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EFFECT OF USING SOME MEDICINAL PLANTS AND THEIR MIXTURE ON PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF GIMMIZAH STRAIN
1- GROWTH PERFORMANCE

Abdalla, A. A.; Mona A. Mahmoud, O.M. Aly; and Effat.Y.Sherif.
El-Sabahia Poult. Res. Station., Animal Prod. Res. Inst., Agr. Res. Center, Minis. of Agri., Egypt.
monamorsy2003@yahoo.com

ABSTRACT

This investigation was designed to evaluate the feed additive potential and antibacterial effect of some medicinal plants as fenugreek, cinnamon, fennel and anise. A total of 405 unsexed Gimmizah chicks (4 weeks of age) were randomly assigned to nine treatment groups, three replicates (each contained 15 chicks). All chicks were raised in battery brooder placed in a temperature-controlled room until 16 wks of age. Chicks in 1, 2, 3 and 4 treatments were fed basal diet supplemented with 1g fenugreek, cinnamon, fennel and anise/kg of diet, respectively. Chicks in treatments 5, 6, 7 and 8 were fed basal diet supplemented with 0.5, 1.0, 1.5 and 2.0 g of equal mixture from the previous medicinal plants / kg diet, respectively. The last group of treatment was used as a control and fed basal diet without any supplementation (T9).

Body weight and body weight gain for birds fed basal diet supplemented with 1 g fenugreek /kg diet (T1) at 16 weeks of age had increased significantly by 24.0 and 26.0 %, respectively, than control group (T9), and they also increased significantly ($P<0.05$) by 9.03 and 10.0 %, respectively, than the chicks fed 2.0 g/Kg of equal mixture (T8). Supplementation of fenugreek alone (T1) increased significantly feed intake through the experimental period (80.63 g/chick/day) as compared to the other treatments. The best feed conversion was recorded (4.23 g/kg diet) for the chicks fed basal diet supplemented with 2.0g/kg of equal mixture medicinal plants (T8), while the worst was recorded for the chicks in control group (T9). Supplementation of fenugreek alone (T1) and the mixture at 2.0 g /Kg (T8) increased significantly the absolute carcass weight and its percentage (1082.9 g and 70.87% for T1 and 1014.4 g and 72.38% for T8) as compared to the other treatments. However, there were no significant differences among the percentage of cocks gizzard, liver, spleen and testes weight due to the different treatments Total cholesterol and the level of Alanine transaminase in blood plasma decreased significantly with supplementation of medicinal plants which studied alone or in the mixture form compared to control group. The total of aerobic and anaerobic bacterial counts and the counts of total coliform were decreased due to supplementation of the basal diet with medicinal plants as compared to control (T9). The greatest reduction of bacterial count was observed with the chicks fed the basal diet supplemented by medicinal plants in a mixture form. Liver, jejunum and ileum DNA concentration were significantly greater for both chicks groups fed basal diet supplemented with fenugreek (T1) or with 2.0 g of mixture/kg diet (T8) than the other treatments. The lowest liver, jejunum and ileum DNA concentration was detected for control group (T9). Supplementation of medicinal plants studied either individual or in a mixture form to the basal diet increased the economical efficiency (EE). Generally, the best EE was recorded for the chicks fed basal diet supplemented with medicinal plants in a mixture form at levels 2 g /Kg (T8) and 1.5 g /Kg (T7) (0.375, 0.296, respectively).

INTRODUCTION

Recently, it has been found that the natural additives such as herbs and edible plants have some properties as growth enhancers to replace synthetic drugs. These additives are given to animals or birds to improve their physiological and productive performance under normal or stress conditions. Bans and restrictions on the use of animal antibiotic growth promoters stimulated interest in bioactive secondary metabolites of plant source as alternative performance enhancers (Greathead, 2003). Herbs contain some complicated mixtures of organic chemicals that may vary depending upon many factors related to the growth, production, and processing of the herbal product. Though herbs with antimicrobial properties are reported, their use in poultry diets has not been studied extensively.

Fenugreek (Trigonella foenum graecum L.) is an annual plant from the family of leguminous. It been recognized as a potential source of diosgenin a basic compound in the hemisynthesis of steroidal sapogenins such as cortisone and sex hormones (Mazur *et al.* 1998). Rao and Sharma (1987) found that the seeds of fenugreek contained 4.8% saponins. Fenugreek seeds are considered as an appetizer and helps in digestion. Fenugreek has antioxidant, antifungal, antiviral and anticarcinogenic activities (Mazur *et al*. 1998). The use of fenugreek was reported to improve the feed intake, feed efficiency, health and immunity in poultry (El-Mallah *et al*. 2005 and Abaza, 2007).

Cinnamon (*Cinnamomum cassia*), candies and gums have minimum inhibitory concentrations ranging from 25-100 mg/ml (Quale *et al.* 1996). Essential oils of cinnamon were found to possess antimicrobial properties in-vitro and shown to inhibit the growth of B.cereus (Valero and Salmeron, 2003). Hassan *et al.* (2004) observed that there were no significant difference in growth treats, while, feed conversion was significantly improved by cinnamon supplementation. Also, albumin content, serum total lipids and cholesterol were significantly decreased by cinnamon supplementation. In a 21 d feeding trail, the high level or low level of cinnamon extract had no significant effect on broilers growth traits (Mohan, 2004).

