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EFFECT OF SOME MEDICINAL PLANTS SUPPLEMENTATION ON DAILY INTAKE, LIVE WEIGHT GAIN AND CARCASS CHARACTERISTICS OF AWASSI LAMBS.

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SUMMARY

Twenty five Awassi lambs weighting 24± 0.5 kg and 5 months old were used to investigate the effect of different levels and source of medicinal plants (*Nigella Sativa*, NS and *Rosemery officinalis*, RO) on dry matter intake (DMI), live weight gain (LWG), feed conversion ratio (FCR) and carcass characteristics. Lambs were divided into five equal groups and fed randomly one of the following diets: The first group received the basal diet, composed of concentrates (yellow corn : barley : wheat bran; 1:1:1) 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 DMI, LWG, FCR, hot and cold carcass weights, killing out proportion and tissues in rack and leg cuts of lambs fed diets supplemented with feed additives (diets D2, D3, D4 and D5) were significantly ($P<0.05$) higher than those fed the control diet (D1). However, lambs fed D4 and D5 shown significantly ($P<0.05$) higher improvement compared with those fed D2 and D3.

Tissues in rack and leg cuts showed that lambs carcasses of those fed NS and RO contained higher ($P<0.01$) percentage of lean tissue compared with those fed the control diet (D1). In addition, a tendency towards an increase in bone and a decrease in fat percentages ($P>0.05$) were observed on lambs fed D4 and D5. Fat tail weight and fat thickness of lambs fed D2 and D3 were higher ($P< 0.05$) than those fed control, D4 and D5 diets. While rib eye area , length of carcass and leg cut weight of lambs fed D4 and D5 were significantly ($P < 0.05$) higher than those fed D1 , D2 and D3 diets.

Keywords: medicinal plants, live weight gain, carcass characteristics, Awassi lambs

INTRODUCTION

Protein supplementation and natural feed additives are very important material that can improve, growth rate, feed efficiency utilization and carcass characteristics of Awassi lambs (Hassan *et al.*, 1991; Al-Jassim *et al.*, 1991; Al-Ani, *et al.*,1991; Hassan, 2005;

Hassan and Mohmed, 2007). This can be achieved by increasing efficiency utilization of both amino acids and energy supplied. While using synthetic feed additives (chemical product) especially antibiotics may has harmful effects particularly with feeding long term. Moreover, the accumulation effect of these products could be considered as pollutants for human and threaten their health (Salem and El-Mahdy, 2001). On the contrast, there are attempts to use microbial treatment and microbial feed additives to manipulate rumen microbial activity (Mahrous and Abou Ammou, 2005; Hassan *et al.*, 2007). Also, they achieved an improvement in average daily gain and feed conversion for growing goats when yeast culture was supplemented to their diets. Moreover, Williams et al. (1990) reported that the microbial protein flow from the rumen was increased with the addition of yeast culture to the wether sheep'diet. On the other hand, attempts to use the natural materials as alternative growth promoters such as medicinal plants are widely accepted. Also some studies reported that such additives had a favourable effect on nutrient digestibility, live weight gain (LWG) and feed conversion ratio (FCR) with cows. Also study carried out by Mohamed et al. (2005) showed a significant improvement in DM digestibility, LWG and FCR when lambs fed diets supplemented with a constant weight of *Nigella sativa* (NS) or *Rosemary officinalis* (RO).

The objective of this experiment was to study the effect of different levels of NS and RO as feed additives supplemented to the concentrate diets on daily feed intake, LWG, FCR and carcass characteristics of Awassi lambs.

