INFLUENCE OF CURCUMIN AND GROUND ANISE SEEDS AS MEDICAL HERBS ON THE PERFORMANCE, EUROPEAN PRODUCTION EFFICIENCY FACTOR, CARCASS CHARACTERISTICS AND SOME BLOOD CONSTITUENTS OF JAPANESE QUAILS

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(Received 01/11/2022, accepted 11/12/2022)

SUMMARY

The present study was designed to investigate the effect of curcumin, anise seeds levels and their interactions on growth performance European Production Efficiency Factor, carcass criteria and some blood parameters of quails. One hundred sixty-two, one day old of Japanese quails were randomly assigned in (3×2) factorial design. Three curcumin levels (0, 100, 200 mg/kg) and two ground anise seeds levels (0, 1%) in six treatments of 27 chicks each (three replicates of 9 chicks, each) were used. Body weight and feed intake were recorded weekly. Body weight gain and feed conversion were calculated at the end of the experiment (42 day of age). Carcass criteria and some blood constituents were measured throughout the experiment. The results showed the main effect of curcumin didn't affect body weight, body weight gain, feed conversion ratio, European Production Efficiency Factor and European Broiler Index. Numerically, all the previous parameters were improved by supplementation of curcumin or ground anise seeds. Concerning with the interactions between the two medical herbs, the results showed that quails fed curcumin at level of 200 mg/kg plus 1% ground anise seeds diet achieved significantly ($P<0.05$) higher body weight, body weight gain and feed intake during the period from 0-14 days of age compared to the control. From the current experimental results, we can recommend supplementing diets with curcumin at level of 200 mg/kg and ground anise seeds at level of 1% to improve growth performance.

Key words: *Curcumin, Anise, Performance, European Production Efficiency Factor, Carcass*

INTRODUCTION

Quail birds occupy a small but special segment of the Egyptian poultry industry. These birds are raised as source of specialty egg and meat. Japanese quail have the advantage of rapid growth rate, small size, good reproductive potential, short life cycle, low feed requirements, good meat taste, better laying ability and shorter time of hatching as compared with the different species of poultry (Siyadati *et al.*, 2011).

Numerous studies have shown that the use of antibiotics in poultry diets, although slightly improved performance; however, long-term use of antibiotics causes bacterial resistance and endangers human health. Therefore, today, due to the limitations of the use of antibiotics, the use of natural alternatives such as medicinal plants have been considered. Medicinal plants as a natural feed additive used as growth promoters and flavor agents, may be used an alternative to antibiotics, and improve the live performance and the immune response, maintaining bird health, and reducing the effects of oxidative spoilage such as curcumin (Metwally *et al.*, 2021), cinnamon, pepper, sage, thyme, and rosemary (Hernandez *et al.*, 2004) or anise powder (Metwally *et al.*, 2021) in broiler feeds. Turmeric (curcuma longa) is one of the many medicinal herbs used in poultry diets (Laguma and Ampode, 2021). Turmeric is a rhizome obtained from the turmeric plant and belongs to the Zingiberacae family that is rich in phenolic compounds with anti-mutagenic and anticarcinogenic properties (Abdullah *et al.*, 2010). Turmeric also contains active compounds such as curcumin, desmethoxycurcumin, bisdemethoxycurcumin and tetrahydro curcuminoid (Kiuch *et al.*, 1993) with antioxidant, anti-inflammatory and nematocidal activities (Osawa *et al.*, 1995). Turmeric, due to its curcumin, can improve the antioxidant and immune status of poultry.

Parvari *et al.* (2022) reported that addition of medicinal plants (curcumin) improved growth rate, carcass and the relative weights of spleen, ovary, and testis. Also, significant increases were observed in red blood cells (RBC), white blood cells (WBC), hemoglobin (Hb), packed cell volume (PCV), total protein and globulin.

There was reduction in cholesterol in treated groups as compared to the control. Also, they mentioned that the beneficial effects of dietary medicinal plants (anise) to improve the health condition as well as the productive and physiological characteristics of quails. Feeding 1.5 % turmeric powder is recommended to improve the performance, blood parameters, and immune response of growing quails (Parvari *et al*., 2022). The addition of any level of nano-curcumin in the quail diet significantly had beneficial impacts on growth, lipid profile, blood constituents, antioxidant indices, and immunity of growing quail, as well as increasing counts of lactic acid bacteria and reducing pathogenic bacteria (Reda *et al.,* 2020). Abdel-Kader *et al.* (2018) mentioned that growth performance of quail was improved by supplementation of 1 and 3%turemeric expressing as heavier body weight at 38 days of age, better body weight gain and feed conversion ratio during the period from 10-38 days of age compared to control group. It has been demonstrated that curcumin reduces levels of cholesterol and triglycerides in quail blood, also reduce LDL and increase HDL in quail eggs (Saraswati and Tana, 2016). Supplementation of turmeric in the ration can stimulate digestive enzymes and pancreatic lipase (Platel and Srinivasan, 2000). It has been reported that the addition of curcumin at a dose of 0.2 g / kg to broiler diet increases the length and weight of duodenum, jejunum, and caeca, thereby improve the digestive process, and increase the utilization of nutrients (Rajput *et al.*, 2013). Curcumin inhibits the absorption of dietary cholesterol in the digestive tract (Arafa, 2005). Curcumin shows increased interest by many researchers, since this compound is considered a functional molecule (Galli *et al.*, 2018; Johannah *et al.*, 2018) that can be added into the animal feed. Youssef *et al.* (2022) reported that significant improvement was detected in final body weight and entire body weight gain for quail fed the diet supplemented with 250 mg /kg diet from curcumin compared with quail fed the control diet. Final body weight and entire body weight gain gained more improvement with increasing curcumin up to 500mg/kg diet. Blood antioxidant parameters were improved by curcumin supplementation. The level of aflatoxin B1 in liver and muscles were significantly decreased by curcumin supplementation. Supplementing diets with curcumin to improve growth performance and alleviate harms effects of free radicals and aflatoxin B1 (Youssef *et al.,* 2022).

Anise (Pimpinella anisum L). is an aromatic annual herb widely grown in the Mediterranean region. The part used is the fruit, or the socalled seeds. Anise seeds have a number of active compounds, particularly volatile oil 1-4%, which consists of largely trans-anethol 70-90% with estragole (methylchavicol), anisealdehyde, bcaryophlline, anise ketone (methyloxyphenylacetone) and the polymers of anethole (Ciftci *et al.,* 2005). Moreover, as a medicinal plant, anise has been used as antibacterial (Tabanca *et al.,* 2003), antifungal (3), antiparasitic (Cabuk *et al.,* 2003). Moreover, previous literature showed that essential oil of anise increased the digestion of protein, cellulose and fats (Jamroz and Kamel, 2002) and improved apparent whole tract and ileal digestibility of nutrients (Hernandez *et al.,* 2004).