Fennel has been used as estrogenic agents and increase libido (Negussie, 1989). A majority of spices (fennel) enhanced the activity of pancreatic lipase and amylase when they are directly in contact with the enzyme (Rao *et al*., 1996). Adding fennel to the control diet improved growth traits (Tolba, 2003) in broiler , (Abd El-Latif *et al.,* 2002) in Japanese quail and the results of Ghazalah *et al.*, 1996 how used fennel oil in duck diets. The greatest percent of dressing, abdominal fat and edible giblets were obtained from birds fed dietary fennel in Japanese quail (Abd El-Latif, *et al*., 2002).

Anise (Pimpinella anisum) has been used as a traditional aromatic herb in many drinks and baked foods because of the presence of volatile oils in its fruits commonly known as seeds. Hot water extracts of the seeds have been used also in folk medicine for their diuretic and laxative effect, expectorant and anti-spasmodic action, and their ability to ease intestinal colic and flatulence (Kreydiyyeh *et al*., 2003 and Kosalec *et al.*, 2005). Also, Anise promoted the absorption of iron (El-Shobaki *et al*., 1990).

Large body size has been found to be positively correlated with increased numbers of muscle cells (Smith, 1963; Lepore *et al*., 1965). DNA concentration is association with genetic increases in BW (Lepore *et al.,* 1965 and Fowler *et al*., 1980). Palo *et al.* (1995) found that total DNA of livers and jejunums were determined as indices of changes in cell size and number, also they reported that reduction of liver and jejunum cell number decrease total organ DNA.

The following study was conducted to investigate the effect of using fenugreek, cinnamon, fennel and anise as medicinal plants on productive performance, blood constitutes and DNA concentration of Gimmizah chicken strain.

MATERIAL AND METHODS

This study was carried out at El-Sabahia Poultry Research Station, Animal Production Research Institute, Agriculture Research Center. At 4 weeks of age, 405 unsexed Gimmizah chicks were wing-banded, weighed and randomly allocated to similar 9 treatment groups (three replicates each contained 15 chicks). All chicks were raised in battery brooder and placed in a temperature-controlled room. Feed and water were offered for *ad-libtum* through the experimental periods. Corn-Soy experimental diets were used as a basal diet through the experimental periods from 4 to 16 weeks of age (Table 1). Chicks within each treatment were fed as follows:

- Basal diet + Fenugreek powder (1 g/Kg). (T1)
- Basal diet + cinnamon powder (1 g/Kg). (T2)
- Basal diet + fennel powder (1 g/Kg). (T3)
- Basal diet + anise powder (1 g/Kg). (T4)
- Basal diet + equal mixture of the previous additives (0.5 g/Kg). (T5)
- Basal diet + equal mixture of the previous additives (1.0 g/Kg). (T6)
- Basal diet + equal mixture of the previous additives (1.5 g/Kg). (T7)
- Basal diet + equal mixture of the previous additives (2.0 g/Kg). (T8)
- Fed basal diet without any supplementation (control). (T9)

Table (1): Composition and calculated analysis of the basal diets during the experimental period.

Ingredients (%)	Starter (0-8 wks)	Grower (8-16 wks)	Calculated analysis (according to NRC,1994)		
			Chemical components	Starter (0-8 wks)	Grower (8-16 wks)
Yellow corn	64.00	63.00	Crude protein (%)	19.56	15.56
Soybean meal (44% CP)	32.10	17.60	ME (Kcal/kg diet)	2860	2707
Wheat bran	------	15.68	C/P ratio	146	174
Dicalcium phosphate	1.80	1.25	Ether extract (%)	2.69	3.01
Limestone	1.40	1.80	Crude fiber (%)	3.65	4.34
Methionine	0.10	0.07	Calcium (%)	1.03	0.97
NaCl	0.30	0.30	Phosphorus available (%)	0.47	0.39
Vit.+mineral (premix)[1]	0.30	0.30	Methionine (%)	0.41	0.33
Total	100	100	Methionine+Cysteine (%)	0.74	0.54
			Lysine (%)		
Total price (LE)	1590	1431		1.03	0.73

[1]**Three kg of vitamin- mineral premix per ton of feed supplied each kg of diet with Vit. A 12000 IU; Vit. D_3 2000 IU; Vit. E. 10mg; Vit. k_3 2mg; Vit.B_1 1mg; Vit. $B_2$4mg; Vit. B_6 1.5 mg; Pantothenic acid 10mg; Vit.B_{12} 0.01mg; Folic acid 1mg; Niacin 20mg; Biotin 0.05mg; Choline chloride (50% choline) 500 mg; Zn 55mg; Fe 30mg; I 1mg; Se 0.1mg; Mn 55mg; ethoxyqain 3000 mg.**

Body weight (BW) and feed consumption (FI) were recorded at 4 weeks (wks) of age and at the end of experimental (16 wks of age). Body weight gain (BWG) and feed conversion (FC) were estimated during the same previous periods.

