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Comparison of the Effect of Adding Methionine, Synthetic and Herbal Lysine, And L-Carnitine in the Diet on the Physiological and Histological Characteristics of Laying Hens(ISA Brown)

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Abstract

This experiment was conducted in the poultry field affiliated to the Department of Animal Production / College of Agriculture / University of Kirkuk, from the period 5/2/2020 until 4/29/2020 (for a period of 12 weeks), and fed for an introductory period of two weeks with experimental treatments in order to accustom the birds to the diets Experience. The aim of the study is to compare the effect of adding methionine, industrial and herbal lysine, and L-carnitine in the diet on some of the physiological and histological characteristics of laying hens. In the experiment, 200 laying hens of (Brown ISA) strain were used at the age of 40 weeks. and the birds were distributed among ten Treatments randomly by five replicates for each treatment and one replicator included four chickens, and the (experimental) nutritional treatments were ,T1: basal diet supplemented with synthetic methionine and synthetic lysine to complete the nutritional requirements, T2: basal diet supplemented with Herbal methionine and Herbal lysine to complete the nutritional requirements, T3: basal diet supplemented with 15% above nutritional requirements from synthetic methionine and synthetic lysine, T4: basal diet supplemented with 15% above nutritional requirements from Herbal methionine and Herbal lysine, T5: T1diet supplemented with 750 mg of L-carnitine per kilogram me of diet, T6: T2diet supplemented with 750 mg of L-carnitine per kilogram me of diet, T7: T1diet supplemented 1gm of L-carnitine per kilogram me of diet, T8: T2diet supplemented 1gm of L-carnitine per kilogram me of diet, T9: T1diet supplemented 1.25gm of L-carnitine per kilogram me of diet, T10: T2diet supplemented 1.25gm of L-carnitine per kilogram me of diet. The water and feed ad libitum were available for the birds, The management conditions with as ISA Brown guide. The statistical analysis results obtained: The biochemical characteristics of serum, which included (uric acid, glucose, cholesterol, total protein, high-density lipoprotein (HDL), low-density lipoprotein (LDL)) and enzymes (AST), aspartate aminotransferase (ALT), alanine aminotransferase, creatine kinase (ALT) (CK) creatine kinase, the antioxidant glutathione (GSH) Glutathione), there were no significant differences between the rates of all treated birds' blood serum for biochemical characteristics. In addition, there was an increase in the rate of villi height and cache depth of the intestines of fourth treatment birds significantly ($P \leq 0.05$) relative to villi in the intestines of first, third, fifth, seventh and ninth treatment birds.

Keywords: L-carnitine, herbal methionine, herbal lysine

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INTRODUCTION

The amino acid methionine and lysine are two specific basic acids, the first and second, respectively, in feeding poultry due to their vital important role in the growth and production of poultry on the one hand, and most of the plant-source feed materials included in the composition of balanced feeds as energy sources such as grains or sources of plant protein such as plant gain are lacking One or more essential amino acids (Si et al. 2001, Abd El-Wahab et al., 2015). Synthetic methionine has been added to feeds to meet the birds' needs for growth and production since the 1950s (Bzinni, 2018). However, the leading countries, including America and European countries, in the field of animal production, especially the production of meat and eggs, have tended to emphasize what is known as poultry organic production of (USDA, 2012, Donoghue and others, 2015). Industrial sources refer to natural sources, i.e. plant origin, including the two basic amino acids methionine and lysine (Kanduri et al., 2013, Kanagaraju and Rathnapraba, 2019). Whereas, industrial methionine is prepared from compounds produced from petroleum refining (Aldrich, 2007). With the accumulation of the compound (propionate methylthio), which has toxic effects to birds and results from industrial methionine metabolism (Al-Hashemi, 2020), knowing that methionine and synthetic lysine are part of it directed to produce the compound L-Carnitine important in fatty acid and cholesterol metabolism (Arslan, 2006). Through the use of the synthetic source compound L-Carnitine and the substitution of the synthetic acids source with methionine and lysine from the source herbs and the effect of this on the productive performance of table egg chickens and their ability to reduce body fat. This study aimed to determine the efficiency of methionine and herbal lysine for the manufacture of L-Carnitine in the liver of birds. Poultry with the addition of the synthetic compound L-Carnitine in the feeding of laying hens on some physical and histological characteristics of the small intestine.

