

Effect of Adding Lecithin to Diets on Productive Performance of Laying Hens**Mustafa A. Mohsen* and B.H. Mousa**

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<http://creativecommons.org/licenses/by/4.0/>.**Abstract**

This study was conducted in the poultry farm of the Department of Animal Production / College of Agriculture / University of Anbar, during the period from 20/7/2021 to 15/10/2021, with the aim of studying the effect of adding lecithin to the diet on the productive performance of laying hens. 60 layer hens of Lohmann Brown breed, aged 43 weeks were used in this experiment. The layer hens were distributed randomly in to five treatments with four replicates per treatment (3 hens/repeat). Birds fed balanced diets contain 5 levels of lecithin as below : T1 (control groups), T2, T3, T4 and T5 adding 0.25, 0.50, 0.75 and 1.0% of lecithin respectively to the basic diet. The results showed the superiority of the addition treatments in the productive traits during most of the production periods, As all the addition treatments during the most stages of production. All additive treatments showed superiority significantly during the third productive period, When calculating the general average, treatments T2 and T5 were significantly superior to the control treatment in the percentage of egg production (Hen Day Production%). Also T5 showed superiority in the average egg weight during the second and third periods, and in the general average. T5 and T4 showed an increase in the egg mass produced during the second period and three period and with general average. The results showed that there were a significant differences between the different treatments in the rates of feed consumption during all stages of production. Also the additive treatment T5 showed the best feed conversion ratio during the second and third production period and in the general average.

Keywords: Lecithin, Productive Performance, Laying Hens.**تأثير اضافة الليسيثين الى العليقة في الاداء الانتاجي للدجاج البياض****الخلاصة**

اجريت هذه الدراسة في حقل الطيور الداجنة التابع لقسم الانتاج الحيواني/ كلية الزراعة / جامعة الانبار, للمدة من 20 / 7 / 2021 لغاية 15 / 10 / 2021، بهدف دراسة تأثير اضافة الليسيثين الى العليقة في الاداء الانتاجي في الدجاج البياض. تم استخدام 60 دجاجة بياضة في هذه التجربة سلالة لوهمان بني اللون (Lohman Brown) بعمر 43 اسبوع وتم توزيعها بصورة عشوائية على خمسة معاملات وبأربعة مكررات للمعاملة الواحدة (3 دجاجة / مكرر) وغذيت الطيور بخمسة انواع من العلائق والتي مثلت المعاملات التجريبية على النحو الآتي : T1 (معاملة السيطرة) ، T2 ، T3 ، T4 ، T5 بإضافة 0.25 ، 0.50 ، 0.75 و 1.0 % بالتتابع لسيثين إلى عليقة السيطرة. اظهرت النتائج تفوق معاملات الاضافة في الصفات الانتاجية خلال معظم المدد الانتاجية، اذ تفوقت جميع معاملات الاضافة خلال المدة الانتاجية الثالثة اما عند حساب المعدل العام فقد تفوقت المعاملتان T2 و T5 معنوياً على معاملة السيطرة في نسبة انتاج البيض (Hen Day Production %). وتفوقت معاملة الاضافة T5 في معدل وزن البيضة خلال المديتين الثانية والثالثة وفي المعدل العام، وتفوقت المعاملتان T4 و T5 في كتلة البيض المنتج خلال المديتين الثانية والثالثة وفي المعدل العام. كما اظهرت النتائج وجود فروق معنوية بين المعاملات المختلفة في معدلات استهلاك العلف وخلال جميع المراحل الانتاجية، كما سجلت معاملة الاضافة T5 افضل معامل تحويل غذائي خلال المدة الانتاجية الثانية والثالثة وفي المعدل العام.

