

Article**Effects of licorice aqueous extract on the productive characteristics of Chinese ducks**

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*Correspondence: jasingharawi@gmail.comAvailable from: <http://dx.doi.org/10.21931/RB/CSS/2023.08.02.84>**Abstract**

This study was conducted at a private field for duck breeding in Al-Muthanna Governorate from 12/14/2021 to 02/14/2022. The field experiment was included to study the effect of adding an aqueous extract of licorice to drinking water on the productive performance of Chinese ducks. A total of 60 unsexed, one-day Chinese duck chicks were used, prepared from one of the hatcheries in Al-Qadisiyah Governorate, were randomly distributed to 4 treatments, included 3 replicates (5 chicks each replicate), the treatments were as follows: T1: control treatment. T2, T3 and T4 were 5, 10 and 15 ml aqueous extract of licorice /liter of drinking water. The results show that there was a significant improvement in all the studied productive traits (body weight, weight gain, feed intake, food conversion) at the treatment of licorice aqueous extract in drinking water, in addition to the high level of licorice aqueous extract (15 ml of licorice per each liter of drinking water), which gave the best results and significantly.

Keywords: licorice aqueous extract, productive traits, Chinese ducks.

Introduction

The change in human lifestyle in many countries economic development and high standard of living for citizens led to a focus on sources rich in nutrients, including poultry products of meat and eggs, which was one of the important sources of animal protein. Therefore, developed countries have provided these resources by raising many domestic birds, such as chickens, turkeys and quails¹.

Duck farming projects are spread in different parts of the world, a food source and one of the finest types of meat. All breeds of domesticated ducks descend from *Anas platyrhynchos*, except for the wild-type Muscovy ducks called Mallard². It is believed that ducks were domesticated more than 2,000 years ago. The production of commercial ducks began a long time ago in China, before other parts of the world³. Due to the world's steadily increasing population, providing more animal protein was inevitable. Therefore, the interest in duck production will be a tributary in providing food security⁴.

Due to the indiscriminate use and adverse effects of antibiotics and medicines used for poultry, poultry specialists focused on medicinal plants, the most important of which is licorice. Licorice (*glabra Glycyrrhiza*) is considered one of the oldest medicinal plants. Its use dates back to the time of the Pharaohs, who used to mix it with medicines and drugs^{5,6}.

Adding licorice extract to poultry feed has positive production positive and practical properties of licorice extract. It has been indicated by Al-Daraji et al.⁷ that licorice stimulates appetite and encourages digestion, increases the rate of blood flow in the mucous membranes of the alimentary canal, increases feed intake of nutrients and the efficiency of its utilization, used to increase body weight as glycyrrhizin, Glyceric acid are components of licorice, which have an effect similar to the actions of steroid hormones.

Al-Daraji et al.⁸ indicated a significant increase in body weight for broilers when licorice extract was given at 450 mg/liter of water. The best results were achieved, also, show that licorice treatments for broilers. The highest rate of weight gain was recorded from 1-4 weeks and 4-7 weeks; 450 mg / L of water recorded the highest weight gain during 4-7 weeks and had the highest weight gain for weeks 1-4. Adding licorice extract to broiler drinking water led to high weight gain.

The current study aims to determine the aqueous extract of licorice on the productive performance of Chinese ducks.

Materials and Methods

This study was carried out at a private field for duck breeding in Al-Muthanna Governorate, from 12/14/2021 to 02/14/2022, from 7/12/2021 to 1/2/2022. The field experiment was included to study the effect of adding licorice aqueous extract to drinking water on the productive performance of Chinese ducks.

60 unsexed, one-day Chinese duck chicks were used, prepared from one of the Al-Qadisiyah Governorate hatcheries, and randomly distributed to 4 treatments. Each treatment included three replicates (5 chicks for each replicate). The treatments were as follows:

T1: control treatment.

T2: 5 ml/L water aqueous extract of licorice.

