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EFFECT OF MEDICAL HERBS AND PLANTS AS FEED ADDITIVES ON SHEEP PERFORMANCE.

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ABSTRACT

Thirty two crossbred Suffolk male lambs (4 month old) with average live body weight 19.75kg were randomly and equally assigned to four experimental treatments (8 lambs each) to study the effect of dietary addition of fenugreek and coriandrum sativum on lamb performance. The lamb groups were fed according to NRC allowances (1989). The four experimental treatments were : T1- concentrate feed mixture and berseem hay (control ration). T2- ration of (T1) plus fenugreek (F) seed meal (5g / head / day), T3- ration of (T1) plus coriandrum sativum (CS) seed meal (5g / head /day) and T4-ration of (T1) plus F and CS (5g / head / day ; 1:1 ratio). The experimental period lasted for 180 days. At the end of the experimental period four animals from each group were used in digestibility trail; also three animals from each group were slaughtered at the end of the experiment.

The main results were as follow :

Dry mater intake was not significantly differed between treatment groups. The DM, OM, CF, EE, and NFE digestibility and total digestible nutrients of T2 was significantly ($P<0.05$) higher than for control diet but insignificantly higher than for T1, T3 and T4. Digestible crud protein was almost similar among all treatments. Ruminal PH value of treated groups were mildly to acidity at zero and 6 hrs. No significant differences were detected between different groups at zero and 6 hrs post feeding for ammonia - nitrogen concentrations. Volatile fatty acids concentrations at all times were higher for supplemented groups than the control group.

Medical plants of the T2 and T3 had higher ($P> 0.05$) values of serum total protein, albumin, Globulin, creatinine, GOT and GPT than values of the control group. However, blood serum alkaline phosphatase, urea nitrogen , values and A/G ratio were lower for T2 ($P>0.05$) than the control. The effect of medical plants on GOT were highly significant ($P<0.01$) and were significant ($P<0.05$) on urea nitrogen and GPT. The effect of sampling time on creatinine, alkaline phosphataes, urea nitrogen, GOT and GPT were highly significant ($P<0.01$) and not was significant on protein fractions. Lambs in treatments T2, T3, and T4 had higher ($P<0.05$) daily gain than those in the control group. The best economical return was achieved by the group fed diet contained fenugreek followed by the group received diet contained coriandrum sativum.

Keywords: Lambs, medical plants, growth, blood, rumen, parameters and carcass traits.

INTRODUCTION

Using medical plants in feeding humans is well renown since thousands of years in ancient Egypt, China, India and Greek. Old drugs industry depended upon the raw materials of medical plants and their extracts which proved safe always. Inversely many synthesized chemicals caused many hazards to animals, plants and human. Feed additives are important materials that can improve feed efficiency and animal performance.

In Egypt, the whole seeds of fenugreek (Trigonella foenum graecum) or coriander (Oriandrum sativum) are traditionally used as flavoring agent for bakery products and for human consumption in medical treatments. Fenugreek and coriander seeds are rich in protein and fat (James, 1984; Rohr *et al.*, 1990; Gupta *et al.*, 1996 and Abo-Donia *et al.*, 2003).

Dietary supplements of medical plants have been reported by Aboul-Fotouh *et al.*, (1999 & 2000); Salem and EL-Mahdy, (2001); Abd.EL- Ghani (2003); Abo-Donia *et al.*, (2003) and Mohamed *et al.*, (2003) to improved digestion coefficients of various nutrients and rumen activity of growing ruminants. Mean while, medical plants supplementation increased body weight gain and feed efficiency of sheep fed on such materials (EL-Ayek, 1999; EL-Ekhnawy *et al.*, 1999 and Salem & EL-Mahdy, 2001).

The present work was conducted to study the effect of including either the fenugreek and / or coriander in rations for male growing suffolk crossbred sheep lambs on their performance, nutrients utilization rumen parameters, some blood constituents and carcass traits.

MATERIAL AND METHODS

This study was carried out at EL-Gemmaiza Experimental station, Animal Production Research Institute, Ministry of Agriculture, Egypt.

Thirty two growing crossbred Suffolk male lambs (4 month old) with an average live body weight of 19.75 kg. Animals were randomly assigned to four treatments (8 lambs each) to evaluate the following rations: T1, control were fed on (40%) berseem hay and (60%) a concentrate feed mixture (CFM), T2, lambs in received control ration plus 5g / head / day Fenugreek seed meal (FSM). In T3, lambs were fed control ration plus 5g / head / day coriandrum Sativum (CS) while, T4, animals in gave control of growing sheep lambs ration plus 5g / head / day from both of FSM & CS (1:1ratio). The nutrient requirements were given according to N.R.C (1989). Drinking water was available to animals twice daily.

The experimental period was extended to 6months. The animals were weighted every two weeks. At the end of the experimental period four animals from each group were used in digestibility trial for 14 day preliminary period followed by 7 day collection period. At the end of the collection period samples of CFM, berseem hay, feed refused and feces were collected for chemical analysis. Proximate analysis for feed, additives (FSM & CS), feces, refused feed and meat was done according to A.O.A.C.(1995). Rumen liquor samples were taken at zero, 3 and 6 hours post feeding by stomach tube to determine pH and ammonia nitrogen, while total volatile fatty acids (TVFA's) samples were stored at (-20 °C) until determined. Ruminal pH measured using pH meter (EIL-7010). Ammonia nitrogen (NH3-N) concentration was determined according to Conway (1958) while, TVFA's concentration was determined according to Warner (1964). Blood samples were taken at 4 hours post feeding during the digestibility trial, serum was separated and stored at (-20 °C) until assayed.

