USE OF ACETIC ACID AND LACTIC ACID AS GROWTH PROMOTERS AND ITS EFFECT ON PRODUCTIVE AND PHYSIOLOGICAL PERFOMANCE IN DIFFERENT STRAIN OF QUAIL

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ABSTRACT

This study was conducted to evaluate the responses of quail strains to acetic acid and lactic acid supplementation on some productive and physiological parameters . 126 quail (1 day old) divided 63 birds from brown strain and 63 bird from black strain were used in the study. The bird were divided into 3 groups 42 birds /group, 3 replicates 14 birds/replicate), The 1st group (control) was reared on standard ration , the 2nd group was reared on standard ration supplemented with 2.5 mg acetic acid / kg ratio and the 3rd group was reared on standard ration supplemented with 2.5 mg lactic acid / kg ratio . the treatment continued for 6 weeks. The results showed that T2 and T3 ($P<0.05$) were superior to the T1 in live body weight at the age of 1 week and 5 weeks, the weight gain and feed consumption were improved from the T2 food conversion factor and T3. The results showed in the weight of the carcass at age 6 weeks in favor of T2 and T3 superior to T1, as well as weights of the back, thigh and chest. The dressing percentage has exceeded T2 and T1 compared with T3 ($P<0.05$), which gave a lower percentage of them and gave the brown strain higher percentage of the black strain and the addition of organic acids improved the weight of the parts of liver and gizzard compared with T1. The blood parameters were significantly higher for $P<0.05$ in RBC(Red blood), PCV(Packed cell volume), HB(Hemoglobin) and MCH(Mean corpuscular Hemoglobin) for the first treatment, while T1 and T2 were higher than T3 in MCV(Mean corpuscular volume) and MCH and the black strains scored higher than brown in RBC, PCV, HB and MHC. ($P<0.05$) T1 and T2 on T3 in serum blood glucose and triglycerides.

Keywords: ORCANG ACID, QUAIL, PRODUCTIVE AND PHYEIOLOGY.

استخدام حامض الخليك وحامض اللاكتيك كمنشطات نمو واثرها على الاداء الانتاجي والفسلجي في مجاميع مظهرية مختلفة من طائر السمان

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الخلاصة

اجريت هذه الدراسة لمعرفة مدى استجابة هجن السمان لإضافات الاحماض العضوية الخليك واللاكتيك وتاثيرها في بعض الصفات الانتاجية والصفات الفسلجية، استخدم 126 طائر سمان بعمر يوم واحد بواقع 63 طائر من السلالة البنية و63 من السلالة السوداء قسمت الى ثلاثة مجاميع 42 طائر لكل مجموعة و3 مكررات 14 / مكرر, المعاملة الاولى معاملة السيطرة T1 دون اضافة والمعاملة الثانية T2 اضافة 2,5ملغم حامض الخليك/كغم علف وT3 اضافة 2,5ملغم حامض اللاكتيك /كغم علف . اظهرت النتائج تفوق معاملة ,T2 وT3 ($P<0.05$)على T1 في وزن الجسم الحي عند عمر اسبوع و 5 اسابيع والزيادة الوزنية واستهلاك العلف وحسنت من معامل التحويل الغذائي لصالح T2 و T3 ولم يلاحظ اي اختلافات معنوية لهجن السمان للصفات الانتاجية عند عمر 5 اسابيع فقط سجل الهجين الاسود استهلاك علف اكثر من البني ولوحظ تحسن معنوي ($P<0.05$) في وزن الذبيحة عند عمر 6 اسابيع لصالح T2 وT3 متفوقة على T1 وكذلك اوزان الظهر والفخذ والصدر ولم تظهر اي فروقات معنوية بين الهجين البني والاسود لهذه الصفات، اما نسبة التصافي فقد تفوقت T2 و T1 على T3 ($P<0.05$) التي اعطت نسبة تصافي اقل منهما واعطى هجين البني نسبة تصافي اعلى من الهجين الاسود وان اضافة الاحماض العضوية حسنت من وزن الاجزاء الماكولة الكبد والقانصة مقارنة مع معاملة السيطرة . اما صفات الدم كان لاضافة الاحماض تاثيرا معنويا ($P<0.05$) في خلايا الدم الحمر RBC