Anise has been examined for its antiparasitic and digestion stimulating properties (Cabuk *et al.,* 2003), as well as its antibacterial (Tabanca *et al.,* 2003), antifungal (Soliman & Badea, 2002), antipyretic (Afifi *et al.,* 1994), antioxidant (Gulcin *et al.,* 2003), antimicrobial (Al-kassie, 2008 and Al-Kassie *et al.,* 2011), anthelmintic (Bhatti *et al.,* 1996) and hypocholesterolemic (Craig, 1999) activities. Additionally, anise is reported to possess anticonvulsant (Pourgholam *et al.,* 1999), antiepileptic (Janahmadi *et al.,* 2008) and muscle relaxant (Albuquerque *et al.,* 1995) properties. Some studies have been conducted to evaluate the use of anise seed or oil in poultry nutrition, especially to replace antibiotics as growth promoters (Al-Beitawi *et al.,* 2009). Antioxidants in poultry diets perform an important role in the good health and performance of poultry and the oxidative stability of their products, and poultry diets are routinely supplemented with antioxidants. Nevertheless, it remains unclear whether the antioxidant properties of aromatic plants are comparable to that of α-tocopheryl acetate, which is usually included in commercial poultry diets (Windisch *et al.,* 2008).

Improved body weight and body weight gain and feed conversion ratio were observed in 6 weeks broiler chickens fed diets containing anise seeds (0.3% and 0.6%) compared to the control treatment (Amein *et al.,* 2019). Mohammed (2019) found that an improved ,body weight and body weight gain were observed in of broiler chickens fed diets containing anise seeds (0.3%,0.6%,0.9%) compared to the control as well as an improved dressing percentage % was observed compared to the control .Moreover body weight gain broiler chickens fed diets containing anise seeds (0.5,0.75, 1 gm/kg) compared to the control besides, improved carcass %was abs observed in 6 week old Cobb broiler chickens compared to the control (Ramadan, 2017).

The experiment aimed to evaluate Influence of curcumin and ground anise seeds as medical herbs on the performance, European Production Efficiency Factor (EPEF), European Broiler Index (EBI), carcass characteristics and some blood constituents of Japanese quails.

MATERIALS AND METHODS

The study was conducted at the Poultry Research Farm, Dep. of Poultry Production, Faculty of Agriculture, Assiut University.

Experimental birds, measurements, and design:

A total number of 162 (one hundred sixty-two) unsexed one days-old quails were used in present study in a 3× 2 factorial arrangement (3 levels of vitamin curcumin, 0 and 100 and 200 mg/kg feed) and 2 levels of ground anise seeds (0, 1%). Chicks were randomly divided into six equal treatments of three replicates each, of nine quails each. Experimental diets were corn –soybean based and contain 24% (standard protein requirement according to NRC (1994, recommendation). The feed raw materials (Pure Curcumin and ground anise seeds) were purchased from a local source in (Cairo and Assiut Governorates) and the dry matter percentage in the feed was chemically estimated well following the standard methods of analysis described by the Association of Official Analytical Chemists (AOAC, 1990) at the Poultry Production Laboratory, Faculty of Agriculture, Assiut Univ., Assiut – Egypt.

Samples of the experimental diets (Table 1) were taken for analysis in the same previous Lab. according to AOAC (1990). The experimental design as follows: Treatment 1 (T1): chicks were fed control diet without addition. Treatment 2 (T2): chicks were fed basal diet includes 1% anise ground seeds. Treatment 3 (T3): chicks were fed Basel diet includes 100 mg curcumin/kg feed. Treatment 4 (T4): chicks were fed basal diet includes 100 mg curcumin/kg plus 1% anise ground seeds. Treatment 5 (T5): chicks were fed basal diet includes 200 mg curcumin/kg feed and treatment 6 (T6): chicks were fed basal diet includes 200 mg curcumin/kg feed plus1% anise ground seeds.

Table (1): Composition and analysis of the experimental basal and treated diets.

Ingredients	Starter and grower%	Anise seed meal %
Yellow corn	53.80	52.80
Soybean Meal (44%)	36.70	36.70
Corn gluten Meal (60%)	6.40	6.40
Anise ground seeds	-----	1.0
Di calcium phosphate	1.05	1.05
Vit . Min. Premix*	0.50	0.50
Limestone	1.25	1.25
Na Cl	0.30	0.30
Total	100	100
Determined[1] and calculated[2] composition		
Nutrient determined analysis		
Dry matter	87.82	86.88
Crude protein	24.3	24.41
Ether extract	2.6	2.53
Crude fiber[1]	2.73	2.84
Nutrient calculated analysis		
Dry matter	87.6	87.9
ME (kcal/kg)	2944	2913
Crude protein	24.3	24.8
Ether extract	2.6	2.53
Crude fiber	2.7	2.9
Calcium	0.8	0.9
Available phosphorus[2]	0.32	0.38
Lysine	1.31	1.47
Methionine	0.50	0.53
Total phosphorus	0.81	0.89

**Vitamins and minerals mixture provide per kilogram of diet: Vitamin A (as all-trans-retinyl acetate); 12000 IU; Vitamin E (all rac-tocopheryl acetate); 10 IU; k3 3mg; Vit.D3, 2200 ICU; riboflavin, 10 mg; Ca pantothenate,10 mg; niacin, 20 mg; Choline chloride, 500 mg; Vitamin B12, 10g; Vitamin B6, 1.5 mg; Thiamine (as thiamine mononitrate); 2.2 mg; Folic acid, 1 mg; D-biotin, 50g. Trace mineral (milligrams per kilogram of diet) Mn, 55; Zn, 50; Fe, 30;Cu, 10; Se, 0.1 and Ethoxyquin 3mg.*

Ground anise seeds were added as a replacement of yellow corn.The experimental chicks were housed in galvanized batteries composed of three tiers, equipped with cages, having the dimensions of (75 cm length, 50 cm width and 45 cm height) and placed in a semi closed house. They were raised under adequate and similar managerial, nutritional, and hygienic conditions Quail chicks were kept during the first three days of age to a lighting period of 23 hr/day, which was gradually decreased by 1hr/day to reach 12L: 12D hours/day during the rest of the growing period.

