Research Article

The Effect of Diet Supplementation with Ginseng (Panax) Root and Juniper Leaf Powders on The Productive Performance of Broiler Chicks

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Abstract | Herbal supplementation of poultry diet induce significant growth and performance of chicks. This trial was conducted to assess the effects of ginseng (panax) root and juniper leaf powders on the broiler chick's productive traits. Trial was carried out under completely randomized desing with a total of 240 unsexed one-day-old Ross 308 strain chicks. Treatments included a control diet (standard feed) without any herbal additive (T1), standard feed with juniper leaf powder added @ 5 g/kg (T2), standard feed with ginseng root powder added @ 5 g/kg (T3) and the fourth treatment (T4) of a combination of T2 and T3. The chicks were raised under ideal conditions for the breeding temperature, light, and humidity. Each treatment contained 60 chicks and was divided into two equal repeats with 30 chicks for each repeat, Birds' growth characteristics, i.e. feed consumption, feed conversion factor, weight gain and average live body weight, were recorded weekly for five consective weeks. Results showed that the average live body weight and weight gain rate of chickens increased significantly ($P < 0.001$) from 2270 to 2420 g and from 2207 to 2376 g, respectively when their feed was supplemented with ginseng root and juniper leaf powders. Moreover, the rate of feed consumption for treatments with ginseng alone or in combination significantly decreased (from 4225 to 3913 g), concomitantly with a significant increase of the feed conversion factor (1.60 to 1.98 g feed/gm weight gain) for these two treatments. These overall findings suggest the potential incorporation of ginseng and juniper plant powders as herbal feed additives as they can enhance animal production, particularly that of poultry.

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Keywords | Herbal feed supplementation, Broiler performance, Feed conversion**,** Juniper leaf powder, Panax ginseng powder, Poultry production

Introduction

Poultry is one of the most economical sources of animal protein supplying a crucial portion of the humans' nutritional needs around the globe. Poultry production is a swift-growing industry of agriculture as it has a significant contribution in food security (Mottet and Tempio, 2017). Because of the tremendous efforts made in research and practical nutritional science, the chicken industry has been advanced

greatly, and the poultry output has been improved dramatically and efficiently (Kadhim, 2023; Korver, 2023; Attia *et al*., 2024). However, the extensive use of antibiotics in poultry production for diseases prevention and growth promotion has provoked many ecological and health consequences including antibiotic resistance induction (Marshall and Levy, 2011).

Since last two decades, attention has been focused on searching for different food additives which can be incorporated in the diets or feed of poultry as alternative to the antibiotics that the World Health Organization considers harmful to the public health. Therefore, a significant number of research work and studies have assessed the influence of aromatic medicinal plants and their extracts in poultry feeding. These studies have shown that dietery supplementation with herbal additives improve the appetite and feed intake by chickens (Kaye *et al*., 2013; El-Sabrout *et al*., 2023) and increase the weight and immunity rates as many of these phytoadditives contain antibacterial and antioxidant agents (Botsoglou *et al*., 2005; Ayalew *et al*., 2022).

Ginseng (panax) root and juniper leaf powders are two of the most effective and promising medicinal additivies being used in poultry diets to enhance poultry growth and performance (Abdel-Moneim *et al*., 2020; Yener *et al*., 2021). Korean or Asian ginseng (panax ginseng) belongs to Araliaceae family and is one of the most well-known medicinal herbs in the world and ranks at top in oriental and traditional medicine (Kiefer and Pantuso, 2003; Han *et al*., 2006), It is a perennial, slow-growing, aromatic herbaceous plant with small white flowers. Many studies have documented that ginseng contains saponins, antioxidants, peptides and different organic acids (Kiefer and Pantuso, 2003; Liu, 2012). Juniper (*Juniperus communis* L.) is an evergreen aromatic tree belonging to the Cupressaceae family that spreads across the Northern Hemisphere's cold and temperate zones (Adams, 2001). Juniper plant has been widely utilized in traditional medicine and in food and feed industry because of its anti-inflammatory and anti-oxidant properties (Tunon *et al*., 1995; Abdel-Moneim *et al*., 2020), antifungal activity (Abbassy and Marei, 2013; Höferl *et al*., 2014), analgesic activity (Banerjee *et al*., 2012), and that the active substances in juniper plant are flavonoids, polyphenols, volatile oils, coumarin), terpenic acids and leucanthocyanidins, gum, and lignin (Sengül *et al*., 2008; Bais *et al*., 2014; Abdel-Moneim *et al*., 2020).

