Effect of some medicinal plants supplementation on Muscles Weight, Chemical Composition, Carcass Fat Partitioning and Distribution of Awassi lambs

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ABSTRACT

Twenty five Awassi lambs weighing 24± 0.5 kg and 5 months of old were used to investigate the effect of different levels and source of medicinal plants (Nigella Sativa ,NS and Rosemery Officinalis,RO) on individual muscles weight , chemical composition, carcass fat partitioning and distribution . Lambs were divided into five similar groups and fed randomly one of the following diets. The first group received the basal diet, composed of concentrate without feed additives which served as the control group (D1).The other tested groups were fed randomly on one of the following diets: D1 diet supplemented with 5 or 7.5 gm NS / Kg DM (D2 and D3 respectively); D1 diet supplemented with 5 or 7.5 gm RO / Kg DM (D4 and D5 respectively).

The results indicated that muscles weight of lambs fed diets supplemented with feed additives (D2,D3,D4 and D5) were significantly ($P<0.05$) higher than those fed control diet (D1).However, lambs fed D4 and D5 showed significantly ($P<0.05$) higher muscles weight as compared with those fed D2 and D3 .The chemical analysis of rack and leg cuts showed that lambs carcasses of those fed RO contained higher ($P<0.01$) percentages of moisture and protein as compared with those fed NS(D2 ,D3) and control diets (D1).In addition similar a tendency was obvious towards an increase in moisture and protein percentages and a decrease in fat percentages ($P<0.01$) in chemical analysis of LD,SM and IS muscles of lambs fed D4 and D5 than lambs fed D2 and D3 . Lambs fed D2 and D3 showed significantly higher ($P<0.01$) in fat carcass,fat tial and subcutenaous fat than those lambs fed D4,D5 and D1 ,while lambs fed D4 and D5 showed significantly higher content ($P<0.01$) intramuscular fat ,

retroperitoneal and Kidney fat and Intra-abdominal fat (Omental fat ,Mesenteric fat and Cardiac fat) than those fed D1,D2 and D3 .As well as, lambs fed D2 and D3 recorded high total body fat (weight and percentage) than those fed D1,D4 and D5 .

It can be conculuded ,that using rosemary officinals as natural feed additives improved carcass quality and efficiency of meat production .

***Key word*: medicinal plants , muscles weight ,chemical analysis and Carcass Fat Partitioning And Distribution , Awassi lambs.**

INTRODUCTION

Dietary influences on meat quality has been extensively studied in a number of meat species.In general, the carcass has less fat and the meat leaner appositive attribute for diet/health conscious consumers (Kerry et al.,2002).Meat fat is considered to cause a variety of human diseases ,mainly because of the belief that it has a high proportion of saturated fatty acids (FFA) which raise blood cholesterol levels ,a risk factor for cardiovascular disease (Department of Health ,1994).A reduction in intramuscular fat content to 2-5% with a relatively greater reduction in waste fat depots such as subcutaneous and intermuscular would make a positive contribution to production effeiciency and consumer health without negatively impacting on meat quality (Kerry et al.,2002). In recent years , many attempts to use the natural supplement to improve the growth rate, feed effeiciency utilization and carcass characteristics by addition of dietary supplementation such as meadicinal plant (Aboul-Fotouh et al.,1999 ; El-Saadany et al.,2001; Saleh ,2004 ; Mohamed et al.,2005 and El-Ashry et al.,2006).However,the chemical products especially hormones and antibiotics ,may cause unfavorable side effects.Moreover,there is evidence indicating that these products could be considered as pollutants for human and threaten their health on the long – run (Abdel_Azeem ,2006) .The World Health Organization (WHO) encourages using medicinal herbs and plants to substitute or minimize the use of chemical through the global trend to go back to nature (Saleh ,2004). Rosemary contain many compounds with antioxidanta properties: Rosmarinic acid, Rosmanol, Carnosic

acid, Rosmaridiquinone, Carnosol and Rosmaridiphenol were identified as phenolic type compounds which probably function as free radical scavengers similar to synthetic phenolic antioxidants BHA and BHT (Senoranse et al., 2000; Djenane et al., 2002 and Abramovič and Abram, 2006). Mohamed et al.(2005) showed significant improvement in growth rate and carcass cuts when lamb were fed diets supplemented with constant weight of Nigella Sativa (NS) or Rosemary Officnalis (RO) .Hassan (2008) reported that diets supplemented with NS and RO were clearly improved live weight gain , feed conversion ratio and some carcass characteristics of Awassi lambs.

