

Effect of addition of different levels of humic acid to drinking water on productive and carcass characteristics of broiler chicks

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Abstract:

This experiment was carried out at the which poultry farm of Babylon to study the effect of adding humic acid to the drinking water on performance of Ross 308 broiler chicks . The experimented the period from 20/1/2017 to 5/3/2017 of birds age , A total of 135 one day old chicks were used in this experimented , chicks were allocated randomly in to 3 treatments, 45 chicks for each treatment , each treatment was included 3 equal replicates, 15 chicks for each one.

The treatments , were: -

Treatment (T1) basal diet + fresh water without addition (Control group).

Treatment (T2) basal diet + fresh water supplemented with Humic acids in (3.6 g.L⁻¹ water .

Treatment (T3) basal diet + fresh water supplemented with Humic acids (7.8 g. L⁻¹ water .

The results of this experiment indicated that supplemented of Humic acids in the fresh water during the period (1-6) week of the experiment , had a significant effect ($P \leq 0.05$) on body weights rate of chicks and accumulative feed consumption , accumulative weights gain of the birds and significant effect($P \leq 0.05$) of feed conversion rate as compared with the control treatment. Addition of humic acid has an significant effect of the birds ($P \leq 0.05$) on the carcass traits of birds (The relative weight of the various carcass cuts and Internal organs) in comparison to the birds of control treatment.

Keywords : Humic acid, Broiler chicks, Carcass traits, Productive Performance , drink water.

تأثير اضافة مستويات مختلفة من مادة الدبال (Humic Acid) الى ماء الشرب لفروج اللحم على الصفات الانتاجية وصفات الذبيحة للطيور.

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مدرس

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المستخلص :

أجريت هذه التجربة في احدى حقول الدواجن الخاصة في محافظة بابل بهدف دراسة تأثير إضافة مادة الدبال Humic Acid إلى ماء الشرب في الأداء الانتاجي وصفات الذبيحة لفروج اللحم من سلالة Ross

308 للفترة الممتدة من 2017/1/20 الى 2017/3/5 ، اذ استخدم في هذه التجربة 135 فرخا بعمر يوم واحد ووزعت بشكل عشوائي على ثلاثة معاملات بواقع 45 فرخا لكل معاملة كما وزعت أفراخ المعاملة الواحدة إلى ثلاثة مكررات متساوية بواقع 15 فرخاً لكل مكرر . وقد كان توزيع المعاملات وفق الآتي:

المعاملة الأولى (T1) معاملة السيطرة بدون أي إضافة لماء الشرب .

المعاملة الثانية (T2) أضيفت الى ماء شرب الطيور المادة الدبالية Humic Acid بمقدار 3.6 غم.لتر¹ من ماء .

المعاملة الثالثة (T3) أضيفت الى ماء شرب الطيور المادة الدبالية Humic Acid بمقدار 7.8 غم. لتر¹ من ماء .

اشارت النتائج التي تم الحصول عليها ان لإضافة المادة الدبالية Humic Acid إلى ماء الشرب لفروج اللحم خلال فترة التجربة تأثيراً معنوياً ($P \leq 0.05$) في معدلات وزن الجسم الحي الأسبوعية واستهلاك العلف الاسبوعي وعلى معدل الزيادة الوزنية كما حصل تحسين معنوي في معامل التحويل الغذائي للطيور عند مقارنته بمعاملة السيطرة . كذلك وجد ان لأضافه المادة الدبال Humic Acid لماء الشرب له تأثيراً ايجابياً معنوياً ($P \leq 0.05$) في تحسين الصفات الذبيحة التي شملت الوزن النسبي للقطيعات الرئيسية والثانوية للذبائح مقارنة مع معاملة السيطرة .

الكلمات المفتاحية : humic acid ، فروج لحم ، صفات الذبيحة ، الاداء الانتاجي ، ماء الشرب .