MATERIALS AND METHODS

200 "ISA Brown" laying hens were used at the age of (36) weeks and were fed on the basic ration shown in Table (1) as they were fed with feed for experimental transactions for a period of two weeks as a preliminary period until the start of data recording. The birds were distributed randomly into 10 experimental treatments with a rate of 5 replicates / treatment, and each repeater contained four hens in battery cages consisting of four floors and each floor consisted of two cages and the dimensions of one cage were (60 x 50 x 45) cm, and the birds were raised in a semi-closed room with Dimensions (50 x 6 x 3) m length, width and height respectively. Each cage contained two chickens, at a rate of 20 chickens for each treatment, as each floor was counted as a repeat. The hall was equipped with an electronic timer in order to obtain 17 hours of lighting and (7) hours of darkness during the day and according to the ISA Brown guide for the year 2010, feeding was free and water was available in front of the hens throughout the days of the experiment that lasted for a period of 90 days divided into 6 experimental periods and each The period was 15 days. At the end of the experiment, 30 chickens were slaughtered, including 3 chickens for each treatment, to measure the chemical characteristics of blood, Completely Randomized Design-CRD was used to study the effect of the studied parameters on the different traits. The Statistical Analysis System-SAS (2001) was used in statistical analysis, and the significant differences between the averages were

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compared with the Duncan polynomial test (Duncan, 1955).

Table 1 composition of experimental diet

Material %	T1	T2
corn	29.83	29.83
wheat	28.00	28.00
Barley	7.49	7.49
Soybean meal (48% CP)	19.25	19.25
oil	3.50	3.50
limestone	9.26	9.26
salt	0.20	0.20
Vitamins premix*	0.10	0.10
Dicalcium Phosphate	2.20	2.20
DL-Methionine	0.142	----
Herbal Methionine	-----	0.142
L- Lysine	0.03	----
Herbal Lysine	-----	0.03
Total %	100	100
Chemical composition		
ME, kcal/kg	2803	2803
Crude protein, %	16.18	16.18
Methionine%	0.43	0.43
Lysine%	0.86	0.86
Calcium%	4.00	4.00
Available phosphorus%	0.36	0.36

*Supplied the following (per kg complete diet): vitamin A, 12,500 IU; vitamin D3, 2,500 IU; vitamin E, 30 IU; vitamin K3, 2.65 mg; thiamine, 2 mg; riboflavin, 6 mg; vitamin B12, 0.025 mg; biotin, 0.0325 mg; folic acid, 1.25 mg; pantothenic acid, 12 mg; niacin, 50 mg.

RESULTS

Table (2) shows the results of a comparison of the effect of adding methionine, synthetic and herbal lysine, and L.carnitine in the diet on a number of biochemical characteristics of white chicken serum (ISA Brown). We note from the table that there are no significant differences between all experimental treatments in the level of uric lion serum. the blood . The experimental treatments recorded the following values (9.36, 9.27, 9.25, 9.38, 9.39,9.28,9.27, 9.32, 9.38,9.33) mg / 100 ml serum, respectively. As for the level of glucose in the blood serum, the results of the same table indicate that there are no significant differences between the trial treatments, and the following values were recorded (216.57,217.08,215.05,219.18, 217.99, 214.30,215.79,218.37,216.99,216.25) mg / 100 ml serum Straight. The results shown in this table also showed the level of serum cholesterol to no significant differences between the trial treatments, and the following values were recorded (144.16,138.33,134.58, 135.41, 131.25,137.91,122.50,137.50,143.50, 127.50) mg / 100 ml serum Blood straight. And the

