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Evaluation of using some Medical Herbs Seeds as Feed Additive on some Hematological and Biochemical Parameters for Male Awassi Lambs Under Local Environmental Condition of Nineveh Province, IRAQ

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ABSTRACT

The experiment was carried out at the sheep farm of Technical Agricultural College, Mosul /Iraq, from 15/2 to 16/6/2013. Twenty four male Awassi lambs aged 3.5-4 months and weights 22-23 Kg. lambs were assigned randomly into 4 main groups (6 lambs/ group) each main group was divided into 2 subgroup (3 lambs/group) and these groups were fed ad libitum on ration consisted as control ration for 4 months, 1st group was fed on control ration only, while 2nd, 3rd and 4th groups were fed on control ration and supplemented with 600 mg. black cumin (*Nigella sativa*) or fenugreek (*Trigon-ella foenum*) or rocket (*Eruca sativa*) seeds/ kg. B.W./day, respectively. Blood samples were collected from jugular vein of all lambs at 4, 6 and 8 months age of lambs. Results indicated that red cell count, hemoglobin, packed cell volume, were increased significantly ($P \leq 0.05$) in blood lambs fed black cumin and rocket seeds, while decreased significantly ($P \leq 0.05$) in blood fed Fenugreek seeds, also the percentages of lymphocytes and eosinophil cells were increased significantly while the percentage of neutrophil cell and blood urea were decreased significantly in blood lambs fed black cumin and fenugreek seed, also total protein, globulin were increased significantly, while glucose, cholesterol, triglycerides were decreased significantly ($P \leq 0.05$) in blood lambs fed black cumin or fenugreek or rocket seeds. Also red cell count, hemoglobin, packed cell volume, percentages of lymphocytes and eosinophils, total protein and globulin were increased significantly, while blood glucose was decreased significantly with age progress. It was concluded that using some medical herbs seeds as feed additive had improved some hematological and biochemical parameters.

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INTRODUCTION

Many of synthesized chemical compounds like antibiotics, hormones and others were used as feed additive in many animal farm diets can cause unfavorable side effects and hazards to animal and human (Schwarz *et al.*, 2001) and this may be due to the harmful risk of appearance of their residues in milk and meat and development of multidrug bacteria (Russell and Houlihan, 2003), and promote the spreading of resistance gene (Hoffmann, *et al.*, 2003), this have lead to prohibition for use of antibiotics in animal feed in European Union's by European Union's Agricultural ministry since the first of January 2006 (Anonymous, 2005). So this leads the researcher in the field of animal science in Iraq in the last ten years for inspection to use of alternative natural material such as medical herbs in animal feed (Al-Fityin, 2008, Al-Sherwany, 2010 and Ibrahim, 2013) to substitute or minimize the use of

chemicals compounds like antibiotic in animal nutrition, because those plants were found to incarnate natural substances that ameliorate health and promote the body condition to counteract the stress of illness (Eisenberg *et al.*, 1993), these nontraditional protein and economic sources must have privilege to ameliorate the animal health represented in supporting a good immunity and animal production represented by the meat production and the animal fertility, improve the economic input (Kamboj, 2000) for production, are not harmful to animal and not left risk residues in milk and meat and consumer safety (Marcus, 2002) and to provide alternative sources or support the chemical medicine (Ali and Blunden, 2003), antioxidant and antimicrobial properties (Yun *et al.*, 2003).

There are many herbaceous plant in local market in Iraq are used in folk medicine and its named as medical herbs (Mossa, 1987). There are about 360-

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370 herbs kinds in local market such as black cumin (*Nigella Sativa Linn*) belong to botanical family Ranunculacea, Fenugreek seed (*Trigonella foenum graecum L.*) belong to botanical family Leguminosae and rocket (taramira) seed (*Eruca sativa mill*) belong botanical family Brassicaceae. Blood profiling is considered to be one of the significant sources for judging the nutrient status and body condition, and a comparison of blood metabolites may be useful for the diagnosis of metabolic disorders. Also, it may a good indicator of the effects of herb feeding on normal physiology (shams al-dain *et al.*, 2014). Many authors studied the effect of some medical herbs on blood metabolites (Sanad, 2010) and can play important role in hematological (shams al-dain *et al.*, 2006 and Al-Janabi and Ali, 2011) and biochemical (Sahni and Sachin, 2010 and Ibrahim, 2013) parameters of sheep.

The aim of this experiment is to study the effect of supplementation black cumin, fenugreek and rocket seeds and age of lambs (4, 6 and 8 months) on the hematological and biochemical parameters of Iraqi Awassi male lambs.

MATERIALS AND METHODS

This work was carried out at sheep farm of animal production department in the Technical Agriculture College, Mosul/Iraq. Twenty four male Awassi lambs of 3.5-4 months old and 21-22kg body weight were divided into 4 comparable main groups of 6 lambs each according to their live weight and each main group was divided into 2 subgroup (3 lambs /subgroup). The first group (T1) was fed on a basal ration (table 1) according to NRC (1994), the other three groups were fed the same basal ration and supplemented daily with either 600 mg. of black cumin (T2) or fenugreek (T3) or rocket seeds (T4)/kg. B.W./day respectively. All rations were fed *ad libitum* twice daily at 8 a.m. and 5 p.m., while straw (2-3 cm) was offered at 1% of their body weight for the experimental animals for four months (15/2-15/6/2013). Fresh water and minerals blocks were freely available at all times. The experiment lasted for 4 months. All lambs were free from diseases and parasites and housed in semi-shaded well ventilated pen.

