EFFECT OF ADDING DAMSISSA (SEEDS OR LEAVES) (*AMBROSIA MARITIMA L.*) TO SHEEP DIETS ON ITS PRODUCTIVE PERFORMANCE.

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SUMMARY

Two experiments were conducted to study the effects of supplement Damsisa leaves or seeds (*Ambrosia maritima L* or *Artemisia absinthium*) diets on growing lambs performance. First experiment was carried out to determine the in-vitro disappearance of dry matter (IVDMD) to find out the best levels of Damsisa leaves and seeds supplementation (from 0.5 to 4% of DMI) that could be applied in feeding and in-vivo digestibility trials. Depending on the results of the first experiment, fifteen growing Barki cross breed lambs of 5 months old and 23.3 kg average live body weight were randomly assigned into 3 similar feeding groups (5 animals each) to fed one of the experimental diets. All diets consisted of 50% roughage (20% berseem hay + 30% rice straw) and 50% concentrate feed mixture (CFM) without Damsisa (D1 control diet), + 2.5% Damsisa leaves as a replacement of DMI, (D2 diet) and 2.5% Damsisa seeds as a replacement of DMI (D3 diet). Diets were formulated to cover maintenance and growth requirements of the growing lambs according to NRC, 1994.

Results of the first experiment indicated that the in-vitro dry matter disappearance (IVDMD) was increased by increasing the level of 2.5% Damsisa leaves or seeds supplemented rations. Results of the second experiment revealed that the inclusion of Damsisa leaves and seeds at 2.5% of DMI in diets tended to increase all nutrients digestibility and nutritive values expressed as TDN and DCP compared with the control rations. Also, animals fed D3 and D2 diets recorded non significant higher; values of blood serum total protein, albumin and globulin concentration and significant higher ($P<0.05$) urea levels, (IgG) & (IgM) concentrations and AST activity and had lower ($P<0.05$) serum ALT activity. Animals fed D3 diet showed significant higher ($P<0.05$) daily gain, DM, TDN and DCP intake, feed efficiency compared with D2 and D1 diets and consequently the lowest feed cost /kg gain.

In conclusion, replacing 2.5% of dry matter intake (DMI) with Damsisa leaves or seeds for growing lambs diets seems may offer improvement in feed digestibility, feed efficiency and reduce cost of gain.

***Keywords**: Damsisa leaves and seeds, lambs, digestibility, rumen activity, feed efficiency.*

INTRODUCTION

The recommended dietary animals' protein intake allowances by NRC, (1980) are 33g per capita. In Egypt animal protein intake is only one third of this allowance; meaning that animals production in Egyptian should be increased by at least three times and therefore many efforts will be done to reach 24g per capita by 2017 (Moa, 2004). Natural feed additives are very important materials that can improve the efficiency of feed utilization and lambs performance (Hassan, 2005 and 2008). However, the use of chemical products especially those of antibiotics, hormones, antispasmodic and antiparasitic may cause unfavorable effects. Many attempts in the field of animal nutrition are being done to achieve an increase in animal production and thereby profit (Abdou, 2001). The use of natural products is becoming more popular, since drugs of synthetic origin may have a negative impact on the environment and parasite resistance to poisonous chemicals can develop after repeated applications (Magi and Sahk, 2003). Using medicinal herbs and seeds as feed additives for ruminants seemed to be a recent global trend (Singh *et al.* 1993). Boulos (1983) indicated that using dietary supplementation has greatly increased, the using of natural feed additives has been important to minimize these adverse effects. Some vegetables herbs, edible plants and seeds are used as tonics and restoratives such as *Trigonella foenum graecum, Sessamum indicum, Lipidium sativa* and *Artemisia absinthum. Ambrosia maritima L* can be used as additive in food packaging materials or in the preservation of some foods (Madkour, 2004). Aboul-Fotouh (1998) showed that sheep ruminal pH values did not differed significantly with *Artemisia judaica* (Sheeh baladi) supplementation diets, ruminal NH3-N concentration was significantly ($P\leq0.01$) decreased, but