MATERIALS AND METHODS

Diets: The effect of three levels of feed additives (0, 5 and 7.5 g/kg dry matter, DM) supplied either by *Nigella sativa* (NS) or *Rosemary officinalis* (RO), were investigated using 5 replicates per level. The control diet, composed of concentrates (yellow corn : barley : wheat bran; 1:1:1), (D1) contained neither additive feed sources and the same 5 replicates served as a control for both additive feeds sources. The other tested groups were fed randomly on one of the following experimental diets. Diet 2, contained 5g/kg DM NS (D2), which is equivalent to 150 mg/kg. live body weight (LBW); Diet3, contained 7.5 g/kg DM, NS, (D3), which is equivalent to 250 mg/kg LBW; Diet 4, contained 5 g/kg DM, RO, (D4); Diet 5, contained 7.5 g/kg DM, RO (D5). All diets were formulated to have similar daily intake of total nitrogen (TN) and metabolizable energy (ME). This was achieved by substituting NS and RO for yellow corn (Tables 1 and 2).

Table (1): Chemical composition % of feed ingredients (DM basis).

Item	Ingredients				
	Barley	Wheat bran	Yellow corn	*Nigella sativa*	*Rosemary officinals*
	Chemical composition				
Dry matter	95.05	89.69	97.32	91.93	92.20
Organic matter	91.43	94.21	92.66	91.32	90.50
Total protein	11.56	14.62	8.12	26.00	24.73
Crude fiber	6.53	10.18	3.60	6.70	21.32
Ether extract	2.21	3.28	4.29	11.52	8.20
Ash	8.57	5.79	7.34	8.68	9.50
Nitrogen free extract	71.13	66.13	76.65	57.10	36.25

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 treated for tapeworms and other helminthes. Lambs were divided into five similar groups (Five lambs each) and assigned to the five experimental diets (Table2). Animals were gradually introduced the level (3 % of live body weight) of concentrate diet. Animals were fed once daily at 09.00 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), these lambs were slaughtered after over night with feeding darawa. Slaughter was performed according to local Muslim practice by severing the jugular vessels, the oesophagus and the trachea without stunning. Carcasses were weighed and chilled for 24 h at 4 °C weighted again and cut into left and right sides, after removing the fat tail from the carcasses. 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. since, Hassan et al.; (1990) reported that leg and ruck was the best cuts representative for lean, bone and fat carcass tissue.

Table (2): Ingredients and chemical composition of experimental diets.

Item	Source of feed additives				
	Control	NS		RO	
Level of feed additives	0.0	5.0	7.5	5.0	7.5
Diet No.	1	2	3	4	5
Ingredients (g/kg MD)					
Barley	420	420	420	420	420
Wheat bran	450	450	450	450	450
Yellow corn	100	95	92.5	95	92.5
Nigella sativa	0.0	5.0	7.5	0.0	0.0
Rosemary officinals	0.0	0.0	0.0	5.0	7.5
Salt	10	10	10	10	10
Calcium carbonate	20	20	20	20	20
Chemical composition %					
DM	92.6	92.6	91.9	92.6	90.9
OM	90.1	90.3	90.1	90.3	90.1
CP	10.12	10.29	10.37	10.21	10.24
CF	7.68	7.68	7.70	7.75	7.71
EE	2.34	2.38	2.40	2.36	2.37
Ash	9.9	9.7	9.1	9.7	9.9
NFE	69.96	69.95	69.63	69.98	69.78
ME*	11.71	11.71	11.71	11.70	11.70

*ME (MJ/ kg DM) = 0.012 CP +0.031 EE+0.005 CF +0.014 NFE (MAFF,1975).

Chemical analysis:

Chemical composition of the ingredients and diets were determined according to the methods described in A.O.A.C (1995).

Statistical analysis: Analysis of variance was carried out on all data .The treatment was partitioned into main effects and their interaction .Values expressed as percentages were transformed using arcsine tables before analysis by using SAS.

RESULTS AND DISCUSSION

Diets:

In general. the lambs consumed all the concentrate diet offered. The daily intake of DM, TN, ME, initial and final live weights, live weight gain (LWG) and feed conversion ratio (FCR) are presented in Table (3). The DM intakes of concentrate diets containing NS or RO were significantly (P<0.05) higher than that of control diet (D1), but these differences were not statistically significant (P< 0.05), when intake was expressed as g/kg $M^{0.75}$. The differences in NS and RO intakes mg/kg LBW were followed the intended treatment differences. Despite of similar amounts of daily intakes of TN and ME across treatments, different responses were shown to be due to medicinal plant as feed additives compared with control diets. Some possible reasons for those responses may explain the beneficial effects of additive feeds in the diet.