Blood samples were individually collected early in the morning at 4, 6 and 8 months of age or at start

, middle and end of the experimental periods via jugular vein using a 10 ml plastic disposal syringe. About 10 ml of blood were obtained from each lambs by using two vacutainer tubes. The first 5 ml of the blood was put in vacutainer tubes containing ethylene-diamine tetra-acetic acid (EDTA), the tubes were inverted several times to ensure adequate mixing of the blood with anticoagulant and transported to the laboratory for hematological analysis, the samples were analyzed within two hours after collection, the hematological analysis included total of erythrocyte (RBC's $\times 10^6$ cells/ul) and leukocyte (WBC's $\times 10^3$ cells/ul) counts were determined manually by using the hemocytometer as described by Schalm (1975), the differential distribution of leukocytes was determined by counting 100 cells per slide using the method described by Cheryl *et al.*, (1992) and expressed as a percentage, hemoglobin concentration (Hb, g/dl) was determined according to Schalm (1975), packed cell volume (PCV%) was estimated by the use of the microhematocrit method according to Cheryl *et al.*, (1992) and expressed as a percentage, the mean corpuscular hemoglobin concentration (MCHC, Mg/dl), the mean cell volume (MCV, FI) and the mean corpuscular hemoglobin (MCH, Pg) were calculated by the formulas cited by Coles (1987). The second 5 ml of the blood but in non heparinized glass tubes, blood samples were centrifugation at 4000 rpm /15 minutes, and the obtained serum samples were divided into two parts and stored at -20°C until biochemical analysis, the first part of blood serum was used to determine the total protein (T.P), albumin (AL), globulin (GL), glycerol (G), triglycerides (TG), urea blood (BU) and blood glucose (BG) in serum by using commercial kits (Biolabo Merieux, France) according to the procedure outlined by the manufacturer and by automatic spectrophotometer. The second part of blood serum was used to determine the concentrations of sodium (Na), chloride (Cl) and (K) were determined by flame photometer based on method described by (Tietz, 1982). The serum concentrations of calcium (Ca), phosphorus (P) and magnesium (Mg) were determined by using commercial kits (Biolabo Merieux, France) according to the procedure outlined by the manufacturer by a automatic spectro photometer.

Table 1: Feedstuffs (gm./kg. feed) and chemical analysis (%) of experimental ration.

Feed stuffs		Chemical analysis%				
Ingredients	gm./kg. feed	items	Black cumin	fenugreek	rocket	straw
Barley grain	420	Dry matter% (Deter.)*	93.1	93.67	93.51	93.11
Wheat bran	420	Crude protein% (Deter.)*	15.26	26.64	27.88	29.94
Soy bean meal	70	Ether extract% (Deter.)*	2.58	10.67	.896	9.64
Yellow corn	70	** (Calc.) %Crude fiber	6.21	8.12	9.92	4.38
NaCl (Salt)	10	Ash % (Deter.)*	5.44	4.53	4.42	6.89
Limestone (CaCO ₃)	10	** (Calc.) %NFE	63.61	43.71	44.40	42.26
Metabolism energy (MJ/Kg. feed) (Calc.)***			11.85	13.03	12.19	12.72

*Determined on dry matter base according to AOAC (2007).

*Calculated from chemical analysis tables for Iraqi feed stuffs (Al-khawaja *et al.* 1978). *

Calculated according to equation of MAFF (1977). ***

The experiment was designed by the complete randomized design(CRD), factorial arrangement 4×3. Where 4 indicate four types of rations(A:control ,B:control+black cumin seed ,C: control+ fenugreek seed and D: control +rocket seed) and 3 indicate experimental periods or lambs age (4,6 and 8 months) .Data generated from the experiment were statically analyzed by analysis of variance was carried out on all data according to SAS(2004).Then means were separated by Duncan's multiple range tests to determine the significant at 0.05 % level of probability (Duncan ,1955).The treatment was partitioned into main effects and their interaction (Steel and Torrie ,1980).

RESULTS & DISSUCION

Data in Table (2) clearly indicated that dietary supplementation with 600 mg.black cumin or fenugreek or rocket seeds /kg.B.W./day were significantly($P \leq 0.05$) affected the total of erythrocyte count (RBC),hemoglobin concentration (Hb) and packed cell volume (PCV).Supplementation of black cumin or rocket seeds to 2nd and 4th groups, respectively were increased significantly ($P \leq 0.05$) the RBC,Hb and PCV%, but their values were decreased significantly in 3rd group that supplemented by fenugreek seeds as compared to those in 1st group (basal ration).The significant increase in the total of RBC,Hb and PCV in 2nd group may be due to that black cumin seeds contains active compound like thymoquinine that has antibacterial which improve the absorption of nutritive compounds from animal gut to blood to be used efficiently in animal growth (Al-Beltawi and El-Ghousein,2008),or may be due that thymoquinine increased the defense mechan-ism of the body against infection (Kanter *et al.*, 2005).The obtained results are in accordance with those reported by Shams al-dain *et al.*,(2006) they reported a significant increase in total of RBC,Hb and PCV% in blood serum of Awassi ewes fed ration contained 7% or 14% black cumin seed meal as compared to those