Introduction

The productive period of most modern breeds of laying hens may reach 95 weeks, and some of them reach 100 weeks, with an average production of 500 eggs per hen (1). It has been expected in increasing world population about 25% for the coming decades and finally there were a new challenge to increases food production by a 60%. Eggs considered as a good food. It contains of 16% protein of high-quality and also contains all the essential amino acids that cannot synthesized in human body such as methionine and lysine, 11% lipids, 58% water and 11% salt (2). Usually the uses of Animal fats and vegetable oils as a factors increasing concentration of energy in feed of the poultry (3), however the ability to digest and absorb dietary fats food was limited in small birds and this can be overcome through addition of emulsifiers to the feed that increase lipid active surface which improve the activity of lipase enzyme and assist in the formation of micelles, one of these emulsifiers are the lecithin which improve the mucus membrane lined the small intestine that leads to ease digestion and protect the mucus membrane of digestive system it has been explained by several studies the possibility of addition of lecithin to the feed as a substitute of lipids in the feed without damage in the productive performance or the ability of absorption of fatty acids (4). The addition of lecithin to the diets of laying hens improve digestion and absorption of nutritional elements and also the lecithin considered is a good alternative source of substitute of energy and choline, which improved production and physiological performance for laying hens. It has been pointed by several authors (5)(6)(7) that addition of lecithin to the laying hens' diet increased egg weight and egg mass and this increase could be attributed to an increase in the weight of egg albumin. Therefore, the study aimed to show the effect of adding lecithin to the diet on the productive performance of laying

hens.

Materials and Methods

This study was conducted in the poultry farm/Department of Animal Production/College of Agriculture/University of Anbar during the period from 20 /7/2021 to 15/10/2021, in order to study the effect of adding lecithin to the diet on the productive performance for laying hens. 60 laying hens were used in this experiment of Lohmann Brown breed, aged 43 weeks. The laying hens were distributed randomly in five treatments with four replicates per treatment (3 laying hens/duplicate). The treatments of the experiment were include, T1 / basic ration without any addition, T2 / adding 0.25% lecithin to the basic diet, T3 / adding 0.50% lecithin to the basic diet, T4 / adding 0.75% lecithin to the basic diet, T5 / adding 1.0% lecithin to the basic diet. The birds were feed according to the rations explained in Table (1). The rations was provided in fixed amounts for all cages. While water was given *ad libitum* according to the system of nipples waterier and the lighting period was calculated to be 15.5 hours per day. The

percentage of egg production were calculated according to H.D %. The average weight of eggs and the feed consumed, eggs mass produced and the feed conversion ratio, gm of feed / gm of eggs according to the equation mentioned by (Rose, 1997). The data were statistically analyzed using the statistical program of (8) to study the effect of different treatments in the studied traits under study according to the complete randomized design (CRD) and compare the significant differences between means with Duncan polynomial test (9).

Results and Discussion

Table (2) showed a highly significant difference ($P < 0.01$) in the percentage of egg production in the third production period (51-54 weeks) for the additive treatments T2, T3, T4 and T5 as compared with the control treatment. It was observed while calculate the general average for

the three periods of egg production the superiority of T2 and T5 significantly ($P < 0.05$) on the control groups. The Lecithin is a type of phospholipids, as the significant improvement in egg production with the used of lecithin might be due to the important role of lecithin as an emulsifier improves the process of digestion and absorption of lipids that improves the health condition of laying hen and acts as a natural antioxidant(10)(11). The results of the current study agreement with(12)(13) who obtained a significant ($P < 0.05$) increase in H.D% egg production rates when adding lecithin to laying hens' diets. While on the other hand the results of previous researchers showed disagreement with our study (6) (14) , who observed there was no significant difference in the percentage of egg production in laying hens after addition of lecithin to the diet.

Table (2) .Effect of adding lecithin to Laying Hens Diets on Egg production%

Treatment	43-46 week Period 1	47-50 week Period 2	51-54 week Period 3	Accumulati ve 43-54week
T1 Control	81.5±2.03 A	87.50±2.94	85.42±2.3 B	84.82±1.10 B
T2 Lecithin 0.25%	80.65±0.5 AB	89.88±0.77	93.75±1.6 A	88.10±0.84 A
T3 Lecithin 0.50%	77.38±0.9 B	87.20±1.4	94.94±0.8 A	86.51±0.83 AB
T4 Lecithin 0.75%	77.98±1.2 AB	89.58±1.3	95.24±1.61 A	87.60±1.32 AB
T5 Lecithin 1.0%	80.36±0.7 AB	88.99±0.5	97.92±0.3 A	89.09±0.34 A
	*	NS	**	*

*The different letters within the same columns are significant differences at ($P < 0.05$).

**The different letters within the same columns are significant differences at ($P < 0.01$).

NS = Non-Significant.