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results from the same table indicated that there were no significant differences between the experimental treatments with the percentage of total protein in the blood serum, and the following values were recorded (3.87, 3.72,4.08,3.79, 3.95,3.77,3.89,4.07,3.92,4.05) g / 100 ml serum Blood straight. As for the level of high-density lipoproteins (HDL) in blood serum, the same table showed that there were no significant differences between the experimental treatments, and the factors recorded the following values (41.09, 51.86, 52.33, 52.00, 52.75,52.47,50.67, 51.76,51.94,51.56.) Mg / 100 mL serum, respectively. The same table also shows that there were no significant differences in the level of low-density lipoproteins (LDL) in blood serum among all the treatments, and the following values were recorded (45.75, 38.14, 45.39, 36.30, 41.95,45.51,43.38,43.00,45.06, 35.21) Mg / 100 mL serum respectively.

Table 2; Comparison of the effect of addition of methionine, synthetic and herbal lysine, and L.carnitine in laying hens (ISA Brown) on some biochemical characteristics of blood serum (mean ± standard error)

Treatments	LDL	HDL	Total protein	Cholesterol	Glucose	Uric acid
T1	45.75±9.78	41.09±8.44	3.87±0.24	144.16±9.27	216.57±11.94	9.36±0.58
T2	38.14±7.14	51.86±6.72	3.72±0.29	138.33±8.09	217.08±12.61	9.27±0.23
T3	45.39±4.98	52.33±6.10	4.08±0.53	134.58±8.23	215.05±12.08	9.25±1.11
T4	36.30±4.85	52.00±4.48	3.79±0.18	135.41±9.72	219.18±7.88	9.38±0.33
T5	41.95±2.74	52.75±2.74	3.95±0.41	131.25±9.48	217.99±11.01	9.39±1.46
T6	45.51±5.37	52.47±7.15	3.77±0.39	137.91±7.35	214.30±8.68	9.28±0.14
T7	43.38±3.15	50.67±3.91	3.89±0.33	122.50±3.30	215.79±0.48	9.27±0.39
T8	43.00±6.60	51.76±5.52	4.07±0.49	137.50±10.37	218.37±7.86	9.32±0.73
T9	45.06±8.14	51.94±3.66	3.92±0.58	143.50±0.52	216.99±0.68	9.38±0.99
T10	35.21±5.42	51.56±3.42	4.05±0.47	127.50±5.90	216.25±3.55	9.33±0.73

*The No letters in the column means no a significant difference between the transaction rates on the probability level 5%

The results of the statistical analysis in Table (3) showed a comparison of the effect of adding methionine, industrial and herbal source lysine, and L.carnitine in the diet on the level of serum enzyme (AST) for laying hens (ISA Brown), to the absence of significant differences between the serum of birds of the experiment treatments. , Which amounted to (129.71,

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126.80, 126.22, 124.47, 128.54, 126.80, 125.05, 126.22,126.80 and 125.05) IU / liter serum, respectively. The same table also shows that there were no significant differences between the experimental parameters in the level of serum enzyme (ALT), and the following values were recorded (15.73, 15.25, 15.72, 15.30, 15.39,15.68,15.40,15.46,15.63,15.35) IU / liter serum Blood straight. The results shown in the same table indicated that there were no significant differences between the experimental parameters of creatine kinase (CK), and the following values were recorded (1047.33, 1032.33, 1025.33, 1028.33, 1027.33,1029.00,1046.67, 1035.33, 1045.33, 1032.33) units. International / liter straight serum. As for glutathione (GSH) antioxidant, no significant differences were observed between the experiment treatments, and the following values were recorded (0.75, 0.74, 0.73,0.74,0.74,0.73,0.74,0.74,0.74,0.73) micro mol / liter serum on Straight.