in basal ration.While the significant increase in the total of RBC,Hb and PCV% in 4th group may be due to that rocket seeds had significantly affected the final weight of lambs that fed rocket seeds and these animal were in phase of growth which is demand the excessive quantity of erythrocyte count cell to do the activeness employments (Shams al-dain *et al.*, 1995),or may be due that rocket seeds contain good percentage of iron (Abdo,2003) which cause a positive reflect to increase the total of RBC, Hb and PCV%. The present results are in agreement with Shakier *et al.*, (2013) they found that supplementation of 0.5 or 0.75 or 1.25 ml of rocket seeds oil/kg.of feed respectively had significantly affected the total of RBC,Hb and PCV% as compared to control group.But the total of RBC,Hb and PCV% were decrease significantly ($P \leq 0.05$) in lambs group fed fenugreek seeds (T3), this may be due to the saponins contents in fenugreek seeds(Snehlata and Payal,2012) caused dissolution of red blood cells and cause rapid circulation that cause significant reduction in the red blood cells count (EL-Nouty,*et al.*, 1996) .The present results are in agreement with those reported by Al-Janabi and Ali (2011) and Ibrahim (2013) they found that total of RBC,Hb and PCV% were decreased significantly ($P \leq 0.05$)in serum blood of Damascus doses that fed different percentages of fenugreek seeds. while the supplementation with 600 mg. black cumin (T2) or fenugreek(T3) or rocket (T4)seeds to the basal rations, respectively had not significantly affected the platelets count (PL),mean corpuscular hemoglobin concentration(MCHC),the mean cell volume(MCV) and the mean corpuscular hemoglobin (MCH)(table 2).The obtained results are in accordance with those reported by Abd El-halim *et al.*,(2014) they found that MCHC,MCV and MCH weren't affected by feeding 47ml.black cumin seeds oil/day to Hammary × Dorset male lambs, and in accordance with those reported by Ibrahim (2013)who found that MCHC wasn't affected by feeding 5% fenugreek seeds to Damascus doses.

Table 2: Effect of adding medical herbs and lambs age in some hematological traits (Mean ±S.E.).

Traits Factors	RBC ($\times 10^6/\mu\text{l}$)	Hb. (g/dl)	Platelets ($\times 10^3/\mu\text{l}$)	PCV (%)	MrrCHC Mg/dl)	MCV (Fl)	MCH (Pg)
Effect of adding medical herbs							
Control only	b7.63 ±1.34	b7.27 ±1.25	a5.21 ±0.29	b±3.12 30.42	a 25.08 ±2.66	9.53 a ±0.45	a23.89 ±1.73
Control +B.C.	a8.94 ±1.44	a8.67 ±1.32	a5.47 ±0.30	33.67 a ±3.19	a23.89 ±1.73	9.69 a ±0.48	a25.75 ±1.25
Control +F.	c6.83 ±1.11	c±1.34 6.53	a5.38 ±0.31	c27.51 ±2.67	a 24.83 ±2.68	a 9.56 ±0.56	a23.74 ±1.81
Control +R.	a8.67 ±1.41	a8.42 ±1.11	a5.39 ±0.29	33.56 a ±3.12	25.83 a ±2.71	9.71 a ±0.51	a25.09 ±1.65
Effect of lambs age (month)							
4	c6.96 ±1.11	a8.42 ±1.11	a5.34 ±0.24	c±42.53 27.3	25.46 a ±2.63	9.32a ±0.36	a23.74 ±1.81
6	b8.13 ±1.36	b7.87 ±1.22	a5.37 ±0.25	b±3.14 31.69	25.65 a ±2.78	9.69 a ±0.50	a 24.83 ±1.65
8	a8.94 ±1.40	a8.80 ±1.07	a5.39 ±0.29	a±3.19 34.85	25.65 a ±2.81	a9.84 ±0.56	a25.25 ±1.25

S.E=standard error, B.C=black cumin seed, F= fenugreek seed, R=rocket seed.

*Means with different letters vertical show significant difference at($P \leq 0.05$).

Data in table (2) indicate that total of RBC, Hb and PCV% were increased significantly ($P \leq 0.05$) with age progress or experimental periods, this may be due that those animal were in phase of growth which demand the excessive quantity of erythrocyte count cell to do the activeness employments (Shams al-dain *et al.*, 1995) and they need more quantity of oxygen that transported by hemoglobin to stopping the need of activeness employments of the body (Shams al-dain *et al.*, 1995), which caused a positive reflect to increased the total of RBC, Hb and PCV% as lambs get older. The obtained results are in accordance with those reported by Opara *et al.*, (2010) in west African dwarfs goat and Shams al-dain *et al.*, (2012) in Iraqi Awassi lambs and Abdel-Fattah *et al.*, (2013) in Egyptian Barki lambs they found that RBC, Hb and PCV% were increased significantly ($P \leq 0.05$) with age progress. While the age progress wasn't significantly affected the PL, MCHC, MCV and MCH (table 2). The obtained results are an opposite trend with those reported by Opara *et al.*, (2010), they found that age was observed to have a significant effect on MCHC values of goat, and Abdel-Fattah *et al.*, (2013), they found that age (1, 3, 5 and 8 months) of Egyptian Barki lambs had a significant effect on mean MCHC, MCV and MCH values. The interaction between medical herb supplementation and lambs age had significantly affected the value of RBC, Hb and PCV only.