Individual blood samples were taken from jugular vein of 3 birds within each treatment at 16 weeks of ages. Serum was separated for determination cholesterol, total protein, albumin, globulin, Alanine transaminase (ALT) and Aspartate transaminase (AST) were calorimetrically determined using commercial kits, following the same steps as described by manufactures. Wintrobe hematocrit tubes were used for determination of hematocrit value (HV). Hemoglobin (Hg) concentration was determined by the cyanomethemoglobin procedure (Eilers, 1967). Red blood cells (RBCs) were counted on an AO Bright line hemocytometer using a light microscope at 400x magnification (Seiverd, 1964).

At 16 weeks of age five cocks from each treatment were selected randomly and slaughtered for carcass evaluation. Carcass was eviscerated and head and shank were removed, liver, gizzard, spleen and testes were dissected from the viscera and weighed. Each portion was expressed as a percentage of life body weight.

Total DNA of intestinal parts (duodenum, jejunum and ileum) and liver were extracted using the procedure of Shibko *et al,* (1967), whereas DNA concentration was quantified using the method of Burton (1968).

Intestinal aerobic and anaerobic microflora counts were determined. Aerobic plate count (APC), total coliform count and total anaerobic count were carried out according to American Public Health Association (A.P.H.A) (1985). Serial ten fold dilutions were done on standard plate count agar, Bacto MacConkeys's broth (Difco) and anaerobic agar medium respectively.

Economical efficiency (EE) of the experimental diets was calculated according to input-output analysis at the end of the experiment (Hassan *et al*., 1996).

All results were statistically analyzed by General Linear Models (GLM), one way analysis of variance, using SAS software (SAS Institute, 1990). Differences among means were separated using Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

1- Body weight and body weight gain:-

Significant differences among treatments were found for BW and BWG through the experimental period (Table 2). The BW and BWG for the birds fed basal diet supplemented with 1 g fenugreek /kg diet (T1) was significantly superior and had the heaviest BW and BWG than the others through the experimental period. Birds BW fed 2.0 g mixture /Kg diet (T8) significantly decreased than those fed basal diet supplemented with 1 g fenugreek /Kg diet (T1). However, BW of birds fed the other supplementation (T2, T3, T4, T5, T6 and T7) was significantly decreased compared to BW of birds for T1 and T8 groups. Moreover, the lightest BW was recorded with chicks in control group (T9). Birds BW and BWG of T1 group at 16 weeks of

age (the end of experiment) had increased significantly by 24.0 and 26.0 %, respectively, than control group (T9).

Table (2): Effect of different medicinal plants supplementations on chicks body weight, body weight gain (g), feed consumption (g/chick/day) and feed conversion (g feed/g gain).

Dietary supplementations	Body weight (g)		Body weight gain (g)	Feed consumption (g/chick/day)	Feed conversion
	4 wk	16 wk	4-16 wk	4-16 wk	4-16 wk
T1	116.33±4.56	1527.94±37.01^{a}	1411.61±31.01^{a}	80.63±11.32^{a}	4.80±0.12^{bc}
T2	118.54±4.45	1346.36±19.63^{c}	1227.82±14.04^{c}	71.71±9.92^{b}	4.91±0.23^{b}
T3	119.20±5.73	1335.11±34.31^{c}	1215.91±20.00^{c}	71.46±11.00^{b}	4.94±0.15^{b}
T4	116.30±3.70	1334.44±31.21^{c}	1218.14±14.44^{c}	72.67±10.32^{b}	5.01±0.25^{b}
T5	115.07±5.52	1238.30±54.12^{d}	1123.23±30.57^{d}	64.16±10.02^{c}	4.80±0.43^{bc}
T6	113.36±7.84	1311.28±33.01^{c}	1197.92±20.01^{c}	67.09±11.00^{c}	4.70±0.35^{c}
T7	116.93±5.63	1333.72±37.01^{c}	1216.79±22.01^{c}	69.26±9.94^{c}	4.78±0.28^{bc}
T8	117.13±4.02	1401.44±34.33^{b}	1284.31±19.33^{b}	64.66±8.11^{c}	4.23±0.23^{d}
T9	114.40±5.67	1236.54±43.81^{d}	1122.14±25.04^{d}	72.43±9.95^{b}	5.42±0.29^{a}

Column means with different superscripts are differ significantly (P < 0.05).
(T1) Basal diet + Fenugreek powder (1 g/Kg), (T2) basal diet + cinnamon powder (1 g/Kg), (T3) basal diet + fennel powder (1 g/Kg), (T4) basal diet + anise powder (1 g/Kg), (T5) basal diet + equal mixture of the previous additives (0.5 g/Kg). (T6) basal diet + equal mixture of the previous additives (1.0 g/Kg), (T7) basal diet + equal mixture of the previous additives (1.5 g/Kg), (T8) basal diet + equal mixture of the previous additives (2.0 g/Kg) and (T9) fed basal diet without any supplementation (control).

