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THE EFFECT OF ADDING ASPARTIC ACID IN DRINKING WATER ON THE PRODUCTIVE PERFORMANCE AND THE PERCENTAGE OF CARCASSES TO MEAT IN BROILER-TYPE ROSS 308

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ABSTRACT

This experiment was conducted in the poultry field of the Department of Animal Resources, College of Agriculture, Al-Qasim Green University, to study the effect of aspartic acid on the product characteristics and the percentages of cuts of broilers. In the experiment 135 birds were used, type 308 Rose, one day old, unsexed, with an average weight of 42 g / bird, and randomly distributed to three treatments, at the rate of three replications for each treatment, and each replicated 15 chicks, where aspartic acid was added to drinking water for the treatments according to the following ratios (T1 0 mg / Liters of water, T2 500 mg/liter of water, T3 700 mg/liter of water) as the results of the experiment showed a high significance for the T2 and T3 treatments compared to the T1 control treatment in live body weight for the third, fourth and fifth weeks, respectively, as well as the high significance of the T2 and T3 treatments compared to the control treatment in The weight gain characteristic of the second, third, fourth and fifth weeks, respectively, as well as in the characteristic of feed consumption. It was observed that there was a higher significance for the T2 and T3 treatments compared to the T1 control treatment for the first, second, and third weeks. As for the efficiency of the Food conversion, the significance was high for the T2 and T3 treatments compared to the control treatment for the first, third, and fourth weeks. Moreover, for the carcass cuts, the significance was high for the T2 treatment only for the chest and neckpieces only compared to the rest of the other treatments. So. We conclude from this experience that there are a benefit and importance to give aspartic acid to improving the product characteristics as well as the proportions of the meat chicken pieces.

Keywords: aspartic acid, productive performance, percentage of carcasses

Introduction

Several experiments have been performed to determine the requirement of amino acids and the optimum dose for birds, Therefore, some changes must be considered, including the environment, body size, Feed Consumption, eggs Production, genotypes, and age. Through these changes, the birds' needs are assessed of amino acids (Fakhraei *et al*., 2010; Gomes *et al*., 2011; Ekmay *et al*., 2013). Jian *et al*., 2004 showed the increase of using the artificial amino acids in poultry feed has led to a gradual decrease in the level of protein consumption in broiler diets, as there are many studies concerned with using a low-protein diet to reduce the cost of feed and this leads to a decrease Essential amino acids (Kidd and Kerr, 1999) the safety acidosis plays an essential role in the maintenance of mucosa and cells (Mao *et al*, 2011). Over the past years the importance of aspartic acid in the endocrine glands and its important role in reproductive activity has appeared (D, Auiello, 2007. Ota, N 2012). Researches showed that steroid formation steps result from aspartic acid and the release of sex steroid hormones and has a direct effect on semen, ejaculation, and sexual desire (Difiore, 2014).

Materials and Methods

This experiment was conducted in the poultry field affiliated to the College of Agriculture, Al-Qasim Green University for the period from 3/21/2019 to 26/4/2019. That, 135 broiler chicks were used as unsexed, type 308Ross with an average weight of 42 g / chick. The chicks were nursed in-ground cages, and the chicks were distributed randomly into three treatments, each consisting of three replicates, as each duplicate contained 15 chicks. Then, (T1) was the control treatment, (T2) treatment was added 500 mg Acid/liter drinking water, and the third treatment (T3) 750 mg acid / liter drinking water was added. Also, feeding birds were free, two rations were given, one diet starting from 1-21 days old, and a final ration from 22-35 days life of birds as shown in Table 1. Moreover, The following characteristics were estimated weekly: weekly and aggregate live body weight, weekly an aggregate weight gain, weekly and aggregate feed consumption rate, weekly and aggregate feed conversion factor, the relative weight of carcass segments, and Completely Randomized Design was used to study the effect of different parameters on the studied traits, and compared Significant differences between the averages using the Duncan polynomial test (Duncan, 1955), and using the SAS statistical program (SAS, 2010) to analyze the data.