Serum total proteins (TP) and albumin were determined according to Doumas and Biggs (1972 a & b), globulin values were calculated by

subtraction of albumin values from their corresponding total protein values and albumin/ globulin ratio (A/G ratio) was calculated. Urea nitrogen concentration according to Talke and Schubert (1965) and creatinine concentration according to Bartels (1971). Alkalin-phosphatase activity was determined according to Kind and King (1954) and GOT and GPT concentrations according to Reitman and Frankel (1957).

At the end of experimental period, three animals from each treatment group were chosen randomly and slaughtered to study some physical and chemical carcass traits. The measurements and classification of carcass were carried out as described by Colomer *et al.*,(1987). Weight of meat, fat and bone carcass were calculated according to procedures of Mokhtar (1974). The pH, tenderness and water holding capacity were determined according to Grou and Hamn (1957), color intensity (EL-Sharkawy, 1984)) of meat was determined.The eye muscle area was measured by planimeter.

Data were statistically analyzed according to SAS (1995) and the differences between means tested using Duncan's multiple range test (1955).

RESULTS AND DISCUSSION

Chemical composition:

Chemical composition of feedstuffs of the experimental rations are shown in Table (1). Data indicated that CP and EE content were higher in fenugreek and coriandrum sativum than those of the concentrate feed mixture (CFM) and berssem hay (BH) on DM basis. However, ash content of fenugreek and coriandrum sativum was less than that of other ingredients. These results were in accordance with those found by Rohr *et al.*, (1990); EL-Saddany *et al.*, (1999); Salem and EL-Mahdy (2001) and Abo-Donia *et al.*,(2003).

Table (1): Chemical Composition (%) of studied medical plants, concentrate feed mixture (CFM) and the basal diets (on DM Basis).

Items	DM	OM	CP	CF	EE	NFE	Ash
Fenugreek	96.7	96.14	22.01	7.78	11.50	54.85	3.86
Coriandrum Sativum	93.4	93.9	16.40	18.20	14.30	45.0	6.10
CFM	89.2	88.86	13.9	15.7	3.71	55.55	11.14
Berssem hay (BH)	88.9	86.30	12.10	30.40	2.80	41.0	13.70
Basal Diets*	89.11	88.09	13.36	20.11	3.44	51.18	11.91

*** Calculated**

CFM (Concentrate feed mixture) = Undecorticated cotton seed cake 35%, yellow corn 22%, rice bran 4%, wheat bran 33%, limestone 2%, salt 1 % and molasses 3%.

Feed intake, digestion coefficients and nutritive values:

Data presented in Table (2) showed that total dry matter intake as g/head/day of growing sheep was not significantly affected by addition of fenugreek and or coriandrum. These results are in agreement with the findings of Horton *et al.*, (1991); Abo EL-Nor, (1999); Aboul-Fotouh *et al.*, (2000); Salem and EL-Mahdy (2001) and Abo-Donia *et al.*,(2003).

Table (2): Feed intake, nutrient digestibility and nutritive values of experimental treatments.

Items	T1	T2	T3	T4	± SE
DM intake;(g/h/day)	1122.7	1091.7	1112.8	1118.2	47.50
Nutrients digestibility, %					
DM	68.84^{b}	78.84^{a}	75.09^{ab}	72.17^{ab}	2.32
OM	69.03^{b}	76.56^{a}	75.45^{ab}	72.91^{ab}	2.12
CP	73.14	78.79	76.72	78.27	2.16
CF	59.35^{c}	66.92^{a}	64.43^{ab}	63.62^{ab}	3.23
EE	57.13^{c}	79.24^{a}	79.48^{a}	63.70^{b}	4.52
NFE	73.37^{b}	86.84^{a}	81.12^{ab}	76.90^{b}	2.37
Nutritive value, %					
TDN	64.42^{b}	74.96^{a}	71.42^{ab}	68.89^{ab}	2.12
DCP	12.08	13.00	12.36	12.94	0.381

a, b and c values with different letters in the same row differ significantly at (P<0.05).

Data concerning digestibility coefficients and nutritive values are presented in Table (2). Results of nutrients digestibility showed cleared that DM, OM, CP, CF, EE and NFE % were significantly (P<0.05) improved by adding fenugreek (T2) and coriandrum sativum (T3) than that of control (T1). TDN value of T2 was significantly (P>0.05) improve than control while T3 and T4 were insignificantly (P<0.05) improved than control. However, similar DCP values were shown for both medical plants and control. No significant differences were observed in the digestion coefficients of DM, OM, CP and CF between T2,T3 and T4. The minimum values were observed in T1 compared to those of other treatments. The improvement in digestion coefficients with medical plants supplementation may be due to of the role of medical plants as inhibitors of gram positive bacteria (Hanafy and Hatem, 1991 and Mohamed *el al.*, 2003). Also, improvements of nutrient digestibility may be attributed to the basis that fenugreek enhanced microbial activity of the rumen and its ability to alter enzyme activities (Saxena *et al*,1971; EL-Amary, 1993 and Onabanjo *et al.*,1993). Results of feeding values were nearly similar to those obtained by Aboul-Fotouh *et al.*, (1999); Attia-Ismail (2000); Salem and EL-Mahdy (2001) and Mohamed *et al.*, (2003).

On the meantime, results obtained might indicate a stimulated rumen microflora activity though one of the following items Decreasing number and activity of antagonistic organisms, or saving some micro factors to rumen microflora as micro elements, Vitamins, hormones, enzymes unknown factors which are required to the efficient digestion, absorption and metabolism, or minimizing effectively hazards of mycotoxins by inhibition of fungi growth and aflatoxin production (Djouvinov *et al.*, 1997 and Allam *et al.*, 1999).