Body weight was recorded at one day old and each week per each replicate till 7 weeks. Also, feed consumed was recorded each week till the last of the experiment. Body weight gain and feed conversion were calculated during the period from 0-7, 0-14, 0-21, 0-28, 0-35, and 0-42 days of age. Mortality was also, recorded daily. Depend on the calculations of BWG and FCR and mortality, some of criteria had been added. The European Production Efficiency Factor (EPEF) and European Broiler Index (EBI) were used to evaluate the growing performance of quails as suggested by Marcu *et al.* (2013). EPEF and EBI were calculated according to the following formula:
TWG (Total weight gain) = Body weight (g) at the end — Body weight (g) at start; ADG (Average daily gain) (g/chick/d) = TWG/ days of growth period. FCR (feed conversion ratio) (kg feed/kg gain) = Viability, % = 100 - mortality, %
EPEF= Viability (%) x BW (kg)*100/Age (d) x FCR (kg feed / kg gain)
EBI = Viability (%) x ADG (g/chick/day) /FCR (kg feed/kg gain) x 10

Carcass and blood measurements:

In the last of the experiment, three chicks from each treatment (total 18 chicks) were taken to slaughter to measure carcass cut parts, then measured as relative to live body weight. Complete bleeding, scalding, and plucking, the edible organs (heart, liver, empty gizzard), weighed and also, estimated as percentage of the live body weight. The dressing percentage was estimated by dividing the weight of the carcass giblets on the pre-slaughter body weight of birds.

Relative organ weight = (organ weight/Live body weight) X 100.

At the same time of slaughtering quails to measure carcass criteria, blood samples were taken from the 3 chicks from each treatment. The blood samples collected in heparinized tube. Separation of plasma was carried out by centrifugation of coagulated blood at 3000 rpm for 10 min. The clear plasma was transferred carefully to clean and dry vials and kept in deep freezer until analysis for determination of plasma albumin, glucose, total protein, calcium, phosphorus, total cholesterol, triglycerides, ALP, Got and GPT using kits from Diamond Diagnostic (Cairo, Egypt).

Statistical analysis:

Data obtained from this study were analyzed by factorial design (3*2) using the SAS procedure (Version 2006). Duncan's multiple range test (1955) was also used to determine differences among means.
The statistical model used as following:

$$Yijk= \mu+ Curi+ Anisj+ (Cur * Anis)ij+ eijk$$

Where; Yijk = An observation of traits. μ= The overall mean.
Curi= The fixed effect of the curcumin (where i = 1, 2 and 3).
Anisj= The fixed effect of; the anised (where j = 1, 2 and 3).
(Cur *Anis)ij= Interaction of Curcumin levels×Anise %)
eijk=The Experimental random error.

RESULTS AND DISCUSSIONS

Body weight (BW), body weight gain (BWG), feed consumption (FC) and feed conversion ratio (FCR) of quails as affected by Curcumin and Ground Anise Seeds as a Medical Herbs:

The results of body weight as affected by curcumin and anise seeds are presented in (Table 2). There were no significant differences due to the main effects of either curcumin or anise seeds supplementation during the experimental periods. Concerning, the interactions between curcumin and anise addition, treatment 4, in which chicks fed 100 mg/kg curcumin plus 1% anise seeds achieved the highest BW at 7 days of age in the same trends, chicks fed 200 mg/kg curcumin plus 1% anise seeds achieved the highest BW at 14 days of age. compared with control or any other treated groups. However, there weren't interactions effects between curcumin levels and anise seeds % on BW at21, 28, 35 and 42 days of age.

The results of body weight gain as affected by curcumin and anise seeds are presented in (Table 3). There were no significant differences due to the main effects of either curcumin or anise seeds supplementation. During the experimental periods, concerning, the interactions between curcumin and anise addition. The results showed that treatment 6, in which chicks fed 200 mg/kg curcumin plus 1% anise seeds achieved the highest

BWG during the period from 0-14 days of age compared with control or any other treatments. However, there weren't interactions effects between curcumin levels and anise seeds % on BWG during the periods from 0-7, 0-21, 0-28, 0-35 and 0-42 days of age.

The results of feed consumption (g) as affected by curcumin and anise seeds are presented in (Table 4). There were significant effects due to main effect of curcumin addition on feed consumption during the period's 0-7 and 0-14 days of age. However, 200 mg/kg feed of curcumin reduced feed consumption compared to the other level of curcumin (100 mg/kg feed) during the period from 0-14 days of age. There were no significant differences due to the main effects of curcumin supplementation during the periods 0-21, 0-28, 0-35 and 0-42 days of age. Increased in FC due to anise supplementation at level of 1% during the period from 0-14 days of age. Concerning, the interactions between curcumin and anise addition, treatment 3, in which chicks fed 100 mg/kg curcumin achieved the highest FC during the period from 0-42 days of age. of age. in the same trends, chicks fed 200 mg/kg curcumin plus 1% anise seeds achieved the highest FC during the period from 0-14 days of age compared with control or any other treated groups. However, there weren't interactions effects between curcumin levels and anise seeds % on FC during the periods from 0-21, 0-28, 0-35 days of age.

The results of feed conversion ratio (FCR) as affected by curcumin and anise seeds are presented in (Table 5). There were significant effects due to main effect of curcumin addition on FCR during the periods 0-14 days of age. However, 200 mg/kg feed of curcumin improved FCR (2.45) compared to the control (2.49) and other level of curcumin (100 mg/kg feed) (2.88) during the period from 0-14 days of age. There were no significant differences due to the main effects of curcumin supplementation during the periods 0-7, 0-21, 0-28, 0-35 and 0-42 days of age. No significant ($P>0.05$) effects due to anise supplementation at level of 1% during all periods of the experiment. Concerning, the interactions between curcumin and anise addition, treatments 6, in which chicks fed 200 mg/kg curcumin p% anise seeds enhanced FCR during the period from 0-14 days of age. However, there weren't interactions effects between curcumin levels and anise seeds % on FCR during the periods from 0-21, 0-28, 0-35 and 0-42 days of age.

Concerning with the positive effects of curcumin on BW, BWG, FC and FCR during some different periods of age, in the present study agree with Rajput *et al.* (2012) who reported that BWG was in birds at (0-42) days of age of broiler chickens fed diets containing curcumin at levels ranged from 100 to 200 mg/kg feed improved significantly ($P<0.05$) compared to the control group and the best one was 200mg/kg. Badran *et al.* (2020) found significant ($P<0.05$) improvement in BW and BWG in broilers (1-35 days) fed diets containing curcumin (50,100 mg / kg) compared with the control group. Arslan *et al.* (2017) showed that BWG and FCR were improved with turmeric supplementation at a higher dose (1.0 and 1.5%), while occurs reducing in serum total cholesterol and increasing in HDL-cholesterol without effect on triglycerides with addition turmeric levels. Attia *et al.* (2017) found that turmeric addition at 1 g/kg diet improved feed conversion ratio (FCR) compared to control groups. Abdel-Kader *et al.* (2018) found that growth performance was improved through quail diets with both 1 and 3% turmeric expressing as heavier LBW at 38d, BWG during (10-38 days of age), lower FC during 10-38 days of age, better FCR during the period from (10-38) of age compared with un supplemented group (control).