The objective of this work was to study the effect of different levels of NS or RO as feed additives supplemented to the concentrate diets on muscles weight individual ,chemical composition of meat and distribution of adipose tissue in Awassi lambs .

Materials and Methods

Diets : The effect of three levels of feed additives (0 ,5 and 7.5 g/ Kg Dry matter , DM) were supplied either by Nigella Sativa (NS) or Rosmeray Officinalis (RO) ,were investigated using 5 replicates per level .The control diet (D1)contained neither additive feed sources and the same 5 replicates served as control for both additive feeds sources.The other tested groups were fed randomely one of the following experimental diets . Diet 2 ,containt 5g/kg DM NS (D2), which is equvelent to 150 mg/kg.live body weight (LBW); Diet3 ,containt 7.5 g/kg DM ,NS,(D3),which is equlevent to 250 mg/kg LBW ;Diet 4,containt 5 g/kg DM,RO, (D4);Diet 5 ,containt 7.5 g/kg DM,RO (D5).All diets were formulated to have similar daily intake of total nitrogen (TN) and metabolizable energy (ME) (table 1and 2).

Animals :Twenty five male Awassi lambs,aged 5 months and averaged 24± 0.5 kg live body weight were used.Animals were purchased from a known local contractor and individually housed at the private farm in Baghdad. The diets were gradually introduced to the lambs over a period of 3 weeks before the start of experiment,during this time all animals were treated for tapeworms and other helminthes.Lambs were divided into five similar groups

(Five lambs each) and assigned to the five experimental diets feeding treatment (Table2). Barley straw was available ad libitum as a basal diet. Animals were gradually introduced the level (3 % of live body weight) of concentrate diet. Animals were offered the daily ration once daily at 09.00 h, and had free access to fresh water. Live body weight (LBW) was recorded twice monthly to the nearest 0.25 kg. Feed intake was determined only for concentrate as the difference between feed offered and refused. At the end of feeding trial (90 days) lambs were slaughtered after over night with drawa of feed. Slaughter was performed according to local muslim practice by severing the jugular vessels,the oesophagus and the trachea without stunnig. Hot carcasses were weighed and chilled for 24 h at 4 °c weighed again and cut into left and right sides , after removing the fat tail from the carcasses.The right side was used to groups of muscles dissection according to the procedures Butterfield et al.(1983) from pelvic limb (SM= Semimembranosus, ST= Semitendinosus,BF= Biceps Femoris , RF= Rectus Femoris and VL= Vustus Lateralis), abdominal wall (LD= Longissimus Dorsi) and thoracic limb (IS= Inferaspinatus , SP= Superaspinatus , TB= Triceps Brachii) the surfaces of muscles are cleaned of all fat and connective tissues and then weight it. The left side was cut into standardized wholesale cuts (Forrest et al.,1975).The cuts were weighed separately;while Ruck and Leg cuts were dissected into lean,bone and fat tissue , the chemical analysis for the cuts and the muscles were determind according to according to AOAC (1980) . Fat partitioning and distribution were dissection from the left side according to Al-Rubeii (2001) it was included Carcass fat (Subcutaneous fat, Intermuscular fat, retroperitoneal and Kidney fat and fat tail) and Intra-abdominal fat (Omental fat, Mesenteric fat and Cardiac fat). the total fat of the half animal body of awassi lambs expressed as weight on percentage. Data was statistically analyzed using Completely Randomized Desigen Model (CRD) procedure by (SAS, 2001). Duncan's multiple range test was used to determine the significance of differences between treatments means .