Rumen activity:-

Results in Table (3) showed that medical plants additive in growing lambs diets did not significantly affected on rumen pH values. These results are in agreement with Youssef *et al.*, (1998); Allam *et al.*, (1999)and Mohamed *et al.*, (2003) who reported that the pH value of rumen liquor did not significantly affect by medical plants supplementation. The pH values were within the normal range for optimum cellulytic bacterial activity (Mertens,1977). Ammonia nitrogen concentration was lower (P>0.05) in T2,

T3 and T4 at 3hours post feeding compared with control group. The T2, T3 and T4 group showed milled increased values at 6 hours post feeding compared to control (T1) group. Similar trend was obtained by Tancurov (1969); Abd-EL-Aziz *et al.*, (1993); Djouvinov *et al.*, (1997) and Mohamed *et al.*, (2003). Also, Zied (1998) showed that ruminal NH_3-N concentration of goats fed control or medical plants supplemented rations was increased at 2 hours post feeding, but it was significantly decreased at 4 hours after feeding for all treatments. Such trend may support the obtained results in the present stud, which may give best utilization of NH_3-N by rumen microbes as indicated by Saxena *et al.*, (1971) and Ololade and Mowat (1975). Also, these medical plants acts as antispasmodic and treatment the gastrointestinal complaints (Medici *et al.*, 1992; EL-Amary, 1993 and Onabanjo *et al.*, 1993). These advantages may give favorable condition in the rumen for useful microorganisms activity and may explain the utilization of ruminal ammonia nitrogen to convert it to microbial protein in T2, T3 and T4.

Table (3): Effect of feeding medical plants on pH, NH_3-N and TVFA's concentration of ruminal fluid of lambs.

Items	T1	T2	T3	T4	± SE
PH value					
0 hours (hr)	6.40	6.14	6.18	6.13	0.38
3 hours (hr)	5.06	5.42	5.59	5.48	0.19
6 hours (hr)	6.12	6.01	5.09	5.82	0.25
Mean	6.06	5.86	5.89	5.81	0.27
Ammonia nitrogen (mg/100 ml)					
0 hr	28.10	28.76	27.10	27.54	0.63
3 hr	34.4^{a}	32.45^{b}	33.70^{b}	33.2^{b}	0.72
6 hr	32.80	33.82	33.40	33.28	0.70
Mean	31.93	31.68	31.40	31.34	0.69
Total VFA,s (mg/100 eg)					
0 hr	7.41^{c}	8.15^{b}	8.60^{a}	8.43^{b}	0.19
3 hr	10.63^{c}	12.16^{ab}	12.38^{ab}	12.54^{a}	0.24
6 hr	8.59^{c}	10.46^{b}	10.98^{ab}	10.6^{ab}	0.20
Mean	8.79^{c}	12.26^{a}	10.65^{ab}	10.52^{ab}	0.21

: Mean of 4 animals in each treatment.
a, b and c, mean in the same row with different superscripts are significantly different. (P<0.05).

Ruminal TVFA's values increased at zero, 3 and 6 hours for T2, T3 and T4 compared with those of T1. These results may indicate a stimulated rumen microflora activity through decreasing number, activity of antagonistic organisms and /or saving some important microfactors to rumen microflora as micro-elements, vitamins, hormones, enzymes or unknown factors which are required to the efficient digestion, absorption and metabolism (Djouvinov *et al.*,1997 and Mir *et al.*, 1998). Such different trend may reflect the effect of type of supplemented medical plants or the voluntary feed intake as indicated by Fenner *et al.*,(1967) and Horton *et al.*,(1991).

Blood serum metabolism

Blood serum proteins:

Values of serum protein fraction (Total protein, globulin) for treatments T2, T3 and T4 were higher than value of their control(T1). While,

the values of serum albumin and A/G ratio for T3 and T2 were the lowest than other values of their treatments, respectively (Table 4 and Fig 1). It can be noticed that T2 recorded the highest value of serum total protein compared to other treatments. These results were parallel with values of CP content in experimental ration (Table 1) and the results of OM and CP digestibility (Table 2), which indicted better utilization of dietary protein through digestive tract. Kumar *et al.* (1980) reported that there was a positive correlation between dietary protein and serum protein concentration. It can be noticed that there was no significant differences in serum total protein values among treatments. These results obtained herein are in agreement with those obtained by Kaneko *et al.*, (1997) ; Youssef *et al.*, (1998); Hoda *et al.*, (2000); Salem and EL-Mahdy (2001) and Abo-Donia *et al.*, (2003). while, Nazar (1999) found significant effect on total protein as a result of using fenugreek as feed additive in feeding buffalo and goats. Total protein in the present estimates lie within the normal range of sheep(6-8 g/dl) reported by Recce (1991).

There were no significant differences ($P<0.05$) in serum protein fraction levels among the sampling times (Table 4). The values were minimum at day 60 at weaning (before feeding) and decreased at day 120 after feeding. Then the values tended to increase to reach the maximum at day 180 after feeding except for A/G ratio.

Values of serum albumin of treatments T2 and T4 were higher than values of T1 and T3 (Table 4 and Fig 1). It can be noticed that there was no significant differences among treatments. This my be due to the higher ($P<0.05$) digestibility of crud protein for T2 and T4 treatments than T1 and T3 (Table 2). Rowlands (1980) reported that dietary protein could affect the concentration of serum albumin. Data indicated the healthy status of liver since, the liver is the main organ of albumin synthesis. Values of albumin were within the normal range obtained by Kaneko (1989) (3.5 to 5 g/dl.The present results are in agreement with the results obtained by Rashwan (1998) and Abo-Donia *et al.*, (2003).