Keeping in view the above mentioned medicinal importance of ginseng and juniper plant, this research work was intended to assess the influence of incorporating the diet of poultry with the root powder of ginseng (panax) and leaf powder of juniper on the growth and performance traits of chicks of Rose 308 broiler strain including feed consumption, feed conversion factor, weight gain and average live body weight.

Materials and Methods

This research trial was performed in the poultry farmhouse of the Animal Production Techniques Department at the Technical College of Al-Mussaib, Babylon City, Almusaib, Iraq to determine the effects of adding ginseng root and juniper leaf powders, alone and in combination, to the feed on some productive parameters of broiler chickens. A total of 240 one-day old unsexed chicks of Ross 308 broiler strain, each weighing about 45 g, were utilized in the experiment. The chicks were randomly divided into four equal-sized treatment groups. The trial was conducted according to a completely randomized design (CRD). There were 60 chicks in each treatment, and each treatment had two duplicates, each of which had 30 chicks. Together with the feed material as recommended by the NRC (1994), the demands of the Rose 308 broiler chicks of various ages were used to calculate the quantity of protein and energy needed for the diets.

The following diets were fed to the chicks in the four treatments: The control diet (standard feed) without any herbal additive (T1), standard feed with juniper plant powder added @ 5 g/kg (T2), and standard feed with ginseng root powder added @ 5 g/kg (T3) and the fourth treatment (T4) with a combination of T2 and T3. Ginseng roots and juniper leaves were procured from the local market and were ground into a fine powder using a specialized electric grinder. Farm, troughs, feeders, incubators, and equipment were all cleaned and sterilized as part of the health and preventive program. The farm was disinfected using the commercial solution (Dexide-100) made by Interchemic Horslerweg 26a Castenary, Holland. Moreover, the farmhouse and its apparatus and gadgets were fumigated using formalin and potassium permanganate. Chicks received vaccinations against infectious bronchitis, Newcastle disease, avian influenza and Camporo disease.

Table 1: *The impact of ginseng (roots) and juniper (leaves) powders on the average body weight (grams) (average ± standard error) of the boriler chicks.*

Treatments	Week one	Week two	Week three	Week four	Week five
T1	148± 2.00 c	427.5± 2.50 c	930± 10.00 c	1395± 5.00 c	2250± 10.00 d
T2	167.5 2.50 a	465± 5.00 a	983.5± 350 a	1525± 25.00 a	2420± 30.00 a
T3	157.5± 2.50 b	384.5 ± 5.50 d	922± 2.00 d	1357.5± 7.50 d	2270 ± 0.00 c
T4	163± 3.00 ab	447.5 ±7.50 b	963± 7.00 b	1465± 5.00 b	2357.5± 7.50 b

Within each column, average values with different alphabets indicate a significant difference (P < 0.01) among them (Duncan's multinomial test).

Table 2: *The impact of ginseng (roots) and juniper (leaves) on the average weight gain (grams) (average ± standard error) of the broiler chicks.*

Treatments	Week one	Week two	Week three	Week four	Week five	Cumulative weight gain
T1	105± 3.00 d	279.5 ± 2.00 c	502.5 ± 1.00 c	465± 2.50 c	855 ± 7.50 c	2207 ± 8.00 d
T2	124± 3.00 a	297.5 ± 500 a	518.5 ± 7.50 b	541. 5 ± 500 a	895 ± 2,00 b	2376.5 ± 40.50 a
T3	114.5 ± 5.50 c	227± 4.00 d	537.5 ± 2.50 a	435,5 ± 3.00 d	912.5 ± 2.50 a	2227 ± 6.50 c
T4	120 ± 3.00 b	284.5 ± 5.00 b	515.5 ± 3.00 b	502 ± 6.50 b	892.5± 10.00 b	2314 ± 27.5 b

Within each column, average values with different alphabets indicate a significant difference (P < 0.01) among them (Duncan's multinomial test).