concentration of TVFA's was significantly increased when the level of Artemisia judaica herb increased from 1% to 3% on the diets. Abd El-Mowla (2007) found that IVDMD was increased by increasing the level of Artemisia absinthum (Damsisa) in the diet up to 3% .Using *Artemisia absinthium* (Damsisa) for lactating buffaloes improved digestibility's, feeding values, and economical efficiency and milk production. El-Shabrawy and Nada (1996) showed that when daily dose of dried leaves of Ambrosia maritime L of (0.5-1.5 gm/ kg fed intake), was fed for 30 days to rats reduced the serum glucose and creatinine but no effect on serum aspartate amino transferase (AST) or alanine amino transferase activities (ALT). Also, Abd El-Mowla (2007) found insignificant differences between control diet and the other diets containing medicinal plants (*Cymbopogon, proximus, Artemisia absinthium and Glycyrhiza glabra*) in total dry matter intake, some digestibility coefficients and feeding values of energy and protein. While, feed efficiency was significantly increased ($P<0.05$) for diets containing medicinal plants compared with control diet.

The objective of this study was to investigate the effect of supplementation seeds or leaves of Damsisa diets as a feed additives on the in vitro dry matter disappearance (IVDMD), rumen activity, digestibility and productive performance of growing lambs.

MATERIALS AND METHODS

Two experiments were conducted in this study; the first study, carried out at the laboratory of Animal Nutrition Research Department, Animal Production Research Institute, Ministry of Agriculture, was an *in vitro* preliminary study to determine the effect of different levels of Damsisa leaves or seeds on dry matter disappearance to identify the best level for a subsequent in vivo digestibility and growth trial. Concentrate feed mixture (CFM) plus Berseem hay (BH) and Rice straw (RS) at ratio of (50: 20: 30%, respectively) on DM basis, respectively were used as a control ration. On the other hand, eight levels of leaves and seeds of Damsisa were included to replace. 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5 and 4.0% of dry matter intake (DMI) to form sixteen tested rations, in addition to the control one were evaluated by using the *In-vitro* technique developed by Tilley and Terry (1963) and as Modified by Barnes (1969). The second experiment was carried out at Experimental animal house, during the period started from February, 2008 till August, 2008 for 210 days feeding trial periods.

Table (1): Chemical composition (%) of ingredients and damsisa leaves or seeds supplemented diets (on DM basis).

Items	DM	% of DM basis					
		OM	CP	CF	EE	NFE	Ash
Damsisa leaves (DL)	92.03	85.14	10.63	24.19	3.57	46.75	14.86
Damsisa seeds (DS)	91.27	78.38	7.65	20.57	2.50	47.66	21.62
CFM	89.49	91.90	14.03	10.56	3.28	64.03	8.10
Berseem hay	89.19	90.02	12.01	28.56	2.41	47.04	9.98
Rice straw	90.50	84.80	2.32	33.63	1.48	47.37	15.20
Calculated composition of experimental diets							
D1	89.73	89.39	10.11	21.08	2.57	55.63	10.61
D2	89.79	89.29	10.12	21.15	2.60	55.42	10.71
D3	89.77	89.12	10.05	21.06	2.57	55.44	10.88

DMI: concentrate feed mixture (50%) + berseem hay (20%) + rice straw (30%) (control ration). The ingredients of concentrate feed mixture (CFM) were 38% wheat brane, 31% yellow corn, 24% undecaticated cotton seed meal, 3.5% molasses, 2.5% limestone and 1% common salt.

D1: Control diet (50% CFM + 20% BH + 30% RS),D2: Damsisa leaves supplemented diet (2.5% of DMI) and D3: Damsisa seeds supplemented diet (2.5% of DMI).

The objective of this study was to investigate the effect of leaves or seeds of Damsisa (Artemisia absinthium or Ambrosia maritima L) as supplements (in the expense of dry matter intake) from diets on performance of growing lambs. fifteen growing Barki cross breed lambs of 5 months old and 23.3 kg average live body weight were used. Lambs were randomly assigned into 3 similar feeding groups (5 animals each) to feed one of the experimental diets, Table (1), all diets consisted of 50% roughage (20%

berseem hay + 30% rice straw) and 50% concentrate feed mixture (CFM) without Damsisa (D1 control diet), + replacing 2.5% of the diet with Damsisa leaves or seeds (D2) and (D3). Diets were formulated to cover maintenance and growth requirements of the growing lambs according to NRC, (1994). Lambs of each group were kept in a separate shaded pen and adapted for the tested diets for 2 weeks before the start of the feeding trial. Experimental diets were fed in two equal feeding while water was continuously. Feeding requirements were adjusted every two weeks according to changes of animals body weights. At the beginning of the feeding trial all animals were individually weighed, then biweekly (on two successive days) in the morning before drinking and feeding throughout the experimental period.