Results and Discussion

Muscles weights data are shown in Table3. Average muscles weight of lambs fed D2,D3,D4 and D5 were significantly higher

(P<0.05) than those fed control diet (D1) .However,lambs fed diets supplemented with RO (D4 and D5) showed significantly higher (P<0.05) muscle weight than those fed diets D1,D2 and D3 .Previous studies had indicated numerous performance advantages and carcass characteristics for lambs fed diets supplemented with RO and NS (Mohamed et al.,2005 ; Hassan ,2008) .This improvement in muscles weight may be due to increases in live weight gain , feed coversion ratio and some carcass characteristics (Hassan ,2008, and Mohamed et al.,2005) .

The lamb fed diets supplemented with NS or RO significantly effected (P<0.01) the chemical composition of rack and leg cuts , (Table4.),except for ash content which was similar across all diets.The D5 carcasses showed highest levels of moisture (57.01%) and protein (17.89 %) in rack, and 57.55 ,19.39 % in leg, however it had the lowest fat content in rack and leg (23.10 ,21.30 % ,respectively) .On the other hand , the lowest moisture and protein content were observed in rack (55.80 ,16.69 %respectively) and leg (56.35 ,18.15% respectively) of lambs fed D3 , while it had the highest fat content (25.46 , 23.13 %) in rack and leg ,respectively .Both sources of feed additives under investigation had different pattern effect on the chemical analysis (moisture ,protein and fat) .Atendency towards an increase in fat content and a decrease in moisture ,protein content (P<0.01) was observed in lambs fed diets supplemented with NS.While, reduction in fat and increasing in moisture and protein content (P<0.01) was observed in lambs fed diets supplemented with RO .These results are in agreement with those reported by Mohamed et al.(2005) and Hassan (2008) who showed that the lambs fed diets supplemented with RO had recorded the lowest fat in rack and leg cuts while the lambs fed diet supplemented with NS had recorded the highest fat percentage in similar cuts.Hence ,prbably the NS herbs fed to the sheep possibly resulted in a metabolism that favored fat formation and moisture decrease in comparison to D1,D4and D5 (Mohamed et al.,2005).

Differences in chemical composition of LD,SM and IS muscles among experimental diets were observed in Table 5. Moisture and protein content of LD,SM and IS muscles for D4 and D5 were significantly higher than D1,D2 and D3. The fat content in LD, SM

and IS muscles of D3 and D2 were found to be higher in D4 ,D5 and DI. Feeding diets with herbs supplements to the sheep may be resulted in some metabolic reaction which affected mutton chemical composition of different treatments .Similar results were obtained by Mohamed et al. (2005) when lambs fed diets supplemented with NS and RO. The present results in this study agree with Allam et al.(2005) who found that addition 35 g/head/day for each ground funnel,rosemary and thyme to concentrate diet showed ,no significant differences among treatments in moisture percentage in chemical composition of LD.However, the highest value achieved by rosemary and the lowest one by thyme in protein percentages 69.36, 65.28%(on dry matter) ,respectively. While, the ether extract percentage was higher in thyme (31.10%) and the lowest with rosemary (27.34%).

Table 6. represent the weights and percentages of fat distribution in carcass . It appears that D3 was superior (P<0.01) in subcutaneous fat and tail fat compared to other diets (D1, D2, D4and D5) while, D5 was higher in intramuscular fat and retroperitoneal and Kidney fat than other diets .However, D5 had the lowest value in carcass fat weight and percentage than other diets. These results are in agreement with those reported by Allam et al.(2005) who found that tail fat weight had the values 0.936,0.981,1.56 and 1.53 kg for control ,fennel, rosemary and thyme additives ,respectively.