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وPCVخلايا الدم المرصوصة وHBهيموغلوبين الدم و معدل هيموغلوبين الدمMCH للمعاملة الاولى بينما اعطت T1 وT2 نسبة اعلى من T3 في MCV وMCH وسجل الهجين الاسود نسبة اعلى من البني في RBC وPCV وHB و MHC بينما اعطى الهجين البني قيمة اعلى من الاسود في MCH و MCHC ، وسجلت صفات الدم الكيموحيوية تفوق (P<0.05) T1 وT2 على T3 في نسبة كلوكوز الدم والكلسيريدات الثلاثية ولم يظهر اي فروقات معنوية بين الهجينين الاسود والبني لصفات الدم الكيموحيوية.

كلمات مفتاحية : احماض عضوية ، السمان ، انتاجية وفسلجية.

INTRODUCTION

Recently, non-antibiotic alternatives have been proposed as stimulants for growth and have been used to feed poultry because of concerns about their effects on human and animal safety at the same time. These are the alternatives, such as Propagate, Propecia, Grass Products and Organic Acids **Islam (9).** Organic acids are the best alternative to growth catalysts due to the effect of these acids on harmful bacteria. When these acids are added to poultry diets, they reduce the pH of these diets and thus reduce the pH Which in turn prevents or stops the growth of harmful bacteria **Anonymous(4).** Organic acids have enhanced protein and digestible energy by reducing microbial competition with nutrient host, self-nitrogen loss, ammonia production, Other microbes that inhibit metabolism **Islam (8).** And that the residues of antibiotics in animal products such as meat and eggs consumed by the consumer lead to negative effects on human health and safety, as well as most of the antibiotics working to kill bacteria, both satisfactory and beneficial, where he **kemin (12)** that the presence of antifungal and yeast Minimize the amount of microflora in the intestines that compete with pathogenic bacteria and thus act to disrupt microbial environment in the intestines. And the emergence of some sensitive diseases for people who eat animal products that have been added to their diet **Jin(11)**. These reasons prompted specialists to seek alternative ways to use antibiotics, such as the use of bio stimulation, or the use of organic acids as growth stimulants and health promoters. Therefore, this study came to investigate the effect of adding some organic and lactic acids to quail diets in some of the production and physiological characteristics of the quail (brown and black).

MATERIALS AND METHODS

The study was conducted in the poultry fields of the Agriculture and Forestry college / Department of Animal Production of the University of Mosul for the period from 25/1/2018 until 1/3/2018 for 6 weeks, during which he studied the effect of adding different levels of organic acids (Lactic and acetic) And the physiology of the quail bird used 126 quail bired (1 day old) divided 63 bird from brown strain and 63 bird from black strain were used in the study. The bird were divided in to 3 groups (42 birds /group) 3 replicates 14 birds/replicate), The 1st group (control) was reared on standard ration , the 2nd group was reared on standard ration supplemented with 2.5 mg acetic acid / kg ratio and The 3rd group was reared on standard ration supplemented with 2.5 mg lactic acid / kg ratio and feed the birds on a ration **N.R.C (17),** table 1. All birds were placed in wooden cages (50 x 50 x 50 cm). The following traits have been studied: body weight (gm), food conversion efficiency (gm feed), dressing percentage and weight chest, back, thigh, and (gazzard , liver and hard) and number of red blood cells and blood cells Concentration of HP, MCV, hemoglobin,hemoglobin.concentration, glucose, triglycerides , total protein, albumin, globulin and globulin / albumin

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Table (1) The components of the ration used in the study.

Ingredients	Growth ration %	Productive ration %
Yellow corn	50	40
Wheat	—	21
Proteins Center	15	10
Soybean Meal	31	22
Sun flower oil	3	2
Calcium	0.9	4.5
Salt	0.1	0.5
Total	100	100
Protein Ratio	23.89	20.4
Calculated energy kcal / kg	2971	2843

Computed based on **N.R.C (17)**

The weight of the live body, the rate of the weight increase, the feed consumed and the food conversion coefficient were measured. At the end of the study, at the age of 42 days, a group of birds (12) were selected from each treatment and were sacrificed to calculate the dressing percentage, heart weight, liver weight, gizzard weigh , chest thigh, and back weight.

