



Evaluating the Effects of Aqueous Extract from Sage Leaves Powder and Licorice, Individually and in combination, on The Productive Performance of Peking Ducks

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Abstract

THIS STUDY was conducted in Al-Muthanna University, College of the Agriculture to investigate the impact of aqueous extract of medicinal plants on the Chinese duck, conducted in a private field for duck rearing in Al-Muthanna Governorate, from 5/11/2021 to 11/1/2022, by 180 ducklings weighing about 42 gm. Randomly the experimental animals were distributed in four groups, T1 group: control group without any additives. T2 group: added 5 ml sage leaves water extract per 1 liter of drinking water. T3 group: added 5 ml of licorice water extract per 1 liter of drinking water. T4 group: added 2.5 ml of water extract of the mixture to each of the leaves of sage and licorice per 1 liter of drinking water for each extract. The results indicated that the groups T2, T3 and T4, led to a significant improvement on the productive performance of the white Peking ducks compared to the T1 group. The treatment of water extract mixture of sage leaves and licorice gave the best results, significant.

Keywords: water extract, sage leaves, licorice, productive, Peking duck.

Introduction

Medicinal herbs have been used since ancient times, for their therapeutic properties as well as their role as an antioxidant [1]. Therefore, specialists took care of these plants due to their lack of side effects, as well as their wide therapeutic range [2,3,4].

The sage plant is one of the medicinal plants of the Lamiaceae family [5]. It has its origin in the Mediterranean countries [6]. It has antioxidant properties, it has the ability to activate oxidative enzymes, the oils used in the sagebrush plant can be used as nutritional supplements for poultry feed in order to prevent or delay oxygen free radicals in broilers [7]. Sagebrush was discovered for the first time in European countries and then spread to the rest of the world after the fourteenth century [8]. The sage plant is the most famous plant used in ancient and modern medicine, located in the Mediterranean basin, often found in the mountainous region. The active compounds in the

sagebrush plant are ochimane, cineoles, limonene, and terpenes, most of the active compounds act as antioxidants, it can kill many kinds of bacteria [9].

Licorice has many uses and is important for health, which made it a well-known plant extract used by many people for its multiple medical benefits. The root of the licorice plant is considered one of the medicinal plants that were used four centuries ago [10]. The used part of the plant is the roots, so it is considered one of the most important herbs that are used. As the licorice plant works today as a dietary supplement for digestive problems, coughing, and as an antidote to many bacterial infections and viral infections [11].

Licorice contains a variety of active biological properties that have antimicrobial effects [12], anti-atherosclerotic [13], antitumor, antiviral [14], antifungal as well as these components reduce low-density lipoprotein VLDL [15].

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Licorice is from the legume family that has nutritional value and medicinal properties, especially in its roots, it has also been used since ancient times as a fatigue factor in diets, drinks, and medical treatments [16]. The licorice plant contains natural antioxidants such as phenols, saponins, flavanols, and isoflavonoids [17], these compounds also help prevent oxidative damage [18]. Licorice is used in various conditions such as boosting the immune system, protecting the liver and detoxifying [19].

The present study aims to determine the impact of an aqueous extract of sage leaf powder and licorice and their combination on the productive performance of Peking white ducks.

Material and Methods

This study was conducted at the Agricultural Research Station, Al-Muthanna city, from 14/12/2022 to 13/2/2023. 180 Peking ducks were used, were randomly distributed into 4 groups, with 3 replicates (15 chicks/replicate), the experimental groups were as:

T1: control treatment.

T2: added aqueous extract of sage leaves at a level of 5 ml / liter of drinking water.

T3: added aqueous extract of licorice at a level of 5 ml / liter of drinking water.

T4: added aqueous extract mixture to each of the leaves of sage and licorice at a level of 2.5 ml / liter of drinking water for each extract.

Sagebrush and licorice roots were washed well and then dried well under the sun for three days, with continuous stirring from time to time to prevent rotting, ground using an electric grinder (Mortar) and the powder was kept in clean plastic bags at room temperature until use.