Values of serum globulin of treatments T2, T3 and T4 were higher than values of the control group (Table 4 and Fig 1). It can be noticed that T2 recorded the highest value of serum globulin followed by T4 and T3. There was no significant differences among treatments. There results obtained herein for serum globulin are in agreement with those obtained by Hoda *et al.*, (2000); Salem and EL-Mahdy (2001) and Abo-Donia *et al.*, (2003). However, Rashawn (1998) and Zied (1998) found no significant effect on blood constituents, while, Nazar (1999) found significant effect as a result of using fenugreek as feed additive in feeding buffalo and goats. Maxine (1984) who reported that albumin tends to predominate over globulin in sheep and goats. Normal globulin values indicate good immunity status animals.

The values of serum A/G ratio in the present study ranged from 0.89 to 0.95. Values of serum A/G ratio for treatments T2 and T3 were lower than values of the T1 and T4. It is important to note that all values of A/G ratio were lower than 1.0, which indicate that animals suffer from any health problems that might affect the performance of experimental animals reported by EL- Sayed, *et al.*, (2002). .

Serum creatinine concentration (mg/dl):

The values of serum creatinine concentration ranged from 0.63 (mg/dl) in T4 to 0.72 (mg/dl) in T3. Values of serum creatinine for T2 and T3 were higher than values for their T1. (Table 4 and Fig 2), where thus T3 was higher than T2. Values of the present study were similar to those obtained by owen *et al.*, (1954) who reported that serum creatinine ranged between 0.08 to 1.4 mg/dl. While, Kaneko (1989) reported that serum creatinine levels ranged between 1.2 and 1.9 mg/dl in sheep blood. Generally, serum creatinine level is a useful indicator of glmerular filtration in the kidney.

Serum urea- nitrogen concentration (mg/dl):

Values of serum urea-nitrogen concentration for T1 was significantly ($P<0.05$) higher than value of T4 (Table 4 and fig 3) but insignificantly higher than of T2 and T3. These values agree with the results obtained by Youssef *et al.*, (1998); Zaoui *et al.*,(2002) and Abo-Donia *et al.*,(2003).This result my be supported by the finding cited early, that rumen ammonia nitrogen concentration for T2, T3 and T4 were lower than value of their control (Table3). Normal levels of serum urea- nitrogen in goats ranged between 8-40 mg/dl (Rokha, 1985). Lewis *et al.* (1957) reported that the overall patterns of rumen ammonia -nitrogen concentration are roughly parallel, and the measurement of blood urea was proposed as supplementary test for efficiency of nitrogen utilization in ruminants. The apparently normal values obtained in the present study for serum urea-nitrogen and fluid ammonia suggests efficient utilization of nitrogen in different experimental rations by rumen microorganisms.

Serum alkalin-phosphatase concentration (U/L):

Values of serum alkalin-phosphatase of treatments T2 and T3 were lower than value of the control group (Table 4 and Fig. 4). It can be noticed that T4 recorded the highest value of serum alkalin-phosphatase followed by T2 and T3. These values agree with results recorded by Youssef *et al.*, (1998); Zaoui *et al.*,(2002) and Abo-Donia *et al.*,(2003). Data of alkalin-phosphatas indicated that the animals were generally in a good nutritional status and their livers were in normal physiological conditions (Blunt *et al.*, 1975).

Serum transaminases:

The values of serum GOT and GPT concentrations for T2 and T3 were higher significantly ($P<0.05$) than value of the control group (Table 4 and Fig 5 and 6). However, T3 was higher than T2 and T4. The values of serum GOT ranged from 31.97 in T4 to 36.78 U/l in T3. Values of the present study were similar to those obtained by Youssef *et al.*, (1998); Zaoui *et al.*,(2002) and Abo-Donia *et al.*,(2003).

Several factors affect GOT and GPT enzymes; as activities as feeding practices, environment, genetic control, response to stress, age, liver function and body weight (Boots *et al.*, 1969). It is clear that the experimental treatments were significantly affected on the serum GOT and GPT levels of the experimental lambs.

Table (4): Effect of feeding medical plants on some blood constituents of growing lambs.

	Parameters								
Items	T. protein (g/dl)	Albumin (g/dl)	Globulin (g/dl)	A / G ratio	Creatinine (mg/dl)	Urea-N (mg/dl)	Alk-Phosphataes (U/l)	GOT (U/l)	GPT (U/l)
Overall means	7.02 ± 0.07	3.37 ± 0.04	3.65 ± 0.06	0.92 ± 0.02	0.68 ± 0.03	36.31 ± 0.59	47.12 ± 1.31	33.95 ± 0.44	11.16 ± 0.38
Treatment									
T1	6.86 ± 0.14^{a}	3.33 ± 0.08^{a}	3.53 ± 0.12^{a}	0.94± 0 .04^{a}	0.64 ± 0.05^{a}	38.61 ± 1.18^{b}	47.68 ± 2.62^{a}	34.13 ± 0.89^{a}	10.21 ± 0.75^{a}
T2	7.17 ± 0.14^{a}	3.38 ± 0.08^{a}	3.79 ± 0.12^{a}	0.89 ± 0.04^{a}	0.71 ± 0. 05^{a}	36.27 ± 1.18^{a,b}	46.45 ± 2.62^{a}	32.93 ± 0.89^{a}	11.24 ± 0.75^{a,b}
T3	6.91 ± 0.14^{a}	3.28 ± 0.08^{a}	3.63 ± 0.12^{a}	0.90 ± 0.04^{a}	0.72 ± 0. 05^{a}	35.80 ± 1.18^{a,b}	44.34 ± 2.62^{a}	36.78 ± 0.89^{b}	12.98 ± 0.75^{b}
T4	7.12 ± 0.14^{a}	3.48 ± 0.08^{a}	3.65 ± 0.12^{a}	0.95 ± 0.04^{a}	0.63 ± 0.05^{a}	34.56 ± 1.18^{a}	49.99 ± 2.62^{a}	31.97 ± 0.89^{a}	10.20 ± 0.75^{a}
Normal range	6-8 (g/dl)	3.5-5 (g/dl)	2-5 (g/dl)		1.2-1.9(mg/dl)	8-40 (mg/dl)	9-35 (U/L)	26-34 (U/L)	20-25 (U/L)
Sampling time									
Day 60 at weaning	6.98 ± 0.12^{a}	3.36 ± 0.07^{a}	3.62 ± 0.11^{a}	0. 93 ± 0.04	0.64 ± 0.05^{a}	34.80 ± 1.03^{a}	41.55 ± 2.27^{a}	35.21 ± 0.76^{a}	10.39 ± 0.65^{a}
Day 120	6.96 ± 0.12^{a}	3.31 ± 0.07^{a}	3.65 ± 0.11^{a}	0.91 ± 0.04^{a}	0.34 ± 0.05^{b}	31.29 ± 1.03^{b}	44.16 ± 2.27^{a}	30.29 ± 0.76^{b}	10.19 ± 0.65^{a}
Day 180	7.10 ± 0.12^{a}	3.43 ± 0.07^{a}	3.67 ± 0.11^{a}	0.93 ± 0.04^{a}	1.04 ±0.05^{c}	42.84 ± 1.03^{c}	55.69 ± 2.27^{b}	36.34 ± 0.76^{a}	12.89 ± 0.65^{b}