On the other hand, the nonsignificant effects due to curcumin supplementations are also in the same trends of Badran *et al.* (2020) who reported that there were no significant differences on BW, BWG and FCR when feeding chicks with diets fed containing curcumin (25 mg / kg) compared to the control group at (1-35) days of age. Moreover, Xie *et al.* (2019) found that there was no significant effect on BW, FC and FCR when feeding chicks with diets containing curcumin (500 mg / kg) compared to the control at age of (22-49) days. Candra and Putri (2020) indicated no significant effect on FC when feeding chicks with diets containing turmeric (500 mg / kg) compared to the control at age 30 days of age.

Regarding with the positive effects of anise seeds on BW, BWG, FC and FCR, the obtained results are in agree with Amein *et al.* (2019) who reported an improve in body weight and body weight gain in birds at 42days of broiler chickens fed diets containing anise seeds. Also Jabber *et al.* (2015) found an improve in feed intake 6 weeks old broiler chickens fed diets containing anise seeds (2,4,6,8kg/ton) compared to the control.

On the other hand, the non-significant effects due to anise seeds supplementation are also in the same trends of Barakat *et al.* (2016) who reported that there was no significant effect on BW and BWG at 5 weeks old of broiler chickens fed diets containing anise seeds (0.5,0.75 gm/kg) compared to the control. Also, Amein *et al.* (2019) indicated that there was no significant effect on feed intake in birds (0-6) week old broiler chickens (Ross 308) fed diets containing anise seeds (0.3%, 0.6%) compared to the control. No significant difference was observed on FCR when feeding chicks with diets containing anise seeds (0.2%, 4%, 0.6%) compared to control (7-35) day at age (Mahmod, 2013). The supplementation of spices and herbs could have many benefits to quail's health and performance such as having anti-oxidative potential, antimicrobial activity (Dorman and Deans, 2000) and enhancing digestion by stimulating endogenous enzymes (Brugalli, 2003).

The results of the present study clearly showed that the addition of curcumin or anise in quails feed had no significant effect on the body weight and weight gain until the third week of feeding. However, the body weight and weight gain began to increase significantly ($P<0.05$) from the fourth week until the end of the experiment.

The positive effect of anise or curcuma on the live body weight and total gain may be attributed to the fact that curcumin contains essential fatty acids and high-quality proteins (Bharath *et al.,* 2018).

Anise seeds stimulate digestion (Cabuk *et al.,* 2003), particularly the digestion of protein, fats and cellulose (Jamroz and Kamel, 2002). In addition, curcuma had the ability to stimulate digestive enzymes and pancreatic lipase (Platel and Srinivasan, 2000; Rajput *et al.,* 2013).

The obtained results agreed with the results of Al–Kassie (2008) indicated that there was a significant ($P<0.05$) increase in the body weight gain of broilers fed 1% anise supplemented diets.

In the present study, anise and curcuma had no significant effect on the feed intake. The obtained results are in harmony with the results of Soltan *et al.* (2008) who reported that anise powder at different levels (0.25, 0.5, 0.75, 1 and 1.5%) of the feed had no significant effect on the feed intake. In addition, Mondal *et al.* (2015) and Ahlawat *et al.* (2018) reported that supplementation of curcuma at level 0.5 and 1% of the feed had no significant effect on the feed consumption. The feed conversion ratio was significantly improved with supplementation of different levels of anise or curcuma. The positive effect on feed conversion ratio may be due to the development of morphological changes of gastrointestinal tissues of the chicks' gut, which can be induced by differences in gut load of microbial content including their metabolites (Alloui *et al.,* 2012; Amal *et al.,* 2013; Mukhtar *et al.,* 2013; Weerasingha and Atapattu, 2013) or stimulation of bird digestive system, particularly protein, fats and cellulose digestion (Cabuk *et al.,* 2003). In addition, Yazdi *et al.* (2014) and Eltazi (2014) reported that feeding of anise supplemented diets at 1% of the feed significantly ($P<0.05$) improved the feed conversion ratio in broilers diets. Moreover, Ahlawat *et al.* (2018) and Choudhury *et al.* (2017) reported that feed conversion ratio was significantly ($P<0.05$) improved in broiler diets supplemented with 0.5% curcuma. Kumar and Shukla (2017) and Rahmani *et al.* (2017), reported that curcuma at different levels had no significant effect on the feed conversion ratio.

Table (2): Body weight (g) of Japanese Quail as affect by dietary curcumin and ground anise seeds.

Treatments	Body weight during the trial period (g)						
	1 day old	7day	14 days	21 days	28 days	35 days	42 days
Curcumin levels (mg/kg)							
0	7.75 ± 0.13	15.472 ± 0.21	54.58 ± 0.97	105 ± 1.47	159.31 ± 3.34	197.64± 5.02	224.31 ± 8.39
100	7.70 ± 0.14	15.75 ±. 021	52.08 ± 2.4	104.31 ± 3.31	157.08 ± 4.5	190.97 ± 7.64	213.89 ± 10.3
200	7.73 ± 0.13	15.53 ± 0.21	57.08 ± 0.66	108.75 ± 2.63	161.39 ± 3.06	198.19 ± 1.81	220.42 ± 1.78
Ground anise seeds (1%)							
0	7.60 ± 0.04	15.52 ± 0.19	54.82 ± 1.15	105.37 ± 2.47	157.22 ± 3.22	194.54 ± 4.65	217.69 ± 6.62
1	7.85 ± 0.11	15.65 ± 0.16	54.35 ± 1.78	106.67 ± 1.79	161.29 ± 2.34	196.67 ±4.12	221.39 ± 5.85
Interactions							
T1	7.60 ± 010	15.11^{c} ± 0.11	53.61^{ab} ± 1.9	103.889 ± 2.78	155.28 ±1.9	191.67 ± 3.89	216.11 ± 6.11
T2	7.90 ± 0.2	15.83^{ab} ± 0.1	55.56^{ab} ± 0	106.11 ± 1.67	163.33 ± 5.56	203.61 ± 8.06	232.50 ± 15.8
T3	7.55 ± 0.05	15.56^{abc}± 0.4	54.72^{ab} ± 3	105.57 ± 7.78	156.94 ± 10	192.78 ± 16	213.89 ± 23
T4	7.85 ± 0.25	15.94^{a} ± 0.06	49.44^{b} ± 2.78	103.06 ± 1.39	157.22 ± 3.89	189.17 ± 9	213.89 ± 0.31
T5	7.65 ± 0.05	15.89^{a} ± 0.11	56.11^{ab} ± 0	106.67 ± 4.44	159.44 ± 6.11	199.17± 4.17	223.06 ± 1.94
T6	7.80 ± 0.3	15.17^{bc} ± 0.1	58.06^{a} ± 0.83	110.83 ± 3.61	163.33 ± 3.33	197.22 ± 0.56	217.78 ± 1.11

Means in the same columns with different superscript are significant difference (P<0.05).