Table (3): Performance of Awassi lambs as affected by supplementation of *Nigella sativa* or Rosemary to the concentrate diets.

Item	Source of feed additives					Significancy		
	Control	NS		RO				
	0.0	5.0	7.5	5.0	7.5	Level (L)	Source (S)	L*S
Initial live weight (kg)	24.1	24.5	23.8	24.0	23.6	ns	ns	Ns
Final live weight (kg)	41.3	43.2	45.1	46.7	49.9	**	*	Ns
Empty body weight (kg)	38.2	39.4	40.9	42.2	43.5	*	*	Ns
Daily gain (g)	191.4	208.3	236.6	252.2	270.6	**	*	Ns
DM intake (g/day)	981	1001	1003	1006	1007	*	Ns	Ns
ME (MJ)	11.48	11.72	11.74	11.77	11.78	Ns	Ns	Ns
Feed conversion (kg DM intake/kg gain)	5.13	4.86	4.36	4.20	4.00	**	*	ns

* P<0.05 , ** P<0.01 , NS ,not significant

Means within rows with different superscripts are significantly different (P<0.05, P<0.01).

Live weight gain:

All lambs responded to feed additives (Table 3). Average daily weight gain for lambs improved significantly (P<0.0 1) by adding feed additives to the diets. However, daily weight gains of lambs fed diet D4 and D5 containing RO were significantly (P<0.01) higher than those fed diet containing NS (D2 and D3). Moreover, supplementation of the diets with increasing levels of NS or RO (0, 5 and 7.5 g/kg DM) showed positively increased daily LWG. However, the improvement was greater with increasing levels of RO than with NS.

The diets supplemented with additive feeds showed best feed conversion ratio (D2, D3, D4 and D5) versus to control diet (D1). However, lambs fed diets supplemented with RO (D4 and D5) showed better improvement (P<0.05) in feed conversion ratio compared with those fed diets supplemented with NS. These results indicated that diets supplemented with medicinal plants (NS and RO), as a feed additives, clearly improved LWG, FCR and

some carcass characteristics. These results are in agreement with results reported by Mohamed *et al.*, (2005); Youssef *et al.*, (1998) and El-Saadany *et al.*, (2001), who obtained that the medicinal plants additives improved the body weight gain, and FCR. The results, also, indicated that greater improvement in LWG and FCR were associated with lambs fed diet supplemented with RO compared with NS. Moreover, growth responses to increasing level of NS and RO supplementation above 150 mg/kg LBW were clearly showed in this study. One explanation for the response to additive feeds cited by Mohamed et al. (2005) may be used as alternative growth promoters, such medicinal plants include NS, has some properties as antiseptic, antibacterial activities against microorganism treatment, of gastro-intestinal complaints and tonic. Hanafy and Hatem (1997) reported that NS seeds extract inhibited gram-positive and gram-negative bacteria. Ferdous et al.(1992) indicated that the oil of NS seeds has therapeutic potential for the treatment of diarrhea caused by 37 isolates of shigella species and 10 strain of *V. cholerae* and *E. coli.* An alternative explanation, discussed by El-Saadany *et al.*, (1996); Allam *et al.*, (1999) and Aboul-Fotouh *et al.*, (1999) showing that the medicinal plants improved rumen activity and nutrient digestibility. Similar results were reported by Mohamed et al.(2005) who calculated that the nutritive values as TDN, ME and DCP were improved significantly as a result of medicinal plants (NS, RO) supplementation. These results are in agreement with results obtained by Salem and El-Mahdy (2001) and Mohamed et al.(2003) who reported that the medicinal plants (NS and Matricarla chamomile) additives improved the digestion coefficient and nutritive value during feeding sheep .