Also, they had increased significantly by 9.03 and 10.0 %, respectively than those of T8. These results agree with reports of many investigators, who reported that adding fennel to the control diet improved body weight and gain weight (Tolba, 2003) in broiler and (Abd El-Latif *et al.*, 2002) in Japanese quail and the results of Ghazalah *et al.* (1996) how used fennel oil in duck diets. In addition, Ramakrishna *et al.* (2003) reported that a majority of fenugreek enhanced the activity of pancreatic lipase and amylase when they are directly in contact with the enzyme. Birds fed on 1% grounds of dried thyme or fennel increased live body weight, weight gain under normal or high temperature conditions compared to those fed on un-supplemented control diets at 42 or49 days of age (Tolba, 2003). On the other hand, Hassan *et al.* (2004) and Mohan, (2004) observed that there was no significant difference in body weight and body weight gain by cinnamon supplementation.

2-Feed intake and feed conversion ratio:-

Statistically analysis of feed intake in Table 2, indicates that, FI was significantly (P<0.05) affected by different supplementation levels through the experimental period. Generally, supplementation of fenugreek alone (T1) increased significantly the birds FI through all experimental period compared to the other supplementations. This result reflects that incorporation fenugreek in birds diet was satisfactory and had no palatability problems during the present experiment. Also, the lowest FI (64.16 g/ birds /day) was recorded for the chicks fed basal diet supplemented with 0.5 g mixture /Kg diet (T5). However, birds fed basal diets supplemented with 0.5, 1.0, 1.5 and 2.0 g mixture/Kg (T5, T6, T7 and T8) were significantly decreased in the FI

compared to the control. On the other hand diets supplemented with cinnamon, fennel and anise did not improve feed intake than the control diet.

Results in Table 2, indicate that feed FC was significantly affected by different levels supplementation through the experimental period. The best FC was recorded for the birds supplemented with 2.0 g mixture /Kg diet (4.23), while the worst one was recorded for control group (5.42). Hassan *et al.* (2004) observed that there were no significant effect on feed intake while, feed conversion was significantly improved by cinnamon supplementation. In contrary, Mohan (2004) reported that there was no difference in feed efficiency was observed with the cinnamon extracts except low level which reduced feed efficiency compared to the other treatments. Adding fennel to the control diet improved feed intake and feed conversion (Tolba, 2003) in broiler, (Abd El-Latif *et al*. 2002) in Japanese quail. Also, the same results were reported by and adding fennel oil to duck diets (Ghazalah *et al.* 1996). The use of fenugreek was reported to improve the feed intake, feed efficiency, health and immunity in poultry (El-Mallah *et al*. 2005 and Abaza, 2007).

3-Carcass characteristics:-

Medical plants supplementation and their mixture affected significantly carcass weight and carcass percentage (Table 3).

Table (3): Effect of different medicinal plants supplementations on carcass weight and the percentages of some carcass traits.

Feed supplementation	Carcass weight (g)	Carcass traits %				
		Carcass	Gizzard	Liver	Spleen	Tests
T1	1082.9±31.5^{a}	70.87±87.3^{a}	1.65±.4	1.92±0.19	0.29±0.03	1.6.8±0.18
T2	831.1±15.9^{c}	61.73±2.88^{c}	1.65±0.9	1.91±0.12	0.34±0.08	1.67±0.05
T3	861.8±12.6^{c}	64.55±1.97^{c}	1.99±0.6	2.16±0.12	0.29±0.06	1.72±0.12
T4	849.5±22.4^{c}	63.66±3.64^{c}	1.71±0.8	1.99±0.12	0.28±0.12	1.65±0.14
T5	822.6±15.5^{c}	66.43±1.95^{b}	1.69±0.7	1.98±0.13	0.27±0.04	1.72±0.16
T6	895.6±18.7^{c}	68.28±2.81^{b}	1.62±0.7	2.31±0.19	0.30±0.11	1.74±0.24
T7	903.4±15.3^{c}	67.73±2.12^{b}	1.84±0.4	2.36±0.18	0.21±0.06	1.68±0.19
T8	1014.4±19.1^{b}	72.38±4.55^{a}	1.79±0.2	1.75±0.09	0.23±0.08	1.66±0.08
T9	768.3±16.4^{d}	62.13±0.95^{c}	1.68±0.4	2.64±0.69	0.19±0.02	1.68±0.15

Column means with different superscripts are differ significantly (P < 0.05).

(T1) Basal diet + Fenugreek powder (1 g/Kg), (T2) basal diet + cinnamon powder (1 g/Kg), (T3) basal diet + fennel powder (1 g/Kg), (T4) basal diet + anise powder (1 g/Kg), (T5) basal diet + equal mixture of the previous additives (0.5 g/Kg). (T6) basal diet + equal mixture of the previous additives (1.0 g/Kg), (T7) basal diet + equal mixture of the previous additives (1.5 g/Kg), (T8) basal diet + equal mixture of the previous additives (2.0 g/Kg) and (T9) fed basal diet without any supplementation (control).

Supplementation of fenugreek alone (T1) increased (P<0.05) absolute carcass weight (1082.9 g) than the other treatments. While, the carcass percentage was superior significantly (P<0.05) for the chicks fed diet supplemented with fenugreek alone (T1) and 2.0 g mixture/Kg diet (T8) as compared to the other treatments (70.87% for T1 and 72.38% for T8, respectively). These results are combatable with the mentioned results of BW and BWG. However, there were no significant differences among the percentages of birds gizzard, liver, spleen and testes weight due to the different supplementations. Adding the thyme or fennel to broiler diets had no

significant effects on relative weights of liver, spleen, bursa of fabricius, thymus gland or intestine (Tollba, 2003).