Introduction :

The poultry industry today was witnessing series of problems such as various disease outbreaks, Essential products like eggs and meat There is high concerns for improving humanity nutrition level so specialized companies began to product broiler precedes with high production properties to provide the optimum level of food security (3). Many researchers worked on conduct numerous study's to reach the best production with the least number of problems for example there was a trend toward using nutrients complaint support growth development in broiler chicken and that will provide of nutrition element which will be acquit ad for live body requirements for production so is it would be necessary to supply food addition to support the increasing in mineral absorption like using humic acid which conceder as a food addition for broiler . Humic acid are produced from the organic degradation of soil ingredients (19) using of humic acid in animal nutrition's have a short history since the first study was to know the effects of the immunity system of calf's (9). and using humic acids like absorption factor and antiseptic in veterinary in Europa (6).

The results of this study illustrated that adding the humic acid in food improving feed conversion ratio than forming factor in poultry (27). Humic acid may stimulated glycoproteins production which may be acting on organization the immune system (23) . Many studies showed that there is no any poisoning effects of using humic acid (6) were catalyzed as feed additive for improving nutrient transforming factor and

serve the health status of birds and as the first antibiotic with no side effect on consumer (8). The aim of this study was to investigate the effects of supplementation different level of humic acid to the broiler drinking water on some production performance and some carcass traits .

Materials and Methods :

One hundred thirty five on day old broiler 308 ross were used in this study . The chicks were kept in a poultry farm and reared for the period from 20/1/2017 to 5/3/2017. the experimented was provide with all equipment's during the whole rearing period. Two deferment concentration level of humic acid were supplemented to drinking water during the period of study . The chicks were distributed randomly into 3 Treatment groups each treatment contained 45 chicks with three replicates in each and each replicates contained 15 chicks .

The treatments were as Follows :

First treatment (T1) the control group: basal diet + fresh water without any supplementation.

Second treatment (T2) the birds were fed basal diet + fresh water supplemented with 3.6 g of humic acid to 1 litter of drinking water .

Third treatment (T3) the birds were fed basal diet + fresh water supplemented with 7.8 g of humic acid to 1 litter of drinking water .

Chick management :

The chicks in this study were kept in a calmed floored cages. These cages were supplied with plastics (5 liter capacity) water for each replication . At the first seven days of ration were put in small round shape plastic feeders to avoid clutters and to insure getting birds as much as quantities of feeds . After one week the plastic feeders were replaced with hanging feeders to the end of the experiment . The environment conditions of the experiment room were adjusted to get the normal atomosphair that need for rearing broiler .

Nutrition :

Two types of diets were used in this experiment , they were as follows:

Table 1: The ingredient and percentages that used in the starter and grower diets which fed to the broiler chicks and their calculated chemical composition

Ingredients	Starter diet1-3week of age	grower diet 4-6week of age
Wheat	40	31
Yellow Corn	20	45
Soybean meal(44%)	30	15
Protein concentrate	6	5
Calcium carbonate	1.4	1.4
Vegetable oil	2	2
Premix**	0.3	0.3
salt (NaCl)	0.3	0.3
Total	100	100
CP %	22.94	18.80
ME (kcal/kg)	2948	3119.5
L-Lysine %	1.19	0.77
Ca %	0.67	0.62
Methionine+cystine	0.85	0.63

*Calculated composition according to (21) .

**Vitamins and minerals premix provides per kg of diet: 10000 IU vit. A, 11.0 IU vit. E, 1.1 mg vitamin K , 1100 ICU vitamin D3, 5 mg riboflavin, 12 mg Ca pantothenate, 12.1 µg vit. B12, 2.2 mg vit. B6, 2.2 mg thiamin, 44 mg nicotinic acid, 250 mg choline chloride, 1.55 mg folic acid, 0.11 mg d-biotin, 60 mg Mn, 50 mg Zn, 0.3mg I , 0.1 mg Co, 30 mg Fe, 5 mg Cu and 1 mg Se.

Measurements and Data's Collections:

The chicks were weighted at one day old then the weighing was continued every week for all treatment of the experiment . There Individual live body weight of the bird (g), feed intake (g/bird) , body weight gain rate (g), and feed conversion ratio (g feed/g gain) were calculated weekly (1) .

Carcass Characteristics:

At the end of the experiment(at the age of 6 week) number of birds came have birds were choose from each treatment after the live body weight was taken the birds were slaughtered to determine the carcass caracheristies ; dressing percentage , edible giblets (heart , liver , gizzard) were as percentage of live body weight (1) .

