous *et al.*(1993) indicated that the addition of ascogen as biogenic enhancer to layer diet increased egg production and improved feed efficiency. Moreover, Mohen Kumar and Christopher (1988) reported that supplementation of probiotic to the diet of laying hens increased their egg yield. Abdel-Rahman (1993) conducted an experiment on the performance of laying hens, he reported that probiotic can be used as alternative to antibiotics as growth parameter, in commercial poultry production. The values of egg production and feed conversion were significantly higher than the control when the layer diet was supplemented with Lactobacillus acidophilus (Haddadin *et al.*, 1996).

By using Gentian violet (GV) it was found from the data in Table (2) that the second and the third levels of GV gave significantly better results for all production performance parameters except FI for the third level as compared to the first level. The second level of GV increased EN, EM and FC 12.72, 16.49 and 19.57% respectively, whereas, the third level resulted an increase of 22.34, 28.67 and 26.09% for EN, EM and FC respectively, as compared with the first level. Comparing the second and third levels, the results were significantly different ($P<0.05$) with respect to in EN and EM. It could be noticed that the third level was better than the second level by 8.53 and 10.46% for these parameters respectively.

The addition of Gentian violet or Lactobacillus culture increased egg production and improved feed efficiency when used with White Leghorn hens (Kruger *et al.*, 1977).

2- Egg Traits

The results of albumen weight (AW), yolk weight (YW), shell weight (SW) and shell thickness (ST) as an affect of supplementing the commercial layer diet with DV, LS or GV are presented in Table (3).

Concerning DV, the differences between its three levels were insignificant for all parameters.

Differences between the three levels of LS for YW and SW were insignificant, while for AW, the differences between the first and the second level, also between the second and third levels were insignificant. But significant difference between the first level of LS and each of the second and the third levels was noted for ST. Both the second level and the third level of LS increased AW by 5.31 and 7.60%, respectively, as compared to the first level. Each of the second and the third levels of LS showed an increase of 14.33 and 9.76% in ST respectively, as compared to the first level.

The result showed that there were no significant differences between the three levels of GV for all egg traits parameters except ST. Whereas, the differences between the first level and each of the second and the third levels of GV for ST were significant ($P<0.05$). Both of the second and third levels of GV increased ST by 12.38 and 10.84% respectively, as compared to the first level.

3- Economical evaluation

The effect of supplementing layer diet with DV, LS or GV on feed cost / kg egg was shown in Table (4). Due to improved egg mass production, feed cost / kg egg decreased by 25.16% at 1500 gm GV / ton feed, 21.77% at 1500 gm DV / ton feed and 20.73% at 750 gm LS / ton feed. The results showed that the third level of GV and the second level of either DV or LS were superior than the other levels of the mentioned supplementation.

Table 2. Effect of different levels of Diamond v, Lacto-sacc and Gentian Violet on egg performance of El-Salam laying hens.

Item	Diamond v.			Lacto-sacc			Gentian violet		
	1	2	3	1	2	3	1	2	3
Egg number (EN)	66.50 c	80.33 a	73.17 b	66.22 c	78.00 ab	73.17 b	65.80 c	74.17 b	80.50 a
Egg weight (EW) gm	42.81 c	43.83 b	44.90 a	42.52 c	43.97 b	44.16 ab	42.31 c	43.83 b	44.56 ab
Egg mass (EM) kg	2.85 c	3.52 a	3.29 b	2.82 c	3.43 ab	3.23 b	2.79 c	3.25 b	3.59 a
Feed intake (FI) kg	12.42 ab	11.73 c	12.30 abc	12.77 a	11.86 bc	11.91 bc	12.77 a	11.98 bc	12.13 abc
Feed conversion (FC)	4.37 a	3.35 d	3.77 b	4.54 a	3.47 bcd	3.70 bc	4.60 a	3.70 bc	3.40 cd

Averages in the same row having the same letter are statistically insignificant (P> 0.05).

Table 3. Effect of different levels of Diamond v, Lacto-sacc and Gentian Violet on egg traits of El-Salam laying hens.

