



Effect of aqueous extract of *Borago officinalis* L. on the productive performance of broiler

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Received: Mar. 11, 2026	Abstract This experiment was conducted to investigate the effect of adding aqueous extract of borage flowers to the drinking water of broiler chickens in the poultry farm, College of Agriculture, University of Karbala, from April 21, 2025, to May 27, 2025, at concentrations of 0,10, 20, and 30 ml/L. One hundred chicks at one 121-day-old, unsexed Ross 308 broiler chicks were used, with an average initial weight of 40 g. The chicks were randomly distributed into four experimental treatments, with 30 chicks per treatment and three replicates (10 chicks per replicate). The results showed a highly significant improvement ($p \leq 0.05$) in all productive traits of broiler chickens in favor of third treatment T3, including final weight, feed consumption, and feed conversion ratio.
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Introduction

Poultry projects are of great importance for achieving economic growth and sustainable development in developing countries. Broiler farming is now referred to as the broiler industry [1]. One of the top priorities of the poultry industry has been identifying nutritional supplements that can enhance the health of the organism, with regard to both quantitative and qualitative outputs [2]. Medicinal plants have been used in the natural treatment of many diseases for centuries, and now phytotherapy appears to be a complementary method to traditional drug treatment for many diseases[3]. One of these plants is *Borago officinalis* L., a perennial plant with blue flowers native to the Mediterranean basin, which was then transferred to Europe, Asia, Africa, and South America. *Borago officinalis* L. is used in Greek medicine to stimulate the brain and the internal and external senses, activate the nerves, activate the heart, and support the respiratory system, in addition to problems with the biliary system, skin diseases, and other diseases[4]. These properties are linked to its rich content of biologically active compounds derived from various parts, including leaves, flowers, seeds, and roots [5]. Its importance lies in its ability to remove free radicals from living cells. Active compounds can protect cells from damage resulting from metabolic processes that lead to excessive oxidation[6]. [7] indicated that borage extract positively affects the growth and immune system performance of broiler chickens raised at high stocking densities.

Weight gain and feed intake were measured weekly, and immune system function was examined twice. Borage extract improves weight gain, feed intake, and feed conversion ratio in broiler chickens. The aim of this research is to study the effect of plant extracts on some productive traits of chickens.

Materials and Methods

Experimental Conditions

It was conducted in the poultry field, the, College of Agriculture, University of Karbala, for the period from 4/21/2025 to 5/27/2025 , 120 one-day-old unsexed broiler chicks of Ross308 strain were used with an initial weight of 40 g. The chicks were randomly distributed into four treatments, 30 chicks per treatment and three replicates per treatment (10 chicks/replicate). As follows:

T1: Control treatment without any addition to the drinking water.

T2: Adding aqueous extract of borage flower at a concentration of 10 ml/liter to drinking water.

T3: Adding aqueous extract of borage flower of 20 ml/liter to drinking water.

T4: Adding aqueous extract of borage flower of 30 ml/liter to drinking water.

Preparation an aqueous extract of the powdered borage flowers

Dried borage flowers were obtained from a market in the holy city of Karbala. The extract was then prepared according to the method of [8]. by mixing 1 ml of the dry powder with 2 ml/liter of distilled water using an electric mixer. The solution was left at room temperature for 24 hours. The solution was then placed in a bath at 60°C for 1 hour and filtered through medical gauze.

Chick feeding

The chicks were raised in two three-story cages, with an area of 1 x 2 m per floor. The floor was divided into two sections measuring 1 x 1 m. Each cage contained 10 broiler chicks. Gas incubators and electric heaters were used to heat the hall, and the temperature was regulated by an electronic thermometer from the age of 1 day until the marketing age (37) days throughout the experiment . All the conditions for raising broiler chicks were provided, such as of feed and water. A continuous lighting system was used 24 hours a day during the first three days of the chicks' life, with one hour of darkness given throughout the days of raising, feed was provided to the birds freely and plastic feed dishes with a diameter of 40 cm were used in the first week, one dish for each chick, water was prepared and provided in inverted plastic troughs with a capacity of 5 liters throughout the rearing period. The chicks were fed ready-made feed (Pellet feed pellets prepared by the Oasis Factory in the holy Karbala Governorate) that included three stages of fee . the first was the starter feed used from 1-14 days of age; the second grower which was finisher which used from 15-28 days of age; and the third was used from 29 days to 37 days of age, table 1.