4-Blood biochemical and hematology traits:-

The results indicated that all blood constituents were significantly influenced by experiment supplementations, as except that of AST, there was no significant effect of feed supplementation on it. (Tables 4 and 5). Supplementation of fenugreek, cinnamon and fennel alone (T1, T2 and T3) and 0.5 and 1.0 g mixture /Kg diet (T5 and T6) increased ($P<0.05$) total plasma protein than the other treatments (Table 4). While, supplementation of anise alone (T4) or 1.5 and 2.0 g mixture/Kg diet (T7 and T8) decreased significantly total plasma protein and were approximately equal to that of control group (T9). Also, supplementation of fenugreek, cinnamon and fennel alone (T1, T2 and T3) increased significantly total plasma albumin (3.0, 2.9, 2.8 g/dL, respectively). Besides supplementations of 0.5 and 1.0 g mixture/Kg diet (T5 and T6) increased significantly ($P<0.05$) total plasma globulin compared to the other treatments.

Table (4): Effect of different medicinal plants supplementations on some blood biochemical traits.

Feed supplementation	Traits					
	Total Protein (g/dl)	Total Albumin (g/dl)	Total Globulin (g/dl)	Total Cholesterol (mg/dl)	AST (U/L)	ALT (U/L)
T1	5.9±1.0^{a}	3.0±0.3^{a}	2.9±.4^{b}	86.8±1.9^{b}	38.0±1.3	16.2±0.8^{b}
T2	5.6±0.9^{a}	2.9±0.2^{a}	2.7±0.9^{c}	89.0±2.0^{b}	39.0±0.8	16.6±1.0^{b}
T3	5.9±0.6^{a}	2.8±0.1^{a}	3.1±0.6^{b}	88.0±2.2^{b}	38.4±0.6	15.7±1.4^{b}
T4	4.9±0.4^{b}	2.2±0.3^{b}	2.7±0.8^{c}	80.0±0.2^{c}	39.3±0.7	14.0±1.1^{c}
T5	5.8±0.5^{a}	2.1±0.4^{b}	3.7±0.7^{a}	80.2±0.3^{c}	39.2±0.4	14.3±0.2^{c}
T6	5.8±0.7^{a}	2.3±0.2^{b}	3.5±0.7^{a}	81.1±1.0^{c}	37.1±0.3	13.2±0.3^{c}
T7	4.9±0.3^{b}	2.3±0.7^{b}	2.6±0.4^{c}	81.0±0.8^{c}	37.2±1.0	13.0±1.1^{c}
T8	4.6±0.1^{b}	2.1±0.2^{b}	2.5±0.2^{c}	80.1±0.39^{c}	39.3±0.78	13.9±1.3^{c}
T9	4.9±0.4^{b}	2.3±0.1^{b}	2.6±0.4^{c}	99.4±4.69^{a}	40.1±0.7	20.0±0.5^{a}

Column means with different superscripts are differ significantly (P < 0.05).

AST = Aspartate transaminase, ALT = Alanine transaminase.

(T1) Basal diet + Fenugreek powder (1 g/Kg), (T2) basal diet + cinnamon powder (1 g/Kg), (T3) basal diet + fennel powder (1 g/Kg), (T4) basal diet + anise powder (1 g/Kg), (T5) basal diet + equal mixture of the previous additives (0.5 g/Kg). (T6) basal diet + equal mixture of the previous additives (1.0 g/Kg), (T7) basal diet + equal mixture of the previous additives (1.5 g/Kg), (T8) basal diet + equal mixture of the previous additives (2.0 g/Kg) and (T9) fed basal diet without any supplementation (control).

Data in Table (4), showed that total supplementation of medicinal plants alone or in the mixture form at any levels decreased significantly cholesterol and the level of ALT in blood plasma compared to control group. However, supplementation of anise alone or the mixture form of the medicinal plants at any levels (T4, T5, T6, T7 and T8) decreased significantly total cholesterol and ALT than the other treatments. No significant effect of food supplementation were found in the level of AST in blood plasma.

The results in Table (5) show that PVC%, Hg% and RBC counts were significantly influenced by feed supplementations which used. The highest percentages of blood hematology traits were recorded for the birds

fed basal diet supplemented with 1 g. anise /kg diet (T5) and those fed 2.0 g mixture /kg diet (T8). However, the lowest percentages of PCV%, Hg % and RBC counts were recorded for control group (T9). These results agree with those reported by El-Shobaki *et al. (*1990) who reported that anise promoted the absorption of iron. A majority of fenugreek enhanced the activity of pancreatic lipase and amylase when they are directly in contact with the enzyme (Ramakrishna *et al*. 2003). The used of fenugreek was reported to improve health and immunity in poultry (El-Mallah *et al.*, 2005), also, induce hypo-cholesterolemia in poultry (El-Mallah *et al*. 2005). Studies have revealed that fennel contains powerful active components that might be effective for increasing human health and preventing cancer (Esiyok *et al*, 2004). Plasma cholesterol and total lipids were decreased for groups fed thyme or fennel compared with control groups under normal or high temperature conditions (Tollba and Hassan, 2003). The results consistence with what reported by Abaza (2001) in broiler chicks and Ghazalah *et al*., (1996) who stated that, supplementation ducks diet with thyme oil decreased the blood total lipids and total cholesterol concentration than control.

