Evaluation of Roselle *Hibiscus sabdariffa* Flower as a Nutritive Additives on the Productive Performance of Broiler

Mamdooh A.M. Al-Nasrawi
Technical Institute, Foundation of Technical Education, Baghdad, Iraq
m_abdalsak@yahoo.com
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Summary

The study included 300 unsexed broiler chicks (Hubbard) were used to evaluate (Roselle Flower) as a feed additives on the productive performance of broiler. The chicks were divided into five groups with three replicates (20 birds in each) and fed on five diets. Diet 1 (control group) dried Roselle flower powder were supplemented to the diet 2, 3, 4 and 5 as 0.25, 0.5, 0.75 and 1% respectively. The result revealed that a significant ($P<0.05$) increase in body weight, body weight gain, feed consumption and improvement in feed conversion ratio. Although the differences between groups for edible parts percent were not significant (Heart, Liver and Gizzard). The hematological values PCV%, RBC, WBC and H/L ratio were increased significantly ($P<0.05$) and cholesterol values decreased significantly as compared with control group. It can conclude that Roselle as other herbal plants may be considered as a feed additive in broiler diet would improve the productive performance, hematological and biochemical values of broiler. Diet Roselle flower supplementation of (1g/kg) might be acceptable for achieving optimum broilers performance.

Keywords: Roselle *Hibiscus sabdariffa* flower, Broiler, Performance, Hematology.

Introduction

Medical plants have been used for centuries and have become part of complementary medicine worldwide because of their potential health benefits. Some of their metabolites have been successfully used directly in the treatments and prevention of infectious diseases and cancer, or indirectly by stimulating the immune system (1). One of these plants Roselle (*Hibiscus sabdariffa L.*) is an interesting herb ingredient because its petals consists of anthocyanin and protacatechiuc acid, which have diuretic and choler tic effects, decreasing the viscosity of the blood, reducing blood pressure and stimulating intestinal peristalsis (2).

Hibiscus sabdariffa belong to the family of Malvaceae is an annual shrub commonly used to make jellies, Jams and beverages. The anthocyanin pigments that confer Ross's color make it a valuable food product (3). Roselle, also know sorrel, Mesta and Kerkrade is a popular plant in Middle Eastern countries (4 and 5).

Red color agent in fruit Pigment which has many properties corresponding to biological activities such as antioxidant activity (6, 7 and 8). The petals of the flower are widely used to prepare herbal drink, and seeds are reported to be rich in protein, directory fiber, carbohydrates and fats (5). For antioxidant properties, results have demonstrated that dried calyx extract of Roselle significantly decreased the leakage of lactate dehydrogenizes, (9).

Hibiscus sabdariffa is rich in vitamin C, compared to other fruits. Clinical reports have to be antiseptic and digestive, which is used to normalize blood pressure, also 18 amino acid have found in Roselle. Two of these arginine and lysine works in synergy with glutamic acid to stimulate brain's pituitary gland.

Hibiscus sabdariffa has been reported to be antiseptic, aphrodisiac, astringent, cholagogue, demulcent, digestive, diuretic, emollient, purgative, refrigerant, sedative and tonic (10). Tis study aimed to evaluate *Hibiscus sabdariffa* as feed additive on the production performance of broiler check.

Materials and Methods

The experiment involved three hundred one-day old mixed sixes chicks (Hubbard).

They were obtained from local hatchery and placed in closed house. Chicks were fed on the starter diet (3000 Kcal ME/Kg, 21.3% CP as dry matter basis) for the first three weeks of the experiment. Consequently they were fed on grower period (3086 Kcal ME/Kg, 19.5% CP as dry matter basis) during 3-6 weeks of the experiment. Chicks were weighted and the average weight was assigned into 5 treatment groups of 3 equal replicates (20 chicks each). Chicks were reared in floor pens (1.25 ×1.25 m). Artificial lighting was provided throughout the experiment. Temperature of the house was maintained and vaccination program was applied based on broiler raisers recommendation. Chemical composition of the basal diet is presented in (table, 1).