Table (1): Chemical components of chicken feed from 1-35 days

Third feed from 29-35 days		Secend feed from 15-28 Days		First feed from 1-4 days	
Com-puted chemical analysis	Nutritional components	Computed chemical analysis	Nutritional components	Com-puted chemical analysis	Nutritional components
3150	Representa-tive en-ergy(K.K)	3100	Representa-tive en-ergy(K.K)	3010	Representa-tive en-ergy(K.K)
17.77%	% raw pro-tein	20.31%	% raw pro-tein	22.80%	% protein
0.64%	% Ca	0.38%	% Ca	0.42%	% Ca
3.23%	% fat	4.45%	% fat	3.39%	% fat
1.99%	% Fiber	2.37%	% fiber	2.43%	% Fiber
0.78%	% Ka	0.96%	% Ka	1.06%	% Ka
10.99%	% moisture	8.33%	% moisture	10.38%	% Moisture
0.14%	% Na	0.140%	% Na	0.17%	% Na
0.54%	% p	0.61%	% p	0.69%	% p
49.00%	% Starch	47.89%	% Starch	38.42%	% Starch
4.41%	% Ash	5.53%	% Ash	6.27%	% ash

Studied Characteristic

Productive Characteristic

Average weekly body weigh

The chicks were weighed at 1 day of age, and then weighed weekly for each replicate of the experimental treatments during the experimental period, using an electronic balance to weigh the birds in each replicate (10 birds/replicate). The following equation was applied to determine the average weight of the live bird within one replicate, which was mentioned by [9]:

$$\text{Average weekly body weight (g)} = \frac{\text{Refined in total birds weights}}{\text{Total number of birds in the replicate}}$$

Weight gain rate

The weekly weight gain was calculated according to the following equation: weekly weight gain = live body weight at the end of the period - live body weight at the beginning of the period, as reported by [9].

Weekly feed consumption

The amount of feed consumed each week was calculated by weighing the amount of feed remaining at the end of the period and subtracting it from the total amount provided during the period, according to the equation provided by [9]:

Weekly feed consumption (g) = feed provided at the beginning of the period - Feed remaining at the end of the period.

Feed Conversion Factor

According to the weekly feed conversion factor as reported by [9] in the following equation:

$$\text{Average amount of feed consumed weekly (g)} = \frac{\text{Average amount of feed consumed per week (g)}}{\text{Average weekly weight gain (g)}} \dots$$

Statistical Analysis

A completely randomized design (CRD) was used to study the effect of different treatments on the studied traits. Significant differences between means were compared using [10] multiple-choice test at significance levels of 0.05 and 0.01. The [11] software was used for statistical analysis.

Results and Discussions

Effect of borage extract on the average weekly body weight

Table (2) and fig.1. indicate that there are significant differences between all treatments and that T3 ($\alpha \leq 0.05$) is significantly superior to T1 and T4, while T1 recorded the highest feed conversion ratio which was 1.826.

Table 1. and Fig 2. The results indicated for all in results and discussions no significant differences between the treatments and the T1. T3 significantly outperformed T2, T3, T4, and T2, recording 3672.17, 3457.95, and 3539.21, respectively, while T1 recorded 3595.59 g. in relation to feed consumption the results show significant differences among treatments and other treatments over the T1, and T3 was significantly superior ($\alpha \leq 0.05$) to the control treatment and the other treatments. The control treatment (T1) recorded the lowest weight gain. Results appeared significant differences in cumulative weight gain in (T1-T4), with T3 outperforming the T1 and supplementation T2 and T4, while T1 recorded the lowest weight gain of 1968.23 g.

Table 1 and Figure 4 show that treatment T3 was statistically superior ($p \leq 0.05$) to treatment T1, while the control group T1 recorded the lowest weight gain. Regarding cumulative weight gain, there were significant differences among all treatments, with T3 outperforming T1, T2, and T4, while T1 recorded the lowest weight gain at 1968.23 grams.

Table (2): The final weight, weight gain rate, feed consumption (g) and feed conversion ratio for broiler chickens.