Table (5): Effect of different medicinal plants supplementations on PCV (%), Hg (%) and RBCs (10^3/mm^3).

Feed supplementation	Blood hematology traits		
	PCV (%)	Hg (%)	RBCs (10^3/$mm^{3)}$)
T1	43.9±0.8^{bc}	10.9±0.9^{a}	3.9±1.0^{b}
T2	44.3±0.9^{bc}	10.7±1.0^{a}	4.1±0.7^{b}
T3	45.7±1.2^{b}	10.6±0.5^{a}	3.9±0.3^{b}
T4	48.8±2.0^{a}	11.2±1.1^{a}	4.7±0.2^{a}
T5	43.0±0.7^{bc}	10.8±0.7^{a}	4.0±0.6^{b}
T6	46.8±0.8^{a}	10.9±0.4^{a}	3.8±0.5^{b}
T7	47.9±1.1^{a}	10.1±0.6^{a}	3.6±0.8^{b}
T8	48.7±1.9^{a}	11.0±1.1^{a}	4.6±0.4^{a}
T9	40.3±0.9^{c}	8.53±0.9^{b}	2.3±0.5^{c}

Column means with different superscripts are differ significantly (P < 0.05)

PCV = Packed cell volume, Hg = Hemoglobin concentration, RBC = Red blood cells (T1) Basal diet + Fenugreek powder (1 g/Kg), (T2) basal diet + cinnamon powder (1 g/Kg), (T3) basal diet + fennel powder (1 g/Kg), (T4) basal diet + anise powder (1 g/Kg), (T5) basal diet + equal mixture of the previous additives (0.5 g/Kg). (T6) basal diet + equal mixture of the previous additives (1.0 g/Kg), (T7) basal diet + equal mixture of the previous additives (1.5 g/Kg), (T8) basal diet + equal mixture of the previous additives (2.0 g/Kg) and (T9) fed basal diet without any supplementation (control).

5-Microbiological Study:-

Effects of using medicinal plant supplementation, separately or in a mixture form on the intestinal microbial counts are shown in Table 6. The total aerobic and anaerobic counts and the counts of total coliform had been decreased due to supplementation of basal diet with medicinal plants as compared to control (T9). The greatest reduction was observed with the chicks fed on the basal diet supplemented by medicinal plants in a mixture form. These results were in agreement with several investigators used medicinal plants as feed additives. Cowan (1999) reported that plants are rich in a wide variety of secondary metabolites have antimicrobial properties. Also, Abdo *et al.* (2003) and

Soliman *et al*.(2003) indicated that the populations of total microbial counts and the counts of total coliform and yeasts microbial on the broiler gastrointestinal tract were decreased due to increasing the level of different additives (red pepper and marjoram)

Table (6): Effect of different medicinal plants supplementations on count of aerobic, anaerobic and total coliform bacteria in intestine

Type of bacteria / Feed supplementation	Aerobic plate count	Total coliform Count	Total anaerobic count
T1	$14x10^3$	$30x10^4$	$5x10^1$
T2	$12x10^3$	$23x10^3$	$4x10^1$
T3	$4x10^2$	$21x10^3$	$3x10^1$
T4	$10x10^4$	$14x10^4$	$4x10^1$
T5	$8x10^2$	$12x10^2$	-ve
T6	$9x10^1$	$5x10^2$	-ve
T7	$2x10^1$	$6x10^1$	-ve
T8	$2x10^1$	$12x10^1$	-ve
T9	$39x10^8$	$72x10^7$	$19x10^3$

(T1) Basal diet + Fenugreek powder (1 g/Kg), (T2) basal diet + cinnamon powder (1 g/Kg), (T3) basal diet + fennel powder (1 g/Kg), (T4) basal diet + anise powder (1 g/Kg), (T5) basal diet + equal mixture of the previous additives (0.5 g/Kg). (T6) basal diet + equal mixture of the previous additives (1.0 g/Kg), (T7) basal diet + equal mixture of the previous additives (1.5 g/Kg), (T8) basal diet + equal mixture of the previous additives (2.0 g/Kg) and (T9) fed basal diet without any supplementation (control).

6-Liver and intestinal DNA:-

Liver, duodenum, jejunum and ileum DNA concentration (mg/g. tissue) were significantly affected by feed supplementation of medicinal plants (Table 7).

