Testing the efficiency of fenugreek seed powder in reducing body weight

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Abstract

This study was conducted for the purpose of comparing the effect of each fenugreek powder by adding it to the feed throughout the duration of the experiment, which amounted to 6 weeks, where the effect of each of them on the productive and physiological performance of broilers was studied. (150) one-day-age Hubbard broiler chicks were used and randomly distributed into 5 groups (30 chicks/group), with two replicates for each group (15 chicks/replicate). The first group included (control treatment), while the second group represented (0.50%) of barley, and the third treatment (50% + 50% fenugreek powder) was given. The results showed the following: T3 treatment (Fenugreek 0.5%) and T2 (Barley 00.5%) showed a non-significant increase in average live body weight and cumulative weight gain compared to the control group. treatment T3 (Circuit 1) showed a significant decrease ($P<0.05$) in the average weekly live weight and the average weekly and cumulative weight gain compared to the rest of the groups. There were no significant differences in the values of feed consumption and feed conversion factors between the different groups. An improvement in blood traits appeared in the T2 and T3 groups, compared to the T1 control group.The four groups T2 and T3 showed a significant decrease ($P<0.05$) in blood sugar and cholesterol concentrations compared to the control group T1.Adding fenugreek seed powder contributed to maintaining the biological balance of total bacterial colonies, coliform bacteria colonies, and lactobacilli bacteria colonies in the intestinal contents of broiler chickens compared with the T3 control group.

introduction

Obesity and overweight are the most common and important health problems facing the global community today. As a result of abnormal or excessive accumulation of fat, more than 3 million adults around the world die every year due to health and medical complications associated with cases of overweight (1). These problems are widespread. In developed and developing countries and in all categories of regions of the world, regardless of race, gender, or age, it is on the rise, as a World Health Organization report indicates high levels of obesity among adults and children in Middle Eastern countries, including Iraq (2), and interference in the system is Diet is the first step in reducing the spread of obesity, as losing weight in people suffering from obesity can reduce medical complications associated with being overweight, while at the same time increasing physical performance and thus improving their quality of life (3)People have turned to medicinal plants to lose weight, including fenugreek, which helps in losing weight because it contains some nutrients and fibers that help suppress appetite, which helps in weight loss, in addition to other chemicals that work to slow down the digestion process as well as the body's absorption of sugar and carbohydrates. While Abdel Majeed (1994) noted that giving boiled fenugreek seeds to broilers at concentrations of 0.1, 0.25, and 0.5 g/kg of body weight leads to a reduction in cholesterol levels and an increase in the total fat level. The study aims to use natural materials free of chemicals that are not harmful to humans to reduce body weight and

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the role of this substance as an effective antioxidant.

In view of the increase in the daily consumption of food products and the spread of health and nutritional awareness, interest has increased in the use of medicinal plants and herbs such as fenugreek, which has had an effective positive effect on some food products (5) because it contains many bioactive compounds that work to burn fat and reduce weight for people. Fenugreek (6), which is added directly or indirectly to other ingredients without causing harmful side effects to human health. In addition, it does not cause unwanted changes in the distinctive properties of the product (7), as fenugreek is characterized by clear properties that contribute to increasing immune activity and antioxidant capabilities. For atherosclerosis and antioxidants (8). Fenugreek also has an important role in lowering cholesterol levels. It is considered an antioxidant and has the ability to burn excess fats than the body needs (9). Fenugreek contains active substances similar in effect to insulin, and thus works to reduce blood sugar levels. It leads to a decrease in the hormone insulin secreted by the pancreas and thus prompts the body to burn fat and regulate the entry of glucose into the blood in a successive and sequential manner (10)

MATERIALS AND METHODS

The location and time of the experiment

The field experiment was conducted in the poultry field of the Department of Animal Production/College of Agricultural Engineering Sciences/University of Baghdad from 3/27/2021 until 5/5/2021 (35 days), to know the effect of adding powder of some medicinal herbs and spices (fenugreek powder) g/kg feed to the feed. In productive performance and some physiological characteristics.

Source of chicks

150 unsexed Ross 308 broiler chicks were used and raised, with an average starting weight of 39.6 grams/chick, prepared from the hatchery of the Al-Shukr National Broiler Production Company, located in Abu Ghraib district.

Experiment design

The chicks were distributed randomly into three treatments, each treatment containing three replicates (10 chicks/replicate). The replicates were distributed randomly among the pens from the first day of the chicks' life, and the treatments were as follows:

The first treatment (T1) control group: given a standard diet devoid of any additives.