T3: 10 ml /L water aqueous extract of licorice.

T4: 15 ml /L water aqueous extract of licorice.

The chicks were reared on the floor in a particular room for raising ducks, it provided all the conditions for breeding ducks. The hall has been divided into 12 pens with dimensions of 200 cm x 125 cm per pen.

Licorice extract was obtained from local markets, which was extracted by cutting licorice and then crushing it, transferred to large basins for soaking with water, by heating with steam, the juice extracted, which constitutes 10% of the substance. The juice is then transferred, where it is heated to a certain degree to extract 50%, and then this extracted juice is transferred to the licorice center, which was used in drinking water for ducks.

Studied traits

Body weight, Weight gain, Feed intake and Feed conversion were used in this study.

The statistical analysis

The statistical analysis of the studied traits was carried out according to a complete random design (CRD) using the ready-made statistical program⁹, and the significant differences between the means were compared using the Duncan¹⁰ multiple range test.

Results

The effect of different levels of licorice aqueous extract on the body weight of Chinese ducks was studied (Table 1). There were no significant differences in body weight at the beginning of the experiment. At the fourth week of the life of the birds, the treatment T4 showed significant superiority, which amounted to (732 gm), compared to T2, which averaged 693 gm, compared to T1, which amounted to 625 gm. No significant differences between T2, T3 and T3, T4. At the end of the

experiment (8 weeks), T4 was superior, which averaged 1611 gm, to T3, which averaged 1537 gm, which was superior to T2, which averaged 1503 gm. It was superior compared to T1, which averaged 1318 gm.

Treatment	Age		
	1 day	4 weeks	8 weeks
T1	41.8	625 c	1318 d
T2	42.7	693 b	1503 c
T3	42.4	717 ab	1537 b
T4	41.9	732 a	1611 a
Sig.	N.S	0.05	0.05

Table 1. The effect of different levels of licorice aqueous extract on the average live body weight (gm) of Chinese ducks.

The effect of licorice aqueous extract on the rate of weight gain of Chinese ducks was studied, as listed in Table 2. At the fourth week of the life of the duck, T4 showed significant superiority ($P \leq 0.05$), which amounted to (690.1 g), compared to treatment T2, which averaged 650.3 g, superior compared to T1, which amounted to 583.2 gm—no significant differences between T2 and T3 and T3 and T4. At 8 weeks, the T4 treatment was significantly superior ($P \leq 0.05$), which averaged 879 gm, compared with treatment T3, which averaged 820 gm, and T2, which averaged 810 gm, was significantly superior ($P \leq 0.05$), compared to the control treatment, which averaged 693 gm. In total weight gain, a significant superiority ($P \leq 0.05$) of T4, which averaged 1569.1 gm compared to T3 (1494 gm), which was significantly superior ($P \leq 0.05$) compared to T2 (1460.3 gm), which showed a significant superiority ($P \leq 0.05$) compared to the control treatment, which averaged 1276.2 gm.

Treatment	Age		Total
	4 weeks	8 weeks	
T1	583.2 c	693 c	1276.2 d
T2	650.3 b	810 b	1460.3 c
T3	674.6 ab	820 b	1494.6 b
T4	690.1 a	879 a	1569.10 a
Sig.	0.05	0.05	0.05

Table 2. The effect of different levels of licorice aqueous extract on Chinese ducks' weight gain (gm).

Table 3 indicates the effect of the aqueous extract of licorice on the feed intake of Chinese ducks. In the fourth week of bird life, T4 showed superiority, which amounted to 1870.17 gm, and T3, which amounted to (1855.15 gm) compared to T2, which averaged 1814.33 gm, significantly superior ($P \leq 0.05$) compared to the control treatment, which amounted to 1755.43 gm, no significant differences between the coefficients T3 and T4. At 8 weeks, T4 significantly outperformed ($P \leq 0.05$), which averaged 3313.83 gm, compared with T3, which averaged 3140.60 gm, and T2, which averaged 3142.80 gm, was significantly superior ($P \leq 0.05$), compared to the control treatment, which averaged 3069.99 gm, there are no significant differences between T2 and T3. At the cumulative feed intake, it was noticed that there was a significant superiority for the T4, which averaged 5184.00

gm, compared with T3 (4995.75 gm) and T2 (4957.13 g), superiority compared to T1(4828.43 gm).