Table 1 : The percentages of forage materials included in the formation of the starting diet and the final diet used in the experimental with the chemical composition calculated for both diets

Feed material	Starter diet (1-21 days) %	Final diet (22-35 days) %
yellow corn	48.2	58.7
Local wheat	8	7.5
Soybean meal (44% protein)	28.5	20.5
protein concentrate *	10	10
Vegetable oil (sunflower)	4	2.5
limestone	1	0.5
Table salt	0.3	0.3
Total	%100	%100
Calculated chemical analysis**		
Representative energy (kilocalories / kg)	3079.85	3102.6
Crude protein (%)	21.56	18.87
Lysine (%)	1.04	0.85
Methionine + Cysine (%)	0.455	0.42
Crude fiber%	3.54	3.2
Calcium (%)	1.28	1.07
Ready phosphorous (%)	0.42	0.41

*Using the Brocon-5 protein concentrate produced from the Dutch company WAFI, which contains 40% crude protein, 3.85% lysine, 3.7 methionine, 4% methionine + cysteine, 2100 kilocalories represented energy / kg, 5% crude fat, 2% crude fiber, 6.5% calcium, 4% available phosphorous, 2.2% sodium, 200,000 IU / kg vitamin A, 40,000 IU / kg vitamin D3, 500 mg / kg vitamin E, 30 mg / kg vitamin K3, 15 mg / kg vitamin B1, 100 mg / kg vitamin B2, 150 mg vitamin B3, 20 mg / kg vitamin B6, 600 mg / kg vitamin PP, 10 mg / kg folic acid, 100 micrograms / kg biotin, 5000 mg / kg choline chloride.

** chemical composition according to the forage analyzes contained in NRC (1994) .

Results and Discussion

Table 2 shows the effect of adding aspartic acid on the characteristic of live body weight. Therefore, the results of the statistical analysis showed that there were no significant differences between the treatments in the first and second weeks of the experiment. Moreover, in the third and fourth weeks, the control treatment was significantly ($p < 0.01$) over the second and third treatments, as it recorded the highest live weight. it was also noticed that there was no significant difference between the second and third treatments during the third and fourth weeks of the experiment, but in the fifth week, an advantage was observed. The significance was high ($p<0.01$) in the live bodyweight of the treatment T3 compared to the control treatment T1, while no significant difference was obtained between the two treatments T3 and T2, respectively.

Table 2: The effect of aspartic acid on the characteristic of live body weight

Treatments	Live body weight g / week					
	The first week	the second week	the third week	the fourth week	the fifth week	the sixth week
T1	43.99 ±0.38 a	160.77 ±3.17 a	457.79 ±5.39 a	939.06 ± 5.15 a	1491.47 ± 17.62 b	2120.40 ± 14.76 a
T2	43.89 ±0.36 a	168.12 ±2.69 a	428.66 ±9.71 b	880.99 ±11.34 b	1549.15 ±16.29 ab	2253.33 ±54.56 a
T3	43.55 ±0.46 a	160.82 ± 2.91 a	419.50 ± 2.47 b	875.99 ±9.64 b	1635.72 ±37.18 a	2230.00 ±115.90 a
level of significance	NS	NS	**	**	**	NS
Means having with the different letters in same column differed significantly. * (P<0.01), NS: Non-Significant.						

Table 3: The effect of aspartic acid on the weight gain characteristic

Treatments	Weight gain, g / week				
	The first week	the second week	the third week	the fourth week	the fifth week
T1	113.44 ±2.0o b	297.01 ±5.49 a	481.27 ±3.85 a	552.41 ±13.08 b	628.92 ±19.23 a
T2	124.23 ±2.35 a	260.54 ±9.76 b	452.44 ±2.73 b	668.15 ±6.65 a	704.18 ±38.32 a
T3	117.26 ±2.45 ab	258.68 ±4.03 b	456.49 ±8.44 b	759.72 ±45.28 a	694.28 ±79.52 a
level of significance	*	**	*	**	NS
Means having with the different letters in same column differed significantly. * (P<0.05), ** (P<0.01), NS: Non-Significant.					