The aqueous extract was extracted as indicated by Hernandez *et al.* [20], which includes mix an amount of dry powder for each of the leaves of the sage plant and the roots of licorice with distilled water by of 100 g: 200 ml, placed in a bathwater at a temperature of sixty °C for 1 hour, for 24 hours at room temperature were leave, filter the result by sterile gauze many layers, the concentrated liquid is ready for use.

The birds were fed freely on two diet types, Starter diet during 2 weeks, content 20% protein and 2850 kilocalories / kg of feed energy, grower from 15 days until the end of the experiment at the age of 56 days (8 weeks), content 18% protein and 2850 kilocalories / kg of feed. The needs were calculated according to the breed guide.

Table (1) shows the percentages of chemical components of sagebrush leaves before and after water extraction, we note that the percentage of the

phenolic compound decreased by 37.17%, while the phytate compound decreased by 45.91%. The chemical compounds nitrification, oxalates, saponins, alkaloids and flavonoids decreased by 40.19, 35.33, 24.29, 41.97, and 83.50%, respectively, may conclude that all measured active compounds were not significantly affected by the aqueous extraction process.

Table (2) shows the percentages of the chemical constituents of licorice root before and after extraction, noting that the percentage of phenol before extraction decreased to 3.47 from 5.62, after the decrease was 38.2, while the complex of phytates decreased by 31.6. And that the chemical compounds tannins, oxalates, saponins, alkaloids and flavonoids decreased by 50.0, 13.7, 15.8, 20.7 and 28.3%, respectively, conclude that all measured active compounds were not significantly affected by the aqueous extraction process.

As for the traits studied (productive traits), which were the average body weight, weight gain, feed intake, and feed conversion factor.

The data were analyzed in a completely randomized design using the ready-made statistical program SPSS, and the means were compared between the treatments using the Duncan multiple range test.

Results and discussion

Table (3) shows effect of water sage leaves extract and licorice roots and their mixture on body weight of white Peking ducks, non-significantly differences among experimental treatments (2 weeks), T4 treatment was a significantly increase ($P \leq 0.05$) on T2 treatment compared to comparison. There were no significant differences between treatments T2 and T3 and treatments T3 and T4. In the sixth and eighth week of the age of the birds, the T4 treatment was superior on T₃, and compared to T₂, compared to comparison. The average final weight was 1627.35, 1844.57, 1893.29 and 1967.30 g for treatments respectively.

Table (4) illustrates impact of sage leaves powder water extract and licorice roots and their mixture on the total weight gain of white Peking ducks. There were a significantly increase ($P \leq 0.05$) in T₄ compared to T₂, and the control treatment. There were no significant differences between treatments T2 and T3 and treatments T3 and T4. In the sixth and eighth week of the age of the birds and the total weight gain, the T4 treatment was superior compared to the T3 treatment, superior on T₂, compared to comparison. The total weight gain was 1585.35, 1802.57, 1851.29 and 1925.30 gm, respectively.

Table (5) indicates the effect of water extract of sage leaves powder and licorice roots and their mixture on the feed intake rate of Peking white ducks. T4 was a significantly increased compared

to T2, on the comparison (4 weeks). At sixth week of the age of the birds, the treatments T2 and T3 showed a significant increase ($P \leq 0.05$) compared to the control treatment. There were no significant differences between the control and T4 treatments and between the T2, T3 and T4 treatments. At the eighth week of the age of the birds and in the total feed consumption, all treatments of the aqueous extract of sagebrush, the root of the stem of the stem and their mixture indicated a significant increase ($P \leq 0.05$) compared to comparison. The total feed intake rate was 5605.57, 5978.01, 6003.69 and 6082.78 gm, respectively.

Table (6) shows impact of water extract of sage leaves powder and licorice roots and their mixture on the feed conversion factor. At the fourth week of the age of the birds, the treatments T3 and T4 showed a significant improvement ($P \leq 0.05$) compared to the control treatment. There are no significant differences between treatments T1 and T2 and treatments T2, T3 and T4, while in the sixth week of age, a significant improvement ($P \leq 0.05$) is observed for the T4 treatment compared to the T2 treatment, which showed a significant improvement ($P \leq 0.05$) at the expense of the control treatment. There were not differences between T2, T3 treatments and T3, T4 treatments. At the eighth week of the age of the birds and the total feed conversion coefficient, a significantly improvement ($P \leq 0.05$) was observed in favor of T4 compared to T3 treatment, and the improvement compared to T2, then T1. The average total feed conversion factor was 3.54, 3.32, 3.24 and 3.16 gm diet /gm weight gain for treatments, respectively.

