IMPACT OF AQUEOUS AND ALCOHOLIC EXTRACTS OF HIBISCUS POWDER AT DIFFERENT AGES ON SOME PRODUCTIVE TRAITS OF BROILER ROSS308

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ABSTRACT:
This experiment was conducted at the Agricultural Research and Experiment Station from December 22, 2025, to January 26, 2026. The aim was to study the effect of aqueous and alcoholic extracts of hibiscus powder on the productive performance of broiler. 450 one-day-old Ross 308 broiler chicks, weighing an average of 38.52 gm, were used. The chicks were divided into five treatments: control, aqueous extract of hibiscus powder at concentrations of 2 and 4 ml/L of drinking water, and alcoholic extract at concentrations of 2 and 4 ml/L of drinking water. The chicks were divided into three age groups (7-35 days, 14-35 days, and 21-35 days). The results indicated that adding the alcoholic extract of hibiscus powder at a concentration of 4 ml/L of drinking water improved the productive performance of the broiler chickens aged 7-35 days compared to the other treatments.

Keywords: Aqueous, alcoholic extracts, hibiscus, different ages, productive, broiler.

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INTRODUCTION:

Poultry is a dynamic industry that requires new innovations to increase productivity and sustainability. Of these alternatives, bioactive plants (i.e., plant-derived products, known to be favourable for health and environmental reasons) have attracted a lot of interest (Nassar and Abbas, 2025). Such natural additives provide a good alternative to traditional growth boosters and are in agreement with the objective of ecologically friendly agricultural production in the world (Al Salman & Al-Gharawi, 2019). According to Al-Gharawi and Al-Salman (2023) bioactive plants comprise a variety of phytochemicals such as essential oils, herbs, spices and extracts. Most potential of the biological properties of these compounds is due to the presence of large amounts of these bioactive molecules like terpenoids, alkaloids and flavonoids. Traditionally a therapeutic substance, plants are now being studied for their potential as a booster of poultry production (Al-Salman and Al-Gharawi, 2023). In poultry farming, Hibiscus is especially beneficial as it acts as a natural intestine wash, cleaner, detoxifier and boost to the immune system due to its vitamin C content and organic acids (citric and malic acid). Additionally, it promotes weight gain, increases blood circulation, and reduces heat stress, which ultimately leads to higher animal production efficiency (Nasrawi, 2013; Al-Gharawi et al., 2014). This research aims to evaluate how aqueous and alcoholic extracts of hibiscus powder influence the productive performance of broiler chickens.

Materials and Methods:

The experiment took place from **December 22, 2025** to **January 26, 2026**, within the Agricultural Research and Experiment Station at the College of Agriculture at Al-Muthanna University in the poultry farm broiler house. **450 unsexed Ross 308 hybrid broiler chicks** of **38.52 grams weight**, each one day old, were included in the study. The chicks were raised using a 4-layered battery cage system where each tier included a cage measuring **1.5 by 1 meter**. Chicks of the experimental protocols were matched randomly to each of the five treatments with 30 chicks in each treatment, and three replicates of **10 chicks each**.

Following were details of experimental treatments:

T1: Control treatment.
T2: Add the aqueous extract of hibiscus powder at a concentration of 2 ml/L of drinking water.
T3: Add the aqueous extract of hibiscus powder at a concentration of 4 ml/L of drinking water.
T4: Add the alcoholic extract of hibiscus powder at a concentration of 2 ml/L of drinking water.
T5: Add the alcoholic extract of hibiscus powder at a concentration of 4 ml/L of drinking water.

With three age groups (7-35 days, 14-35 days, and 21-35 days).

Four-tiered batteries, each measuring 1.5 x 1 m, were used to raise the chicks. Ten broiler chicks (one replication per treatment) were kept in each tier. From the first day until market age (35 days), the temperature was controlled with a mercury thermometer. The Ross 308 hybrid handbook was followed when using gas incubators and exhaust fans. There were all the circumstances needed to raise broilers. They have unlimited access to food and drink. From the first day of the chicks' life, a 24-hour lighting system was in place.

Plastic feeders with a diameter of 38 cm were used during the first week, one per tier. These were then gradually replaced with cylindrical feeders, similar to those used in battery cage rearing systems. Clean water was provided in inverted 5-liter plastic waterers until the end of the experiment. The birds were fed two types of rations: Starter ration from 1 to 15 days of age, and finisher ration from 16 days of age until the end of the experiment at 35 days of age.

Results and Discussion:

Table (1) shows the effect of (aqueous and alcoholic) hibiscus extracts at different ages on the mean body weight of broiler chickens. These treatments were important as they strongly affected the average final weight of these chickens. Of interest, treatment T5 showed significant improvement over treatment T4, which in turn outperformed treatment T3, whereas treatment T2 also improved on the control treatment (T1). In addition, there was a marked increase of treatment T2 relative to the control group. In terms of administration age, results revealed that administration from 7 to 35 days resulted in a considerable increase when compared to the intervals of 14 to 35 days and 21 to 35 days. Additionally, there was a significant interaction effect observed between the treatments and the age at which they were administered concerning the average body weight of broiler chickens. Specifically, treatment T5 applied during the age range of 7-35 days yielded the highest average body weight at 1926.46 grams, whereas the control group recorded an average weight of 1736.62 grams during the period from 21 to 35 days.