Treatment	Food conversion factor	Cumulative feed consumption	cumulative weight gain	Final weight
T1	$0.0154 \pm .1826$ d	40.56 ± 3595.59 Ab	5.49 ± 1968.23 d	4.97 ± 2007.73 d

T2	0.0057 ± 1.624 b	16.26 ± 3539.21 Bc	$.233 \pm 2178.67$ b	1.85 ± 2218.67 b
T3	$0.0099 \pm .1605$ a	26.31 ± 3672.17 A	3.75 ± 2288.00 a	3.19 ± 2326.67 a
T4	$0.0069 \pm .1649$ c	18.61 ± 3457.95 C	2.56 ± 2096.56 c	2.51 ± 2137.00 c
Morale level	*	*	*	*

T1: Control without (addition). T2: Addition of 10 ml/liter of borage flower aqueous extract. T3: Addition of 20 ml/liter of borage flower aqueous extract. T4: Addition of 30 ml/liter of borage flower aqueous extract.

different letters within columns refers to significant different at ($p \leq 0.05$) for all tables.

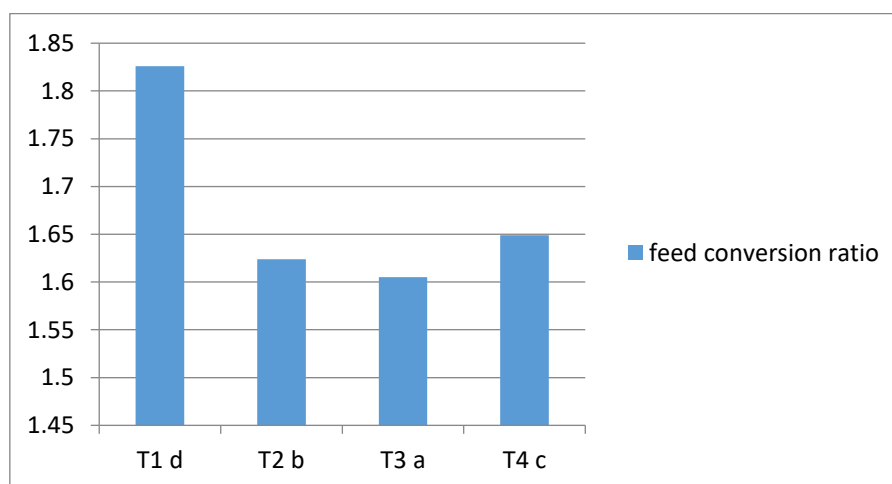


Figure (1): Effect of adding aqueous extract of borage flower powder to drinking water on the feed conversion ratio of broiler chickens.

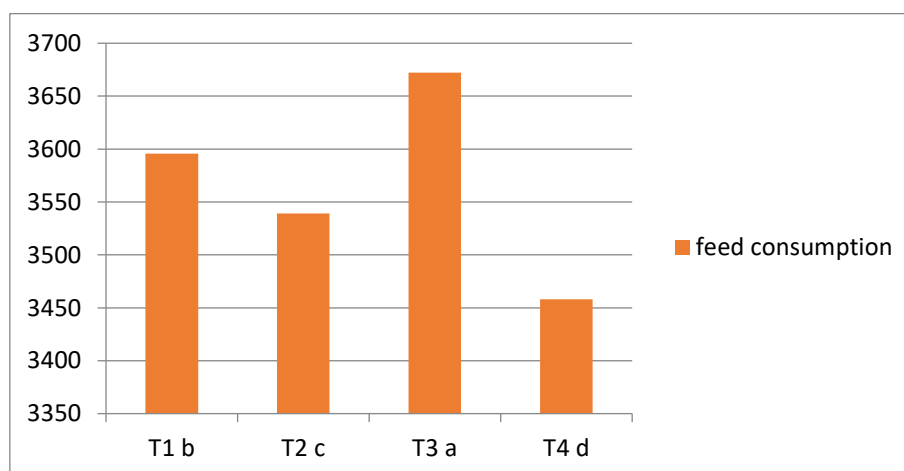


Figure (2): Effect of adding aqueous extract of borage flower powder to drinking water on the cumulative feed consumption of broiler chickens.