Treatment	Age		Total
	4 weeks	8 weeks	
T1	1755.43 c	3069.99 c	4828.43 c
T2	1814.33 b	3142.80 b	4957.13 b
T3	1855.15 a	3140.60 b	4995.75 b
T4	1870.17 a	3313.83 a	5184.00 a
Sig.	0.05	0.05	0.05

Table 3. The effect of different levels of licorice aqueous extract on Chinese ducks' feed intake (gm).

Table 4 indicates the effect of licorice aqueous extract on the feed conversion factor of Chinese ducks. At the fourth week of the birds' life, all treatments of licorice water extract showed a significant improvement ($P \leq 0.05$) compared to T1, as the average reached 2.79, 2.75, and 2.71 gm feed/gm weight gain for T2, T3 and T4 respectively, while the control treatment reached 3.01 gm feed / g weight gain. At 8 weeks, the T4 showed significant improvement ($P \leq 0.05$), which averaged 3.77 gm of feed/gm of weight gain, compared to the T2, which averaged 3.88 gm of feed/gm, the superior weight gain was a significant improvement ($P \leq 0.05$), compared to the control treatment, which averaged 4.43 gm of feed/gm of weight gain. There are no significant differences between T2 and T3 on the one hand and T3 and T4 coefficients on the other. At the cumulative feed conversion factor, all treatments of licorice aqueous extract improved compared to T1, as the average amounted to 3.39, 3.34 and 3.30 gm feed/gm weight gain of licorice aqueous extract treatments, respectively. The control treatment reached 7801 gm feed/gm weight gain.

Treatment	Age		Total
	4 weeks	8 weeks	
T1	3.01 b	4.43 c	3.78 b
T2	2.79 a	3.88 b	3.39 a
T3	2.75 a	3.83 ab	3.34 a
T4	2.71 a	3.77 a	3.30 a
Sig.	0.05	0.05	0.05

Table 4. The effect of different levels of licorice aqueous extract on feed conversion (gm diet/ gm weight gain) of Chinese ducks.

Discussion

From the observation of these results, the addition of licorice extract in the drinking water of Chinese ducks for the duration of the experiment led to a significant improvement in the productive performance of Chinese ducks. This improvement was represented by birds' live body weight, weight gain rate, feed consumption and food conversion factor. These findings may be due to the improved health of the birds, which led to the birds benefiting from the nutritional components of the diet better, in agreement with ^{11, 12}, who indicated that licorice extract improves health,

the flavonoids reduce the risk of disease, it also prolongs the effectiveness of vitamin C and acts as an anti-inflammatory.

Moreover,¹³ found that licorice extract contains compounds (Terpenoids, Flavonoids, Iso flavonoids, Coumarins, volatile oils, vitamins, minerals, proteins, and sugars) that improve the feed conversion factor.

The flavonoids were licorice compounds. Instead, it reduces the incidence of diseases, prolongs the effectiveness of vitamin C, and acts as an anti-inflammatory agent, leading to the maximum benefit for the birds that took licorice extract from the food and converting it to live weight, which means that there has been an improvement for the birds in the feed conversion factor¹⁴.

Conclusions

The results show that there was a significant improvement in all the studied productive traits (body weight, weight gain, feed intake, food conversion) at the treatment of licorice aqueous extract in drinking water, in addition to the high level of licorice aqueous extract (15 ml of licorice per each liter of drinking water), which gave the best results and significantly.

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