At the end of the feeding trial, digestibility trial was conducted by using 3 mature lambs from in each trial group. Digestibility trial consisted of 10 days as a preliminary period, followed by 7 days as a collecting period. Experimental diets were weighed and offered to the individual animals and the refusal (if any) were recorded daily once at 8:00 a.m. Feces were collected in the morning, the urine was collected for each lamb in glass bottles with 1ml of 5% sulphoric acid (H_2SO_4). Representative samples from feeds were used and execrated feces were dried 6 hours after feeding on the last day of the trial and drying oven at 65°C for 24 hours to determine daily dry matter intake (DM) Rumen fluid samples were taken individually from three lambs of each group before morning feeding and 3 and 6 hours after feeding at the end of the experimental trial. Rumen fluids were obtained by using stomach tube with an aid of vacuum pump. Rumen fluid was strained through four layers of cheese cloth and each sample was divided into three portions, the first aliquot was used to immediately determine ruminal pH using a digital pH-meter and stored in dry clean glass bottles and frozen at 20°C until chemical analysis. The concentration of VFA's was determined in rumen liquor by the steam distillation method (Eadie *et al.* 1967) using markham micro-distillation apparatus. The concentration of NH3-N was determined using saturated solution of magnesium oxide distillation according to the method of A O A C (1995). Blood samples were taken two times at the beginning and at the end of feeding trial from the same animals of digestibility trials from the jugular vein in heprinized vials and centrifuged for 20 minutes at 3000 r.p.m to get plasma, then frozen (at -20°C) until chemical analysis. Serum total protein was determined by a colorimetric method using commercial kit purchased from biomerieux according to the method of Henry *et al.* (1974), with minor modification, serum albumin was carried out by using commercial kit purchased from biomerieux according to the method of Doumas *et al.* (1971) and Drupt (1974), The concentration of serum globulin was obtained by subtracting the albumin value from the total protein concentration and A/G ratio was calculated. Also, Serum urea nitrogen (NH3-N) was determined calorimetrically by using commercial kits purchased from biomerieux, according to Patton and Grouch, (1977) , Serum aspartate amino transferase (AST) and alanine amino transferase (ALT) activities were determined calorimetrically by using commercial kits purchased from biomerieux (Marcyi, Etoile 69260, charbonnieres, LesBains, France) according to the method of Reitman and Frankely (1957), Serum immunoglobulin G and M (IgG and IgM) determination were carried out by an Enzyme-Linked Immuno sorbent assay (ELISA) as described by Hudson and Hay (1989).

The chemical composition of different ingredients, leaves and seeds of Damsisa and feces samples were analyzed according to the A.O.A.C. (1995), procedures to determine moisture content, dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE) and Ash, while nitrogen free extract (NFE) content was calculated by difference. The data were analyzed statistically according to SAS, (2000). The significantly among experimental diets, time sampling and periods means were tested by Duncan's Multiple Range Test (1955), when the main effects were significant.

RESULTS AND DISCUSSION

Chemical composition:

The effect of damsisa leaves or seeds supplemented diets on chemical composition are presented in Table (1), data showed that the tested diets and the control one have nearly similar chemical composition, but Damsisa leaves contained more DM, OM, CP, CF and ether extract, but it had less nitrogen free extract (NFE) and Ash compare to damsisa seeds.

Effect of Damsisa (*Artemisia absinthium* or *Ambrosia maritima L*) leaves or seeds supplementation on *in-vitro* dry matter disappearance (*IVDMD*).