Table 3 showed that the effect of adding aspartic acid on the weight gain characteristic, as treatment T2 significantly exceeded the control treatment, and there was no significant difference between T2 and T3 treatments in the first week. The difference was highly significant compared to the rest of the trial treatments T2 and T3, where the highest weight gain was recorded, and the values of this increase were for the two weeks respectively (297.01 gm and 481.27 gm), but in the fourth week, an effect of aspartic acid was observed on the trial parameters, where treatment T2 and T3 outperformed treatment Control, the weight gain values were: 668.15 g and 759.72 g for the two parameters T2 and T3, respectively. Also, No significant difference found between all trial treatments in the fifth week. As for the effect of

aspartic acid on feed consumption in Table 4, the superiority of the control treatment T1 was observed in the first and second week, this was a highly significant superiority over the two trial treatments T2 and T3, where the highest value was recorded in the starting feed, but in the third week, the trial treatments exceeded T2 and T3 compared to the T1 where this superiority was significantly (P <0.01). The feed consumption values were: 534.00 gm, 653.59 gm, and 665.77 gm for T1, T2, and T3, respectively. As for the fourth and fifth weeks, no significant difference was recorded between all transactions.

Table 4: The effect of aspartic acid on the feed consumption

Treatments	feed consumption g/week				
	The first week	the second week	the third week	the fourth week	the fifth week
T1	115.33 ±2.77 a	363.44 ±4.30 a	534.00 ±14.32 b	757.00 ±33.46 a	981.33 ±31.81 a
T2	61.44 ±2.33 b	309.11 ±10.78 b	653.59 ± 4.29 a	812.88 ±7.56 a	974.22 ±13.82 a
T3	52.77 ±6.82 b	308.88 ±13.76 b	655.77 ±4.59 a	818.41 ±3.86 a	985.55 ±2.94 a
level of significance	**	**	**	NS	NS
Means having with the different letters in same column differed significantly . ** (P<0.01), NS: Non-Significant.					

Table 5: The effect of aspartic acid on the food conversion factor

Treatments	The efficiency conversion grams of feed / g by weight gain				
	The first week	the second week	the third week	the fourth week	the fifth week
T1	1.016 ±0.02 a	1.223 ±0.01 a	1.110 ±0.03 b	1.368 ±0.03 a	1.566 ±0.10 a
T2	0.478 ±0.01 b	1.191 ±0.08 a	1.444 ±0.01 a	1.217 ±0.02 b	1.393 ±0.09 a
T3	0.451 ±0.06 b	1.195 ±0.06 a	1.437 ±0.02 a	1.084 ±0.06 b	1.456 ±0.15 a
level of significance	**	NS	**	**	NS
Means having with the different letters in same column differed significantly. ** (P<0.01), NS: Non-Significant.					

Moreover, Table 5 shows the effect of aspartic acid on the food conversion factor, T1 highly significant (P <0.01) was superior over the rest of the trial treatments T2 and T3 in the first and fourth weeks. In the third week, the superiority was highly significant for the treatments T2 and T3 compared to the control treatment, where the values of the food conversion factor were: 1.110, 1.444, and 1.437 for the treatments T1, T2, and T3, respectively. In the second and fifth weeks of the experiment, there was no significant difference in the food conversion ratio of the trial and control treatments. For the effect of adding aspartic acid on the relative weight of the carcass parts, table 6 showed that there was a significant superiority (P <0.01) for treatment T2 in the ratio of the weight of the chest and neckpieces compared to the control treatment T1 and the treatment T3 where the relative weight values of the chest piece were recorded as follows 38.48%, 44.84%, and 38.31% for the treatments T1, T2 and T3, respectively, and no significant differences were observed between the trial parameters and the control treatment for the rest of the traits studied in the aforementioned table.

Table 6: The effect of aspartic acid on the weight of the main and secondary pieces of the carcass of broilers

Studied traits / Treatments	The percentage of the weight of the Thighs %	The percentage of The weight of the Drumstics %	The percentage of The weight of the Breast %	The percentage of the weight of the Back %	The percentage of The weight of the Neck %	The percentage of Wings weight %
T1	16.45 ±0.92 a	11.55 ±0.33 a	38.48 ±0.47 b	16.54 ±0.10 a	4.12 ± 0.22 b	11.15 ±0.22 a
T2	15.66 ±0.74 a	11.52 ±0.31 a	44.84 ±0.93 a	14.72 ±0.35 a	5.43 ±0.29 a	10.49 ±0.76 a
T3	17.31 ±0.62 a	12.60 ±0.51 a	38.31 ±0.20 b	15.04 ±1.44 a	4.09 ±0.14 b	10.68 ±0.89 a
level of significance	NS	NS	**	NS	**	NS
Means having with the different letters in same row differed significantly.* (P<0.05), ** (P<0.01), NS: Non-Significant.						