Data in table (3) revealed that supplementation 600 mg. black cumin or fenugreek seeds /kg. B.W./day to 2nd and 3rd groups respectively, which caused a significant increase in the percentages of lymphocyte and eosinophils cells only, while the percentage of neutrophils cell was decreased significantly, but the supplementation of 600 mg. rocket seed/kg. B.W./ day to 4th groups which caused a significant ($P \leq 0.05$) increase in the percentage of lymphocyte cell only as compared to 1st group. While the supplementation with 600 mg. black cumin or fenugreek or rocket seeds to the control rations, respectively had not significantly affected the total of WBC counts and the percentages of monophiles and basophiles cells. The significant increase in the percentage of lymphocytes cell in 2nd group may be due that black cumin seeds contain active compound like thymoquinone that has ant parasites (Rathee *et al.*, 1982), antibacterial growth and immunopotentiating activities via increasing the neutrophil percentage and hence increasing the defense mechanism of the body against infection (Kanter *et al.*, 2005). The obtained results are in accordance with those reported by Shams al-dain *et al.*, (2006) they reported a significant increase in percentages of lymphocytes and eosinophils cells in blood of Awassi ewes fed ration contained 7% or 14% black cumin seed meal. While the increasing the percentage of lymphocytes cell in 3rd group may be due that fenugreek seeds contains active compound that hence increasing the defense

mechanism of the body especially the percentage of B-Lymphocytes cell which is responded for production of antibodies (Oda *et al.*, 2000), while the reason for significant decreasing the percentage of neutrophils cell may be due to active compound against infection in fenugreek seed via decreasing antibacterial infection (Al-Janabi and Ali, 2011). The present results are in agreement with those reported by Hassan and Hassan (2010) they found that percentage of lymphocytes was increased significantly, while the percentage of neutrophils cell was decreased significantly in Damascus does goat that feed 4% or 6% fenugreek seed. Also the increasing significantly in the percentage of lymphocytes in the 4th group that supplemented by rocket seed may be due to increasing in lymphocytes helper T. as a result of increasing immunopotentiating (Mahe-al den, *et al.*, 1990). The present results are in agreement with Shakier *et al.*, (2013), they found that supplementation of 0.5 or 0.75 or 1.25 ml of rocket seeds oil/kg. of feed respectively had significantly affected the percentage of lymphocytes. While the supplementation with 600 mg. black cumin or fenugreek or rocket seeds to the control rations, respectively had not significantly affected the total of leukocyte counts (table 3). Obtained results are in accordance with those reported by Shams al-dain *et al.*, (2014), they reported that feed-ing 25 g. of black cumin seed/day/ewe had not significantly affected the total of leukocyte counts in blood of Awassi ewes, and the results of Ibrahim (2013) who reported that feeding different percentages (0% or 5% or 10%) of fenugreek had not significantly affected the total of leukocyte counts in blood of Damascus does goat, and the results of Shakier *et al.*, (2013) they found that supplementation of 0.5 or 0.75 or 1.25 ml of rocket seeds oil/kg. of feed respectively had not significantly affected the total of leukocyte counts.

Data in table (3) indicate that total of leukocyte count values and the percentage of lymphocytes were increased significantly ($P \leq 0.05$), but the percentage of neutrophils was decreased significantly ($P \leq 0.05$) as lambs get older, this may be due that those animal were in phase of growth and the animal need for defense system against diseases (Shams al-dain *et al.*, 1995). The obtained results are in accordance with those reported by Opara *et al.*, (2010), they found that total of leukocyte count and the percentage of lymphocytes were increase significantly ($P \leq 0.05$) in serum blood of the west African dawarfi (wad) goat as get older, and the results of Shams al-dain *et al.*, (2012) they found that total of leukocyte count and the percentage of lymphocytes were increase significantly ($P \leq 0.05$) in serum of Awassi lambs as get older (4 and 7 months). Also the obtained results are in accordance with those reported by Abdel-Fattah *et al.*, (2013) they found that Egyptian Barki lambs age (1, 3, 5 and 8 months) had significantly affected the total

of leukocyte count and the percentage of lymphocyte cell, but not significantly affected the percentage of monocytes cell on the blood .The

interaction between medical herb supplementation and lambs age had significantly affect the lymphocytes and esinophils percentages only.

Table 3: Effect of adding medical herbs and lambs age in the total of leukocyte counts and their differential distribution (Mean \pm S.E.).