Table 3; Comparison of the effect of addition of methionine, synthetic and herbal source lysine, and L.carnitine in laying hens (ISA Brown) on serum enzymes AST, ALT, CK and GSH (mean ± standard error)

Treatments	GSH	CK	ALT	AST
T1	0.75±0.37	1047.33±81.25	15.73±2.15	129.71±25.21
T2	0.74±0.40	1032.33±73.16	15.25±2.79	126.80±19.80
T3	0.73±0.38	1025.33±84.88	15.72±1.47	126.22±25.96
T4	0.74±0.39	1028.33±67.09	15.30±2.73	124.47±12.14
T5	0.74±0.37	1027.33±60.38	15.39±2.71	128.54±25.41
T6	0.73±0.39	1029.00±70.50	15.68±2.86	126.80±26.82
T7	0.74±0.38	1046.67±86.66	15.40±1.48	125.05±16.37
T8	0.74±0.40	1035.33±58.76	15.46±4.36	126.22±20.56
T9	0.74±0.40	1045.33±14.16	15.63±2.08	126.80±26.77
T10	0.73±0.40	1032.33±78.84	15.35±3.25	125.05±13.77

*The No letters in the column means no a significant difference between the transaction rates on the probability level 5%

Table (4) indicates the results of comparing the effect of adding methionine, synthetic and herbal lysine, and L-carnitine in the diet on the height of the villi length in the small intestine of the laying hens, as the absorption efficiency of the nutrients is affected by several factors, the most important of which are the length of the villi and the depth of the crypts , As it led to the substitution of methionine and synthetic lysine to the herbal source with an increase in addition to the barrier, an additional amount of 15% of the requirements of the herbal lysine and methionine, which led to a significant increase in villi length ($P \leq 0.05$) for the small intestine of fourth treatment birds relative to birds of villi length For the small intestine in the jejunum region for the first, third, fifth, seventh and ninth treatments by (14, 22.8, 14.9, 14.3 and 17.8%), as well as the significant increase ($P \leq 0.05$) for the length of the crypts in the small intestine of the fourth treatment birds in proportion to the first treatment birds , Third, fifth, seventh and ninth by (10.2, 14.1, 11.7, 12.1 and 13.3%), respectively.

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Table 4; Comparison of the effect of addition of methionine, synthetic and herbal source lysine, and L.carnitine in leeches (ISA Brown) on the rate of villi height and Crypts -depth (μm) in the small intestine (jejunum) (mean ± standard error)

Treatments	Villi Height	Crypts
T1	678.33±19.22 bc	98.00±3.46 bc
T2	726.66±20.27 abc	102.00±1.15 abc
T3	630.00±22.91 c	94.66±4.37 c
T4	773.33±37.67 a	108.00±1.15 a
T5	673.33±6.00 bc	96.66±2.90 bc
T6	730.00±15.27 abc	103.33±1.76 abc
T7	676.66±22.38 bc	96.33±1.20 bc
T8	708.33±27.67 abc	102.66±1.76 abc
T9	656.66±13.64 c	95.33±2.90 c
T10	760.00±13.22 ab	104.66±2.02 ab

*The different letters within the same column indicate a significant difference between the transaction rates on the probability level 5%.

DISCUSSION

The moral superiority demonstrated by the fourth treatment may be due to the improvement in the internal environment of the intestines of birds who took herbal methionine, which led to an increased utilization of nutrients (Al-Hashemi, 2020) or perhaps the reason for the use of herbal lysine and its effect on the treatment of peptic ulcers and gastroenteritis, It absorbs toxic substances and excretes them with the waste out of the body (Kor et al., 2013).

CONCLUSION

In conclusion, Herbal methionine and herbal lysine can fulfill the same roles as synthetic methionine and synthetic lysine. In addition, they can improve the internal environment of poultry and thus improve nutrient absorption and thus increase production.

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