Blood samples : The blood, divided into two parts, was collected in a containing an EDTA=(ethylene diamine tetra acetic acid) and was used to study the blood image and include the total number of red blood cells **Campbell(5).** Concentration Hemoglobin, size of cerebrospinal volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration **Jain(10),** second part of blood retention in tubes Free of anticoagulant and the serum was isolated from it and stored at (-20 ° C) to conduct the biochemical measurements.

The statistical analysis was carried out using the design of global experiments (3 × 2 × 3). The Duncans test was compared to all the characteristics studied in the study **SAS (19)** and according to the following mathematical model

Yijk = m + Ai + Bj + (AB) ij + eijk i = 1,2,3 .... (a)

j = 1,2,3 ... (b)

k = 1.2, 3 ... (r)

Yijk = value of observations in the experimental unit k i took level i of factor a (organic acids) and level j of factor b (breeds)

M = the general average.

Ai = the value of the level i effect of factor A (organic acids), where i (0, 2.5 acetic acid, 2.5 lactic acid %)

Bj = the value of the level j effect of factor B, where j represents the strain (black, white, gray).

(AB) ij = overlap or co-effect between level i of factor a and level j of factor b eijk = Random error value for experimental unit.

RESULTS AND DISCUSSION

The results in Table (2) showed significant differences ($p < 0.05$) between the three parameters of the body weight at the first week. The treatment was higher than T3 lactic acid and T2 treatment. Acetic acid was treated with control and recorded at week age 57.68 g and 53.31 g Compared with 50.09 g respectively. At the age of 5 weeks, T3 was recorded when adding lactic acid, the highest mean 243.80 g followed by the second treatment, acetic acid 230.65 g, compared with control treatment 190.33 g.

The consumption of feed for the second and the third was higher than the first treatment (T2 779.50gm, T3 832.92gm and T1 714.95gm). The reason is that the use of organic acids such as acetic and lactic reduces colonies bacterial disease and reduce metabolic toxins.and improve the digestion of protein and calcium and phosphorus and zinc so it is a good catalyst for growth and thus lead to weight gain. The acetic acid is considered as an appetizing substance, thus increasing the consumption of fodder and then

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increasing the weight . These results were consistent with those found **AL-Shididi (3),** noting that there were significant differences in body weight at age 5 weeks for the addition of acetic compared to the treatment of control, and agreed with what **Shellash(20).**

Table 2 effect of organic acid, strain and Interactions on productive performance from 1day to 5 week

Parameters / treatment	Initial weight 1 week age	Body weight 5th week (gm)	Body weight gain 5th week (gm)	Feed consumption 5th (gm)	Feed conversion ratio(g)feed/(g) w.gain
Effect Treatments	*	*	*	*	*
T1 control 0%	50.90± 2.52 b	190.33± 6.19 c	139.43±6.89 b	714.95±9.86 c	5.17±0.19a
T2acetic acid 2.5%	53.31 ± 2.07 a	230.65 ± 3.34 b	177.33±3.82 a	779.50±7.64 b	4.41±0.09b
T3lactic acid 2.5%	57.68 ± 1.93 a	243.80 ±2.08 a	186.12±1.001 a	832.92±10.05a	4.48±0.05b
Effect of strain	N.S	N.S	N.S	N.S	N.S
Brown	53.02 ±2.21	217.77 ±9.11	164.74±7.62	769.98±19.95	4.71±0.12
Black	54.91 ±1.68	225.42 ±8.07	170.01±8.29	781.59±16.80	4.65±0.19
Interactions	*	*	*	*	*
T1× brown	46.67 ±1.20 b	182.67± 0.88 b	136.00±0.58 b	698.00±7.00c	5.13±0.07ab
T2× brown	55.70 ±3.35 ab	228.63±3.32 a	172.93±5.83 a	731.90±12.25d	5.21±0.41a
T3× brown	56.00 ±3.95 a	242.00±4.04 a	186.00±0.55 a	787.83±10.30 Bc	4.56±0.12 bc
T1× black	55.13 ±3.35 ab	198.00±11.50 b	142.87±14.99 b	771.17±10.77c	4.25±0.07 c
T2× black	50.93 ±2.13 ab	232.67±6.39 a	181.73±4.42 a	824.13±20.09ab	4.45±0.10 c
T3× black	58.66 ±1.34 a	245.60±1.40 a	186.93±0.64 a	841.70±4.92 a	4.50±0.02 c

Values means ±S.E with different vertical letters indicate significant differences at the ($p<0.05$) .