Weekly data was recorded regarding the productive characterisitcs of chicks including feed consumption, feed conversion ratio, live body weight and weight acquisition. Duncan's (1955) multinomial test was used to compare the significant differences among the means or average values. Data was analyzed using the statistical program Statistical Analysis System-SAS (2012) to examine the impact of above mentioned treatments on the traits of chicken.

Results and Discussion

Effect of herbal additives on live body weight of chicken

According to results, there was a significant effect (P <0.01) of the feed additives (both ginseng and juniper powders) on the average body weight of live birds (Table 1). At the end of first week of incubation, the body weight reached 148 g in the first treatment (T1) having standard feed only, while the highest average live body weights recorded in the treatments of juniper leaf power (T2), ginseng root powder (T3) and of their combination (T4) were 167.5 157.5 and 163.0 g, respectively (Table 1). Results from other weeks showed that the second treatment (standard feed mixed with ginseng powder) remained superior to others, demonstrating a significant additive effect of ginseng addition on the average live body weight of the chicks. These results are consistent with the findings of Yan *et al.* (2011) who observed an improvement in the body weight characteristic when adding wild ginseng powder @ 1.0 g/kg of feed to a broiler diet compared with the control group. Similarly, Yildirim *et al.* (2013) observed no significant variations in the average live body weight of laying hens, although the data contradicted their findings when using different amounts (50, 100, and 150 mg/kg feed) of ginseng root powder in the diets provided. Differential results in this study perhaps might be due to the varied concentration of the plant materials used in the diets. Moreover, our results are in line with Inci *et al.* (2016) who noted body weight improved when juniper fruits were added to the Japanese quail diet. Improved chick performance after plant powder addition may be due to increased digestive enzyme secretion, better digestion, and the plants' antibacterial, antifungal, and antioxidant properties (Sengül, *et al.*, 2008; Seidavi *et al.*, 2022; Ivanova *et al.*, 2024).

Influcence of diet treatments on average weight gain

Results showed a substantial and significant (P <0.01) effect of herbal additives on the average weight gain of birds as compared to control treatment (Table 2). With an average of 124, 297.5 and 541 g in the end of first, second and fourth weeks, respectively, the treatment with ginseng root powder (T2) proved to be best than other ones (Table 2). However, in the third and fifth weeks, the third treatment (T3) remained better averaging weight gain of 537.5 and 912.5 g, respec-

tively. In terms of the cumulative weight gain rate, the second and fourth weeks exhibited highst weigh gain reaching up to 2376.5 and 2314 g, respectively. These weight gain improvements are in line with the results of Yan *et al*. (2011) and Yener *et al*. (2021) showing similar trend of weight gain with broiler feed supplemented with wild ginseng powder. These results also corroborate those of Yesilbag *et al*. (2014), who found that feeding Japanese quail with juniper oil significantly increased their rate of weight gain when compared to the control diet. Our results however contradicted the findings of Çelik and Şahin's (2015) which showed no significant impact of essential oil mixtures (including juniper) in broiler drinking water on bird's weight gain.

Average feed consumption by birds fed on different treatments

The effect of incorporating ginseng and juniper plant powders on the feed consumption rate is shown in Table 3 according to which there was considerable variations in the cumulative feed intake in all treatments during the experimental period. The second and fourth treatments had the lowest feed consumption, reaching 3913.32 and 3960.98 g, followed by the third (T3) and first (T1) treatments consuming up to 4218.15 and 4225.21 g, respectively (Table 3). When compared with the control treatment, Azazi *et al*. (2011) found that ginseng supplementation at dosages of 150 mg or 300 mg/kg did not affect the bird's body weight gain or feed consumption intake. This contradicton could be due to the different bird conditions and differential amount of diet supplements used in the experiment. The results did not agree with Çelik and Şahin (2015) as they did not notice a significant effect of herbal oils on the feed consumption when adding juniper oil mixed with other plant oils to the drinking water of broilers in contrast to the control group.