Table, 1: Chemical composition of the basal chick diet in different periods of the experiment

Ingredient (%)	Starter 1-21 day	Finisher 22-42 day
Yellow Corn	51	53.3
Soybean meal (45% protein)	30	25
Wheat	13.8	15
Oil	1	2.5
Premix	2.5	2.5
Salt	0.3	0.3
Methionine	0.1	0.1
Lysine	0.1	0.1
Di- Calcium phosphate	1.2	1.2
Calculated chemical analysis		
ME(Kcal/kg)	3000	3086
Crude protein %	21.3	19.5
Calcium %	0.69	0.52
Avialablephosphore	0.74	0.69
Methionine	0.33	0.31
Lysine	1.19	1.08

∗Premix (2.5%) Provided the following (Per Kg of complete diets).Vit A. 367500 IU,133500 IU Vit. D3, 1920 mg Vit.E, 84.42 Vit.K3, 50 mg Vit.B1, 150 mg Vit.B2, 500 mg Vit.B3, 177.5 mg Vit.B6, 0.8 mg Vit.B12, 600 mg Vit. PP, 24.5 mg folic acid, 27 mg biotin, 5767.5 mg choline, 2667 mg Fe, 333.75 mg Cu, 3334.06 mg Mn , 203 mg Co , 2334.38 mg Zn , 100.75 mg Ca , 10 mg Se, 65446.46 mg Ph, 36667.5 mg DLMithionine, 200.02mg, Ethoxyquin,50mg Flavophospholipol, 30g Fish meal, 1800g wheat bran.

It was formulated to meet nutrient requirement of broiler chickens (11). Birds in group 1 were fed a basal diet and assigned as a control. Whereas groups 2, 3, 4, and 5 were fed Roselle flower at 0.25%, 0.50%, 0.75% and 1% respectively, in addition to group 1 diet. Chicks of each treatment were fed the respective diets. Water and feed were provided *ad libitum* throughout the experimental period. The average live body weight, body weight gain, feed intake, mortality percent and feed conversion ratio were measured on weekly basis.

At the end of the experiment, birds were slaughtered after fasted for 10 hours, weighted and slaughtered, after removal of edible, non-edible and lymphoid organs carcass was weighted, then relative organ was calculated on live body basis, and spotted for throat and jugular vein using a sharp knife near the first vertebra. From each replicate 10 birds were picked for eviscerating to calculate the dressing percent without the edible giblets. Meanwhile blood samples (5ml) were collected from the bronchial vein with an anticoagulant (Sodium Ethylene Dietary amino) to determine the number of red blood cells (RBC), white blood cells (WBC), packed cell volume (PCV) and hemoglobin (Hb) percentage. Five mls of the blood sample was collected from each bird and serum was separated to determine the concentration of cholesterol and uric acid measured according to the method described by researchers (12). Humeral immune response was evaluated by measuring antibody against Newcastle Disease Virus (NDV) vaccine using Enzyme-linked Immuno sorbent Assay (ELISA) and haemagglutination Inhibition (HI) according to (13 and 14).

Data were analyzed by using the General Linear Model Procedure (15). Means were compared by the Duncan's Multiple Range test at 5% probability (16).

Results and Discussion

The effect of Roselle on broiler performance is presented in (table,2). Body weight, Body weight gain, feed consumption and conversion ratio were significantly ($P<0.05$) improved, while mortality rate was significantly ($P<0.05$) lower when feeding Roselle. This improvement could be due to the active compounds that is presented in Roselle (anthocyanin and protacatechiuc) and its content of vitamin C, which had a positive effect on all cell activity

and increase O_2 consumption and as a result stimulate thyroid gland which play a major role in metabolism (17). Authors (18) reported that there was a positive correlation between vitamin C, which increase the metabolism of phenylalanine and tyrosine, that main amino acid in thyroid hormones synthesis and maintain growth hormone secretion as a result of the increase in basal metabolism.