Data in Table (2) showed that values of *in-vitro* dry matter disappearance were improved by adding the medicinal plants compared to the control ration, however, it was found that values of IVDMD were increased by increasing the level of Damsisa leaves or seeds up to 2.5%, (68.67 and 71.48%,

respectively). This may be due to enhancing the microbial activity by a certain level of the essential oils included in the medicinal plants leaves and seeds of Damsisa. These results are in agreement with Abd El-Mowla (2007) who reported that values of IVDMD were increased by increasing the level of Artemisia absinthium in the diet up to 3% by using 5 levels of Artemisia absinthium to replace 1, 2, 3, 4 and 5% of clover hay in addition to the control one.

Table (2): Effect different supplementation levels of leaves or seeds of Damsisa on *in-vitro* dry matter disappearance (*IVDMD*).

Experimental rations	% ingredients on DM basis	% IVDMD	Relative improvement of IVDMD**
DMI (control)	100%	61.53*	100
DMI + DL	99.5 +0.5	61.76	100.37
DMI + DL	99.0 +1.0	63.74	103.59
DMI + DL	98.9 +1.5	65.67	106.73
DMI + DL	98.0 +2.0	64.33	104.55
DMI + DL	97.5 +2.5	68.67	111.60
DMI + DL	97.0 +3.0	67.92	110.38
DMI + DL	96.5 +3.5	66.02	107.30
DMI + DL	96.0 +4.0	65.33	106.17
DMI + DS	99.5 +0.5	66.33	107.80
DMI + DS	99.0 +1.0	66.20	107.59
DMI + DS	98.5 +1.5	69.71	113.29
DMI + DS	98.0 +2.0	70.67	114.85
DMI + DS	97.5 +2.5	71.48	116.17
DMI + DS	97.0 +3.0	70.67	114.85
DMI + DS	96.5 +3.5	69.59	113.05
DMI + DS	96.0 +4.0	66.33	107.80

** the common divisible* *** % IVDMD / The common divisible.*

Nutrient digestibility coefficient and feeding values:

Nutrients digestibility of leaves and seeds of Damsisa supplemented diets are presented in Table (3). Data showed that digestibility coefficients of all nutrients were non significantly different. It was observed that the inclusion of Damsisa leaves or seeds at 2.5% level tended to increase all nutrients digestibility. However, the higher values of all nutrients digestibility were recorded for D3 diet which contained Damsisa seeds, then D2 diet which contained Damsisa leaves than the control diet. This may be attributed to two reasons: 1) the damsisa leaves and seeds included essential oils that enhanced nutrients digestibility as was supported by the results in Table (3). The same trend was observed by Abd El-Mowla (2007) who used Artemisia absinthium as feed additives.

Table (3): Nutrients digestibility and nutritive values of the experimental diets fed to lambs.

Item	Experimental diets		
	D1 ±SE	D2 ±SE	D3 ±SE
Digestibility coefficients %			
DM	68.77 ±4.780	72.75 ±4.93	73.87 ±5.045
OM	75.15 ±4.880	77.72 ±5.009	77.83 ±5.050
CP	70.75 ±4.930	74.09 ±4.106	76.75 ±4.935
CF	55.79 ±4.850	61.79 ±5.020	67.45 ±4.702
EE	75.72 ±5.009	78.97 ±5.219	80.14 ±5.097
NFE	75.03 ±4.700	74.99 ±4.862	75.25 ±4.678
Nutritive values (%)			
TDN	65.03	66.75	68.26
DCP	7.15	7.50	7.71

D1 = Control diet, D2 = Damsisa leaves supplemented diet, D3 = Damsisa seeds supplemented diet.

Difference in nutritive values of tested rations were not significant, TDN and DCP values were slightly improved by adding Damsisa leaves or seeds at 2.5% level to the diets (D2 and D3 diets) compared to the control diet (D1). This may be attributed to the increase in total bacteria count with increasing level of Damsisa seeds, which tended to increase nutrient digestibility parallel with increase biosynthesis of microbial protein, which led to increase CP digestibility and diets DCP content. These results are in harmony with those observed by Abd El-Mowla (2007) who found that most of nutrients digestibility and feeding values as TDN and DCP of lambs diets were non significantly improved by adding *Artemisia absinthium* at 3, 4 and 5% level compared to the control.