The percentages weights for main Caracas cuts (breast and thigh) and secondary parties which were (back , wing and neck) which were determined as percentages of carcass weight (1) .

Statistical Analysis :

Data of this experiment were analyzed by using CRD model and the significant differentness between treatments were comprised with by Duncan test (4) using with

SAS statistical software ,The Differences were considered significant at level ($P \leq 0.05$) The Statistic System was used (25).

Results and Discussion:

Table 2 show the effect of adding humic acid to drinking water on live body weight of the bird during the period 1-6 weeks of age . The results detected a significant increase ($p \leq 0.05$) for the treatment of adding humic acid on the body weight level during the experiment period . T3 recorded the higher excel in the first week in body weight average (137.23 g/bird) and treatment T2 be came after while T1 (control grope) recorded the least weight (118.39 g/bird) in first week .In the second, third and fourth week of age T2 and T3 had the significant increase ($p \leq 0.05$) in body weight as compared by control grope while in fifth week of age an significant increase to T3 over T2 and T1 in body weight while T2 had an over lapping on T1 grope . In the 6th of bird age no significant different between T2 and T3 in body weight but both had significant increase ($p \leq 0.05$) on T1 in total body weight .

It can be concluded that the adding humic acid to drinking water may cause significant improvement in live body weight of bird , this may be due to the action of humic acid which increased permeability of cell membrane to the mineral to trans to inside of the digestive system (17) . Besides that the humic acid have an effect on the microorganisms balance on its activity inside intestine of chicks which will cause height benefits of mineral invasion (27 , 28) .

The enhancing in body weight averages in this study had an accordance with was recorded by (24, 5 ,1) and also with (2) that were found an enhancing in body weight average when humic acid was supplemented to the quail diets during the experiment period .

However this study didn't agree with (1 , 14) which had no body weight enhancing with adding only humic acid to the rations of broiler during the experiment period .

Table 2 : The Effect of adding humic acid to drinking water on live body weight (g) of broiler chicks during the period of 1-6 of age week of breeding (standard error \pm mean)

Treatments	1 Age in week	2 Age in week	3 Age in week	4 Age in week	5 Age in week	6 Age in week
T1 (control) Fresh water	118.39 \pm 0.995 c	288.63 \pm 6.945 b	635.22 \pm 20.083b	1002.50 \pm 2.404 b	1560.55 \pm 17.378 c	1890.61 \pm 5.972 b
T2 Humic acid 3.6 g.L ⁻¹ of water	126.41 \pm 1.691 b	348.61 \pm 9.371 a	726.93 \pm 12.776a	1196.89 \pm 17.412 a	1700.12 \pm 14.337 b	1980.21 \pm 22.681 a
T3 Humic acid 7.8 g.L ⁻¹ of water	137.23 \pm 2.168a	354.36 \pm 4.445 a	751.64 \pm 18.080 a	1230.89 \pm 8.663 a	1750.94 \pm 8.057 a	2041.36 \pm 31.602 a
Significant	*	*	*	*	*	*

*Means within a column with different letters differ significantly (P<0.05) .

Data of as **table 3** indicates the effect of supplemented humic acid on body weight gain rate of broiler for one to six weeks of age .It showed that birds in T3 were higher in body weight gain at the 1st week of age as compared to other treatment , however gave control grope the lowest body weight gain in this comparison (71.95g. chick⁻¹) The results showed significant differences in body weight gain at 2nd week of age in which supplemented treatments gave the highest level while the lowest level was for control grope (170.25 g. chick⁻¹) .The statistical analysis illustrated a significant different on body weight gain in the 3rd and 4rd weeks of study , The T2 and T3 achieved the highest level in significant increase (p \leq 0.05) comparison with control , while in 5th week of age the results showed no significant difference between T3 and T1 in body weight gain while we can see an overlapping of control on T2 significantly (p \leq 0.05). In 6th week of age no significant difference in body weight gain of bird for treatments but an overlapping of T2 and T3 significant increase (p \leq 0.05) comparison with control in total on body weight gain can be seen .