Table (3) showed the effect of addition of lecithin to the laying hens' diet on the average of egg weight. There was a highly significant difference ($P < 0.01$) in the average egg weight for the T5 during the third productive period (51-54 weeks) and the general average for the three periods as compared with other treatments when it measured the highest values (65.45gm). Some of the studies hypothesized that increase in the lipids level in laying hens' diets may increase eggs weight, several studies have been conducted to proof this hypothesis and they found that an increase in egg weight results from increase in egg yolk weight and egg albumin in laying hens with an age of 30 weeks. While an increase in egg weight when laying hens age, it may be attributed to the increase in egg weight with laying hens aging might be due to increase of weight of egg albumin that belonged to the role of lipids in stimulate proteins of oviduct synthesis through estrogen hormone that play a role in egg weight (15). Also a good content of lecithin from linoleic acid that increases eggs weight produced, it has been observed by (16) that an increase in egg weight production after addition of linoleic acid to the laying hens diet. The results were agreed with (12) when they found that addition of lecithin in 3% to laying hens' diets leads to significant increase in the average egg weight in laying hens from an age of 47-70 weeks. The results also agreed with (5) who reported the addition of 40 mg/kg of ration from lecithin leads to an increase in egg weight in laying hens and this increase in egg weight might be due to the addition of lecithin in a percent of 40 mg / kg of ration increase the percent of linoleic acid from 14.3 to 28.7 gm / kg that increase the egg weight production. The results also agreed with study of (14) when they found that addition of 2% of lecithin to the laying hens' diets leads to a significant increase in the average egg weight. While the results were disagreed with (13) who reported non-significant effect of addition of lecithin in a percent of 0.25, 0.50, 0.75 and 1.0 % to the laying hens diet in the average egg weight.

The results also disagreed with observation of (6) when addition of 0.05 and 0.1% of lecithin to the laying hens diet with an age of 42 – 49 week that leads to non-significant difference in egg weight production.

Table (3) .Effect of adding lecithin to laying hens diets on average egg weight (gm)

Treatment	43-46 week Period 1	47-50 week Period 2	51-54 week Period 3	Accumulative 43-54week
T1 Control	58.01±07 B	56.65±1.1 B	59.16±0.6 C	57.94±0.8 C
T2 Lecithin 0.25%	59.55±06 AB	59.05±0.6 A	59.89±0.3 C	59.50±0.38 B
T3 Lecithin 0.50%	59.20±0.9 AB	60.11±0.2 A	61.09±0.9 B	60.13±0.15 B
T4 Lecithin 0.75%	60.10±08 A	60.41±0.2A	61.70±0.2 B	60.74±0.19 AB
T5 Lecithin 1.0%	59.34±02 AB	60.65±0.06 A	65.45±0.2 A	61.81±0.09 A
	*	**	**	**

*The different letters within the same columns are significant differences at (P<0.05).

**The different letters within the same columns are significant differences at (P<0.01)

The results in Table (4) showed a highly significant difference (P<0.01) in egg mass for T5 in the third productive period of production (51-54 weeks) and the general average for the three periods. The results of current study were agreed with (5) who proved significant increase in the egg mass when addition lecithin to the laying hens' diets when the mass of egg reached 58.8g as compared with control treatment. The results agreed with (13) who found significant increase (P<0.01) in egg mass produced from Hay-Line Brown hens that feed on 0.75% of lecithin. While the results of our study disagreed with (14) who pointed that addition of lecithin to laying hens diets (Novogen Brown breed) in a rate of 2, 4, 6, 8% have no significant effect on egg mass. The

results also disagreement with (6) who found no significant effects in egg mass produced from addition of 0.05 and 0.1% of lecithin to the laying hens diets raised at the age of (42-49) weeks.

Table (4) .Effect of adding lecithin to laying hens diets on average egg mass

Treatment	43-46 week Period 1	47-50 week Period 2	51-54 week Period 3	Accumulative 43-54week
T1 Control	47.34±1.7	49.49±1.1 B	50.49±0.98 D	49.13±0.51 C
T2 Lecithin 0.25%	48.04±0.2	53.09±0.9 A	56.14±0.98 C	52.42±0.81 B
T3 Lecithin 0.50%	45.81±0.1	52.41±0.7 A	58.00±0.56 BC	52.02±0.51 B
T4 Lecithin 0.75%	46.87±1.2	54.11±0.6 A	58.75±0.90 B	53.21±0.82 B
T5 Lecithin 1.0%	47.69±0.3	53.97±0.3 A	64.08±0.45 A	55.07±0.15 A
	N.S	*	**	**

*The different letters within the same columns are significant differences at (P<0.05).

**The different letters within the same columns are significant differences at (P<0.01).

NS = Non-Significant.