a, b and c: Means in the same column or raw with different superscripts are significantly (P<0.05) differed.

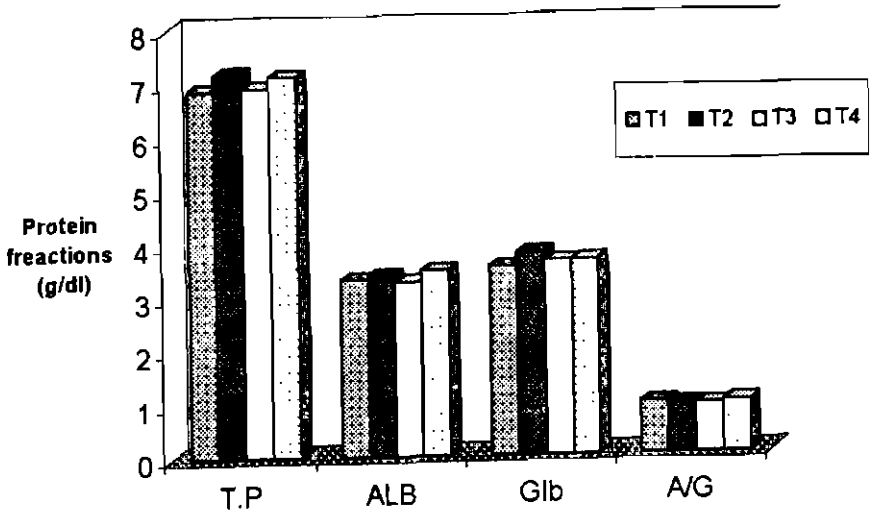

Fig 1: Serum protein fraction values as affected by dietary treatments.

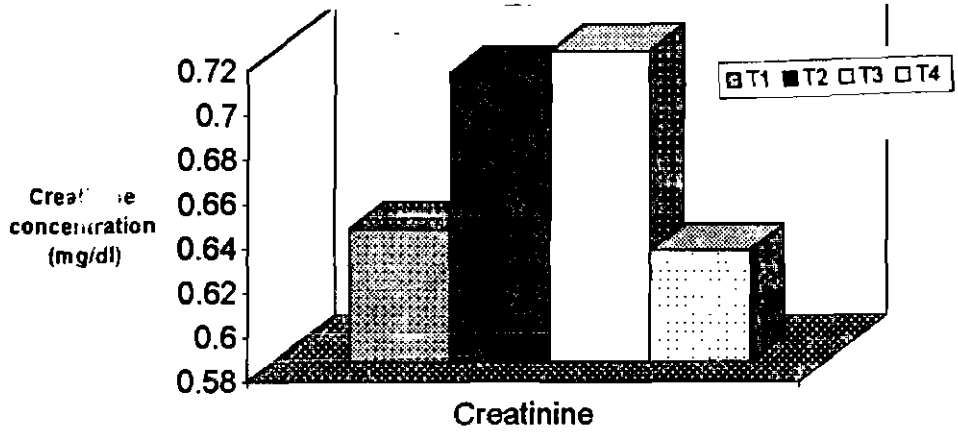

Fig 2: Values of serum creatinine concentration as affected by dietary treatments.

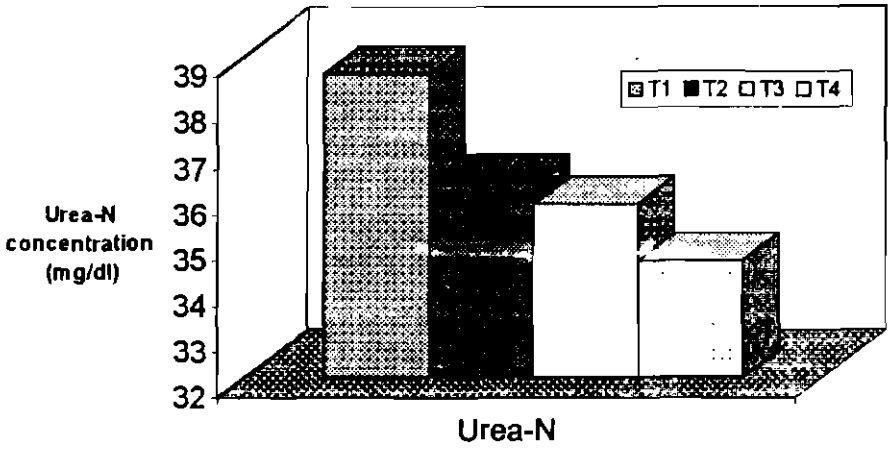

Fig 3: Values of serum urea-N concentration as affected by dietary treatments.