T1=control; T2=1% ground anise seeds; T3=100 mg curcumin; T4=100 mg curcumin+1% anise; T5=200 mg curcumin; T6=200 Curcumin+1% anise.

Table (3): Body weight gain (g) of Japanese Quail as affect by dietary curcumin and ground anise seeds.

Treatments	Body weight gain during the trial period (g)					
	BWG (0-7)	BWG (0-14)	BWG (0-21)	BWG (0-28)	BWG (0-35)	BWG (0-42)
Curcumin levels (mg/kg)						
0	7.72 ± 0.2	46.83 ± 0.9	97.25 ± 1.4	151.56 ± 3.2	189.89 ± 4.92	216.56 ± 8.2
100	8.05 ± 0.2	44.38 ± 2.4	96.61 ± 3.3	149.38 ± 4	183.27 ± 7.68	206.19 ± 1.0
200	7.80 ± 0.2	49.36 ± 0.5	101.03 ± 2	153.6 ± 2.9	190.47 ± 1	212.69 ± 1.8
Ground anise seeds (1%)						
0	7.92 ± 01	47.22 ± 1.1	97.77 ± 2.4	149.62 ± 3.2	186.94 ± 4.6	210.09 ± 6.6
1	7.79 ± 0.1	46.50 ± 1.7	98.82 ± 1.7	153.45 ± 2.3	188.82 ± 4.1	213.54 ± 5.8
Interactions						
T1	7.51 ± 0.2	46.01^{ab} ± 2	96.289 ± 2.8	147.678 ± 2.0	184.07 ± 3.9	208.51 ± 6.2
T2	7.93 ± 0.2	47.66^{ab} ± 0.2	98.21 ± 1.4	155.43 ± 5.3	195.71 ± 7.8	224.60 ± 15
T3	8.01 ± 0.4	47.17^{ab} ± 3.5	98.01 ± 7.7	149.39 ± 10.2	185.23 ± 16.0	206.34 ± 23.8
T4	8.09 ± 0.3	41.59^{b} ± 2.5	95.21 ± 1.6	149.37 ± 4.1	181.32 ± 9.4	206.04 ± 8.5
T5	8.24 ± 0.1	48.46^{ab} ± 0.1	99.02 ± 4.3	151.79 ± 6.0	191.52 ± 4.1	215.41 ± 1.8
T6	7.37 ± 0.2	50.26^{a} ± 0.5	103.03 ± 3.3	155.53 ± 3.0	189.42 ± 0.2	209.98 ± 1.4

Means in the same columns with different superscript are significant difference (P<0.05).

T1=control; T2=1% ground anise seeds; T3=100 mg curcumin; T4=100 mg curcumin+1% anise; T5=200 mg curcumin; T6=200 Curcumin+1% anise.

Table (4): Feed consumption (FC, g) of Japanese Quail as affect by dietary curcumin and ground anise seeds.

Treatments	Feed consumption (g) during the trial period (g)					
	FC (0-7)	FC (0-14)	FC (0-21)	FC (0-28)	FC (0-35)	FC (0-42)
Curcumin levels (mg/kg)						
0	23.00^{b} ±0.8	116.50^{b} ± 2.9	268.44± 10.8	370.25 ± 9.3	554.56 ± 14.6	703.58 ± 11.9
100	23.75^{ab} ± 0.4	126.25^{a} ± 3.7	267.5± 9.9	388 ± 12.8	602.72 ± 23.8	749.25 ± 24.8
200	25.25^{b} ± 0.4	120.75^{ab} ±2.9	260.75± 6.3	355.33± 12.0	563.39 ± 13.1	695.47 ±15.2
Ground anise seeds (1%)						
0	24.33 ± 0.4	116.83^{b} ± 2.1	259.61± 6.0	373.00 ±10.5	576.98 ± 20.2	721.33 ± 22.0
1	23.67 ± 0.7	125.50^{a} ± 2.3	271.52± 7.4	369.39 ±10.7	570.13 ± 11.9	710.87 ± 11.1
Interactions						
T1	24.0^{ab} ±1	112^{c} ± 3	256.17 ± 7.7	367.28 ±1.1	538.67 ± 14.6	688.67^{b} ±14.67
T2	22.0^{b} ±1	121b^{c} ± 2	280.72 ± 18.3	373.22 ± 22.5	570.44 ± 23.6	718.50^{ab} ±13.9
T3	24.0^{ab} ±1	120^{bc} ± 2	256.11 ± 18.1	395.44 ± 15.4	624.61 ± 34.61	781.83^{a} ± 18.1
T4	23.5^{ab} ± 0.5	132.50^{bc}± 0.5	278.89 ± 0.8	380.56 ± 25.2	580.83 ± 35.5	716.67^{ab}±35.2
T5	25.0^{ab} ±1	118.50^{bc} ± 4.5	266.56 ± 9.7	356.28 ± 25.1	567.67 ± 30.3	693.50^{b} ± 35.1
T6	25.50^{a} ± 0.5	123^{b} ± 2	254.94 ± 8.8	354.39 ± 15.5	559.11± 9.1	697.44^{ab}±12.4

Means in the same columns with different superscript are significant difference (P<0.05).

T1=control; T2=1% ground anise seeds; T3=100 mg curcumin; T4=100 mg curcumin+1% anise; T5=200 mg curcumin; T6=200 Curcumin+1% anise.

Table (5): Feed conversion ratio (g. feed/g. gain) of Japanese Quail as affect by dietary curcumin and ground anise seeds.