Table 3 : The effect of adding humic acid to drinking water on body weight gain (g) for broiler chicks during the period of 1-6 week of age (standard error ± mean)

Treatments	1 Age in weeks	2 Age in weeks	3 Age in weeks	4 Age in weeks	5 Age in weeks	6 Age in weeks	Total body weight gain(g/bird)
T1 (control) Fresh water	71.95± 0.995c	170.25± 5.949 b	346.59± 13.137b	367.28± 22.487b	558.06± 14.973 a	330.06± 23.350	1844.17± 5.972 b
T2 Humic acid 3.6 g.L ⁻¹ of water	79.97± 1.691b	222.20± 11.045a	378.33± 3.652ab	469.96± 29.535 a	503.23± 7.100 b	280.09± 21.372	1933.77± 22.681a
T3 Humic acid 7.8 g.L ⁻¹ of water	90.79± 2.168 a	217.12± 6.600a	397.28± 16.861 a	479.25± 14.589 a	520.06± 13.692ab	290.42± 32.501	1994.92± 31.602a
significant	*	*	*	*	*	N.S	*

*Means within a column with different letters differ significantly (P<0.05).

N.S = non-significant .

The significant increase in body weight gain of birds in supplemented with humic acid may be became its important in metabolism of carbohydrate and protein via stimulation gens which affect by reducing PH of digestive organism and this will ducts to distractions viruses and Bactria (11) also the growth of crypt depth into vil-lus in ileum which depended on reducing PH intestine and humic acid may act on reducing PH of digestive system and reduce the harm bacteria in digestive system of poultry and that will act on organize the ecology of digestive system of birds and enhance the metabolic rate which will due to increasing in body weight (27) . otherwise , it may use as a natural source of mineral and that act positive on secretion and absorption mineral in digestive system which will take a role in increasing body weight gain (7). Humic acid act as aprotic of epithelial tissue of digestive duct and capillary from clam ages by make a good protect layer It play a role in balancing the microor-ganism intestine which will due to increasing in body weight without increasing quantities of feed stuff it taken place in inhibit the growth of pathogen microorganism inside digestive system which will decrease poisoning concentration and enhance general health (12) .

Results of the study are in agreement with (22) that were found significant increasing in body weight gain rate when humic acid was supplemented to drinking water during breeding period .also the study agreed with (28) who were found that when humic acid supplemented to Japanese quail diets enhancing body weight gain will be recoded with positive relation with increasing in feedstuff consuming. also the study agreed with(22) who were found that significant enhancing in body weight gain rate was related all ways with adding humic acid to the rations of Japanese quail during rearing period .

But the study disagreed with (15) who found that when humic acid was supplemented to diets there was no effect on body weight gain of broiler all breeding period .

It can be seen from **Table 4** that supplementation of humic acid to drinking water in treatments 2 and 3 (T2,T3) had significant ($p \leq 0.05$) increase in the feed intake (g) of the birds during the first 4 weeks of age as compared to birds to T1 , mean while showed T1 significant increase in the feed intake as compared to birds of other treatment . however no significant difference among the three treatments at the 6th week of age in this trait . In calculation the overall mean of feed consumption of the birds during the whole period (1-6 weeks), the data indicated that T3 had an significant overlap in the amount of feed consumption as compared to birds in T1 and T2 .

The significant increase in feed intake of birds the supplemented treatments may be due to positive relation between body weight increasing and feed consumption rate (29). in addition to that humic acid may have action on increasing the active of usefully microorganisms in the digestive system of bird which may cause an increment in metabolic rate of bird (20).

This result agrees with that of (18) who found a significant increase in feed consumption rate when different concentration of humic acid were supplemented to layer diets in comparison with control treatment . also this study agree with (13 , 10) who found increase in feed intake diets of due to the different concentration of humic acid in layer diets.

Table 4 : The effect of adding humic acid to drinking water on Feed intake (g) for broiler chicks during the period of 1-6 week of age (standard error \pm mean).