The second treatment (T2): A treatment containing only 50% barley.

The third treatment (T3): A treatment containing 50% barley + 7.5% fenugreek powder.

Experiment design plan and studied traits.

Management of chicks

The chicks were raised on the ground in a hall divided into 3 pens, and the area of each pen was 2 x 2 m. The pens were covered with sawdust 3-5 cm thick, and the replicates were randomly distributed among them. The rearing system was followed with continuous lighting, 23 hours of light per day, with one hour given. Darkness to accustom the chicks to the dark so that they do not become disturbed when the power goes out suddenly.

The chicks were fed a starter diet from one day to the age of 21 days and a growth diet from the age of 22 to 35 days. During the first days of the chicks' life, the starter feed was provided in circular plastic dishes with a

diameter of 38 cm, at the rate of one dish/knife. At the age of seven days, it was gradually replaced with manual hanging circular feeders with a diameter of 45 cm. The feeders are raised weekly to the top to ensure that they are at the level of the bird's back to facilitate eating the feed and reduce its scattering as it ages. The feed was provided in a free form (ad libitum) during the experiment period. Inverted plastic siphons with a capacity of 5 liters were also used to provide drinking water in a free form in the form of one siphon. At the end of the first week, they were replaced with automatic, suspended manholes that were at the level of the bird's back and raised with age to make it easier for it to drink water with complete freedom.

Appropriate environmental conditions were provided for rearing at different stages of growth. The birds were received on the first day of life in a hall at a temperature of 34°C using gas incubators, and then the temperature was reduced weekly at a rate of 2°C until it reached a temperature of 20-22°C.

controlling and health program

The table shows the preventive and health program that was followed for broilers. The chicks were dehydrated three hours before insemination, and a mixture of vitamins was added with drinking water after the insemination procedure, according to the instructions of the producing company.

The type of vaccine and antibiotic	*age (day)*
Vaccination with Newcastle B1 vaccine + infectious bronchitis (IB) vaccine using coarse spraying	1
Giving the antibiotic Colistin + Neomycin 0.5 gm / liter of drinking water + a group of vitamins and minerals in the amount of 0.5 g / liter with drinking water	1-5
Vaccination with Newcastle strain Lasota vaccine through drinking water	10
Vaccination with Campurus-Lucard strain through drinking water	14
Giving a mixture of vitamins and minerals (Colivet) at an amount of 0.5 g/L of drinking water	14-17
The birds were vaccinated with the third Newcastle vaccine, the Lasota strain, through drinking water	20

Table (3-4) controland health program used in the experiment for broiler chickens Bird feeding

Fenugreek powder was obtained from the local markets of the city of Baghdad, and it was ground using an electric grinder. The chicks were fed crushed feed throughout the experiment, and the starter diet was used from 1-10 days of the chicks' age. It contained 23% crude protein, 0.003 kg, its price per kg of energy feed. Representative, then followed by the growth diet provided from 11-24 days of the chicks' age, which contained 21% crude protein, 3100 kilocalories/kg of feed energy, and the final diet of 19% protein and 3,200 kilocalories/energy.

water after vaccination, according to the instructions of the producing company.

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The studied traits

productive traits

The average live body weight

The chicks were weighed on the first day of age , and at the end of each week they were collectively weighed with an electronic scale, and then the average body weight was calculated according to the following equation (Al-Fayyadh and Naji, 1989)

Average live body weight of the bird (g) $= \frac{Total\ bird\ weights\ (gm)\ for\ replicates}{The\ total\ number\ of\ birds\ in\ replicates}$

weekly weight gain

The weekly increase for the total period is expressed according to Al-Fayyad and Naji (1989) in the following equation:

Weekly weight gain (gm) = live body weight at the end of the week (gm) - body weight at the beginning of the week (gm)

The amount of feed consumed

The amount of feed consumed per week and for the total period is calculated by recording the amount of feed provided at the beginning of the week and the remaining feed at the end, and the difference between them is extracted according to the following equation as indicated by (Al-Zubaidi, 1986)

Amount of feed consumed per week = Feed provided at the beginning of the week (gm) - Feed remaining at the end of the week (gm)

Chemical traits of blood:

After collecting the blood with a syringe, the blood is placed in glass tubes containing gel tubes with a capacity of 6 ml. These tubes are placed in a centrifuge at a speed of 4000 rpm for 10 minutes. The serum is separated from the cellular part, and kept at a temperature of -20 C until the tests are conducted. Then the following tests were coundected:

blood lipid profile

Determination of the triglyceride concentration

Determination of serum triglycerides concentration

A ready-made test kit (Kit) from the French company Biolabo was used, which relies on the enzymatic method to decompose triglycerides into glycerol, which enters into a series of reactions, resulting in a complex product with a pink color, as shown in the equations below:

$$\text{Triglycerides} + H_2O \xrightarrow{\text{Lipoprotein lipase}} \text{Glycerol} + \text{Fatty acids}$$

$$\text{Glycrol} + \text{ATP} \xrightarrow{\text{Glycerol Kinase}} \text{Glycerol-3-phosphate} + \text{ADP}$$

$$\text{Glycrol-30-phosphate} + O_2 \xrightarrow{\text{GPO}} \text{Dihydroxy acetone phosphate} + H_2O_2$$

$$2H_2O + \text{4-aminoantipyrine} + \text{ADP} \xrightarrow{\text{POD}} \text{quinoneimine} + 4H_2O$$

Then the color intensity of the complex resulting from the reaction was read by a spectrophotometer at a wavelength of 500 nm and the concentration of triglycerides was calculated as shown in the following equation:

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Triglycerides concentration (mg / 100 ml) = $\frac{sample\ absorbance}{absorbance\ of\ the\ standard\ solution}$ × The concentration of the standard solution (200 mg/100 mL)

2-3-12-3 Estimation of total cholesterol concentration in blood serum

Determination of serum cholesterol concentration

The concentration of total cholesterol in blood serum was calculated using the assay kit (Kit) from the French company Biolabo, which relies on the enzymatic method to convert cholesterol and cholesterol esters into quinoneimine scarlet red dye, as in the reactions below:

Cholesterol esters ⟶ Cholesterol + free fatty acid

Cholesterol + O_2 $\xrightarrow{\text{Cholesterol Oxidase}}$ Cholesterol + free fatty acid

$2H_2O_2$ + phenol + 4-Amino-antipyrine $\xrightarrow{\text{peroxidase}}$ Quinoneimine + $4H_2O$

Then the intensity of the scarlet red color of the resulting complex was measured using a spectrophotometer at a wavelength of 500 nm, then the total cholesterol concentration was calculated according to the following equation: -

Cholesterol concentration(200 mg/100 ml) =(sample absorbance /absorbance of the standard solutionthe) × standard solution concentration

3-13- Statistical analysis

The statistical software sciences social package Statistical (SPSS) version 16 was used to analyze the primary data of the results of the current study. The analysis of variance (ANOVA) test was used, and the level of significant differences between the rates of the criteria included in the current study was extracted using the least significant difference at the statistical level ($P < 0.05$).

Results and discussion

Table 1: The effect of the studied treatments on the average weekly body weight

Average weekly body weight ± standard error (g(					
35day	28day	21day	14day	7day	treatments
±2293.67 80.25a	**1544.10** **14.16±**a	**1116.67** **16.01±**a	**511.46** **12.18±**a	**4.71± 178.53**a	T1
1423.33 **51.34±**b	**1054.10** **44.35±**b	**52.70± 764.60** b	**413.46** **62.77±**b	**0.82± 122.86**b	T2
1401.87 **18.28±**b	**1045.80** **33.04±**b	**14.31± 699.87** b	**6.31± 316.00** c	**1.18± 120.93**b	T3
**	**	**	**	**	Significant level
The averages with different letters within the same column are significantly different (P<0.01.(					

Table(4-1) shows the effect of adding some medicinal herbs, including fenugreek and barley, to the broiler diet on the average weekly body weight, where it is noted that there is a significant difference in the average body weight in the first week of T2 treatment compared with the control treatment, and the control treatment had the highest value (178.53).) gm, then followed by the barley treatment, which amounted to 122.86 g. In the second week only, a significant difference ($p<0.01$) was observed for the control

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treatment with the barley treatment, and the lowest value was 316.00)) for the fenugreek treatment, where there was a significant difference in all treatments compared with the control treatment and it was in the third week, where the treatment of fenugreek and barley had the lowest value (699.87) (764.60) compared with the control treatment (1116.67). In the mean body weight in the third week, the highest values were recorded in the fourth and fifth weeks, the control treatment (1544.10) (2293.67) compared with The other treatments were 1423.33 and 1401.87, respectively, and the fenugreek treatment was the lowest value (1401.87).