Treatments	Feed conversion ratio during the trial period (g)					
	FCR (0-7)	FCR (0-14)	FCR (0-21)	FCR (0-28)	FCR (0-35)	FCR (0-42)
Curcumin levels (mg/kg)						
0	2.98 ± 0.1	2.49^{b} ± 0.04	2.76 ± 0.08	2.44 ± 0.04	2.92 ± 0.01	3.26 ± 0.07
100	2.96 ± 0.08	2.88^{a} ± 0.22	2.76 ± 0.18	2.39 ± 0.30	3.02 ± 0.45	3.34 ± 0.41
200	3.25 ± 0.14	2.45^{b} ± 0.04	2.59 ± 0.09	2.31 ± 0.07	2.96 ± 0.04	3.27 ± 0.06
Ground anise seeds (1%)						
0	3.08 ± 0.06	2.48 ± 0.07	2.67 ± 0.10	2.36 ± 0.19	2.91 ± 0.28	3.24 ± 0.26
1	3.05 ± 0.15	2.73 ± 0.16	2.76 ± 0.11	2.41 ± 0.07	3.02 ± 0.06	3.34 ± 0.07
Interactions						
T1	3.19^{ab} ± .04	2.44^{b} ± 0.04	2.66 ± 0.001	2.49 ± 0.03	2.93 ± 0.02	3.30 ± 0.03
T2	2.78^{b} ± 0.2	2.54^{b} ± 0.05	2.86 ± 0.14	2.39 ± 0.06	2.91 ± 0.01	3.21 ± 0.16
T3	3.01^{ab} ± 0.1	2.56^{b} ± 0.24	2.64 ± 0.39	2.25 ± 0.70	2.84 ± 1.06	3.19 ± 0.99
T4	2.91^{b} ± 0.2	3.19^{a} ± 0.21	2.93 ± 0.06	2.55 ± 0.09	3.20 ± 0.03	3.48 ± 0.03
T5	3.04^{ab} ± 0.2	2.44^{b} ±0.09	2.69 ± 0.02	2.34 ± 0.07	2.96 ± 0.09	3.22 ± 0.13
T6	3.46^{a} ± 0.05	2.45^{b} ± 0.01	2.48 ± 0.17	2.28 ± 0.14	2.95 ± 0.05	3.32 ± 0.04

Means in the same columns with different superscript are significant difference (P<0.05).

T1=control; T2=1% ground anise seeds; T3=100 mg curcumin; T4=100 mg curcumin+1% anise; T5=200 mg curcumin; T6=200 Curcumin+1% anise

European production efficiency factor (EPEF) and European broiler index (EBI):

The results in Table (6), showed that Europe Production efficiency Factor (EPEF) and Europe Broiler Index (EBI) values of quails during the period from one day old to 42 days of age. The results showed that curcumin and anise seeds and their interactions didn't affect either EPEF or EBI. The obtained results disagree with that reported by Attia *et al.* (2017) who found that turmeric supplementation at 1 g/kg feed significantly improved European production index compared to the control group. If for instance a very low density is used during the grow-out period, the daily gain and with it the EBI will most likely go up, but the profit per square meter will go down, and the last one is economically of more interest. If a low density, cheap feed is used, the daily growth and feed conversion might be negatively influenced, and with it the EBI, but the net profit per kg of meat might go up.

Table (6): EPEF and EPI as of Japanese Quail as affect by dietary curcumin and ground anise seeds.

Treatments	EPEF	EBI
Curcumin levels (mg/g)		
0	16.29±0.99	15.74±0.98
100	13.64±1	13.15±0.98
200	15.91±0.34	15.35±0.34
Ground anise seeds (1%)		
0	14.86±0.89	14.34±0.87
1	15.71±0.73	15.15±0.72
	Interactions	
T1	15.42±0.57	14.88±0.57
T2	17.17±2.03	16.59±1.98
T3	12.79±2.08	12.34±2.06
T4	14.49±0.47	13.96±0.48
T5	16.36±0.54	15.79±0.52
T1	15.46±0.09	14.90±0.07

Means in the same columns with different superscript are significant difference(P<0.05). T1=control; T2=1% ground anise seeds; T3=100 mg curcumin; T4=100 mg curcumin+1% anise; T5=200 mg curcumin; T6=200 Curcumin+1% anise

Carcass criteria of quails as affected by Curcumin and Ground Anise Seeds as a Medical Herbs:

The results of carcass traits as affected by curcumin levels and ground anise seeds % are presented in (Table 7). There were significant differences due to the main effects of curcumin on liver%. However, using 100 mg/kg curcumin achieved the highest percentage of liver (2.15%) relative to live BW compared to the other level and control. No significant (P>0.05) effects due to curcumin or anise seeds on Heart, gizzard, proventriculus, carcass, giblet and dressed percentages.

Regarding with the interactions between curcumin and anise seeds, there were significant (P<0.05) interaction effects on liver, Heart, gizzard, proventriculus and carcass percentages. Carcass% achieved the highest value (69.8%) in treatment 6 in which chicks, fed 200 mg/kg curcumin plus 1% anise seeds compared to the other treatments except control group. The obtained results disagree with Abdel-Kader *et al.* (2018) who reported that, adding 1% turmeric did not affect the carcass% in quails. Mohammed (2019) reported that there was no significant effect on liver%, heart%, gizzard % when feeding chicks with diets containing anise seeds (0.3%, 0.6%, 0.9%) compared to control diet at age of 42 day. Ramadan (2017) reported that there was no significant effect on liver%, heart %, gizzard % when feeding chicks with diets containing anise seeds (0.5, 0.75, 1gm/kg) compared to control. Durrani *et al.* (2006) showed beneficial effects of dietary turmeric meal supplementation (5.0 g/kg) to increase carcass quality and dressing percentage. Other studies did not find any significant effect of turmeric supplementation at the rate of 1.0 g/kg (Rahmatnejad *et al.,* 2009) or 2.0 g/kg (El-Hakim *et al.,* 2009) on carcass production. Also, Ürüşan and Bölükbaşı (2017) reported that adding turmeric did not affect the carcass yield. Turmeric also improves liver and bile functions through increased bile secretions, protects the stomach from ulcers and reduces liver toxins. These improvements can enhance digestion, metabolic processes and nutrient utilization for growth through stimulation of protein synthesis by the chicken enzymatic system (Al-Sultan, 2003). Turmeric has been observed to enhance the intestinal lipases, amylase, trypsin and chymotrypsin secretions (Rajput *et al.,* 2012). Therefore, the

improvement in the growth performance due to turmeric supplementation to broilers' diets can be partly attributed to improving the ecology and function of the digestive tract of chicks. Suvanated *et al.* (2003) reported that chicks fed dietary turmeric powder had a higher body weight gain, energy efficiency ratio, yield of production and lower FCR than the basal diet ($P < 0.05$).