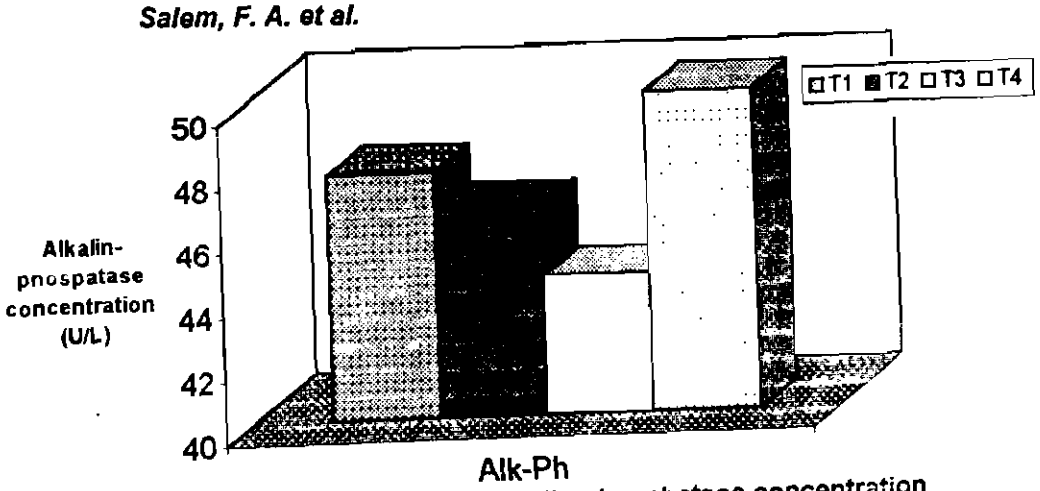

Fig 4: Values of serum alkalin phosphatase concentration as affected by dietary treatments.

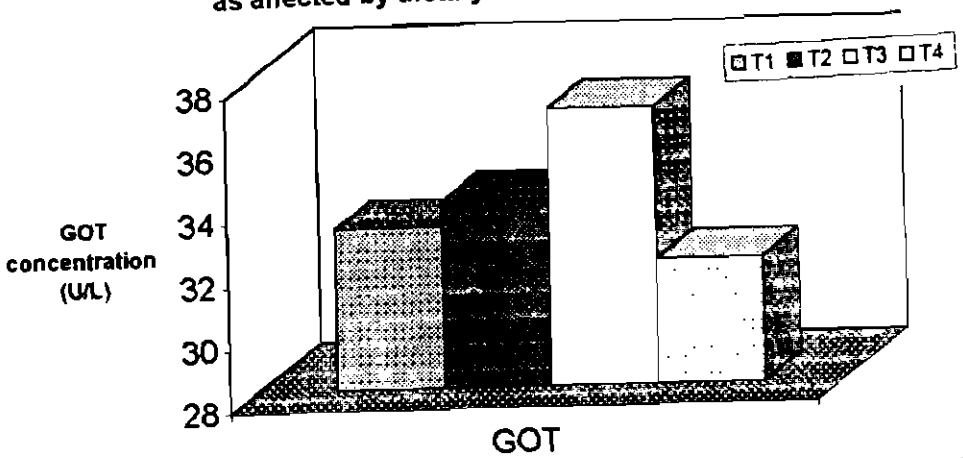

Fig 5: Values of serum GOT concentration as affected by dietary treatments.

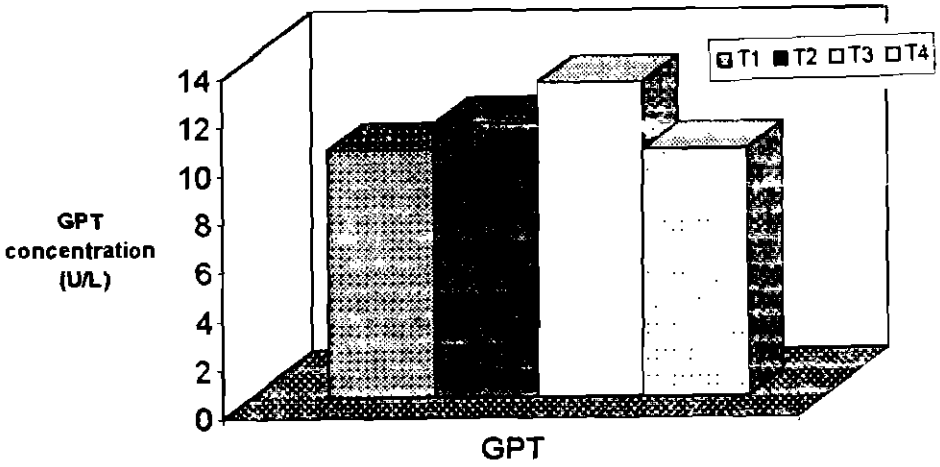

Fig 6: Values of serum GPT concentration as affected by dietary treatments.

It could be noticed that GOT levels were higher than those for GPT for all experimental treatments. On the contrary, Abd El-Kareem (1990) and El-Ashry et al.(1997) found that GPT levels were higher than GOT levels.

Regarding the effect of sampling times on serum creatinine, urea-nitrogen, alkalin-phosphatase, GOT and GPT. There were significant ($P<0.01$) differences among the sampling time. The values were minimum at day 60 at weaning (before feeding) and decreased levels at day 120 after feeding. Then the values tended to increase to reach the maximum at day 180 (after feeding).