Table 2: The effect of the studied treatments on the weekly weight gain rate

Average weekly weight gain ± standard error (g(						treatments
total	35day	28day	21day	14day	7day	
2254.07 80.25	**±749.57** 94.36	**±427.43 23.20**	**±605.20 4.74**	**±332.93 7.58**	**±138.93 4.71**	T1
1383.73 51.34	**±369.23 12.71**	**±289.50 19.06**	**±351.13 100.79**	**±290.60 63.41**	**±83.26 0.81**	T2
±1362.27 18.28	**±356.06 19.60**	**±345.93 19.13**	**±383.86 8.03**	**±195. 06 5.56**	**±81.33 1.18**	T3
**	**	**	**	**	**	Significant level
The averages with different letters within the same column are significantly different (P<0.01.(						

Table (2.4) shows statistical analysis data and the effect of some medicinal herbs, including fenugreek and barley, for broiler diets, on the weekly and cumulative weight gain rate, where it turns out that there is a significant difference (P<0.01). In the control treatment (2254.07) g / bird, compared with treatments respectively 1383.73 and 1362.27 g / bird. The reason for the significant decrease in the average body weight in birds fed on a diet containing medicinal plants, including barley and fenugreek, is the nutritional value of the elements included in the components of the diet by stimulating it to secrete some digestive enzymes for proteins, carbohydrates and fats, such as the amylase enzyme, which is important in the analysis of starch and hydrolyzed lipase for fats (Kamel, 2000).In addition to the fact that these materials contain effective compounds, which may be attributed to the presence of high levels of steroidal saponins, which leads to loss of appetite and a decrease in the rate of food consumption as a result of the bitter and pungent taste of these compounds, which causes a decrease in the weight of the bird (Francis et al. 2002).It also has a role in reducing the profile of fats in the blood of domestic birds, due to its ability to curb free radicals Reactive of oxygen species=ROS (Ciftci et al. 2010)Fenugreek also has a direct role in the metabolism of fats and preventing high cholesterol by increasing the speed of the body's disposal of it with a decrease in the level of free fatty acids (Jalaluddin et al. 2013).

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Table 3: The effect of the studied treatments on the average weekly feed intake

Average amount of feed consumed ± standard error (g/bird)						treatments
total	35day	28day	21day	14day	7day	
±4698.27 15.63	**±1860.07 8.14**	**1367.5± 5.36**	**±683.20 2.27**	**±630.80 10.28**	**±156.66 0.08**	T1
±3985.60 44.86	**±1464.40 21.53**	**±1292.60 28.98**	**±464.93 13.00**	**±630.80 12.79**	**±132.86 1.44**	T2
±3990.90 30.95	**±1461.33 23.13**	**±1338.53 10.25**	**±453.33 44.51**	**±591.20 8.44**	**±146.50 0.65**	T3
**	**	**	**	N.S	**	Significant level
Means with different letters within the same column are significantly different (P<0.01).						

Table (3-4) shows that there are significant differences at the level (P<0.01) about the effect of adding medicinal plants, including fenugreek, to the broiler diet on the weekly and cumulative feed consumption rate of birds in the experimental treatments for weeks 5,4,3,2,1. While there was a significant decrease (P < 0.01) in the value of this trait in the third week of life in favor of the addition barley treatment, which amounted to (464.93) (g / bird) compared to the control treatment, which amounted to (683.20) g / bird. As for the cumulative feed consumption, it is noted that there are significant differences in all treatments compared to the control treatment for all weeks compared to the control treatment. The decrease in the average of feed consumption in the fifth week of ginger treatment was consistent with (Al-Qayyim, 1999), which showed the reason for the decrease in the rate of feed consumption when using fenugreek compared with the control treatment, that the fenugreek leads to an increase in the secretion of glucocorticoids from the adrenal gland, and the latter leads to a decrease in the rate of feed intake.The researcher Minaiyan et al 2006) indicated that the root of ginger belongs to the widespread medicinal herbs that are used to treat gastrointestinal disorders that include indigestion, bloating colic, dizziness, and diarrhea. The antiseptic properties of ginger are also very useful for stomach disorders, including types of food poisoning (Al-Ayoubi, 2003 ; Armoush, 2006).The oily plant extracts have a stimulating effect on the digestive system of animals and poultry in particular, where it improves nutrients inside the small intestine, especially the ileum, and works to increase the secretory activity of the pancreas to secrete Lipase and Amylase enzymes (Hernandez et al., 2004).