Table (1) Effect of aqueous and alcoholic extracts of hibiscus powder at different ages on body weight (gm) at 35 days of age of broiler (mean ± standard error).

Treatments	Giving age (day)			Mean	Sig.
	7-35	14-35	21-35		
T1	1736.42±13.62 E	1736.42±13.62 D	1736.42±13.62 D	1736.42 E	N.S
T2	1815.37±9.84 Da	1797.66±9.84 Ca	1762.13±9.84 Cb	1791.72±9.84 D	*
T3	1857.81±11.78 Ca	1819.98±11.78 Bb	1792.64±11.78 Bb	1805.87±11.78 C	*
T4	1888.59±12.08 Ba	1839.74±12.08 Bb	1813.63±12.08 Ab	1847.32±12.08 B	*
T5	1926.46±15.27 Aa	1878.84±15.27 Ab	1837.59±15.27 Ac	1880.96±15.27 A	*
Mean	1844.93±15.27 a	1814.53±15.27 b	1800.96±15.27 b		*
Sig.	*	*	*	*	

Capital letters within a single column indicate significant differences between transactions below the significance level 0.05.
Lowercase letters within the same row indicate significant differences in age at giving below the significance level 0.05.

Table (2) illustrates the impact of both aqueous and alcoholic hibiscus extracts administered at various ages on the weight gain rate of broiler chickens. These treatments significantly affected these chickens' cumulative weight gain. Notably, Treatment T5 had greater improvements than Treatment T4 and also showed significant enhancement compared to Treatment T3. Moreover, Treatment T5 significantly resulted in improvement over Treatment T2. A huge increase was seen when compared to the control treatment (T1). On the analysis of age-related administration, a remarkable surge was seen in 7-35 day old subjects where the 14-35 and 21-35 day groups all fell short of this. This also shows a clear difference between these latter age groups. Additionally, a significant interaction effect emerged between the treatments and age regarding the cumulative weight gain observed in broiler chickens. Specifically, Treatment T5 administered during the 7-35 day period yielded the highest average weight gain of 1887.94 grams, surpassing the control treatment's average weight gain of 1697.90 grams noted during the 21-35 day period.

Table (2) Effect of aqueous and alcoholic extracts of hibiscus powder at different ages on weight gain (gm) at 35 days of age of broiler (mean ± standard error).

Treatments	Giving age (day)			Mean	Sig.
	7-35	14-35	21-35		
T1	1697.90±13.62 E	1697.90±13.62 D	1697.90±13.62 D	1697.90 E	N.S
T2	1776.85±9.84 Da	1759.14±9.84 Ca	1723.61±9.84 Cb	1753.20±9.84 D	*
T3	1819.29±11.78 Ca	1781.46±11.78 Bb	1754.12±11.78 Bb	1767.35±11.78 C	*
T4	1850.07±12.08 Ba	1801.22±12.08 Bb	1775.11±12.08 Ab	1808.80±12.08 B	*
T5	1887.94±15.27 Aa	1840.32±15.27 Ab	1799.07±15.27 Ac	1842.44±15.27 A	*
Mean	1806.41±15.27 a	1776.01±15.27 b	1762.44±15.27 b		*
Sig.	*	*	*	*	

Capital letters within a single column indicate significant differences between transactions below the significance level 0.05.
Lowercase letters within the same row indicate significant differences in age at giving below the significance level 0.05.

Table (3) shows the effect of aqueous and alcoholic hibiscus extracts at different ages on the total feed intake of broiler chickens. The treatments had a significant effect on the cumulative feed intake of broiler chickens. A significant increase was observed with treatment T5, compared to treatment T3, which showed a significant increase compared to treatments T1 and T2. Regarding the age at which feed was administered, the results showed a significant increase at 7-35 and 14-35 days, compared to 21-35 days. The results also indicate a significant interaction effect between treatments and feeding age on the cumulative feed intake of broiler chickens. Treatment T5, at 14-35 days of feeding age, resulted in the highest cumulative feed intake, reaching 3207.68 gm, compared to the control treatment at 21-35 days of feeding, which had an average of 3077.48 gm.

Table (3) Effect of aqueous and alcoholic extracts of hibiscus powder at different ages on Feed intake (gm) at 35 days of age of broiler (mean ± standard error).