Carcass, physiological traits and chemical composition:-

Results in Table (5) showed that the average values of carcass weight, shoulder, legs and ribs weight in T2 were significantly ($P<0.05$) higher than T1 and T4 while insignificantly higher than in T3. Also, the brisket and flank weight values were higher ($P<0.05$) in the groups received medical plants than those of control group. However, T1 group recorded the lowest values in shoulder, loin, rack, brisket, flank, liver, spleen and heart weight than other groups. Similar trend for carcass traits were obtained bt Ibrahim *et al.*, (1994); Mir *et al.*, (1998) and Salem and EL-Mahdy (2001).

Table (5): Effect of feeding medical plants on carcass traits of male lambs.

Items	T1	T2	T3	T4	± SE
Fasting weight (wt); kg	43.5^{b}	49.27^{a}	48.25^{ab}	44.0^{ab}	1.62
Carcass wt.; (kg)	22.33^{b}	25.78^{a}	24.74^{ab}	22.37^{b}	0.81
Shoulder wt.; (kg)	4.19^{b}	5.57^{a}	4.69^{ab}	4.38^{b}	0.35
Legs wt.; (kg)	7.56^{b}	9.39^{a}	8.82^{ab}	7.3^{b}	0.48
Loin wt.; (kg)	1.764	1.88	1.817	1.808	0.11
Neck wt.; (kg)	1.822^{b}	2.12^{a}	2.179^{a}	1.404^{c}	0.062
Rack wt.;(kg)	4.82	4.61	5.57	5.09	0.284
Brisket; (kg)	0.936^{c}	1.531^{a}	1.085^{bc}	1.408^{ab}	0.117
Flank; (kg)	1.212^{c}	2.438^{a}	1.802^{b}	1.574^{bc}	0.124
Ribs (9,10,11)	563.2^{b}	947.7^{a}	550.3	477^{b}	103.2
Pelt, kg	3.49^{b}	3.19^{b}	3.42^{b}	4.06^{a}	0.096
Full, e., (kg)	7.05	7.18	6.89	7.99	0.36
Empty, (kg)	3.26^{a}	2.96^{ab}	2.9^{b}	2.9^{b}	0.09
Legs, (kg)	1.122^{ab}	1.107^{ab}	1.045^{b}	1.337^{a}	0.091
Internal fat, (gm)	353.5^{b}	676^{a}	848^{a}	415^{b}	64.55
Kidney fat, (gm)	91.5^{b}	382.7^{a}	364.0^{b}	83.5^{b}	60.30
Liver, (gm)	731.5^{b}	1067.7^{a}	832.7^{ab}	1070.0^{a}	71.61
Kidney, (gm)	148^{b}	232.3^{b}	181.0^{ab}	128.5^{b}	19.1
Testes, (gm)	313	455	368	308	66.42
Spleen, (gm)	60.0^{b}	140^{a}	147.3^{a}	88.5^{ab}	18.96
Heart, (gm)	241	261	380.3	537	106.9
Lungs and Traces, (gm)	774^{a}	558.3^{b}	504.3^{b}	837.2^{a}	51.02

a, b and c :Mean in the same row with different superscripts significantly ($P<0.05$) differed.

Data presented in Table (6) showed that T2 and T3 treated animals recorded lower values of pH ($P<0.05$) than T1 and T4 diets. However, Fenugreek and coriandum sativum treatment groups had higher values of the meat, bone and fat weight than those of the control diets, while, T2 diet had lower values ($P<0.05$) of fat (%) than other groups.

Table (6): Effect of feeding medical plants on physical and chemical composition of eye muscle lean.

Items	T1	T2	T3	T4	± SE
Physical composition of 9,10,11 ribs					
pH	5.57^{b}	5.46^{c}	5.35^{c}	5.76^{a}	0.034
Colour	0.206	0.209	0.198	0.195	0.01
Tenderness (cm^2)	3.58^{b}	4.10^{a}	3.83^{ab}	3.82^{ab}	0.123
Water holding capacity(cm2)	8.86	8.77^{b}	8.99^{a}	8.95^{ab}	0.06
Meat weight (gm)	215.70^{c}	352.0^{a}	312.7^{ab}	302.3^{b}	12.30
Bone weight (gm)	90.00^{b}	116.7^{a}	116.0^{a}	122.3^{a}	5.96
Fat weight (gm)	143.70^{b}	218.0^{ab}	247.7^{a}	218.3^{ab}	28.53
Chemical composition (%)					
Moisture	74.96	75.74	75.59	74.78	0.286
Protein	84.87	85.48	84.96	84.59	0.32
Lipids.	10.80^{ab}	9.90^{b}	11.03^{a}	10.81^{ab}	0.32
Ash	4.30	4.61	4.48	4.59	0.124

a, b and c :Mean in the same row with different superscripts significantly (P<0.05) differed.

Performance of growing lambs and economical efficiency:

The present data (Table 7) clearly showed that animals fed ration supplemented fenugreek or coriander (T2, T3 or T4) during 6 months had higher (P<0.05) total body gain than those of control group (T1).The increase in body weight gains may be due to the increase in nutrients digestibility and ruminal TVFA's for treated groups compared to the untreated group (control). The average daily gain are parallel with the results obtained in ruminal TVFA's of treated animals which were higher than control group. These results are in accordance with those found by Salem and EL-Mahdy (2001) and Abo-Donia *et al.*, (2003). The higher propionate concentration might also, decrease heat increment (Smith, 1971) and methanogenesis (Van Nevel *et al.*, 1974). As shown in Table (7) the best feed utilization efficiency and economical return was achieved by group fed diet contained fenugreek followed by the group fed diet contained coriander while the lowest was the control. These positive economic and growth performance results of tested animal may encourage to recommend using fenugreek or coriander as a natural feed additive of the diet at level of 5g (head/day) of growing lamb without any adverse effect on their growth performance. These results are in agreement with the findings of Salem and EL-Mahdy (2001); Abo-Donia *et al.*,(2003) and Mohamed *et al.*, (2003).