Table 7: The effect of aspartic acid on some productive characteristics of broilers

Studied traits / Treatments	Live weight g	The degree of fullness of the body	Empty weight g	The percentage of dressing without the Giblets %	The percentage of dressing with the Giblets %	The length of the body cm	The circumference of the thigh cm	The ratio of the length of the digestive tract cm / 100g
T1	2703.33 ± 13.02 b	70.22 ±1.60 a	2105.00 ±16.07 a	77.86 ±0.24 a	81.77 ± 0.22a	30.00 ±0.57 a	17.33 ±0.33 a	6.57 ±0.27 a
T2	2833.33 ±93.73 b	72.71 ±1.22 a	2255.0 ±72.86 a	79.59 ±0.06 a	83.44 ±0.31 a	31.00 ±0.57 a	17.33 ±0.88 a	7.50 ±0.08 a
T3	3190.00 ±80.82 a	74.27 ±4.13 a	2313.33 ±227.56 a	72.27 ±.65 a	76.24 ±6.11 a	31.00 ± 1.53 a	19.00 ±0.57 a	5.83 ±0.13 b
level of significance	**	NS	NS	NS	NS	NS	NS	*
Means having with the different letters in same column differed significantly. * (P<0.05), ** (P<0.01), NS: Non-Significant.								

From Table 7 the live weight characteristic of treatment T3 was highly superior (P <0.01) over treatment T2 and control treatment T1, the values of this trait were: 2703.33 gm, 2833.33 gm, and 3190.00 gm for T1 and T2 treatments and T3, respectively. Moreover, control treatment T1 and T2 treatment were observed for the gut length ratio characteristic compared to treatment T3 was significant (P <0.05), and no significant differences were observed between the trial and control treatments for the rest of the traits studied in this table. The effect of aspartic acid on the relative weight characteristic of the edible viscera, through table 8 it is evident that it is significant (P <0.05) superiority in the characteristic of the heart weight ratio between the trial and control treatments, where the control treatment T1 and T3 slightly outperformed the treatment of T2, which scored less a value in the percentage of heart weight. As for the rest of the characteristics mentioned in this table, no significant differences were noted between the trial and control treatments**.**

Table 8: Effect of aspartic acid on the weight characteristic of edible viscera

Studied traits / Treatments	The percentage of the weight of the liver %	The percentage of the heart weight %	The percentage of the weight of the gizzard %
T1	1.86 ± 0.06 a	0.337 ± 0.006 a	1.719 ± 0.07 a
T2	1.79 ± 0.11 b	0.423 ± 0.04 ab	1.632 ± 0.24 a
T3	1.87 ± 0.22 a	0.491 ± 0.01 a	1.598 ± 0.28 a
level of significance	NS	*	NS
Means having with the different letters in same column differed significantly. (P<0.05), NS: Non-Significant.			

In general, from the results obtained in this experiment, it can be concluded that there are a significant superiority of the T2 and T3 treatments birds compared to the control birds T1 in the average live body weight before slaughter, and this may be due to the fact that the adding of aspartic acid to the diet promoted the activity of digestive enzymes and thus Increased hydrolysis of protein and amino acids (Samanta *et al*., 2010; Salgado-Tránsito *et al*., 2011). The organic acids can also provide the appropriate medium that helps convert pepsinogen into pepsin and thus boost protein digestion (Afsharmanesh and Pourreza, 2005; Marín- Flamand *et al*., 2014), which may have a positive effect on production performance. Good gut health in poultry is also of great importance to achieve target growth rates (Huyghebaert *et al*., 2011) as the improvement in the bird's intestinal environment caused by the presence of organic acids that help the growth of beneficial bacteria and reduce the number of pathogenic bacteria has contributed to raising the efficiency of the digestive system and ability to digest and absorb (Woo *et al*., 2006; Ghazalah *et al*., 2011; Mohammadpour *et al*., 2014), and the improvement in live body weight prior slaughter of the treated birds were reflected in an increase in the main chest piece estimated to contain 65% of the amount of meat eaten (Mountney, 1976).

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