Some blood constituents of quails as affected by Curcumin and Ground Anise Seeds as a Medical Herbs:

The results of blood parameters as affected by curcumin levels and ground anise seeds are presented in (Table 8). There were significant ($P<0.05$) differences due to the main effects of curcumin on some blood plasma (total protein, calcium, phosphorus, cholesterol, triglycerides, and ALP. The highest total protein, calcium, phosphorus, and triglycerides values were recorded for chicks fed 100 mg/kg curcumin in feed. Low cholesterol levels were achieved in groups fed the highest level of curcumin (200 mg/kg). Curcumin affects blood lipid metabolisms. The present study reveals that low levels of cholesterol for quails fed curcumin compared with control. The same findings were reported by Emadi *et al.* (2007) and Hosseini-Vashan *et al.* (2012). Curcumin reduces plasma LDL and VLDL significantly and liver cholesterol content along with an increase of plasma α-tocopherol level in rat, suggesting in vivo interaction between curcumin and α-tocopherol that may decrease cholesterol levels (Kamal-Eldin *et al.,* 2000). Lowering cholesterol effects may be mediated by the stimulation of hepatic cholesterol-7-hydroxylase activity because the digestibility of triglycerides (TG) was not affected by curcominoid supplementation (Asia *et al.,* 1999).

No significant ($p>0.05$) differences due to anise seeds supplementation on all blood plasma parameters except glucose. The addition of 1% anise seeds decreases the level of glucose in blood plasma from 312.2 to 275.5 mg/dl.

Regarding with the interactions between curcumin and anise seeds, there were significant ($P<0.05$) interaction effects on glucose, calcium, phosphorus, and triglycerides. Cholesterol was achieved the lowest value in blood plasma of chicks fed 200 mg/kg curcumin and 1% anise seeds. Abdel-Kader *et al.,* (2018) found that the diets supplemented with turmeric showed lower total Cholesterol, LDL, and AST than the un supplemented quail groups. Also, the last previous authors mentioned that useful intestinal bacteria (Lactobacillus) in growing quails significantly increased with added turmeric to quail diet and both Salmonella and E. coli (harmful intestinal bacteria) reduced significantly than the control group. Dietary supplementation of turmeric meal reduced ALT (Akbarian *et al.,* 2012) and alkaline phosphatase (ALP) activities in the blood serum (Emadi *et al.,* 2007), which can be indication of better function of liver. There is a positive effect for turmeric on health of the liver whereas contains active components that usefully catalyze bile excretion and bile flow. As noticed by Emadi and Kermanshahi (2007), supplementation of turmeric meal in the diets at the proportion of 2.5-7.5 g/kg lowered the condensations of aspartate aminotransferase (AST), alanine aminotransferase (ALT), lactate dehydrogenase (LDH) and alkaline phosphatase (ALP) in chickens' blood. Reductions of these enzymes are important as the aggregation of these enzymes in the liver is attached to toxicity. Malekizadeh *et al.,* (2012) showed that supplementing diets with 10.0-30.0 g/kg turmeric meal reduced the ALT and AST in blood serum of single comb white leghorn (W-36) laying hens. Turmeric has also been proven to have ability to stimulate the expression of genes which are involved in antioxidant and immune system of broiler chickens. Using a quantitative real-time PCR technique, Yarru *et al.,* (2009) showed that 5.0 g/kg turmeric meal supplementation had beneficial effects on the stimulation of genes expression that involved in antioxidant function [cytochrome P450 1A1 and 2H1 (CYP1A1 and CYP2H1)] and genes expression that involved in the immune system [interleukins 6 and 2 (IL6 and IL-2)] in chickens. These improvements could be attributed to activity of curcumin as immuno stimulant agent (Gautam *et al.,* 2007).

The beneficial effects of anise on the cellular and biochemical traits of blood may result from the improvement of biological and metabolic processes as well as from the optimized utilization of nutrients in the digestive system (Al-Shammari *et al.,* 2017). Also, the increases in the levels of total protein, albumin and globulin may confirm that anise may enhance the resistance of the chickens against different stress factors (Soltan *et al.,* 2008). The obtained results showed that the plasma levels of calcium and phosphorus were not significantly affected with anise inclusion in broiler diets. the results agree with that of Al-Shammari *et al.* (2017), who noted that supplementation broiler with anise at levels 500, 700 and 1000 mg/l, had significant ($P<0.05$) increase in the levels of albumin, globulin and total protein in the serum of broilers. The inclusion of curcuma in the diet of broilers had resulted in significant ($P<0.05$) increases in the plasma levels of total protein, albumin. Elevated total protein level suggested better ability of the hepatocytes of the treated group to synthesize protein. Also, significantly high serum globulin level suggested that birds of treated group had potential for better humoral immune status (Kumari *et al.,* 2007). The obtained results are in line with Hussein (2013),

who reported that plasma triglycerides level was significantly (P<0.05) decreased with 7 g curcuma fed diet. The obtained results indicated that the relative economic feed efficiency was increased in all treated treatments in comparison with the control group.

Table (7): Carcass traits as % of live body weight of Japanese Quail as affected by (dietary curcumin and ground anise seeds).

Treatments	Carcass parts							
	BW/g	Liver, %	Heart, %	Gizzard, %	Proventriculus %	Carcass%	Giblet, %	Dressed %
Curcumin levels (mg/g)								
0	244.25 ± 1.4	2.05^{a} ± 0.29	2.79 ± 0.007	1.26 ± 0.37	0.37 ± 0.09	70.09 ± 1.35	4.11± 0.25	74.19 ± 1.59
100	253.75 ± 3.1	2.15^{a} ± 0.07	2.82 ± 0.07	1.19 ± 0.04	0.33 ± 0.02	67.46 ± 0.90	4.16 ± 0.06	71.62 ± 0.88
200	255 ± 6.4	1.41^{b} ± 0.09	0.72 ± 0.07	1.26 ± 0.09	0.22 ± 0.01	69.09 ± 0.49	3.39 ± 0.11	72.48 ±0.42
Ground anise seeds (1%)								
0	249.5 ± 2.9	2.06 ± 0.18	0.78 ± 0.06	1.24 ± 0.05	0.37 ± 0.05	69.82 ± 0.78	4.08 ±0.18	73.89 ± 0.94
1	252.5 ± 4.6	1.68 ± 0.19	0.78 ± 0.03	1.23 ± 0.04	0.25 ± 0.02	67.94 ± 0.81	3.69 ± 0.19	71.63 ± 0.67
				Interactions				
T1	246^{bc} ± 1	2.56^{a}± 0.03	0.79^{c} ± 0.02	1.19^{c}± 0.02	0.51^{a} ±0.06	72.15^{a} ± 0.72	4.55 ± 0.06	76.70 ± 0.79
T2	242.5^{c} ± 2.5	1.54^{d} ± 0.01	0.79^{c} ± 0.002	1.32^{b} ± 0.03	0.23^{c} ± 0.02	68.03^{bc} ± 1.36	3.66 ± 0.03	71.68 ± 1.39
T3	257.5^{ab} ± 3	2.04^{c} ± 0.08	0.94^{a} ± 0.001	1.13^{d} ± 0.03	0.37^{b} ± 0.02	68.93^{b} ± 0.30	4.11± 0.11	73.03 ± 0.41
T4	$250b^{c}$ ± 5	2.26^{b} ± 0.03	0.69^{d} ± 0006	1.26^{bc} ± 0.005	0.29^{bc} ± 0.01	65.99^{c} ± 0.68	4.22±0.02	70.21 ± 0.66
T5	245^{bc} ± 5	1.57^{d}± 0.01	0.59^{e} ± 0.008	1.41^{a}± 0.008	0.22^{c} ± 0.02	68.38^{bc}± 0.38	3.57±0.01	71.95 ± 0.39
T6	265^{a} ± 5	1.25^{e} ± 0.01	0.85^{b} ± 0.003	1.11^{d} ± 0.002	0.23^{c} ± 0.03	69.80^{ab} ± 0.57	3.21±0.01	73.001 ±0.58

Means in the same rows with different superscript are significant difference (P<0.05).