The results of distribution of Intra-abdominal fat as affected by RO and NS additives are shown in Table 7. Data showed that RO tended to increase Intra-abdominal fat which was included Omental fat, Mesenteric fat and Cardiac fat, while NS additives tended to decrease significantly (P<0.01) Intra-abdominal fat. Allam et al. (2005) also reported that rosemary additive to ration tended to increase significantly (P<0.01) internal fat to 700 gm than 587,430 and 636 gm for control, fennel and thyme additives, respectively. Through out the results both sources of feed additives diets had different pattern effect on partitioning and distribution of fat deposition .A tendency towards an increase in carcass fat and decrease in internal fat (P<0.01) was observed in lambs feed diets supplemented with NS .While, reduction in carcass fat and increasing in internal fat (P<0.01) was observed in lambs fed diets supplemented

with RO .These may due to the effect of dietary herbal feed additives on metabolic changes in distribution and partitioning fat in carcass.

Values of total body fat weight and percentage are presented in Table 8.Data indicated that differences among diets were significant ($P<0.01$) in total body fat . Lambs fed diets supplemented with NS had recorded the highest value of total body fat weight and percentage (3703.49 gm, 18.11% and 3447.0 gm ,17.52%) for D3 and D2 ,respectively .At the contrary ,the lambs fed diets supplemented with RO had recorded the lowest value of total body fat weight and percentage (3176.19 gm,14.62% and 3203.40 gm ,15.20%) for D5 and D4 ,respectively .These results are in agreement with those reported by Allam et al.(2005) who found that the fat percentage relative to slaughter weight in lambs feed rosemary had recordede the lowest value of fat (5.506 %) while ,the lambs fed thyme supplement had the highest value (5.64 %) .This may be due to reflect better in metabolic changes in the adipocytes because there are many studies that have shown that nutrition and growth path can influence the fatness of animal (Candek-Potokar et al.,1997) , as well as , may be the medicinal plants have digestibility stimulating effect attributed to the effect of the essiential oils of the medicinal plant (El-Bordeny et al.,2005) .An- alternative explanation discussed by Allam et al.(1999) when used chamomile supplementation for Zaraibi bucks diets and Aboul-Fotouh et al.(1999) when used Cymbopogon citrates and Eucalyptus globules Labill leaves as feed additives to sheep that the medicinal plants improved rumen activity and nutrient digestibility. .

It is concluded that addition of rosemary and nigella sativa as a feed additives were clearly improved carcass quality and meat production efficiency of Awassi lambs this improvement was parallel to the enhancements in live weight gain, feed conversion ratio some carcass characteristics and this may give approve to the critical role of these additives in improving growth performance.

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Table 1: Chemical composition of the ingredients (g/kg DM).

	Ingredients				
Chemical composition	**Barley**	**Wheat bran**	**Yellow corn**	**Nigella sativa**	**Rosemary officinals**
Dry matter g/kg fresh	**950.5**	**896.9**	**973.2**	**919.3**	**922.0**
Organic matter (OM)	**914.3**	**942.1**	**926.6**	**913.2**	**905.0**
Total nitrogen (TN)	**18.5**	**23.4**	**13.0**	**41.6**	**39.0**
Crude fiber (CF)	**65.3**	**101.8**	**36.0**	**67.0**	**213.2**
Ether extract (EE)	**22.1**	**32.8**	**42.9**	**115.2**	**82.0**
Nitrogn free extract (NFE)	**767.6**	**666.5**	**812.2**	**432.8**	**424.0**

Table 2 : Ingredients and chemical composition of experimental diets .

	Source of Feed Additives				
	Control	NS		RO	
Level of Feeds Additives (g/kgDM)	0	5	7.5	5	7.5
Diet No	1	2	3	4	5
Ingredients (g/kg DM					
Barley	420	420	420	420	420
Wheat bran	450	450	450	450	450
Yellow corn	100	94	92.5	95	92.5
Nigell Sativa	—	5	7.5	—	—
Rosemary Officinals	—	—	—	5	7.5
Salt	10	10	10	10	10
Calcium carbonate	20	20	20	20	20
Chemical Composition g/kg DM					
DM (g/kg fresh)	926	926	919	926	919
OM	901	903	901	903	901
TN	10.12	10.29	10.37	10.21	10.24
CF	76.8	76.8	77.0	77.5	77.1
EE	23.37	23.75	23.98	23.58	23.73
NFE	703.3	701.4	700.6	701.6	700.5
ME*(MJ)	11.71	11.71	11.71	11.70	11.70

* ME (MJ/kg DM) = 0.012 CP + 0.031EE + 0.005CF + 0.014 NFE

Table3: The effect of supplementation of Nigella Sativa or Rosemary to the concentrate diets on individual muscles weight of Awassi lambs carcasses .