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The addition of 6.2% of acetic acid to broiler chicken resulted in improved body weight, and **Frankenbach(6)** showed a significant improvement in body weight when adding 1, 2 and 3% of lactic acid to broiler chicken. As well as the increase in the weight and the amount of feed consumed. T2 and T3 acidity coefficients exceeded the control treatment. The weight gain was 177.33 and 186.12 compared with 139.43gm respectively and the consumption of feed T2 779.50 and T3 832.92 compared with T1 714.95 gm, **Khalied(13).** The results indicated that there was a significant increase in the rate of weight gain and the amount of feed consumed and a significant improvement in the food conversion coefficient in favor of the added 3% of acetic acid compared with the control treatment. Results **Liem(14)** agreed that adding 0.1 and 0.2% of citric and lactic acid to The meat breeder led to an increase in the

For the interaction between the coefficients and the strains, it was observed that there were significant differences (p <0.05) for the studied traits (Table 2), the interaction log between the third treatment, the brown strain, the third treatment, the black strains, the second treatment, the strain, the brown, the second treatment, the black strain, the weight of the body is higher at the age of 1 week and 5 weeks compared to the treatment

The ratio of consumption of the third treatment with the brown and the second treatment and the third with the black increased significantly on the rest of the transactions amounted to 787.83 and 824.13 and 841.70 g on the rest of the transactions respectively, due to the genetic makeup and the addition of acids, which improves digestion and increase appetite. While the first treatment and T2 of the brown strains was the highest (5.13and 5.21) followed by the first treatment of the black strains (4.25), then the third treatment of the black strains and the third treatment of the brown and the second of the black strains as well as the second of the brown (4.50, 4.56, 4.45) g / g respectively.

amount of feed consumed with control without adding(P <0.05) with the addition of acetic acid T2 4.41 g Feed / g increase in weight followed by lactic treatment T3 4.48 g Feed / g Increase in weight and recorded control treatment 5.17 g The results did not agree with the findings of **Abd EL-Hakim(1),** where they did not find significant differences in the efficiency of food conversion between the added treatments 3% Of citric acid and formic and between control treatment.

No significant differences were observed for the brown and Black strains for body weight, weight gain, and conversion efficiency. The differences were simple for the studied traits. As for the consumption of fodder, there were significant differences between the brown and the black record of the strains black consumption of higher feed 59.781 g of the brown strain 769.98 grams of feed due to the different strain and their performance. The first of the black and brown strains reached 56,00, 58.66, 55.70 and 50.93 compared to 55.13 and 46.67, respectively, at the age of one week and 245.75, 242.00, 232.67 and 228.63 compared to 198, 00 and 182.67, respectively, at the age of 5 weeks. As well as in terms of the increase in weight, where the above transactions exceeded the control transaction.

Table (3) indicates that there are significant differences in the percentage of the dressing percentsge where the second treatment recorded the highest percentage of 64.48% followed by the first treatment without adding 63.84% and the third treatment amounted to 62.39%. The results agreed. with **Livingston(15)** indicating that there was a significant increase in the dressing a diet containing 3% citric acid and fumaric compared with the control group. The results also agreed with **Abdalla(2),** where they obtained a significant increase in the dressing percentage, when added citric acid in different proportions to meat broiler chicken. **Husseini(7)**. There was a significant increase in the percentage of recovery for the treatment of acetic and lactic acid with control. This is

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Table (3) Effect of organic acid and strain on dressing percentage and carcass cuts.