Treatments	**Giving age (day)**			**Mean**	**Sig.**
	7-35	**14-35**	**21-35**		
T1	3088.48±27.33 D	3088.48±42.86 C	3088.48±28.72 C	3088.48 C	N.S
T2	3111.26±58.62 CD	3118.96±59.18 C	3074.92±39.39 C	3101.71±31.52 C	N.S
T3	3152.83±29.14 C	3149.62±63.48 B	3120.58±42.71 B	3141.01±27.46 B	N.S
T4	3183.97±34.75 Ba	3168.35±58.44 Bab	3134.84±44.29 ABb	3162.39±40.74 AB	*
T5	3201.95±33.19 Aa	3207.68±39.58 Aa	3159.17±27.83 Ab	3189.60±26.26 A	*
Mean	3147.70±25.39 a	3146.62±19.62 a	3115.60±11.92 b		*
Sig.	*	*	*	*	

Table (4) shows the effect of aqueous and alcoholic hibiscus extracts in broiler chickens at different ages on the feed conversion ratio. The effectiveness of the treatments on the feed conversion efficiency was notable. Treatment T5 notably enhanced significantly in relation to treatments T3 and T2, and also compared positively to the control. When we look at the age of introduction for the plant, there was a significant positive impact during 7 to 35 days compared to 14 to 35 and 21 to 35 days. There was also significant interaction effect of the treatments with the timing of introduction for the feed conversion ratio in broiler chickens. More specifically, treatment T5 introduced between 14 and 35 days produced an optimum feed conversion ratio of 1.696 g/g weight gain, compared with the control group introduced during 21-35 days and experienced the highest ratio of 1.819 g/g feed intake per g weight gain.

Table (4) Effect of aqueous and alcoholic extracts of hibiscus powder at different ages on Feed Conversion (gm feed intake/ gm weight gain) at 35 days of age of broiler (mean ± standard error).

Treatments	**Giving age (day)**			**Mean**	**Sig.**
	7-35	**14-35**	**21-35**		
T1	1.819±0.009 E	1.819±0.009 D	1.819±0.009 D	1.819 C	N.S
T2	1.751±0.010 Da	1.773±0.009 Cab	1.784±0.008 Cb	1.769±9.84 B	*
T3	1.733±0.007 Ca	1.768±0.013 Bb	1.779±0.009 BCb	1.760±11.78 B	*
T4	1.721±0.006 Ba	1.759±0.014 ABb	1.766±0.011 ABb	1.749±12.08 AB	*
T5	1.696±0.008 Aa	1.743±0.008 Ab	1.756±0.007 Ab	1.732±15.27 A	*
Mean	1.736±0.016 a	1.769±0.010 b	1.781±0.008 b		*
Sig.	*	*	*	*	

Using Table (5), it can be observed that there are different aqueous and alcoholic extracts of hibiscus, which affect the production index of broiler chickens at each different age. These treatments can be seen to significantly improve the feed conversion ratio in broiler chickens. Treatment T5 increased significantly over treatment T2 which significantly outperformed control. At follow-up date at age of chickens fed 7-35 days, the

improvement occurred significantly in comparison to 14-35 days and 21-35 days. They showed that such interaction effect between treatments and age was statistically significant in the production index among broiler chickens. The highest production index was 324.54 when Treatment T5 (14-35 days) compared with the control treatment (21-35 days) at mean 266.69.

Table (5) Effect of aqueous and alcoholic extracts of hibiscus powder at different ages on production index of broiler (mean ± standard error).

Treatments	Giving age (day)			Mean	Sig.
	7-35	14-35	21-35		
T1	272.74±1.22 C	266.69±1.08 C	266.69±2.17 B	266.69 C	N.S
T2	296.22±0.97 Ba	283.48±0.89 Bab	282.21±1.49 Ab	287.30±0.84 B	*
T3	306.29±1.08 Ba	287.89±2.01 Bb	287.90±1.66 Ab	294.03±0.88 AB	*
T4	313.54±0.88 ABa	292.57±1.14 ABb	293.42±0.92 Ab	299.84±1.27 AB	*
T5	324.54±0.78 Aa	301.67±0.66 Ab	298.99±1.07 Ab	308.40±1.34 A	*
Mean	302.67±0.86 a	286.46±0.75 b	285.84±1.28 b		*
Sig.	*	*	*	*	

The improved productivity across all extract treatments of hibiscus powder may be attributed to several factors. Hibiscus (*Hibiscus sabdariffa*) contains a rich array of bioactive compounds, most notably anthocyanins (responsible for its red color and antioxidant properties), phenolic acids, and flavonoids (such as quercetin and goosepetin). It is also known for its content of organic acids (citric, malic, and tartaric acids) and polysaccharide compounds, giving it anti-inflammatory, antioxidant, and blood pressure-lowering properties (Amaya-Cruz *et al*., 2019; Cira-Chávez *et al*., 2025).

These active compounds have positive effects on the body's cells. They stimulate cell activity and increase oxygen consumption. By stimulating the thyroid gland to contribute to increased vital bodily functions, the secretion of growth hormone increases. This, in turn, increases the basal metabolic rate. This improves the productive recital of broiler chickens (Maggawa *et al*., 2020; Yeom *et al*., 2025).

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