Treatment	Muscles (g)								
	LD	SM	ST	BF	RF	IS	SP	TB	VL
D1	380.40 ± 5.91 e	150.25± 1.19 e	120.15± 3.33 d	180.75± 2.60 e	167.55± 4.34 d	134.72± 2.25 d	125.90± 2.25 e	165.83± 3.65 d	200.80± 10.04 d
D2	400.70± 7.57 d	170.85± 2.53 d	136.17± 3.19 c	210.81± 2.10 d	190.40± 8.01 c	157.67± 4.27 c	148.33± 4.13 d	179.37± 6.04 c	240.60± 5.14 c
D3	450.20 ± 4.75 c	207.35 ± 3.50 c	170.44± 6.08 b	243.70± 11.07 c	218.10± 9.04 b	180.58± 3.47 b	176.20± 3.25 c	207.22± 6.47 b	275.22± 6.52 b
D4	490.15 ± 7.73 b	240.67± 6.20 b	198.65± 5.93 a	280.50± 5.35 b	256.30± 6.03 a	219.68± 4.89 a	203.75± 3.34 b	249.26± 4.54 a	305.10± 3.94 a
D5	539.52 ± 4.75 a	265.20± 5.02 a	210.48± 4.78 a	305.30± 5.20 a	272.11± 6.84 a	232.50± 7.43 a	225.36± 6.87 a	263.42± 4.67 a	320.45± 5.15 a

Means± SE within the same column having unlike letters (a-e)are significantly different among treatments.(P<0.05). Control (T1), Nigella sativa 5 gm NS / Kg DM (T2), Nigella sativa 7.5 gm NS / Kg DM (T3), Rosemery Officinalis 5 gm NS / Kg DM (T4) and Rosemery Officinalis 7.5 gm NS / Kg DM (T5) .LD= Longissimus Dorsi ,SM= Semimembranosus, ST= Semitendinosus,BF= Biceps Femoris , RF= Rectus Femoris , IS= Inferaspinatus , SP= Superaspinatus , TB= Triceps Brachii, VL= Vustus Lateralis .

Table 4. The effect of supplementation of Nigella Sativa or Rosemary to the concentrate diets on chemical composition of rack and leg of Awassi lambs carcasses .

	Chemical composition %							
	Rack				Leg			
	Moisture	Protein	Fat	Ash	Moisture	Protein	Fat	Ash
Treatments								
D1	56.21±	16.90 ±	24.61±	1.52±	56.88 ±	18.30±	22.45±	1.60±
	0.09 b	0.18 c	0.07 c	0.02 a	0.12 b	0.03 c	0.10 b	0.00 a
D2	55.97±	16.80±	25.09±	1.55±	56.65±	18.25±	22.95±	1.55±
	0.0 8	0.07 c	0.09 b	0.05 a	0.07 bc	0.07 c	0.12 a	0.05 a
D3	55.80±	16.69±	25.46±	1.50±	56.35±	18.15±	23.13±	1.60±
	0.13 b	0.02 c	0.07 a	0.00 a	0.06 c	0.04 c	0.14 a	0.00 a
D4	56.74±	17.46±	23.62±	1.51±	57.32±	18.95±	21.71±	1.55±
	0.14 a	0.10 b	0.04 d	0.01 a	0.08 a	0.12 b	0.04 c	0.05 a
D5	57.01±	17.89±	23.10±	1.50±	57.55±	19.39±	21.30±	1.52±
	0.11 a	0.11 a	0.13 e	0.00a	0.08 a	0.10 a	0.10 d	0.02 a