Table (7): Effect of different treatments on DNA concentration (mg/g tissue) of liver and intestine (Duodenum, Jejunum and ileum) for Gimmizah cocks

Feed supplementation	DNA concentration (mg/g tissue)			
	Liver	Duodenum	Jejunum	Ileum
T1	6.99 ± 0.6^{a}	10.09 ± 0.1^{a}	14.35 ± 0.8^{a}	20.60 ± 0.2^{a}
T2	4.23 ± 0.9^{b}	10.75 ± 0.7^{a}	10.82 ± 0.2^{c}	9.74 ± 0.3^{c}
T3	4.19 ± 0.8^{b}	10.22 ± 0.5^{a}	10.62 ± 0.3^{c}	9.77 ± 0.7^{c}
T4	4.02 ± 0.5^{b}	$10.89\pm0.8b^{a}$	10.25 ± 0.6^{c}	9.73 ± 0.5^{c}
T5	3.44 ± 0.2^{bc}	7.58 ± 0.2^{bc}	9.90 ± 0.5^{c}	8.93 ± 0.7^{cd}
T6	3.98 ± 0.8^{b}	8.00 ± 0.8^{b}	9.82 ± 0.7^{c}	9.52 ± 0.5^{c}
T7	4.31 ± 0.5^{b}	8.60 ± 0.5^{b}	9.92 ± 0.8^{c}	9.75 ± 0.1^{c}
T8	6.39 ± 0.2^{a}	8.62 ± 0.6^{b}	12.15 ± 0.5^{b}	12.92 ± 0.4^{b}
T9	3.14 ± 0.9^{c}	7.05 ± 0.9^{c}	9.94 ± 0.7^{c}	8.61 ± 0.9^{d}

Column means with different superscripts are differ significantly (P < 0.05).

(T1) Basal diet + Fenugreek powder (1 g/Kg), (T2) basal diet + cinnamon powder (1 g/Kg), (T3) basal diet + fennel powder (1 g/Kg), (T4) basal diet + anise powder (1 g/Kg), (T5) basal diet + equal mixture of the previous additives (0.5 g/Kg). (T6) basal diet + equal mixture of the previous additives (1.0 g/Kg), (T7) basal diet + equal mixture of the previous additives (1.5 g/Kg), (T8) basal diet + equal mixture of the previous additives (2.0 g/Kg) and (T9) fed basal diet without any supplementation (control).

The DNA concentration were significantly greater for both birds fed basal diet supplemented with fenugreek (6.99, 10.09, 14.35 and 20.6 mg/g tissue respectively) or those fed basal diet supplemented with 2.0 g mixture/kg diet (6.39, 8.62, 12.15 and 12.92 mg/g tissue, respectively) than the other treatments. The lowest liver, jejunum and ileum DNA concentration was detected for control group (T9). Birds fed basal diet supplemented with individual medicinal plants (T1, T2, T3 and T4) had significantly higher duodenum DNA concentration than those fed the other treatments. The lowest duodenum DNA concentration was detected for control group (T9). These results associated and compatible with the results of BW and BWG, since the highest birds BW and BWG had the highest liver, jejunum and ileum DNA concentration and vice versa. Medicinal plants protect liver and intestinal tissue from damage and degradation, so that its metabolic function increased. Large body size has been found to be positively correlated with increased numbers of muscle cells (Smith, 1963; Lepore *et al.* 1965). DNA concentration is associated with genetic increases in BW (Lepore *et al*., 1965 and Fowler *et al*., 1980). Palo *et al*., (1995) found that total DNA, protein : DNA and RNA : DNA ratios of livers and jejunums were determined as indices of changes in cell size and number, also they reported that reduction of liver and jejunum cell number decrease total organ DNA.

7-Economical efficiency:-

The EE and REE values of different supplementations are summarized in Table 8. However, supplementation of medicinal plants as in individual or in mixture were form to chick basal diet increased the EE. Generally, the best EE was recorded for the birds fed basal diet supplemented with medicinal plants in mixture form at levels 2 g /Kg diet (T8)and 1.5 g /Kg diet (T7), which recorded 0.375, 0.296, respectively.

Table (8): Economical efficiency (E.E.) and relative economical efficiency (R.E.E.) estimated for different dietary supplementation

Feed supplementation	BW(1)	T. Rev/ .bird (2)	T. F. cost(3)	Net Rev. / bird(4)	E.E(5)
	g	*L.E.*	*L.E.*	*L.E.*	
T1	1411.6	11.999	9.919	2.08	0.210
T2	1227.8	10.436	8.916	1.52	0.171
T3	1215.9	10.336	8.781	1.55	0.177
T4	1220.0	10.390	8.935	1.44	0.161
T5	1123.3	9.547	7.489	2.06	0.275
T6	1200.1	10.201	8.232	1.93	0.239
T7	1217.1	10.345	7.983	2.36	0.296
T8	1284.3	10.917	7.939	2.98	0.375
T9	1122.1	9.538	8.889	0.65	0.073

(1) **average live body weight. (2) total revenue / birds assuming 8.5 L.E. / kg BW**
(3) total feed cost / birds. (4) net revenue=(2)- (3). (5) E.E. = (4)/(3).

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تـأثير استخدام بعض النباتـات الطبيـة وخلطاتهـا علـى الأداء الإنتـاجى والتناسلى لسلالة الجميزة

1- صفـات النمو

احمد عبد العزيز عبد الله , منى محمود احمد مرسى, أسامة محمود على ,عفت يحيي حسن
محطة بحوث الدواجن – الصبحية - معهد بحوث الإنتاج الحيواني – الدقي – مصر.