Carcass characteristics :

Hot and cold carcass weights (HCW and CCW respectively) of lambs fed feed additives diets were significantly higher ($P<0.05$) than those fed control diets (Table 4). However, lambs fed diets supplemented with RO showed higher ($P<0.05$) HCW and CCW than those fed diets supplemented with NS. Killing–out proportions of lambs fed diet supplemented with feed additives were higher ($P<0.05$) than those fed control diets when CCW was expressed as a portion of slaughter weight (SW) or empty body weight (EBW). However, higher killing–out proportion was associated with lambs fed diets supplemented with RO additives feeds ($P < 0.05$).

Tissues in rack and leg cuts (Table 5) clearly showed that lambs carcasses of those fed additives feeds contained higher ($P<0.01$) percentages of lean tissue compared with those fed control diets. However, both sources of feed additives diets had different pattern effect on the percentages of fat and bone tissues. A tendency towards an increase in fat and a decrease in bone percentages ($P<0.05$) were observed in lambs fed diets supplemented with NS. While, reduction in fat and increasing in bone percentages ($P >0.05$) were observed in lambs fed diets supplemented with RO.

Fat tail weight, fat thickness were significantly higher ($P<0.05$) in lambs fed diets supplemented with NS (D2 and D3) than those fed control diet and those fed diets supplemented with RO (D4 and D5).However ,the rib eye area and the length of carcass were significantly ($P<0.05$) increased with both feed additives (D2,D3,D4,D5) compared with control diets (D1). Wholesale cuts weight expressed as percentages of HCW were not significantly different between diets, except that the leg and shoulder cuts weight of both feed additives diets, which were significantly ($P<0.05$) higher than the control diet.

Table (4): Carcass yield and characteristics as affected by *Nigella sativa* or Rosemary supplementation diets

Item	Source of feed additives					Significancy		
	Control	NS		RO				
	0.0	5.0	7.5	5.0	7.5	Level (L)	Source (S)	L*S
Slauter weight (kg)	40.1	41.9	43.7	45.3	46.5	**	**	Ns
Hot carcass weight (HCW) (kg)	18.1	19.3	19.8	21.0	22.3	**	**	Ns
Cold carcass weight (CCW) (kg)	17.7	18.9	19.4	20.5	21.8	*	**	Ns
Empty body weight (EBW) (kg)	38.2	39.3	40.9	42.1	43.4	*	*	Ns
Killing-out proportions (g/kg)								
HCW/Slauter weight	451	460	453	468	480	*	*	Ns
CCW/Slauter weight	424	450	443	454	469	*	**	Ns
CCW/EBW	464	481	474	488	503	*	*	Ns
Tissue in Rack cuts %								
Lean	58.1	59.2	59.4	61.0	62.9	**	*	Ns
Fat	20.6	21.4	22.0	16.2	15.0	*	**	*
Bone	21.3	19.4	18.0	22.8	22.1	Ns	*	*
Lean : Fat ratio	2.8	2.7	2.7	2.8	4.2	*	**	Ns
Tissue in leg cuts %								
Lean	60.1	61.8	62.9	64.9	66.2	**	*	Ns
Fat	21.7	21.8	22.2	15.7	14.7	*	**	*
Bone	18	16.4	14.9	19.5	19.1	*	**	*
Lean : Fat ratio	2.7	2.8	2.8	4.1	4.5	*	**	Ns

* P<005, ** P<0.01, NS ,not significant, Means within rows with different superscripts are significantly different (P<0.05, P<0.01).

Table (5): Effect of experimental diets on fat tail weight, fat thickness, rib eye area, length of carcass and carcass cuts percentages .