T1=control; T2=1% ground anise seeds; T3=100 mg curcumin; T4=100 mg curcumin+1% anise; T5=200 mg curcumin; T6=200 Curcumin+1% anise.

Table (8): Some blood constituents of Japanese Quail as affected by (dietary curcumin and ground anise seeds.

Treatments	Plasma constituents									
	Albumin (g/dl)	Glucose (mg/dl)	T protein (g/dl)	Calcium (mg/dl)	Cholesterol (mg/dl)	Phosphorus (mg/dl)	Triglyceride (mg/dl)	ALP U/L	GOT U/L	GPT U/L
Curcumin levels (mg/g)										
0	1.56±0.1	293.75±9.44	3.59^{ab}±0.2	10.05^{ab}±0.2	320^{ab}±30.0	6.55^{ab}±32.1	244^{a}±12.31	218.75^{ab}±0.8	80.25±2.3	80.08±0
100	1.59±0.04	281±16.9	4.02^{a}±0.23	10.45^{a}±0.1	364.75^{a}±27	7.03^{a}±0.26	305^{a}±16.58	207^{b}±14.25	79±2.48	78.83±0.1
200	1.48±0.05	302.25±14.8	3.13^{b}±0.09	9.65^{b}±0.13	259.75^{b}±24.	6.15^{b}±0.25	123.5^{b}±28.3	256^{a}±8.44	78.75±2.7	77.98±1.0
Ground anise seeds (1%)										
0	1.56±0.1	312.17^{a}±7.8	3.62±0.28	10.07±0.24	315.33±29.98	6.62±0.18	235.50±43.7	225.17±12.9	79.83±1.7	79.23±1.6
1	1.52±0.1	275.50^{b}±7.04	3.54±0.18	10.03±0.13	314.33±28.48	6.53±0.30	212.83±33.1	229.33±13.2	78.83±1.6	78.68±0.4
					Interactions					
T1	1.61±0.1	302.50^{ab}±12.5	3.70±0.60	10.10^{a}±0.50	316.50±69	6.90^{ab}±0.10	258^{ab}±68	220±30	79±10	82±5
T2	1.52±0.8	285^{abc}±15	3.49±0.32	10.10^{ab}±0.1	323.50±36	6.20^{ab}±0.30	230^{ab}±20	217.5±2.5	81.5±0.5	78.15±0.7
T3	1.55±0.1	307^{ab}±19	4.15±0.35	10.55^{a}±0.25	359.50±60	6.60^{ab}±0.20	330^{a}±0	212±32	77.5±4.5	79.05±0.1
T4	1.67±0	255^{c}±1	3.89±0.41	10.35^{ab}±0.1	370±30	7.45^{a}±0.05	280^{a}±20	202±12	80.5±3.5	78.6±0.10
T5	1.53±0.1	327^{a}±8	3.01±0.15	9.55^{b}±0.15	270±30	6.35^{b}±0.55	118.5^{b}±31.5	243.5±6.50	83±3	76.65±0.9
T6	1.44±0.1	277.50^{bc}±5.5	3.25±0.05	9.55^{ab}±0.2	249.50±50.5	5.95^{b}±0.05	128.5^{b}±61.5	268.5±8.5	74.5±0.50	79.30±1.5

Means in the same columns with different superscript are significant difference (P<0.05).

T1=control; T2=1% ground anise seeds; T3=100 mg curcumin; T4=100 mg curcumin+1% anise; T5=200 mg curcumin; T6=200 Curcumin+1% anise

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تأثير الكركمين وبذورااليانسون المطحون كأعشاب طبية على معدل الأداء ومعامل كفاءة الإنتاج الأوروبي وصفات الذبيحة وبعض مكونات الدم في السمان الياباني

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صممت الدراسة الحالية لمعرفة تأثير مستويات الكركمين وبذور اليانسون والتداخلات بينهما على الأداء الإنتاجي وعامل كفاءة الإنتاج الأوروبي وصفات الذبيحة وبعض مكونات دم السمان الياباني. تم اختيار مائة واثنان وستون كتكوت سمان ياباني عمر يوم بشكل عشوائي في تصميم عاملي (3 × 2). فتم استخدام ثلاثة مستويات من الكركمين (0 ، 100 ، 200 مجم / كجم) ومستويين من بذور اليانسون المطحون (0 ، 1٪) في ستة معاملات من 27 كتكوت لكل معاملة (ثلاث مكررات من 9 كتاكيت ، لكل منهم). تم تسجيل وزن الجسم وكميات العلف المستهلكة أسبوعيا. تم حساب وزن الجسم المكتسب ومعامل التحويل الغذائى طوال التجربة حتى 42 يوم من العمر. تم قياس صفات الذبيحة وبعض مكونات الدم خلال التجربة. أظهرت النتائج أن التأثير الرئيسى للكركمين لم يؤثر على وزن الجسم ، وزيادة وزن الجسم ، ومعامل التحويل الغذائي ، وعامل كفاءة الإنتاج الأوروبي ، ومعامل دجاج اللحم (EBI). ، وعدديا لوحظ تحسن فى جميع االصفات السابقة عند إضافة الكركمين أو بذور اليانسون المطحون. وفيما يتعلق بالتداخلات بين المادتين كاعشاب طبية ، أظهرت النتائج أن طائر السمان الذي يتغذى على الكركمين بمستوى 200 مجم / كجم بالإضافة إلى 1٪ من بذور اليانسون قد حقق زيادة معنوية (P <0.05) في وزن الجسم وزيادة وزن الجسم وتناول العلف خلال فترة الفترة من 0-14 يوم من العمر مقارنة مع المجموعة الكنترول. ومن النتائج التجريبية الحالية ، يمكننا أن نوصي باضافة الكركمين بمستوى 200 مجم / كجم علف مع بذور اليانسون المطحون بمستوى 1٪ لتحسين معدلات أداء النمو.