Means± SE within the same column having unlike letters (a-e)are significantly different among treatments.($P<0.01$). Control (D1 Nigella sativa 5 gm NS / Kg DM (T2), Nigella sativa 7.5 gm NS / Kg DM (T3), Rosemery Officinalis 5 gm NS / Kg DM (T4) and Rosemery Officinalis 7.5 gm NS / Kg DM (T5)

Table 5. The effect of supplementation of NS.or RO. to the concentrate diets on chemical composition of Longissimus Dorsi (LD),Semimembranosus (SM)and Infraspientus (IS) of Awassi lambs carcasses

	Treatment				
	D1	D2	D3	D4	D5
Muscles					
LD					
Moisture	71.37± 0.07 a	70.81± 0.09 b	70.42± 0.06 c	71.55± 0.05 a	71.63± 0.09 a
Protein	21.63± 0.12 c	21.88± 0.06 c	22.29± 0.06b	22.81± 0.13 a	23.12± 0.06 a
Fat	4.51± 0.04 b	4.96± 0.06 a	5.16± 0.06 a	3.44± 0.08 c	3.10± 0.03 d
Ash	1.65± 0.05 a	1.60± 0.10a	1.60± 0.00a	1.60± 0.05 a	1.65± 0.05 a
SM					
Moisture	73.70± 0.04c	73.53± 0.08 c	73.24± 0.06d	73.94± 0.09b	74.20± 0.03 a
Protein	20.33± 0.07 b	20.48± 0.07 b	20.55± 0.08b	21.55± 0.05 a	21.67± 0.10 a
Fat	3.32± 0.07b	3.49± 0.03b	3.74± 0.06a	2.21± 0.05c	1.97± 0.03 d
Ash	1.70± 0.10a	1.70± 0.05a	1.65± 0.05a	1.60± 0.00a	1.60± 0.00 a
IS					
Moisture	72.60± 0.10 b	72.28± 0.07 c	71.94± 0.06 d	72.90± 0.12 a	73.07± 0.07 a
Protein	21.20± 0.09 d	21.43± 0.09 cd	21.62± 0.08 c	22.18± 0.06 b	22.46± 0.07 a
Fat	3.66± 0.04 b	3.84± 0.07 b	4.07± 0.03 a	2.66± 0.06 c	2.32± 0.08 d
Ash	1.70± 0.10 a	1.70± 0.10 a	1.70± 0.05 a	1.60± 0.00 a	1.65± 0.05 a

Means± SE within the same row having unlike letters (a-d) are significantly different among treatments.(P<0.01). Control (T1), Nigella sativa 5 gm NS / Kg DM (T2), Nigella sativa 7.5 gm NS / Kg DM (T3), Rosemery Officinalis 5 gm NS / Kg DM (T4) and Rosemery Officinalis 7.5 gm NS / Kg DM (T5) .

Table 6. Carcass fat partitioning and distribution weight and percentages[(1)] as affected by supplementation of NS or RO to the concentrate diets of Awassi lambs.

	Treatments No.				
	D1	D2	D3	D4	D5
Adipose tissue					
[a]Sub.fat (gm)	1178.04 ± 13.94 c	1289.04 ± 12.26 b	1520.30 ± 20.86 a	571.81 ± 4.86 d	550.10 ± 5.03 d
%	36.40 ± 0.02 c	37.39± 0.02 b	41.05 ± 0.05 a	17.85 ± 0.04 d	17.32 ± 0.05 d
[b]Interm.fat(gm)	655.32 ± 7.51 b	590.12 ± 5.05 c	566.40± 4.62 d	918.25 ± 4.71 a	933.72± 5.66 a
%	20.25 ± 0.07 c	17.12 ± 0.07 d	15.29± 0.04 e	28.66 ± 0.04 b	29.39 ± 0.05 a
[c]Retro.Kid.fat(gm)	135.10 ± 3.14 b	120.40 ± 0.23 c	110.13 ± 2.65 d	156.18 ± 3.32 a	149.70 ± 0.96 a
%	4.17 ± 0.02 c	3.50± 0.05 d	2.97 ± 0.02 e	4.87± 0.01 a	4.71± 0.04 b
[d] Tail Fat (gm)	1005.0 ± 7.27 d	1200.0 ± 13.22 ab	1250.0 ± 28.86 a	1150.0 ± 28.80 bc	1125.0± 14.43 c
%	31.06± 0.08 e	34.81± 0.07 c	33.75± 0.14 d	35.89± 0.02 a	35.42 ± 0.04 c
[e]Carc.fat(gm)	2973.46± 18.72 c	3199.56± 27.97 b	3446.83 ± 39.54 a	2796.24± 34.44 d	2758.52 ± 23.27 d
%	91.90 ± 0.10b	92.82± 0.20a	87.29± 0.08 a	93.07 ± 0.33c	86.85± 0.17 c