Table,3 shown the hematological and biological values, there were significant ($P<0.05$) decrease in the value obtained in group that fed different levels of Roselle when compared to control group. This may be due to nutritional and metabolic specificity of those organisms. Earlier speculated that *Hibiscus sabdariffa* extract may inhibit intestinal absorption of lipids (19). Other researchers (9) reported a decreased in triglycerides levels in chickens. The reduction of total blood cholesterol may be to active substrate of Roselle flower. Like most of herbal plants inhibits lipid metabolism by interfering with micelles solubilization of cholesterol in digestive tract which in turn decrease cholesterol absorption and increased the excretion of fecal bile acid cholesterol (20). Also, Roselle flower reduce pancreatic lipase activity and gastric lipase which resulted in a drastic decrease in gastric lipase that causes inhibition of digestive lipids and so likely to reduce fat digestion (21). Additionally, Vitamin C reduces corticoid secretion and so lipoprotein and tissue lipases are consequently not stimulated as a result of which lipids is not mobilized from tissue. Vitamin C also increased the rate of beta-oxidation by stimulating carnitine synthesis leading to reduction of serum triglycerides concentration (22).

Broiler immune system status was measured by ELISA and HI as a response to feeding different levels of Roselle flower, was illustrated in table,4. It is obviously that feeding experimental diets improved the immune status as reflected by ELISA titer compared with that of the control. The highest value was obtained with group fed diet supplemented with (1g/kg) of Roselle flower followed by Roselle flower at (0.75 g/kg) diet. Similar result was recorded with method of HI titer comparing with their value in the control group.

This improvement of antibody level against NDV could be attributed to mineral contents of Roselle flower, which affecting oxygen transportation that was needed for eventually increasing hemoglobin synthesis in the blood (23). Also, (24) reported that several herbs including Roselle flower, can stimulate some of immune system. Mechanism of medicinal plants components may include improving the physical conditions of gut ecosystem and enhancing function of immune system of chicks (25).

Table, 2: Effect of different levels of Roselle flower as feed supplement on the performance of broiler.

Ingredient / Parameters	Roselle Flower (%) in diets				
	0.00	0.25	0.50	0.75	1.00
Initial body weight (g/bird)	40.1 ±0.36	39.9 ±0.45	40.0 ±0.51	38.7 ±0.62	41.0 ±0.38
Final body weight (g/bird)	1911.8 ±102.3 c	2023.7 ± 93.9 b	2118.9 ± 70.4 a	2115.5 ±66.8 a	2123.3 ± 69.7 a
Average body weight gain (g/bird)	1871.7 ±98.7 c	1983.8 ± 96.8 b	2078.9 ± 102.3 a	2076 ±99.8 a	2082.3 ± 94.6 a
Average feed intake (g/bird)	3762.1 ±106.7 c	3927.9 ± 180.3 b	3908.3 ± 156.7 b	3827.3 ± 183.8 c	3998.0 ± 123.4 a
Feed conversion (g.feed/g.weight)	2.01 ±1.20 a	1.98 ±0.91 ab	1.88 ±0.92 c	1.84 ±0.82 c	1.92 ±0.79 bc
Edible giblets					
Heart %	0.69 ± 0.03	0.74 ± 0.04	0.74 ± 0.02	0.77 ± 0.03	0.76± 0.05
Liver%	3.72 ± 0.16	3.68 ± 0.18	3.71 ± 0.19	3.73 ± 0.17	3.12 ± 0.20
Gizzard%	3.14 ± 0.21	3.19 ± 0.19	3.27 ± 0.22	3.71 ± 0.23	3.41 ± 0.20
Dressing percent	71.22 ± 0.19 c	72.6 ± 0.23 c	74.71 ± bc	76.02 ± b	78.51 ± a
Mortality rate %	8.3 a	6.3 b	2.7 c	3.9 c	2.0 c

a,b,c: means had different subscript in each raw were differ significantly ($P<0.05$).

Table, 3: Effect of different levels of Roselle flower as feed supplement on the hematological and biochemical values of broiler.