Traits Factors	WBC ($\times 10^3/\mu\text{l}$)	Lymphocytes (%)	Esinophils (%)	Neutrophils (%)	Monocytes (%)	Basophils (%)
Effect of adding medical herbs						
Control only	a7.58 ± 0.95	b55.51 ± 1.34	b5.09 ± 0.25	a31.79 ± 1.24	a6.78 ± 0.36	a0.83 ± 0.04
Control +B.C.	a7.62 ± 1.11	a60.66 ± 1.30	a7.74 ± 0.23	b23.99 ± 1.22	a6.74 ± 0.38	a0.87 ± 0.06
Control +F.	a7.64 ± 1.09	a60.78 ± 1.24	a7.68 ± 0.19	b23.91 ± 1.16	a6.81 ± 0.41	a0.82 ± 0.08
Control +R.	a7.51 ± 0.95	b55.72 ± 1.36	b5.74 ± 0.25	a31.12 ± 1.24	a6.59 ± 0.36	a0.83 ± 0.04
Effect of lambs age (months)						
4	c7.33 ± 0.95	c54.15 ± 1.36	a6.42 ± 0.20	a31.33 ± 1.25	a6.75 ± 0.36	a0.83 ± 0.04
6	b7.61 ± 0.95	b58.22 ± 1.30	a6.94 ± 0.21	b27.84 ± 1.18	a6.71 ± 0.38	a0.82 ± 0.06
8	a7.87 ± 0.95	a62.11 ± 1.21	a6.41 ± 0.20	c23.93 ± 1.23	a6.72 ± 0.36	a0.82 ± 0.08

S.E=standard error, B.C=black cummin seed, F= fenugreek seed , R=rocket seed.

*Means with different letters vertical show significant difference at ($P < 0.05$).

Data in Table(4) revealed that total protein and globulin were increased significantly ,while the value of cholesterol, triglycerides and glucose were decreased significantly by supplementation black cummin or fenugreek or rocket seeds to 2nd ,3rd and 4th groups respectively, also the value of urea was decreased significantly in 2nd and 3rd groups respectively as compared to control group (1st group),but the value of albumin was not affected by supplementation of any medical herbs seeds to the ration groups.The significant increase in the value of total protein in 2nd group may be due that black cummin seeds contain essential amino acids that required for building protein(Ahmed *et al.*, 2004) ,or may be due to the increase of digestibility coefficient of crude protein of black cummin seed (Shams al-dain and Al-Rawi ,2005)which cause increasing the total protein in blood (Kassab,2007) ,or may be due to have appositve relation between protein intake and total protein in blood (Taha and Shams al-dain,1998) ,or may be due that black cummin seeds contains some active compounds like thymoquinine ,nigellen and nigellon which are responsible for increasing building protein in animal body(Al-Kaisey *et al.*,2002),or may be due that supplementation of black cummin seeds has appositve effect on thyroid hormones secretion(Sanad,2010).The obtained results are in accordance with those reported by Al-Khauzai *et al.*,(2012) they reported that value of total protein was increased significantly in serum blood of male Awassi lambs that fed on ration contain 2%black cummin seeds as compared to control ration, and the results of Zouny *et al.*, (2013) they noticed that value of total protein was increased significantly in serum blood of Egyptian Ossami lambs groups that fed ration supplemented with 100 or 200 mg. black cummin seeds powder/ kg. B.W./day , respectively as

compared to control group.The significant increased in the value of total protein in 3rd group may be due that fenugreek seeds contain saponins compounds that reduce the activity of micro fauna in rumen which cause increase the indigestible protein in rumen to reach small intestine (Thomas *et al.*,1994).The obtained results are in accordance with those reported by Al-Khauzai *et al.*,(2012) they reported that value of total protein was increased significantly in serum blood of male Awassi lambs that fed ration contain 2% fenugreek seeds as compared to control ration. The significant increased in the value of total protein in 4th group may be due that rocket seeds is a good source for protein (El-Gengaihi,*et al.*,2004) ,or may be due that crude protein of rocket seeds contains a good percentages of amino acids and high quality of protein (Srinibas *et al.*,2001)which cause increased of total protein in blood,or may be due that rocket seed contain vitamin C and carotenoids(Carr *et al.*,2004),both of them play a good role for protection from ant-oxidative damage in the body (Kim *et al.*,2004).The obtained results are in accordance with those reported by Zeweil *et al.*, (2008) that value of total protein was increased significantly in serum blood of New Zealand white rabbits that fed ration contain 10.5% rocket seeds as compared to control ration.

While the significant increase in globulin value in 2nd group (table 4) that fed control ration supplemented by black cummin seed may be due that black cummin seed has caused increased in serum glutamyl transfirase enzyme which caused increased in immunopotentiating activity in blood serum (Sanad,2010),or may be also due to an immune stimulant effect of black cummin seed (Mohamed *et al.*, 2003), or may be also due to that black cummin seeds increased the thyroid hormones which led to increase of gamma globulin (Sanad,2010).The