Generally, using natural Fenugreek and coriandum sativum seed meal as feed additive in sheep nutrition lead to improve the nutrients digestibility, rumen parameters and blood constituents and carcass traits. Also lead to best economic return.

Table (7): Growth performance and economical evaluation of lambs fed the experimental rations.

Items	Treatment			
	T1	T2	T3	T4
Experimental period (day):-	180	180	180	180
Initial body weight (kg)	21.67 ± 0.88	17.33 ± 1.86	21.0 ± 0.58	19.0 ± 2.00
Final body weight (kg)	43.60^{d} ± 3.93	49.30^{a} ± 3.18	48.30^{b} ± 3.34	44.0^{c} ± 1.16
Mean gain (g /day)	$121\ 83^{d}$ ± 5.80	177.61^{a} ± 2.33	151.67^{b} ± 4.64	138.9^{c} ± 5.50
Feed utilization efficiency :-				
Kg DMI / kg gain	9.22	6.15	7.34	8.05
Kg TDN / kg gain	5.94	4.61	5.24	5.55
Kg DCP / kg gain	1.113	0.799	0.907	1.042
Feed cost /lamb (L.E.)	117.3	131.90	125.2	130.20
Cost of total weight gain (L.E.)	263.16	383.64	327.6	300.00
Net revenue* (L.E.)	145.86	251.74	202.4	169.8
Economic efficiency**	1.243	1.909	1.617	1.304
Relative economic efficiency*** (%)	100	153.6	130.1	104.9

a, b,c, and d, Means with different letters in the same row are significantly (P<0.05) differed.

Based on market prices at the beginning of the experiment the prices (L.E./ Ton) were CFM; 700, berssem hay; 400, fenugreek; 2000 and coriander; 1000 and live body weight of sheep; 12 L.E /kg.

*** Net revenue = (Price of total gain) - (Total feed cost / lamb).**

**** Economic efficiency = Net revenue / total feed cost.**

***** Economic efficiency = (Economic efficiency of control) X 100.**

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تأثير النباتات الطبية والعطرية كإضافات غذائية على أداء الأغنام

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استخدم في هذه الدراسة ٣٢ من ذكور حملان خليط السافولك (سافولك X أوسيمى) متوسط وزن ١٩,٧٥ كجم عند عمر ٤ شهور . قسمت الحيوانات عشوائيا إلى أربع مجموعات تجريبية لدراسة تأثير إضافة الحلبة والكسبرة على الأداء الإنتاجي للأغنام ، وقد غذيت الحيوانات طبقا لمقررات NRC عام ١٩٨٩ حيث غذيت المجموعة الأولى على علف المركز ودريس برسيم عليقه مقارنة بينما غذيت المجموعة الثانية على عليقه المجموعة الأولى مضافا إليها بذور الحلبة المطحونة بمعدل (٥ جم/ رأس/ يوم) ، المجموعة الثالثة غذيت على عليقه المقارنة مضافا إليها بذور الكسبرة المطحونة بمعدل (٥ جم/ رأس/ يوم)، المجموعة الرابعة غذيت على عليقه المقارنة مضافا إليها مخلوط الحلبة والكسبرة بمعدل (٥ جم/ رأس/ يوم) بنسبة (١:١) وقد استمرت التجربة لمدة ١٨٠ يوم أجرى في نهايتها أربعة تجارب هضم وقد تم ذبح ثلاثة حيوانات من كل مجموعة تجريبية لدارسة خصائص الذبيحة وقد أظهرت نتائج الدراسة مايلى:

لم تظهر اختلافات معنوية في المادة الجافة المأكولة بين المجموعات المختلفة بإضافة بذور الحلبة (المعاملة الثانية) حدثت زيادة معنوية في معاملات هضم كل من المادة الجافة ، المادة العضوية ، الألياف الخام ، الدهن الخام والكربوهيدرات الذائبة مقارنة بمجموعة الكنترول. بينما لا توجد فروق معنوية بين المعاملات الثلاثة الأخرى.

بالنسبة لقياسات الكرش أظهرت الدراسة ميل الأس الأيدروجينى للحموضة في المجاميع المضاف إليها حلبة أو كزبرة أو الخليط بينهما عند صفر ، ٦ ساعات بعد التغذية. بينما لا توجد اختلافات معنوية في تركيز الأمونيا بين المجاميع المختلفة عند نفس التوقيت، بينما وضح أن تركيز الأحماض الدهنية الطيارة زاد في مجموعات الإضافة مقارنة بالكنترول عند كل الأوقات.

بالنسبة لقياسات الدم لم تظهر هذه الإضافات أي تأثير معنوي على كل من البروتين الكلى ، الألبيومين ، الجلوبيولين ، الكرياتين وأنزيم الفوسفاتيز القاعدي بين المجموعات المختلفة. بينما أثرت معنويا على كل من اليوريا وأنزيمات الكبد بالزيادة مقارنة بالكنترول.

أظهرت الحملان المغذاة على العلائق المضاف إليها بذرة الحلبة أو الكزبرة أو خليط بينهما تحسن في أداء النمو ومحصول اللحم.

حسنت إضافة بذرة الحلبة (المجموعة الثانية) العائد الاقتصادي بدرجة أكبر من إضافة الكزبرة (المجموعة الثالثة) والمجامع الأخرى.

من النتائج السابقة يتضح أن استخدام بذور كل من الحلبة والكزبرة الطبيعية كإضافات في تغذية الأغنام أدت إلى تحسن معاملات الهضم المختلفة وقياسات الكرش وصفات الذبيحة وأيضا العائد الاقتصادي.