The results of the statistical analysis of Table (5) presence of significant differences between experimental treatments in the feed consumption. It has been observed when general average of three periods calculated the presence of high significant (P<0.01) differences in feed consumption for T4 (addition of 0.75% lecithin). Nagargoje (17) pointed that an increase in feed consumption by the birds to the role of lecithin in improvement of palatability of feed that leads to increase feed consumption by the birds. Also it is role to facilitate the process of digestion and absorption. The results of current study agreed with(6) who showed that addition of lecithin to

laying hens diets leads to significant increase ($P < 0.05$) in daily feed consumption, while (18) found a significant decrease ($P < 0.05$) in feed consumption when addition of lecithin to the rabbit diets. While the results disagreed with (5), (12) where showed no significant effect of addition lecithin to the laying hens' diets on feed consumption.

The results in Table (6) showed a significant differences between experiment treatments in the feed conversion ratio. Treatment T5 showed a highly significant superiority ($P < 0.01$) in the third period of production and a general average for three periods. While the lower significant values in the feed conversion ratio from all treatment was in T1 (control groups). The laying hens used lecithin for eggs production more efficiently than non-polar lipids of animal fat that leads to improve feed conversion ratio and increase egg weight, in addition to that, lecithin contained 21 gm / kg inositol that play an important roles in the metabolism in liver and in the reproductive organs of poultry (19). (20) Pointed that the addition of 1 gm of inositol /kg to the laying hens' diets increased the ratio of egg production and egg weight at an age of 18 to 28 weeks with a decrease feed conversion ratio. The results of current study agreed with (6) who pointed that addition of 0.05 and 0.1 % of lecithin to the laying hens diets leads to a significant

Table (5) .Effect of adding lecithin to laying hens diets on feed consumption

Treatment	43-46 week Period 1	47-50 week Period 2	51-54 week Period 3	Accumulative 43-54week
T1 Control	2740.8±39.1 B	2959.0±19.8 ABC	3034.6±7.9 B	8734.5±48.9 B
T2 Lecithin 0.25%	2788.6±33.9 AB	2973.5±9.8 AB	3043.83±9.8 B	8806.0±51.9 AB
T3 Lecithin 0.50%	2749.3±6.8 B	2915.4±21.2 C	3061.9±2.8 A	8726.6±21.4 B
T4 Lecithin 0.75%	2864.0±12.6 A	2983.6±15.2 A	3068.0±0.8 A	8915.7±5.1 A
T5 Lecithin 1.0%	2818.0±20.2 AB	2921.1±15.6 BC	3066.4±2.6 A	8805.5±27.7 AB
	*	*	*	**

*The different letters within the same columns are significant differences at ($P < 0.05$).

**The different letters within the same columns are significant differences at ($P < 0.01$).

decrease in feed conversion ratio, this might be due to the role of lecithin as a source of Antioxidant, (21) reported a significant decrease ($P < 0.05$) in feed conversion ratio in broiler chicken when lecithin added to the diet. The results also agreed with (22) who observed significant decrease in the feed conversion ratio when feed a turkeys on a diets with low energy adding to it 2 gm lecithin for kg / feed. The results disagreed with (14), (13) who observed that addition of lecithin to the laying hens diets have no significant effect on feed conversion ratio.

Table 6 .Effect of adding lecithin to laying hens diets on feed conversion ratio

Treatment	43-46 week Period 1	47-50 week Period 2	51-54 week Period 3	Accumulative 43-54week
T1 Control	2.07±0.06	2.14±0.06 A	2.15±0.04 A	2.12±0.03 A
T2 Lecithin 0.25%	2.07±0.03	2.00±0.04 B	1.94±0.03 B	2.00±0.03 B
T3 Lecithin 0.50%	2.14±0.03	1.99±0.04 B	1.89±0.02 B	2.00±0.02 B
T4 Lecithin 0.75%	2.19±0.05	1.97±0.03 B	1.87±0.03 B	2.00±0.03 B
T5 Lecithin 1.0%	2.11±0.03	1.93±0.01 B	1.71±0.01 C	1.90±0.01 C
	NS	**	**	**

**The different letters within the same columns are significant differences at (P<0.01).

NS = Non-Significant

Conclusions

It was concluded from this study that addition of lecithin to the laying hens diets of a ratio of 1.0 % is enough to increase egg production , egg mass , average egg weight and decrease feed conversion ratio (gm feed / gm egg)

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