Treatments / Parameters	Effect Treatments			Effect of strain	
	T1 control 0%	T2 Acetic acid 2.5%	T3 Lactic acid 2.5%	Brown	Black
dressing percentage %	63.84 ± 0.73 ab	64.48±1.36 A	62.39±0.42 b	64.64±0.77 A	62.49±0.60 b
Body weight 6week g	185.85± 3.14 c	219.17±1.68 b	225.72±2.03 a	210.04±7.67	210.44±5.09
Carcass weight (g)	144.40 ± 1.70 c	164.15±4.74 a	158.58±3.68 b	160.60±5.13 a	151.06±0.91 b
Breast weight (%)	30.53±0.70 C	32.45±0.59 B	32.67±1.23 a	31.04±0.32 B	32.72±0.97 a
Back weight (%)	22.34±0.85 C	24.68±0.08 B	25.15±1.04 a	23.88±0.27 B	24.30±1.01 a
Thigh weight (%)	18.48±0.70 C	18.70±0.15 B	18.96±0.55 a	18.18±0.12 B	19.25.0.25 A

Values means ±S.E with different horizontal letters indicate significant differences at the ($p<0.05$).

probably due to a significant improvement of the total weight increase in favor of the study coefficients compared to control. There was also a significant difference between the black and brown strains for the percentage of extinction, where the brown strains 64.64% over the black strains 62.49% is due to the fact that organic acids improve digestion through the secretion of some enzymes and other useful substances such as proteins and amino acids The nutrient is analyzed into small units that are easy to absorb by the body and therefore weight gain leads to an increase in the dressing percentage.

Table (3) shows that there are significant differences in body weight at the age of 6 weeks, where the treatment exceeded the third 225.72 g and the second 219.17 g on the first treatment 185.85 g is due to the fact that acetic acid and lactic have an important role in improving the internal environment of the channel The digestive system is suitable for the activity and activity of digestive enzymes and thus improved digestion and absorption processes resulting in an improvement in body weight. No significant differences were observed between the two black and brown strains on the weight of the live body at that age. The weight of the carcass was significant for the second treatment with the addition of acetic acid 164,15 g followed by the third treatment of lactic 158.58 g and the two treatments were significantly superior to the control treatment where the weight of the carcass 144.40 g. The brown strains on the black strains in the weight of the carcass also increased to 160,60 g, compared to 151.06 g respectively .As for the cuts of the carcass (chest, thigh and back), the third and second treatments were significantly higher than the control treatment without adding, 32.67, 32.45 % and 30.53% respectively, 25.15, 24.78 and % respectively compared to 22.44 % respectively 18.96 ,18.70% and 18.48 % respectively, and significant differences between the black and brown strains black 32.72 brown 31.04 relative weights for breast.and relative weights back black 24.30 , brown 23.88 and relative weights for thigh the black 19.25 and brown 18.18.

Table (4) showed significant differences in the relative weights of the meat parts of the meat to the third and the second. The relative weight of the liver was 2.88, 2.61, 2.38% for the third and second treatment compared to the first and the relative weights for the Gizzard T2 2.10 T3 1.89 compared to the first 1.73%. There was a significant increase in the heart relative weights for T1 1.45% with T2 1.42 and T3 1.39. did not agree with the results.

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Table (4) Effect of organic acids and strain on the percentage weights of the internal organs.

Treatment / Parameters	Effect Treatments			Effect of strain	
	T1 control 0%	T2 Acetic acid 2.5%	T3 Lactic acid 2.5%	Brown	Black
Liver weight %	2.38 ±0.06 c	2.61±0.01 B	2.88±0.08 a	2.61 ±0.03 b	2.64±0.11 a
Gizzard weight %	1.73 ± 0.01 c	2.10 ±0.02 a	1.98 ±0.03 b	1.93±0.06 b	1.94±0.06 a
Heart weight %	1.45 ± 0.01 a	1.42±0.02 B	1.39 ±0.06 c	1.38± 0.03 b	1.45±0.02 A

Values means ±S.E with different horizontal letters indicate significant differences at the ($p<0.05$) .

They observed that the addition of citric acid and 0.1% to 2% of the broiler did not cause any significant differences in the weights of the macrophages compared with the control treatment **Abd EL-hakim (1).** There were significant differences in the relative weights for heart ,liver and gizzard between the black and brown strains. the black strains recorded a significant gain of heart 1.45% on the brown strains 138%. the relative weights for the Gizzard to black 1.94%and brown 1.93%. the black strains recorded a significant relative weights for the liver 2.64% and the brown 2.61%.