obtained results are in accordance with those reported by Sachin and Sahni(2010),they noticed that a significant effect of using 500mg. black cumin seed/B.W in the serum globulin of goat, and the results of Al-Khauzai *et al.*,(2012) they reported that value of globulin was increased significantly in serum blood of male Awassi lambs that fed on ration contain 2% black cumin seeds as compared to control ration. The significant increase in the value of globulin in 3rd group may be due that fenugreek increasing the defense mechanism of the body especially the percentage of B-lymphocytes cell which cause increase in globulin. The obtained results are in accordance with those reported by Al-Saiady *et al.*, (2007) they reported that value of globulin was increased significantly in serum blood of lactation does that fed on ration contain 10% fenugreek seeds as compared to control ration. the significant increase in globulin value in 4th group that fed control ration supplemented by rocket seed may be due that rocket seed has caused increased immune response of the body (Abdo, 2003), and increase the cellular antioxidant defenses (Barillari,*et al.*,2005). Similar results were observed by Zeweil *et al.*, (2008) they reported that value of globulin was increased significantly in serum blood of rabbit that fed on ration contain 10.5% rocket seeds as compared to control ration. Also the results in table (4) indicated that supplementation of black cumin or fenugreek or rocket seed to basal rations had not significantly affected the albumin. The obtained results are in accordance with those reported by Shams al-dain *et al.*,(2006) they reported that value of albumin was not significantly affected in serum blood of Awassi ewes that fed on ration contain 7% or 14% black cumin seeds meal as compared to control ration, and the results of Ibrahim (2013) who reported that feeding different percentages (5% or 10%) of fenugreek had not significantly affected the albumin in blood of Damascus does goat, and the results of Zeweil *et al.*,(2008) who reported that feeding 10.5% 20% rocket seed had not significantly affected the albumin in blood of rabbits.

Data in Table(4) revealed that value of cholesterol and triglycerides were decreased significantly by supplementation black cumin or fenugreek or rocket seeds to 2nd, 3rd and 4th groups respectively as compared to control group(1st group). The significant decrease in the value of cholesterol and triglycerides in 2nd group may be due that black cumin seeds contain higher content of unsaturated fatty acids (Mostafa, 1998) or may be as a result from the hypolipidemic effect of oleic acids (Allman-Farinelli *et al.*,2005) and linoleic acids (Kamal El-Din and Bakeet,2006) as a major unsaturated fatty acids of the oil of black cumin from its effect on lipoprotein, or may be due to decreased dietary cholesterol absorption or increased primary bile acid synthesis and/or through its fecal losses, by making liver cell more efficient to remove LDL-C from

blood through increasing LDL receptor densities in liver and by binding to apolipoprotein-B (El-Beshbishy,*et al.*,2006). The obtained results are in accordance with those reported by El-Saadany,*et al.*,(2008) they found that value of cholesterol and triglycerides were decreased significantly in serum blood of lactating Zairaib does that fed on ration that supplemented by 5gm .black cumin seeds/day/doe as compared to control ration. and results of Zanouny *et al.*,(2013) they noticed that value of cholesterol and triglycerides were decreased significantly in serum blood of Egyptian Ossami lambs groups that fed ration supplemented with 100 or 200 mg.black cumin seeds/kg.B.W./day, respectively as compared to control group. The significant decrease in the value of cholesterol and triglycerides in 3rd group may be due that fenugreek seeds contain some compounds like diosgenin and steroidal saponins extant which are precursor with cholesterol for forming sex hormones which reduce cholesterol in blood (Tiran, 2003) or may be due that fenugreek seeds contain saponins which is indigestible in rumen so when reach small intestine it connected with bile acid and reduce absorption in small intestine which reduce cholesterol in blood(Rao and Sharma,1987),or may be due that fenugreek seeds stimulated the conversion of cholesterol to bile salts, this was a direct result of increased bile secretion and decreased cholesterol in serum blood(Bhat *et al.*,1985). The obtained results are in accordance with those reported by Ibrahim(2013) who noticed that value of cholesterol and triglycerides were decreased significantly in serum blood of Damascus does goat that feeding 10% of fenugreek ration as compared to control group. The significant decrease in the value of cholesterol and triglycerides in 4th group may be due that rocket seeds contain higher content of unsaturated fatty acids (85%) like linolenic and linoleic acids(Thomas,2002) and glucosinolates (Al-Doghachi *et al.*,2010) which play role inhibition absorption of fatty acids or inhibition the enzyme H yroxyl-methyl-glutary-CoA reductas which is important in cholesterol formation (Bulbul,*et al.*,2009) which cause reduction of cholesterol value in blood(Al-Doghachi *et al.*,2010),or may be due that rocket seeds contain β -Sitosterol which reduce absorption of cholesterol from small intestine so cholesterol value in blood will reduce(El-Gengaihi *et al.*,2004). The obtained results are in accordance with those reported by Ibrahim (2005) who noticed that value of cholesterol and triglycerides were decreased significantly in serum blood of rabbit that feeding 1% or 5% of rocket seeds ration as compared to control group.