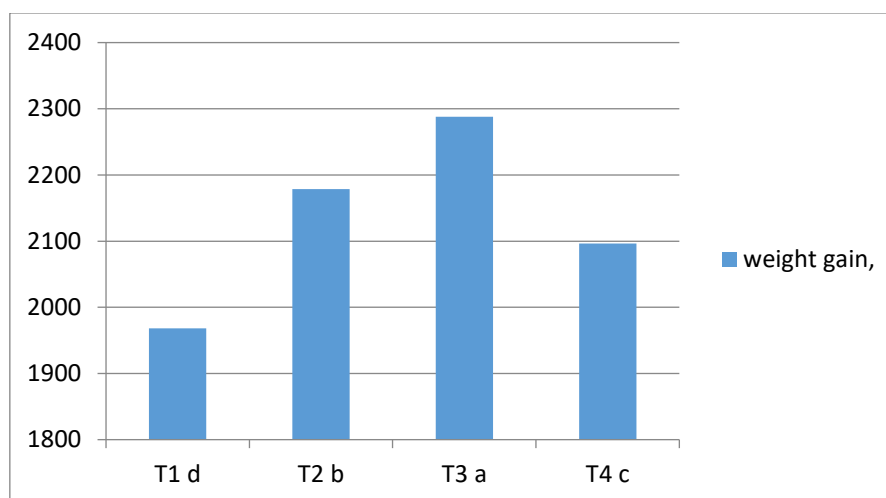


Figure (3): Effect of adding aqueous extract of borage flower powder to drinking water on the final weight gain rates of broiler chickens.

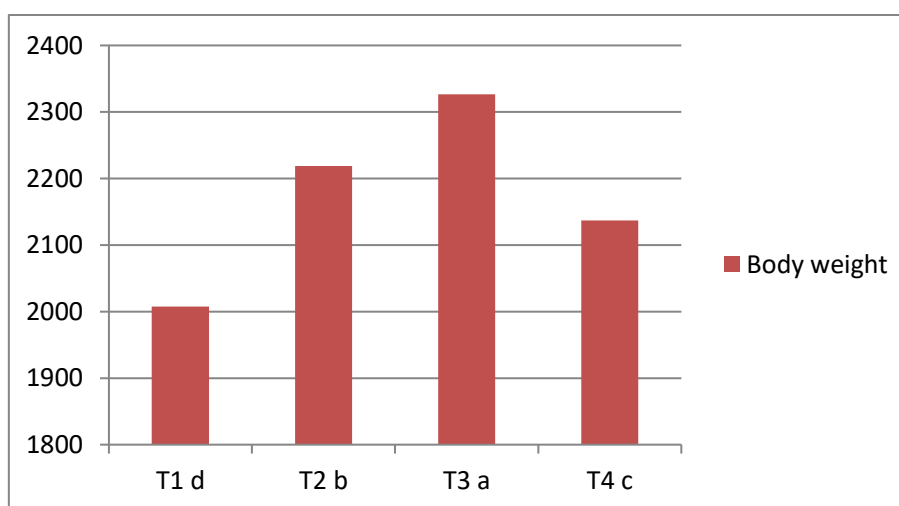


Figure (4): Effect of adding borage powder extract to drinking water on the average weekly body weight

From the results in Table No. 2, it is clear that adding the aqueous extract of borage plant to the drinking water of broiler chickens improved production characteristics for T3, including weekly weight gain, final weight gain, feed consumption rate, and food conversion rate, were 571.83 gm, 2290g, 1376.41 g and 1.605 g respectively.

These results are consistent with what [12] found when feeding broiler chickens an aqueous extract of pomegranate peels and improves the food conversion rate [13] [14]. stated that these herbs act as a nutritional supplement, in addition to stimulating the brain, stimulating the internal and external senses, activating the nerves, activating the heart, and also the respiratory system, in addition to problems of the biliary liver, skin diseases and other diseases [15,4]. which improves food digestion by stimulating

the secretion of digestive enzymes, which leads to improved digestion of the food consumed[16], which in turn helps in the growth of better broiler chickens[7,17].

15% borage plant led to improvements in production characteristics, including final body weight, weight gain, feed consumption, and feed conversion ratio. The increase in feed consumption and feed conversion ratio, in turn, had a positive impact on the final body weight.

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