Means± SE within the same row having unlike letters (a-e) are significantly different among treatments. (P<0.01). Control (T1), Nigella sativa 5 gm NS / Kg DM (T2), Nigella sativa 7.5 gm NS / Kg DM (T3), Rosemery Officinalis 5 gm NS / Kg DM (T4) and Rosemery Officinalis 7.5 gm NS / Kg DM (T5) . a= Subcutaneous fat, b= Intermuscular fat, c = retroperitoneal and Kidney fat , d= Tail Fat , e= Carcass fat(a+b+c+d) . [(1)] fat weight (gm) / weight total of fat in the half animal body *100 .

Table7. Intra-abdominal fat partitioning and distribution weight and percentages[(1)] as affected by supplementation of Nigella Sativa or Rosemary to the concentrate diets of Awassi lambs.

	Treatments No				
	D1	D2	D3	D4	D5
Adipose tissue					
[a]Oment.fat (gm)	196.97±	186.51±	187.11±	309.43±	312.04 ±
	3.71b	1.93b	1.88b	5.67a	3.29 a
%	6.08±	5.41±	5.05±	9.66±	9.82 ±
	0.01 c	0.04 d	0.02 e	0.02 b	0.04 a
[b]Mesent.fat(gm)	55.11 ±	51.00 ±	59.30 ±	86.72±	92.63±
	0.05 d	1.41 e	0.40 c	0.14 b	0.20 a
%	1.70±	1.48±	1.60±	2.71±	2.92±
	0.02 c	0.01 e	0.01 d	0.02 b	0.04 a
cCardiacfat (gm)	10.00±	10.00±	10.25±	11.00±	13.00±
	0.00 c	0.00 c	0.38 c	0.28 b	0.20 a
%	0.31±	0.30±	0.27 ±	0.34 ±	0.41±
	0.00bc	0.00c	0.01c	0.01b	0.02 a
[d]Intra-abdom.fat(gm)	262.08±	247.51±	256.66±	407.15±	4.17.67±
	1.78 c	3.20 d	2.62 cd	4.31 b	2.83 a
%	8.10±	7.18±	6.93±	12.71±	13.15±
	0.08 c	0.03 e	0.03 e	0.09 b	0.06 a

Means± SE within the same row having unlike letters (a-c) are significantly different among treatments. (P<0.01). Control (T1), Nigella sativa 5 gm NS / Kg DM (T2), Nigella sativa 7.5 gm NS / Kg DM (T3), Rosemery Officinalis 5 gm NS / Kg DM (T4) and Rosemery Officinalis 7.5 gm NS / Kg DM (T5) . a= Omental fat, b= Mesenteric fat , c= Cardiac fat, d = Intra-abdominal fat (a+b+c) . [(1)] fat weight (gm) / weight total of fat in the half animal body *100 .

Table 8. The effect of supplementation of Nigella Sativa or Rosemary to the concentrate diets on the total body fat of the half animal body of Awassi lambs expressed as weight on percentage.