Data in Table(4) revealed that value of glucose was decreased significantly by supplementation black cumin or fenugreek or rocket seeds to 2nd, 3rd and 4th groups respectively as compared to control group(1st group). The significant decrease in the value of glucose in 2nd group may be related to

decrease of insulin secretion by β -cells of pancreas due to dietary black cumin seeds supplementation (Kanter, *et al.*, 2003). Similar results were obtained by Abo El-Nor *et al.*, (2007) in buffalo, Sachin and Sahni (2010) in goat and Zanouny *et al.*, (2013) in lamb, they founds that supplementation of black cumin seed decreased significantly plasma glucose. While the significant decrease in the value of glucose in 3rd group may be due that fenugreek seeds stimulate pancreatic insulin secretion (Yadav, *et al.*, 2004, and Schryver, 2002) who reported that fenugreek seeds contain amino acid called 4 hydroxy iso leucine which appears to increase the body's production of insulin, that help glucose to penetrate the cell membrane, or may be due that fenugreek seeds contain alkaloids called Nilotine which appear to reduce plasma glucose (Shanigi, *et al.*, 1974). The obtained results are in accordance with those reported by Alamer and Basiouni (2005) they noticed that value of plasma glucose was decreased

significantly in serum blood of goat that feeding 60 gm. of fenugreek seeds/goat/day as compared to control group, and result of Ibrahim (2013) who noticed that value of glucose was decreased significantly in serum blood of Damascus does goat that feeding 10% of fenugreek ration as compared to control group. While the significant decrease in the value of glucose in 4th group may be due that rocket seeds effect carbohydrate metabolism through stimulate the activity of glycogen synthetase enzyme and reduce the activity of glycogen phospho-rylase enzyme (Khan *et al.*, 1995) or may be due that rocket seeds reduce the level of serum glucose (Khare, *et al.*, 2007). The obtained results are in accordance with those reported by Al-Darajie and Razuki (2012) they noticed that feeding 1, 2 or 3 kg rocket seeds/ton of feed reduce the serum glucose as compared to control group.

Table 4: Effect of adding medical herbs and lambs age in some biochemical parameters (Mean \pm S.E.).

Traits Factors	T/protein (g/dL)	Globulin (g/dL)	Albumin (mg/dL)	Cholesterol (mg/dL)	Triglyceride (mg/dL)	Glucose (mg/dL)	Urea (mg/dL)
Effect of adding medical herbs							
Control Only	6.43 b 0.24 \pm	4.12 b 0.16 \pm	2.31 a 0.09 \pm	177.89 a \pm 6.54	62.76 a 1.14 \pm	72.58 a 2.82 \pm	50.84 a 2.24 \pm
Control +B.C.	7.68 a 0.35 \pm	5.45 a 0.11 \pm	2.23 a 0.06 \pm	147.67 b 12.4 \pm	41.59 b \pm 0.76	55.61 b \pm 1.54	41.79 b \pm 1.87
Control +F.	7.59 a 0.42 \pm	5.32 a 0.09 \pm	2.27 a 0.08 \pm	146.32 b 3.75 \pm	40.48 b \pm 0.48	53.34 b 1.21 \pm	42.23 b 1.92 \pm
Control +R.	7.52 a 0.38 \pm	5.31 a 0.08 \pm	2.21 a 0.06 \pm	144.89 b 3.54 \pm	41.34 b \pm 0.71	56.28 b \pm 1.67	49.91 a \pm 2.04
Effect of lambs age (month)							
4	6.18 b \pm 0.26	3.95 b \pm 0.15	2.23 a 0.08 \pm	155.22 a 4.89 \pm	48.95 a 0.84 \pm	62.98 a 2.11 \pm	48.21 a \pm 2.02
6	7.40 a 0.31 \pm	5.10 a 0.08 \pm	2.38 a 0.07 \pm	154.17 a 4.62 \pm	46.65 a \pm 0.78	58.03 b \pm 1.84	46.06 a \pm 1.98
8	8.32 a 0.40 \pm	6.00 a 0.09 \pm	2.32 a 0.08 \pm	153.21 a 4.55 \pm	44.31 a \pm 0.77	57.34 b \pm 1.63	44.32 a \pm 1.66

S.E=standard error, B.C=black cumin seed, F= fenugreek seed, R=rocket seed. *Means with different letters vertical show significant difference at (P \leq 0.05).

The value of blood urea (table 4) was decreased significantly by supplementation of black cumin or fenugreek to 2nd and 3rd groups respectively, while supplementation of rocket seeds have not significantly affect the value of blood urea as compared to control group (1st group). While the significant decreased in the value of blood urea in 2th group may be due that adding the protein of black cumin seed cause increase the ammonia production that enter in ruminal microbial protein production which increase amino acid supply to small intestine which reflect on decrease NH₃-N in blood (Hassan and Hassan, 2009). The obtained results are in accordance with those reported by Al-Sherwany (2010) they found that feeding 7.5 gm of black cumin seed/kg. dry matter to Iraqi Hamd anylambs caused decreased in blood urea as compared to control ration. While the significant decrease in the value of blood urea in 3rd group may be due that adding fenugreek seed increased ammonia production in the rumen can increase urea recycling (Atta Elmnan *et*

al., 2013) which is necessitated to detoxify ammonia through formation of urea finally decrease NH₃-N in blood (Abo El-Nor *et al.*, 2007). Similar results were obtained by Soliman *et al.*, (2010) in Zarabi kids goat, they founds that supplement-entation of fenugreek seed decreased significantly plasma urea. But supplementation of rocket seeds have not significantly affect the value of blood urea as compared to control group, similar results were obtained by Zewel *et al.*, (2008), they noticed that value of plasma urea was not significantly affect the serum blood of rabbit that feeding 5% or 10.5% or 21% of rocket seeds ration as compared to control group.