Rumen activity parameters:

The effect of damsisa leaves or seeds supplementation diets on ruminal pH values, NH3-N and TVFA's concentrations are shown in Table (4). No differences in the pH values were found due to the damsisa leaves or seeds within each sampling time. Data clearly showed that the mean value of D3 diets showed higher values compared with other treatments, but all values were within the normal range. This could have been caused by an increase in activity of ruminal bacteria with Damsisa seeds. These results agreement with Allam *et al.* (1999) and Ali *et al.* (2005) who reported that pH values of rumen liquor was not significantly affected by medical herbs and plants (MH and P) supplementation.

In-sepection of the effect of different sampling times on ruminal pH (Table 4) indicated a lowest value ($P<0.05$) at 3 and 6 hr-post-feeding, whereas, the highest one was recorded at 0 hr (before feeding). These results may probably be related to fermentation process of both non structural and structural carbohydrates and the production of VFA's with different proportions of acetic: propionic causing the different values of ruminal pH. Such results support the findings of Emmanuel *et al.* (1969), Khattab *et al.* (1982), El-Ashry *et al.* (1987) and Aboul-Fotouh (1998). Also, the present results are in line with those of Abd El-Mowla (2007) who found that pH values were higher before feeding and decreased at post feeding.

Table (4): Effect of experimental diets on ruminal parameters during the feeding trial.

Experimental diets	pH	NH3-N mg/dl	TVFA's mmol/dl
D1	6.10±0.2	27.93^{b}±2.72	9.61^{b}±1.5
D2	6.03±0.17	45.85^{a}±4.86	12.42^{a}±1.4
D3	6.20±0.14	46.02^{a}±3.22	16.97^{a}±0.98
Different times			
H0	6.74^{a}±0.05	31.20^{b}±3.5	7.53^{b}±1.0
H3	5.72^{b}±0.07	48.09^{a}±3.8	14.56^{a}±0.9
H6	5.86^{b}±0.06	40.52^{a}±4.86	12.61^{a}±0.75

Concerning, NH3-N concentration in the rumen liquor at different experimental rations (Table4). Ammonia-N concentration was lower at zero time with the control ration than damsisa seeds or leaves. After the first hour, ammonia-N concentration started to decline to reach the minimum at 6 hr post-feeding. These results are probably attributed to the rapid degradation and deamination of dietary degradable protein. Moreover, these results may be due to the effect of increase total bacteria count and its activity; this advantage may give a favorable condition in the rumen for useful microorganism's activity (El-Bordeny *et al.* 2008). These findings are in agreement with those recorded by Abd El-Aziz *et al.* (1993) and Abd El-Mowlla (2007) who found that NH3-N concentration was increased by *Artemisia absinthium* supplementation in the diet at 3 hrs after feeding.

Also, data of rumen liquor TVFA's concentration clearly showed that the values of D3 and D2 diets recorded significantly higher ($P<0.05$) values compared to D1 diet. The higher value of Damsisa leaves and seeds diets may be attributed to an increase of ruminal fermentation process as results of different sources of components of the diets and its availability which affected rumen microflora (Khorshed, 1995). These results were in a good agreement with those obtained by Aboul-Fotouh (1998) and Abd El-Mowla (2007). Concerning the effect of sampling times, the TVFA's concentration before feeding was lower significantly ($P<0.05$) in all the experimental diets than post feeding samples. The increase in TVFA concentrations at 3 hrs post feeding lead to the decrease of pH values, while the lowest value ($P<0.05$) was observed at 0 hr of feeding. These finding are in agreement with those obtained Allam *et al.* (1999), Abd El-Mowla (2007) and El-Bordeny *et al.* (2008) found that TVFA's concentration in the rumen was low before feeding and depending on type, physical supplementation of *Artemisia absinthium* in the diets.

In general, using the tested additives could be increase the bacterial counts and activity, through one or more of the following: 1) Decreasing number and activity of antagonistic organisms. 2) Saving some important micro factors to rumen microflra as micro elements, vitamins, enzymes or unknown factors which are required to the efficient digestion, absorption and metabolism and available as effective groups or components in MHQP. 3) Decreasing hazards of some harmful heavy metals as lead by Chelation with them (Aboul-Fotouh, 1998; Allam *et al.* 1999; Mohamed *et al.* 2003 and Abd El-Mowla, 2007).