Table 5 indicates a significant increase in the number of red blood cells and the size of the blood cells. The T3 treatment was superior to the T2 treatment in the number of red blood cells 5,50 and 4,65 compared with 3.48 and the volume of the blood cells was 39.95, 36.98 and the two treatments superior to control 3, 48 for red blood cells 34.08 for blood cells, respectively. The results of Table (5) showed that the treatment of Lactate and the second acetic treatment in thehemoclobin concentration compared with the control treatment was 16.86, 16,80 and 12.10 respectively, while the rate of pellet volume in T2 and T3 was decreased compared to control treatment Were 101,94, 74.78 compared to 131,60, respectively. In the third treatment, the rate of hemochlobin decreased in the third treatment (33.98) compared with the second treatment and the control treatment at 46.33 and 43.99 respectively, while the second and third treatments recorded the highest percentage in the concentration of hemochlobin compared with the control treatment. For the effect of camel transactions, the black strains was observed in the number of red blood cells, the size of the blood cells, the concentration And the brown strains were superior to the black strains in the serum hemoglobin and the

Table (5) Effect of organic acid treatments and strain on blood characteristics.

Treatment / Parameters	**Effect Treatments**			**Effect of strain**	
	T1 control 0%	**T2 Acetic acid 2.5%**	**T3 Lactic acid 2.5%**	**Brown**	**Black**
RBC Million/mm^3	**3.48±0.11 c**	**4.56±0.30 B**	**5.50±0.16 a**	**4.32±0.23 b**	**4.77±0.40 a**
PCV %)(	**34.08±0.26 c**	**36.98±0.63 B**	**39.95±1.23a**	**35.66±0.50 b**	**38.35±1.35 a**
Hb (gm)	**12.10±0.31 b**	**16.80±0.51 A**	**16.63±0.90a**	**14.86±0.89 b**	**15.64±0.94 a**
MCV (ft.m)	**131.60±13.27a**	**101.94±9.65b**	**74.78±1.12c**	**100.39±6.94b**	**105.16±14.06a**
MCH (pg)	**43.99±3.85 a**	**46.33±6.78 A**	**33.98±0.74b**	**44.29±4.37 a**	**38.58±3.40 b**
MCHC(%)	**37.40±0.19 B**	**64.05±2.10 A**	**45.96±0.81a**	**45.35±1.97 a**	**40.92±1.06 b**

Values means ±S.E with different horizontal letters indicate significant differences at the ($p<0.05$).

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hemocyclobin concentration. This is due to the different genetic structures and abilities of each strains, which is reflected in the .Table (6) physiological aspect of the bird indicates significant differences in the concentration of glucose and Triglycerides in the second and first treatments compared to the third treatment with 285.62, 265.10 compared with 247.99 for glucose respectively, 889.46, 511.07 compared to 501 , 66 for triple Triglycerides, respectively. No significant differences were observed in the concentration of total protein, albumin, globulin and ratio of albumin / albumin between the three treatments. Also, no significant differences were observed between the brown and black strains in the concentration of glucose, triglyceride, total protein concentration, albumin, globulin and ratio of albumin / albumin. These results were agreed with the results **Safawi(18),** with no significant differences in glucose concentration between the treatments. The results differed as indicated **Luckstadt(16).**

Table (6) Effect of organic acid treatments and strain on some biochemical parameters.

Treatment / Attribute	Effect Treatments			Effect of strain	
	T1 control 0%	T2 Acetic acid 2.5%	T3 Lactic acid 2.5%	Brown	Black
Glucose	265.10±6.43 ab	285.62±6.43 a	247.99±5.45 b	256.08±7.21	276.39±11.51
Triglycerides	511.07±11.8 ab	889,46±14.1 A	501.66±24.3 b	676.04±10.2 a	592.08±17.9 b
Total protein(gm)	5.14±0.18	5.06±0.18	5.43±0.31	5.26±0.23	5.16±0.15
albumin (gm)	2.19±0.18	2.36±0.06	2.41±0,15	2.24±0.14	2.40±0.08
Globulin	2.90±0.10	2.89±0.24	2.87±0.17	2.87±0.15	2.99±0.13
Globulin/ albumin	1.42±0.21	1.14±0.03	1.27±0.12	1.41±0.12	1.15±0.05

Values means ±S.E with different horizontal letters indicate significant differences at the ($p<0.05$).

There were significant differences in protein concentration in favor of organic acid compared to control. **Abdalla(2)** showed a significant improvement in the concentration of total blood protein in meat broilers at the addition of 0.5 and 1% of citric acid.

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