Item	Diamond v.			Lacto-sacc			Gentian violet		
	1	2	3	1	2	3	1	2	3
Egg weight (gm)	51.90 ab	51.93 ab	51.68 ab	48.88 ab	52.34 a	51.09 ab	48.21 ab	50.19 ab	50.06 ab
Albumin weight (AW) %	54.51 abc	55.49 abc	53.76 bc	53.26 bc	56.09 ab	57.31 a	52.66 c	55.11 bc	54.54 abc
Yolk weight (YW) %	32.61 a	31.53 a	31.91 a	31.68 a	31.05 a	31.60 a	31.76 a	31.75 a	32.96 a
Shell weight (SW) %	12.88 ab	12.98 ab	13.67 a	12.38 b	12.97 ab	12.95 b	12.66 b	13.14 ab	12.63 b
Shell thickness (ST) mm	0.352 a	0.365 a	0.375 a	0.328 b	0.375 a	0.360 a	0.323 b	0.363 a	0.358 a

Averages in the same row having the same letter are statistically insignificant (P> 0.05).

Table 4. Effect of supplemental Diamond v, Lacto-sacc and Gentian Violet to layer diet on feed cost / kg egg.

Item	Diamond v.			Lacto-sacc			Gentian violet		
	1	2	3	1	2	3	1	2	3
Feed price / kg (p.t.)	65.00	66.50	68.00	65.00	67.48	69.95	65.00	65.45	65.90
Total feed intake / hen (kg)	12.42	11.73	12.30	12.77	11.86	11.91	12.77	11.98	12.13
Total feed cost / hen (p.t.)	807.30	780.05	836.40	830.05	800.31	833.10	830.05	784.09	799.37
Total egg weight / hen (kg)	2.85	3.52	3.29	2.82	3.43	3.23	2.79	3.25	3.59
Feed cost / kg egg (p.t.)	283.26	221.61	254.22	294.34	233.33	257.93	297.51	241.26	222.67
Relative to control	100.0	78.23	89.75	100.0	79.27	87.63	100.0	81.09	74.84

N.B: Price / kg of Diamond v. = L.E. 10.0 Price / kg of Lacto-sacc = L.E. 33.0 Price / kg of Gentian violet = L.E. 6.0

From the previous results it could be stated that the commercial additives used in the present study improved the productive performance of laying hens comparing with the control. It could be concluded also that the recommended levels of DV, LS or GV are 1500, 750 or 1500 gm / ton feed, respectively.

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الأداء الإنتاجى للدجاج البياض المغذى على علائق مضاف إليها بعض الإضافات الغذائية التجارية

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تهدف هذه الدراسة إلى تقييم إستخدام ثلاثة إضافات غذائية تجارية مختلفة وهى الديامونـد ف واللاكتوساك والجنتيانا البنفسجية على الأداء الأنتاجى للدجاج البياض المحلى (سلالة السلام).

أشتملت الدراسة على ١٤٤ دجاجة بياضة عمر ٢٨ أسبوع غذيت على ٩ معاملات غذائية: عليقة تجارية لإنتاج البيض (عليقة أساسية) وهى تعتبر المستوى الأول لكل إضافة من الثلاثة إضافات الغذائية المستخدمة ويضاف إليها ٧٥٠ أو ١٥٠٠ جرام لاكتوساك أو جنتيانا بنفسجية، عليقة أساسية مضاف إليها ١٥٠٠ أو ٣٠٠٠ جرام ديامونـد ف / طن علف.

تحتوى كل معاملة على أربع مكررات (بكل مكرر ٤ دجاجات). أستمرت التجربه لمدة عشرين أسبوع مقسمة إلى خمسة فترات (كل فترة ٤ أسابيع).

يتم فى نهاية كل فترة قياس عدد ووزن وكتلة البيض وإستهلاك العلف ومعامل التحويل الغذائى. كما تم تقدير وزن كل من الألبيومين والصفار والقشرة كنسبة متوية من وزن البيضة، وقياس سمك القشرة.

أوضحت نتائج الدراسة ما يلى :-

ـ أدت إضافة الديامونـد ف عند مستوى ١٥٠٠ جرام واللاكتوساك بمستوى ٧٥٠ جرام والجنتيانا البنفسجية بمستوى ١٥٠٠ جرام / طن علف إلى زيادة معنوية فى إنتاج البيض بالمقارنة بالعليقة الأساسية.

ـ لم تؤثر إضافة الديامونـد ف عند أى مستوى على صفات البيضة.

ـ أدت إضافة اللاكتوساك إلى تأثير معنوى على وزن البياض وسمك القشرة. كما أدت إضافة الجنتيانا البنفسجية إلى تأثير معنوى على سمك القشرة.

ـ أظهر التقييم الأقتصادى لإضافة هذه الإضافات الغذائية أن إضافة الديامونـد ف بمستوى ١٥٠٠ جرام واللاكتوساك بمستوى ٧٥٠ جرام والجنتيانا بمستوى ١٥٠٠ جرام أفضل إقتصاديا عن باقى المستويات الأخرى.