Concerning the effect of experimental periods or lambs age on biochemical traits (table 4), data showed that total protein, globulin and glucose were significantly differences among different periods, the concentration of total protein and globulin were significantly increased, while the concentration of glucose was decreased significantly with advance of animal age. The increase of total protein and

globulin by advance of age may be due to the increase of digestibility coefficient of crude protein that may be the reason of increasing total protein and globulin (El-Saadany *et al.*, 2008), Similar results were reported by Al-Khauzai *et al.*, (2012) they found that the concentration of total protein and globulin was significantly increased in Iraqi local lambs with age progress. While the decrease of glucose level by advance of age may be due to a high metabolic rates in young animals results from the high rates of cellular activities, and rapid synthesis of cellular material and growth of body, which requires moderate quantities of energy (Omima, 1993), or may be related to rapid rate of hydrolysis and absorption of dietary carbohydrates in alimentary tract (Williams, 1989). Similar results were obtained by Zanouny *et al.*, (2013), as they reported that glucose level was significantly declined with advance of age of Egyptian Ossimi male lambs. While the concentration of cholesterol, triglyceride and urea were not significantly difference among experiment periods or advance of lamb age. The present results are in agreement with Kiran *et al.* (2012) found that the concentration of cholesterol and triglyceride were not significantly affected in Pakistanian lambs with age progress. The interaction between medical herb supplementation and lambs age had significantly affect the concentration of total protein, globulin and glucose only.

Minerals are the essential nutrients bearing a significant role in the animals, because their excess or deficiency produces detrimental effect on the performance of livestock (Khan *et al.*, 2005). Data in table (4) revealed the blood minerals concentration remained within the normal physiology ranges of recently published by Al-Judi *et al.*, (2011) and Al-Hadithy *et al.*, (2012) on Iraqi sheep. The data in table (4) indicate that no significant effect of using medical herbs seeds and experimental periods or lambs age on concentration of calcium, phosphorus, potassium, sodium, chloride and magnesium. The obtained results are in accordance with those reported by Shams al-dain *et al.*, (2005) they noticed no significant effect of feeding 14% black cumin seed meal on the concentration of calcium, phosphorus, potassium, sodium, chloride and magnesium, and the results by Al-Darajie and Razuki (2012) they noticed that feeding 1, 2 or 3 kg rocket seeds/ton of feed had no significant effect on concentration of calcium and phosphorus. Similar results were obtained by Al-Hadithy *et al.*, (2012) as they reported that concentration of calcium, potassium and chloride was not significantly affected with advance of age of Iraqi Awassi male sheep. The interaction between medical herb supplementation and lambs age had not significantly affect the concentration of studied minerals.

Table 5: Effect of adding medical herbs and lambs age in some blood minerals (Mean \pm S.E.).

Traits factors	Calcium (mmol.l ⁻¹)	Phosphors (mmol.l ⁻¹)	(%)Sodium (mmol.l ⁻¹)	Potassium (mmol.l ⁻¹)	Magnesium (mmol.l ⁻¹)	Chlore (mmol.l ⁻¹)
Effect of adding medical herbs						
Control only	9.77 a 0.77 \pm	4.23 a 0.39 \pm	142.55 a 4.22 \pm	8.11 a 0.31 \pm	4.91 a 0.15 \pm	119.75 a 2.65 \pm
Control +B.C.	9.82 a 0.77 \pm	4.34 a 0.41 \pm	142.34 a 4.19 \pm	8.18 a \pm 0.31	4.81 a 0.13 \pm	118.88 a 2.51 \pm
Control +F.	9.86 a 0.78 \pm	4.41 a 0.36 \pm	142.52 a 4.17 \pm	8.15 a 0.24 \pm	4.78 a 0.11 \pm	118.93 a 2.44 \pm
Control +R.	10.48 \pm 0.71	4.78 \pm 0.31	142.42 \pm 4.14	7.99 0.36 \pm	4.73 0.11 \pm	119.14 \pm 2.47
Effect of lambs age (month)						
4	9.87 a 0.74 \pm	4.31 a 0.41 \pm	142.38 \pm 4.16	8.04 a 0.27 \pm	4.76 a 0.12 \pm	118.87 \pm 2.41
6	9.97 a 0.75 \pm	4.42 a 0.37 \pm	142.55 \pm 4.19	8.11 a 0.31 \pm	4.81 a 0.14 \pm	119.28 \pm 2.48
8	10.09 a 0.72 \pm	4.59 a 0.31 \pm	142.42 \pm 4.15	8.18 a 0.33 \pm	4.85 a 0.12 \pm	119.67 \pm 2.53

S.E=standard error, B.C=black cumin seed, F=fenugreek seed, R=rocket seed. *Means with different letters vertical show significant difference at (P \leq 0.05).

It can be concluded that supplementation with 600 mg black cumin (*Nigella sativa*) or fenugreek (*Trigonella foenum*) or rocket (*Eruca sativa*) seeds/kg.B.W./day in Awassi lambs rations had improved the studied hematological and biochemical parameters without adverse effect on the animal health however further studies are needed in this aspect.

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