Ingredient Parameters	Roselle Flower (%) in diets				
	0.00	0.25	0.50	0.75	1.00
Hb (gm/100ml)	8.6 0.43	9.8 ± 0.61	10.9 ± 0.47	11.2 ± 0.58	11.7 ± 041
PCV%	29.6 ± 0.9 c	31.8 ± 0.8 b	33.9 ± 0.9 ab	34.4 ± 0.4 a	35.2 ± 2 a
RBC (10^6/mm3)	3.3 ± 0.06 b	3.8 ± 0.01 a	3.9 ± 0.03 a	4.1 ± 0.05 a	4.2 ± 0.01 a
WBC(10^6/mm3)	6.88 ± 0.06 c	7.31 ± 0.04 b	7.49 ± 0.06 ab	7.58 ± 0.05 a	7.60 ± 0.04a
H / L ratio	0.41 ± 0.03	0.39 ± 0.01	0.39 ± 0.03	0.37 ± 0.05	0.42 ± 0.06
Biochemical values Cholesterol (mg/dl)	157.0 ± 3.2 a	122.8 ± 5.8 b	115.7 ± 4.1 b	116.7 ± 3.7 b	112.5 ± 2.3b
Total protein	3.81 ± 0.07 b	3.79 ± 0.05 b	4.57 ± 0.09 a	4.78 ± 0.06 a	4.89 ± 0.07 a

a,b,c: means had different subscript in each raw were differ significantly (P<0.05).

Table, 4: Effect of dietary levels of Roselle flower as feed supplement on immune system status of broiler.

Roselle flower (%)	Immune system	
0.00	0.34 ± 0.23 c	2.71 ± 0.84
0.25	0.54 ± 0.31 b	2.73 ± 0.78
0.50	0.77 ± 0.22 b	2.70 ± 0.61
0.75	1.98 ± 0.93 a	2.69 ± 0.83
1.00	2.43 ± 1.31 a	2.61 ± 0.94

a,b,c: means had different subscript in each raw were differ significantly (P<0.05).

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تقييم ازهار شاي الكجرات كأضافات غذائية في الاداء الانتاجي لفروج اللحم

ممدوح عبد الرزاق النصراوي
المعهد التقني، هيئة التعليم التقني، بغداد، العراق

الخلاصة

شملت الدراسة 300 فرخة نوع هبرد بعمر يوم واحد غير مجنسة لتقييم أضافة أزهار شاي الكجرات كأضافات علفية على الاداء الانتاجي لفروج اللحم . وزعت الافراخ عشوائيا الى خمسة مجاميع بواقع ثلاث مكررات لكل مجموعة (20 فرخ لكل مجموعة) ، تم تغذيتها على 5 علائق.عليقة 1 (مجموعة السيطرة) خالية من اي اضافة علفية بينما اضيف مسحوق ازهار شاي الكجرات الى العلائق 2 و3و4و5 وفق النسب التالية 0.25، 0.50، 0.75 ، 1.0% على التوالي .تبين من النتائج حصول زيادة معنوية ($P<0.05$) في كل من وزن الجسم، معدل الزيادة الوزنية اليومية، استهلاك العلف وتحسن في نسبة التحويل الغذائي.ورغم

ان الاختلافات بين المجاميع في نسب الاعضاء الداخلية الماكولة (القلب والكبد والقانصة) كانت غير معنوية فأن قيم الصفات الدمية WBC و RBC وPCV قد ازدادت بصورة معنوية وانخفضت قيم الكوليستيرول معنويا مقارنة مع مجموعة السيطرة. نستنتج ان الكجرات كبقية الاعشاب يمكن اعتبارها كأضافات غذائية في علائق فروج اللحم والتي يمكن لها ان تحسن الاداء الانتاجي وبعض الصفات الدمية والكيمياحيوية وان النسبة 1% تعد مقبولة للحصول على اداء انتاجي افضل في فروج اللحم.

الكلمات المفتاحية:ازهار شاي كجرات, الاداء الانتاجي, فروج الحم , الصفة الدموية.