Influence of herbal feed supplements on average feed conversion factor

Results showed a signficant effect ($P < 0.01$) of the addition of ginseng and juniper powders to the standard feed on the chicken's average feed conversion factor (Table 4). The ginseng treatment (T2) had the lowest value of this feed conversion factor (*i.e.*1.60 g feed/gm weight gain) as compared to the control treatment which shoed feed conversion factor of 1.93 g feed/gram weight gain. Since ginseng contains physiologically active compounds like glycosides and saponins (Kiefer and Pantuso, 2003) that increase the efficiency of feed conversion in the herbal treatments (Abdel-Moneim *et al*., 2020), the improvement in the feed conversion coefficient in these herbally supplemented treatments (T2, T3, and T4) would be the result of the efficacy of these plant active compounds. These findings are in line with the observations of

Table 3: *The impact of ginseng (roots) and juniper (leaves) on the average amount of feed consumed (grams) (average ± standard error) by the broiler chicks.*

Treatments	Week one	Week two	Week three	Week four	Week five	Cumulative feed consumed
T1	193.56 ±192.50b	486.66 ± 100 b	861.66 ± 50 a	1255 ±150 a	1428.33 ± 150 b	4225.21± 242.50 a
T2	173.33± 100 c	446.66 ± 100 c	788.33 ± 150 d	1155 ± 150 d	1350 ± 500 d	3913.33 ± 1000 d
T3	200.83 ± 475 a	495 ± 150 a	831.66 ± 20 b	1245.6 ±70 b	1445 ± 350 a	4218.15 ± 925 b
T4	179.33 ± 120 c	453.33 ± 100 c	796.66 ± 100 c	1166.66 ± 0.00 c	1365 ± 450 c	3960.98 ± 770 c

Within each column, average values with different alphabets indicate a significant difference ($P < 0.01$) among them (Duncan's multinomial test).

Table 4: *The impact of ginseng (roots) and juniper (leaves) on the feed conversion factor (average ± standard error) of the broiler chicks.*

Treatments	Week one	Week two	Week three	Week four	Week five	Cumulative feed conversion factor
T1	1.84 ±0.03 a	1.74 ±0.02b	1.71± 0.00 a	2.69 ± 0.00 b	1.67± 0.01 a	1.93 ± 0.01 b
T2	1.39±0.01d	1.5 ± 0.01 d	1.52 ± 0.01 c	2.13 ± 0.00 c	1..50± 0.01 c	1.60 ± 0.01 d
T3	1.75 ±0.02b	2.18± 0.00a	1.54 ± 0.01 b	2.86 ± 0.01 a	1.58 ± 0.00 b	1.98 ± 0.00 a
T4	1.49 ± 0.02c	1.59±0.001c	1.54 ± 0.01 b	2.32 ± 0.00 c	1.53 ± 0.01 b	1.69 ± 0.00 c

Within each column, average values with different alphabets indicate a significant difference ($P < 0.01$) among them (Duncan's multinomial test).

Park *et al.* (2005), who demonstrated that birds fed on 0.4% wild ginseng diet had an enhanced nutritional conversion factor when compared to other groups. Our results are in line with findings of Wallace *et al.* (2010) and Annooz and Areaaer (2022) who reported that addition of 2 – 6 g ginseng (panax) root powder per kg feed significantly increased the average live body weight, total feed consumption and weight gain, and reduced the feed conversion factor.

Conclusions and Recommendations

Based on overall trial, it is concluded that the average body weight and weight gain rate of chickens increased significantly when their feed was supplemented with ginseng root and juniper leafs powder. Moreover, the rate of feed consumption by birds for treatments with ginseng alone or in combination significantly decreased, concomitantly with a significant increase of the feed conversion factor for these two treatments. These overall findings suggest the potential incorporation of ginseng and juniper plant powders as herbal feed additives as they can enhance animal production, particularly that of poultry.

Novelty Statement

Organic nutritional supplements increase productivity and performance in broiler chicks by adding ginseng root powder and juniper leaves to the diet. As a promising method for increasing performance in broiler chicks.

Conflict of Interest

Authors declare no conflict of interest regarding the submission and publication of this research work.

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