Our results indicate that the use of aqueous extract treatments for both sagebrush leaves and licorice root, significantly improved in all studied production traits of Chinese white ducks. T4 (a mixture of sage leaves and licorice) gave the best

results significantly. The improvement in productive performance may be due to the effective compounds present in each of the leaves of sagebrush and licorice, the most important of which are saponins, tannins and flavonoids, which were not significantly affected after the extraction process (Tables 1 and 2), has a major role in improving growth performance as well as stimulating feed consumption, as a result of increasing both digestion and absorption, as well as increasing the rate of blood flow to the mucous membranes of the alimentary canal [21,22]. The result may be the improvement in the general health of the herd due to the role of the active compounds, which were considered as antibacterial and viral, as well as its role as an antioxidant, which reduces free radicals [23].

Conclusions

The use of aqueous extract of sage and licorice powder in drinking water significantly improved the productive characteristics of Chinese ducks individually compared to the control treatment. Using the aqueous extract of the mixture of sage powder and rosehip gave significantly better results compared to using the aqueous extract of the two plants individually.

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Conflict of interest: The authors declared that no conflict of interest.

TABLE 1. Percentages of chemical components of sage leaves before and after water extraction

Active substance	Phenol	Phytate	Tannin	Oxalate	Saponin	Alkaloids	Flavonoids
Before extraction (%)	3.47	0.98	1.02	3.17	4.98	1.62	2.97
After extraction (%)	2.18	0.53	0.61	2.05	3.77	0.94	0.49
Drop rate (%)	37.17	45.91	40.19	35.33	24.29	41.97	83.50

The analyzes were carried out in the laboratories of the Ministry of Science and Technology in Baghdad.

TABLE 2. Percentage of chemical components of licorice before and after water extraction

Active substance	Phenol	Phytate	Tannin	Oxalate	Saponin	Alkaloids	Flavonoids
Before extraction (%)	5.62	2.18	1.88	4.08	4.66	2.22	4.13
After extraction (%)	3.47	1.49	0.94	3.52	3.92	1.76	2.96
Drop rate (%)	38.25	31.65	50.0 0	13.72	15.87	20.72	28.32

TABLE 3. Impact of water extract of sage leaves and licorice roots and their mixture on the body weight every two weeks (g) of Peking ducks ± standard error

Treatments	Age (week)			
	2	4	6	8
T1	160.25 ± 1.62	451.29 ± 3.11 ^c	825.62 ± 5.14 ^d	1627.35 ± 11.69 ^d
T2	159.82 ± 2.07	511.55 ± 4.27 ^b	917.16 ± 4.66 ^c	1844.57 ± 10.47 ^c
T3	161.38 ± 1.35	538.19 ± 2.16 ^{ab}	953.44 ± 6.12 ^b	1893.29 ± 10.85 ^b
T4	162.07 ± 2.12	579.45 ± 3.38 ^a	998.17 ± 5.47 ^a	1967.30 ± 15.08 ^a
Sig.	N.S	*	*	*

TABLE 4. Impact of water extract of sage leaves powder and licorice roots and their mixture on weight gain every two weeks (g) for Peking ducks ± standard error

Treatments	Age (week)				Total
	2	4	6	8	
T1	118.25 ± 1.62	291.04 ± 3.11 ^c	374.33 ± 3.78 ^d	801.73 ± 7.57 ^d	1585.35 ± 9.42 ^d
T2	117.82 ± 2.07	351.73 ± 4.27 ^b	405.61 ± 9.29 ^c	927.41 ± 4.04 ^c	1802.57 ± 10.65 ^c
T3	119.38 ± 1.35	376.81 ± 2.16 ^{ab}	415.25 ± 6.65 ^b	939.85 ± 8.51 ^b	1851.29 ± 8.87 ^b
T4	120.07 ± 2.12	417.38 ± 3.38	418.72 ± 10.69 ^a	969.13 ± 8.50 ^a	1925.30 ± 11.05 ^a
Sig.	N.S	*	*	*	*