Treatments	1 Age in weeks	2 Age in weeks	3 Age in weeks	4 Age in weeks	5 Age in weeks	6 Age in weeks	Total Feed intake (g/ bird)
T1 (control) fresh water	122.99 \pm 2.115 b	255.00 \pm 16.359b	637.42 \pm 19.349 b	790.10 \pm 15.452b	1375.05 \pm 35.746a	1119.24 \pm 97.227	4299.80 \pm 107.415b
T2 Humic acid 3.6 g.L ⁻¹ of water	137.14 \pm 1.840 a	321.10 \pm 3.344a	738.46 \pm 28.806a	875.25 \pm 10.716a	1186.56 \pm 5.892 b	1078.71 \pm 38.592	4337.21 \pm 30.047b
T3 Humic acid 7.8 g.L ⁻¹ of water	142.95 \pm 1.982a	326.77 \pm 3.905a	733.38 \pm 14.075a	883.60 \pm 6.787a	1196.75 \pm 46.334b	1183.46 \pm 43.149	4466.90 \pm 74.336a
significant	*	*	*	*	*	N.S	*

*Means within a column with different letters differ significantly ($P < 0.05$).

N.S = non-significant .

Data in Table 5 indicates the effect of adding humic acid to the drinking water on the Feed conversion ratio (FCR) of broiler it can be seen an significantly improvement ($p \leq 0.05$) in Feed conversion ratio of the birds at the age of first week T3 in comparison with T1 and T2 which were no significant difference between them while no significant different were found between the 2nd week and 3rd week in feed

conversion ratio among all study treatments . while in 4th week of age significant improvement ($p \leq 0.05$) were found for both T2 and T3 in Feed conversion ratio over control grope Best feed conversion ratio was observed in 1.85 , 1.87 respectively while the Feed conversion ratio of control was 2.16 . in fifth and sixth week and total Feed conversion ratio no significant different among treatment in Feed conversion ratio were found .

The reason behind the enhancing of (FCR) in supplemented treatment may due to the reason of the depend on feed consumption diets and increasing in body weight rate (26) . could due to role humic acid in enhancing the permeability improvement of cell membrane and it role of increasing mineral feeding that will enhance feed conversion ratio (17) .

The results of this study accorded with those of (22) who found significant improvement in feed conversion ration when humic acid was supplemented to drink water of broiler . the study accorded with (1,2,15) results who found significant improvement of FCR which were that when humic acid was supplemented there would be an improvement of FCR comparison with control .

Table 5 : The effect of adding humic acid to drinking water on Feed conversion ratio (FCR) for broiler chick to period of 1-6 week of age (standard error \pm mean) .

Treatments	1 Age in weeks	2 Age in weeks	3 Age in weeks	4 Age in weeks	5 Age in weeks	6 Age in weeks	Total (FCR)
T1 (control) Fresh water	1.71 \pm 0.051a	1.50 \pm 0.043	1.85 \pm 0.124	2.16 \pm 0.089a	2.47 \pm 0.130	3.40 0.245 \pm	2.33 \pm 0.052
T2 Humic acid 3.6 g.L ⁻¹ of water	1.71 \pm 0.023a	1.45 \pm 0.063	1.95 \pm 0.057	1.87 \pm 0.097ab	2.36 \pm 0.040	\pm 3.89 0.267	2.24 \pm 0.011
T3 Humic acid 7.8 g.L ⁻¹ of water	1.57 \pm 0.017b	1.51 \pm 0.026	1.85 \pm 0.098	1.85 \pm 0.066b	2.31 \pm 0.142	4.14 \pm 0.310	2.24 \pm 0.035
Significant	*	N.S	N.S	*	N.S	N.S	N.S

*Means within a column with different letters differ significantly ($P < 0.05$).

N.S = non-significant .

We can see from **Table 6** significant increment($p \leq 0.05$) in live chick body weight rates at the end experiment .In the age of sixth weeks for T2,T3 which reached to 1952.92 g , 2012.73g respectively in comparison with control T1 which was 1885.34g only . either the dressing percentage with edible giblets no significant different among treatment were found but there was found a calculated enhancement for T2,T3 in comparison with T1 .

The percentage of heart and liver no significant differences were recorded among treatment of supplemented humic acid in comparison with T1 but there was found calculated increasing for T2,T3 was recorded .