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Table 4: The effect of the studied treatments on the weekly feed conversion rate

Feed conversion rate ± standard error (kg feed / kg meat)						treatments
total	35day	28day	21day	14day	7day	
±2.08 0.06	**±2.55 0.28**	**±3.21 0.17**	**±1.12 0.00**	**±1.89 0.01**	**±1.13 0.03**	T1
±2.88 0.08	**±3.97 0.08**	**±4.51 0.37**	**±1.60 0.50**	**±2.35 0.42**	**±1.59 0.01**	T2
±2.93 0.06	**±4.13 0.30**	**±3.89 0.12**	**±1.18 0.13**	**±3.03 0.12**	**±1.80 0.03**	T3
**	**	*	N.S	**	**	Significant level
The averages with different letters within the same column are significantly different (P<0.05).						

Table (4-4) shows that there are no statistically significant differences in the average values of the weekly and total food conversion rate, and the best value of the food conversion ratewas recorded by the birds of the T3 group, as it amounted to (2.93), and this is due to the superiority of the birds of this group in the values of weight gain with Low feed consumption at this age. While the two groups T1 and T3 recorded the highest value in terms of the total feed conversion rate, which amounted to (1.78). The feed conversion coefficient is one of the important economic indicators to indicate the efficiency of birds in converting feed into live weight, and any decrease in these values indicates an improvement. Converting feed into live weight.The results achieved in this experiment indicate a clear economic improvement in the two groups T4 and T5, and the reason for the improvement in the efficiency of food conversion in these two groups may be due to the improvement in the efficiency of the digestive system to digest nutrients through the role of the active substances present in the fenugreek that contain digestive enzymes as well as absorption and the neutralization of toxins (ginger, Medical Encyclopedia, 2006 (Foster, 2000); Ginger increases the flow of bile into the intestine (Vanaclocha and Canigueral, 2003), and this helps in the digestion and absorption of fats in addition to the vitamins soluble in it (Harold, 1986), and thus works to increase the readiness of some nutrients.

Table (5). The effect of the studied treatments on the rate of weight gain of the bird

Mean ± standard error							treatments
belly fat (%)	gizzard (%)	heart (%)	liver (%)	dress percentage	hot Carcass Weight (gm)	Live weight at slaughter (kg)	
±0.93 0.03	**±1.32 0.02**	**±0.46 0.01**	**±2.68 0.16**	**±73.73 7.63**	**±1715.0 93.00**	**±2338.0 116.0**	T1
±1.31 0.15	**±1.97 0.23**	**±0.48 0.00**	**±1.99 1.03**	**±71.66 1.20**	**±1327.0 177.0**	**±1848.0 216.0**	T2
±1.38 0.04	**±2.10 0.09**	**±0.61 0.05**	**±2.44 0.09**	**±71.00 1.17**	**±1279.00 29.00**	**±1801.00 11.00**	T3
**	**	*	**	N.S	*	*	Significant

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							level
The averages with different letters within the same column are significantly different (P<0.05.(							

It is noted from the results of Table (5) that there are significant differences between the treatments under study, as the control treatment T1 showed the highest rate of 2338.0 kg, compared to the barley feeding treatment, which gave an average of 1801 kg. The treatment of the same comparison treatment, T1, gave the highest average hot carcass weight, which was (1715.0 g).While the treatment of feeding with fenugreek gave an average of (1279.0 g). The T1 control treatment also gave an average of (73.7%) compared to the fenugreek feeding treatment, which gave (71.0%). In domestic birds (1715.0 g). While the treatment of feeding with fenugreek gave the highest rate of (1.38%) in the weight of belly fat, and the usual feeding treatment (T1 control treatment) gave an amount of (0.93%). acid, stearic acid, and oleic acid that caused the accumulation of fat in the belly of the bird (3 Food and Agriculture Rural Revitization, 200)

Conclusions

1- Group T3 (Fenugreek 1 plant) showed a significant decrease (P<0.05) in the average weekly live weight and the rate of weekly and cumulative weight gain compared to the rest of the groups.

2- Groups T3 (Fenugreek 0.5%) and T2 (Barley 00.5%) showed a non-significant increase in average live body weight and cumulative weight gain compared to the control group.

3- The three groups T2 and T3 showed a significant decrease (P<0.05) in the characteristics studied in the average weekly body weight compared with the control group T1.

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