تم إجراء هذه الدراسة لتقييم التاثيرالمثبط للبكتريا والقوة الكامنة كإضـافة غذائيـة لمسـحوق بعض النباتات الطبية مثل الحلبة و القرفة و الشمر و الينسون. تم تقسيم عشوائيا ٤٠٥ كتكوت غير مجنس من سلالة الجميزة عمر ٤ أسابيع الى ٩ معاملات (كل معاملة تحتوى على ثلاث مكررات بكل مكررة ١٥ كتكوت). تم تربيـة الكتاكيت فى بطاريـات فـى غرفـة بهـا نظـام تحكم للحـرارة الـى عمر ١٦ أسبوع. الكتاكيت بالمعاملات ١ و٢ و ٣ و ٤ غذيت على عليقة اساسية مضاف اليها ٠.١ جم من الحلبـة أو القرفـة أو الشمر أو الينسون المطحون لكل كجم علف علـى التوالى. الكتاكيت بالمعـاملات ٥ و٦ و ٧ و٨ غذيت علـى عليقـة اساسية مضـاف اليهـا ٠,٥ أو ١,٠ أو ١,٥ أو ٢,٠ جم من مخلوط متساوى من النباتات الطبية السابقة وذلك لكل كجم علف علـى التوالى. وأستخدمت المعاملة الأخيرة (معاملة ٩) كمجموعة مقارنة حيث غذيت على العليقة الأساسية بدون أى اضافات.

اوضحت النتائج الأتى:

وزن الجسم والزيادة فى وزن جسم الطيور (عند عمر ١٦ أسبوع) التى غذيت على عليقة اساسية مضاف اليها ١,٠ جم حلبة/ كجم علف (معاملـة ١) زاد معنوياً بمقدار ٢٤,٠% و ٠.٢٦ % على التوالى عن الكتاكيت التى بالمجموعة المقارنة و كذلك زاد زيادة معنويـة بقدار ٠٣.٩% و ١٠,٠% على التوالى عن الكتاكيت التـى غذيت علـى المخلـوط بمعدل ٢,٠جم/كجم علـف (معاملـة ٨).

إضافة الحلبة بمفردها (معاملـة ١) أدى الـى زيـادة معنويـة فـى أستهلاك العلـف خـلال فتـرة الدراسـة (٨٠,٦٣ جم /كتكوت/يوم) مقارنة بالمعاملات الأخرى.

أفضل كفاءة تحويلية للعلف (٤,٢٣ جرام/كيلوجرام علـف) كانـت للكتاكيت التـى غذيت علـى عليقـة اساسية مضـاف اليها المخلوط بمعدل ٢,٠ جم/كجم علف (معاملة ٨), بينما أقل كفائة تحويليـة كانـت لكتاكيت المجموعة المقارنة(معاملة ٩).

إضافة كل من الحلبة بمفردها(معاملة١) أو المخلوط بمعدل ٢,٠جم/ كجم علف(معاملة ٨) أدى إلى زيادة معنوية فى وزن الذبيحة المطلق وكذلك النسبة المئوية لها (١٠٨٢,٩جم و ٧٠,٨٧%

للمعاملة ١ و١٠١٤,٤جم و ٧٢,٣٨% للمعاملة٨) مقارنة بالمعاملات الأخرى.وبصفة عامة لاتوجد اختلافات معنوية بين المعاملات فى النسبة المئوية للقونصة و الكبد و الطحال و الخصيتان نتيجة للإضافات المختلفة.

تركيز كلا من الكوليسترول الكلى وإنزيم Alanine transaminase فى بلازما الدم ينخفضان معنويا. إضافة النباتات الطبية التى تم دراستها كل بمفردها او فى صورة مخلوط بأى نسبة مقارنة بالمجموعة المقارنة.

العدد الكلى للميكروبات الهوائية واللاهوائية و أعداد بكتيريا القولون الكلية إنخفضت انخفاضا معنويا نتيجة لإضافة النباتات الطبية مقارنة بالمجموعة المقارنة (معاملة٩) و قد لوحظ أكبر انخفاض بالكتاكيت التى غذيت على عليقة اساسية أضيف اليها النباتات الطبية فى صورة مخلوط.

تركيز الحامض النووى DNA للكبد و الجزء الأول للأمعاء الدقيقة Jejunum والجزء الثانى للأمعاء الدقيقة Ileum زاد زيادة معنوية لكل من الكتاكيت التى غذيت على عليقة أساسية مضاف اليها الحلبة (معاملة ١) أو المضاف اليها المخلوط بمعدل ٢,٠جم / كحم علف(معاملة ٨) مقارنة بالمعاملات الأخرى. أقل تركيز للحامض النووى DNA بالأعضاء الثلاث السابقة لوحظ لكتاكيت المجموعة المقارنة (معاملة٩).

إضافة النباتات الطبية المستخدمة كل بمفردها أو فى صورة مخلوط للعليقة الأساسية لعلف الكتاكيت يؤدى الى زيادة فى الكفائة الإقتصادية. وبصفة عامة سجلت افضل كفاءة إقتصادية للكتاكيت التى غذيت على عليقة أساسية مضاف اليها مخلوط النباتات الطبية بمعدل ٢,٠جم / كجم علف (معاملة٨) و ١,٥ جم /كجم علف (معاملة٧) وكانت ٠,٣٧٥ و ٠,٢٩٦ على التوالى.