Either is, there was a significant increasing ($p \leq 0.05$) for the percentage of weight of gizzard in T3 which was 1.70% in comparison with T1 and T2 which were the percentage of weight of gizzard 1.34 and 1.47 % respective with no significant different between the both .

The enhancement that been seen when humic acid was upplemented to drink water could be due to the increasing in benefit of feed conversion ration which would cause an increase in living body weight (17) and that may positive work of performance of all feed ingredients in diets and that play a main role in enhance the total body weight of chicks .

This result agree with those of (1) who found a significant increasing of adding humic acid of height total flesh coughing in comparison with control .

Table 6 : The effect of adding humic acid to drinking water on the dressing percentage with edible giblets in broiler at the end experiment (standard error \pm mean).

Treatments	T1 (Control) Fresh water	T2 Humic acid 3.6 g.L ⁻¹ of water	T3 Humic acid g.L ⁻¹ of water	Significant
Living body weight (g)	1885.34 \pm 40.331 b	1952.92 \pm 62.538a	2012.73 \pm 96.593a	*
The dressing percentage with edible giblets%	71.19 \pm 0.927	72.82 \pm 0.583	71.71 \pm 2.195	N.S
Heart %	0.50 \pm 0.025	0.56 \pm 0.027	0.55 \pm 0.013	N.S
Liver %	2.24 \pm 0.104	2.60 \pm 0.097	2.79 \pm 0.093	N.S
Gizzard %	1.34 \pm 0.037b	1.47 \pm 0.046 ab	1.70 \pm 0.122 a	*

*Means within a column with different letters differ significantly ($P < 0.05$).

N.S = non-significant .

As Table 7 indicates, effect of supplemented humic acid to drinking water on the relative weight of essential and secondary carcass parts of broiler at the end of the study .

The results showed a significant increasing ($p \leq 0.05$) of supplemented treatment chicks T3 and T2 in comparison with T1 of the relative weight of thigh and wings , breast and back at the of end experiment . while no found significant different had been shown relative weight of the neck among all in treatment all over the study . The reason behind the significant increasing in relative weight of carcass part for the supplemented treatment may be came from the increasing of body weight rates could be cause arising in flash quantities in essential and secondary carcass parts and that verifies the role of humic acid in enhancing the performance of advantage the feed ele-

ments by active the microorganism in the intestine of chicks which may due to an increasing in body weight through breeding period and that would have are flection on the quantity of meat in essential and secondary carcass party for broiler (27, 28) . The results of this study accorded with those of (22) who found significant increasing in total carcass weight rate and the relative weight of thigh and breast in comparison with control when humic acid was supplemented to drink water . This also agree with (1) who note weight in supplemented treatment in relative weight for thigh and breast in comparison with control grope .

But our study did not agree with (16) result who found no significant different in relative weight for thigh and Brest when humic acid was supplemented to drink water of broiler all over the period of study .

From the present study it can be concluded that :

1- The supplementing of humic acid to drinking water of broiler cause a significant enhancement in production at period of six week .

2- Supplementing humic acid cause of significant enhanced in relative weight of essential secondary carcass part of broiler at six week age .

Table 7 : The effect of adding humic acid to drinking water on relative weight of essential and secondary parts of in broiler at the end experiment (standard error \pm mean) .

Treatments	T1 (control) fresh water	T2 Humic acid 3.6 g.L ⁻¹ of wa- ter	T3 Humic acid 7.8 g.L ⁻¹ of water	significant
Thighs %	24.88 \pm 0.969 b	30.07 \pm 1.281a	30.23 \pm 1.552a	*
Wing %	11.16 \pm 0.401b	13.05 \pm 0.406ab	13.59 \pm 0.997 a	*
Breast %	26.37 \pm 1.604b	32.26 \pm 2.210a	29.73 \pm 1.663a	*
back %	16.26 \pm 0.417b	20.90 \pm 1.047a	20.19 \pm 1.097 a	*
Nick %	4.37 \pm 0.149	4.79 \pm 0.149 a	4.96 \pm 0.187a	N.S

*Means within a column with different letters differ significantly (P<0.05).

N.S = non-significant .

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