Item	Source of feed additives					Significancy		
	Control	NS		RO				
	0.0	5.0	7.5	5.0	7.5	Level (L)	Source (S)	L*S
Fat tail weight (kg)	2.1	2.4	2.5	2.3	2.2	*	*	Ns
As a percentage of HCW	11.6	12.4	12.6	11.9	10.1	*	*	*
Fat thickness (mm)	2.7	2.8	3.1	2.7	2.5	*	*	*
Rib eye area (cm^2)	16.4	17.1	17.7	18.5	18.8	*	*	Ns
Length of carcass (cm)	65.9	67.1	68.0	68.8	69.0	*	Ns	Ns
Carcass cuts weight % HCW								
Leg	22.1	22.8	23.3	23.8	24.7	*	*	Ns
Loin	10.8	10.4	10.1	9.5	9.4	Ns	Ns	Ns
Rack	11.0	10.4	10.1	10.5	10.8	Ns	Ns	Ns
Shoulder	16.8	17.1	17.2	17.8	18.0	*	Ns	Ns
Foreshank	4.5	4.7	4.6	5.2	5.4	Ns	Ns	Ns
Breast	7.7	7.3	7.3	7.1	7.2	Ns	Ns	Ns
Neck	10.7	10.4	10.1	10.5	9.9	Ns	Ns	Ns
Flank	4.6	4.7	4.6	4.6	4.5	Ns	Ns	Ns

* P<0.05 , ** P<0.01 , NS ,not significant
Means within rows with different superscripts are significantly different (P<0.05, P<0.01).

CONCLUSION

Diets supplemented with medicinal plants such as NS and RO as a feed additives were clearly improved LWG, FCR and some carcass characteristics of Awassi lambs.

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تأثير إضافة بعض النباتات الطبية في المتناول اليومي، معدل الزيادة الوزنية وصفات الذبيحة في الحملان العواسي

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تم دراسة خمسة وعشرون حملا"عواسيا" بعمره اشهر و بمتوسط وزن ٢٤ كغم لدراسة تأثير استخدام مستويات ومصادر مختلفة من النباتات الطبية (الحبة السوداء واكليل الجبل) في كمية المتناول اليومي، معدل الزيادةالوزنية، كفاءة التحويل الغذائي وصفات الذبيحة. قسمت الحملان الى خمسة مجاميع متساوية وغذيت على العلائق التالية :

العليقة الاولى (عليقة السيطرة، و هي عبارة عن مخلوط مركزات من الذرة الصفراء و الشعير و تبن القمح (بنسبة ١:١:١)) لاتحتوي على اي نبات طبي .

العليقة الاولى مع ٥ او ٧.٥ غم حبة سوداء /كغم مادة جافة (العليقة الثانية والثالثة على التوالي).

العليقة الاولى مع ٥ او ٧.٥ غم اكليل الجبل / كغم مادة جافة (العليقة الرابعة والخامسة على التوالي).

اظهرت النتائج ما يلى:

ان الحملان المغذاة على النباتات الطبية (العليقة٢،٣،٤،٥) زيادة عالية المعنوية في كمية المتناول اليومي ، معدل الزيادة الوزنية ، كفاءة التحويل الغذائي وزن النبيحة الحار والبارد ونسبة التصافي وفي انسجة قطعة الاضلاع والفخذ مقارنة بالحملان المغذاة على عليقة السيطرة (العليقة الاولى).

ان انسجة قطعة الاضلاع والفخذ اظهرت ان ذبيحة الحملان المغذاة على الحبة السوداء واكليل الجبل تحتوي على نسبة عالية من اللحم مقارنة بذبائح الحملان المغذاة على عليقة السيطرة.

ان وزن الألية وسمك الطبقة الدهنية في الحملان المغذاة على العليقة ٣،٢ كانت اعلى معنويا" (على مستوى ٥٪) من الحملان المغذاة على العلائق ١،٤،٥ في حين ان مساحة العضلة العينية بطول النبيحة، وزن قطعة الفخذ في الحملان المغذاة على العليقة ٤،٥ كانت اعلى معنويا" (على مستوى ٥٪) من تلك المغذاة على العلائق ١،٢،٣