	Total adipose tissue (gm)	[1](%)
Treatm ent No.		
D1	3235.54 ± 42.32 c	16.94± 0.03 c
D2	3447.06 ± 13.47 b	17.52 ± 0.06 b
D3	3703.49 ± 13.30 a	18.11± 0.04 a
D4	3203.40 ± 16.59 c	15.20 ± 0.03 d
D5	3176.19 ± 14.76 c	14.62 ± 0.03 e

Means± SE within the same column having unlike letters (a-e) are significantly different among treatments.(P<0.01). Control (T1), Nigella sativa 5 gm NS / Kg DM (T2), Nigella sativa 7.5 gm NS / Kg DM (T3), Rosemery Officinalis 5 gm NS / Kg DM (T4) and Rosemery Officinalis 7.5 gm NS / Kg DM (T5) .

[1] fat %= Total body fat weight / Half empty body weight *100 .

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الملخص العربي

تأثير اضافة بعض النباتات الطبية في وزن العضلات ، التركيب الكيميائي وتقسيم وتوزيع دهن الذبيحة في الحملان العواسية

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الملخص

تم استخدام خمسة وعشرون حملا"عواسيا" بعمر٥ اشهر وبمتوسط وزن ٢٤ كغم لدراسة تأثير استخدام مستويات ومصادر مختلفة من النباتات الطبية (الحبة السوداء والكليل الجبل)في وزن العضلة الفردي والتركيب الكيميائي وتقسيم وتوزيع الدهن في الذبيحة . قسمت الحملان الى خمسة مجاميع متشابهه وغذيت على العلائق التالية : العليقة الاولى D1 (عليقة السيطرة) لا تحتوي على اي نبات طبي .العليقة الاولى مع ٥ او ٧,٥ غم حبة سوداء /كغم مادة جافة (العليقة الثانية D2 والثالثة D3 على التوالي). والعليقة الاولى مع ٥ او ٧,٥ غم كليل الجبل / كغم مادة جافة (العليقة الرابعة D4 والخامسة D5 على التوالي). اشارت النتائج إلى أن الحملان المغذاة على العلائق المحتوية على الإضافات من النباتات الطبية (D5,D4,D3,D2) اظهرت ارتفاعاً معنويا" ($P<0.05$) في وزن العضلات المفردة بالمقارنة مع التي غذيت على عليقة السيطرة (D1)، في حين ظهر ارتفاع معنوي ($P<0.05$) في وزن العضلات بالمقارنة مع التي غذيت على العلائق D2 ,D3. واشار التحليل الكيميائي لقطعتي الاضلاع والفخذ بأن ذبائح الحملان المغذاة على الحصالبان( ) D5,D4 احتوت اعلى($P<0.01$) نسبة رطوبة وبروتين مقارنة مع المغذاة على الحبة السوداء(D3,D2) وعليقة السيطرة(D1) .بالاضافة الى ذلك ظهر اتجاه مشابه نحو زيادة نسبة الرطوبة والبروتين وانخفاض نسبة الدهن ($P<0.01$) في التحليل الكيميائي للعضلات LD,SM,IS في الحملان المغذاة على D5,D4 بالمقارنة مع الحملان التي غذيت على D3,D2 . واظهرت الحملان المغذاة على D3,D2 ارتفاعا عالي المعنوية ($P<0.01$) في دهن الذبيحة ودهن الآلية ودهن تحت الجلد بالمقارنة مع الحملان التي غذيت على D5,D4,D1 . بينما الحملان التي غذيت على D5,D4 اظهرت ارتفاع معنوي ($P<0.01$) في الدهن بين العضلات ودهن الحوض والكليتين والدهن الداخلي او البطني الذي شمل دهن المعدة والامعاء والقلب ، بالمقارنة مع المغذاة على D1, D3,D2 .كذلك سجلت الحملان المغذاة على D3,D2 على اعلى وزن ونسبة للدهن الكلي في الجسم بالمقارنة مع المغذاة على D5,D4,D1 . يستنتج من الدراسة بأن استخدام نبات الحصالبان كمضافات غذائية طبيعية يحسن من نوعية الذبيحة وكفاءة انتاج اللحم .

مفتاح الكلمات : نباتات طبية ،وزن العضلات ،تحليل كيميائي ،تزيع دهن الذبيحة ،حملان عواسية