TABLE 5. Impact of water extract of sagebrush leaves powder and licorice roots and their mixture on the rate of feed

Treatments	Age (week)				Total
	2	4	6	8	
T1	310.99 ± 9.42	841.10 ± 12.33 ^c	1358.81 ± 20.16 ^b	3094.67 ± 24.37 ^b	5605.57 ± 36.18 ^b
T2	307.51 ± 6.81	967.25 ± 9.52 ^b	1383.13 ± 18.26 ^a	3320.12 ± 19.35 ^a	5978.01 ± 39.66 ^a
T3	315.16 ± 8.78	1017.38 ± 10.56 ^{ab}	1391.08 ± 22.23 ^a	3280.07 ± 31.07 ^a	6003.69 ± 27.55 ^a
T4	310.98 ± 9.06	1118.57 ± 13.22 ^a	1377.58 ± 19.30 ^{ab}	3275.65 ± 21.14 ^a	6082.78 ± 30.19 ^a
Sig.	N.S	*	*	*	*

Intake every two weeks (g) for Peking ducks ± standard error.

TABLE 6. impact of water extract of sagebrush leaves powder and licorice roots and their mixture on the feed conversion ratio every two weeks (gm diet / gm weight gain) for Peking ducks ± standard error

Treatments	Age (week)				Total
	2	4	6	8	
T1	2.63 ± 0.009	2.89 ± 0.010 ^b	3.63 ± 0.017 ^c	3.86 ± 0.011 ^d	3.54 ± 0.022 ^d
T2	2.61 ± 0.005	2.75 ± 0.009 ^{ab}	3.41 ± 0.015 ^b	3.58 ± 0.016 ^c	3.32 ± 0.013 ^c
T3	2.64 ± 0.005	2.70 ± 0.0015 ^a	3.35 ± 0.011 ^{ab}	3.49 ± 0.013 ^b	3.24 ± 0.023 ^b
T4	2.59 ± 0.007	2.68 ± 0.0013 ^a	3.29 ± 0.015 ^a	3.38 ± 0.015 ^a	3.16 ± 0.019 ^a
Sig.	N.S	*	*	*	*

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تقييم تأثير المستخلص المائي من مسحوق أوراق الميرمية وعرق السوس منفردة أو مجتمعة على الأداء الإنتاجي للبط البكيني

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الخلاصة:

اجريت هذه الدراسة في كلية الزراعة جامعة المثنى لمعرفة تأثير المستخلص المائي للنباتات الطبية على البط الصيني في حقل خاص لتربية البط في محافظة المثنى للمدة من 11/5/2021 الى 11/1/2022، تم استخدام 180 فرخ بط وزن حوالي 42 جرام، وزعت عشوائياً على أربع معاملات؛ المعاملة الاولى (T1): مجموعة السيطرة بدون أي إضافات. المعاملة الثانية (T2): إضافة 5 مل من مستخلص ماء أوراق الميرمية لكل 1 لتر من ماء الشرب. المعاملة الثالثة (T3): إضافة 5 مل من مستخلص ماء عرق السوس لكل 1 لتر من ماء الشرب. المعاملة الرابعة (T4): إضافة 2.5 مل من المستخلص المائي للخليط إلى كل من أوراق الميرمية وعرق السوس لكل 1 لتر من ماء الشرب لكل مستخلص. أشارت النتائج إلى أن المعاملات T2 و T3 و T4 أدت إلى تحسن معنوي في الأداء الإنتاجي لبط بكين الأبيض مقارنة بمعاملة السيطرة (T1). أعطت المعاملة بالمستخلص المائي لخليط أوراق الميرمية وعرق السوس أفضل النتائج بشكل ملحوظ.

الكلمات المفتاحية: المستخلص المائي، أوراق الميرمية، عرق السوس، الإنتاج، بط بكيني.