Blood parameters:

All values of blood parameters were in the normal range, total protein level in blood serum is considered available index reflecting health and performance characteristics of the animal (O'Kelly, 1973). Data in Table (5) indicated that the animals fed D3 and D2 diets recorded non-significant higher; values of blood serum total protein, albumin and globulin concentration. This may be attributed to the increase of DCP as well as the higher protein digestibility by animal groups fed (D3 and D2) than D1 diets (Table 3).

The present data showed non significant higher serum total protein value at the end than that at the beginning experiment. The present estimates lie within the normal range (6-8 gm/dl) reported by Recce, (1991) and El-Ashry *et al.* (2006).

The mean value of serum albumin value of the first day (3.60 mg/100 ml) was nearly similar to that of last day of the experiment.

The increase in serum globulin may possible due to the parallel increase gamma globulins or due to the development immunity against infection (Metwally, 1994).

Table (5): Effect of feeding experimental diets on blood serum parameters of lambs during the feeding trial.

Item	TP g/dl +SE	AL g/dl +SE	GL g/dl +SE	A/G ratio	Urea-N mg/dl +SE	AST IU/L	ALT IU/L	IgG mg/ml	IgM mg/ml
D1	6.78 ±0.233	3.61 ±0.187	3.17 ±0.196	1.14 ±0.084	23.75^{b} ±3.591	14.23^{a} ±0.633	6.83^{a} ±0.349	805^{b} ±34.12	120^{b} ±12.25
D2	6.84 ±0.246	3.52 ±0.074	3.32 ±0.231	1.06 ±0.075	31.80^{a} ±1.045	11.40^{b} ±0.450	6.56^{a} ±0.570	825^{b} ±45.27	138^{a} ±22.63
D3	7.16 ±0.233	3.69 ±0.102	3.47 ±0.265	1.06 ±0.139	24.79^{b} ±2.728	14.0^{ab} ±0.752	5.60^{b} ±0.175	900^{a} ±69.56	143^{a} ±18.64
Time									
T1	6.81 ±0.144	3.60 ±0.055	3.21 ±0.159	1.15 ±0.065	28.19^{a} ±2.410	14.52^{a} ±0.586	6.58^{a} ±0.328	840^{b} ±38.39	130^{b} ±38.99
T2	7.04 ±0.231	3.16 ±0.139	3.42 ±0.219	1.10 ±0.105	25.36^{b} ±2.414	11.90^{b} ±0.379	6.07^{b} ±0.381	960^{a} ±57.84	145^{a} ±27.12

For each factor means within the same column followed by the letters did not differ significantly (P<0.05).
T1 = at the beginning of feeding trial T2 = at the ending of feeding trial

Data clearly showed that values of A/G ratio, animal group fed D1 diet was slightly higher than those animals fed D3 and D2 diets. With respect to period effect, data clearly showed that (T1) was slighter higher than (T2). This result indicated that age progress affect significantly A/G ratio.

The mean values of serum urea nitrogen (N) of the Damsisa leaves and seeds supplemented diets at different periods are shown in Table (5). Values of supplemented diets were higher significantly (P<0.05) than control diet. According to Lewis *et al.* (1957), the overall patterns of rumen ammonia and blood urea concentration are roughly parallel, and the measurement of blood urea was proposed as supplementary test for the efficiency of nitrogen utilization in rumen. Data indicated significant (P<0.05) difference between the start and the end experiment. This may be probably attributed to the gradual increased in feed intake and rumen volume with age.

The enzymes aspartate amino transferase (AST) and alanine amino transferase (ALT) is most important indicator for liver cells activity. Data clearly showed the animals fed (D2) was lowest (P<0.05) values (AST) compared with other treatments

The results of serum AST of the present study are within the general ranges reported by Fouad, (1992) who found that the AST activity was 94 to 151 units/ml and are in a good agreement with those obtained by (El-Shabrawy and Nada. 1996).

Mean values of serum ALT of animal groups fed the experimental diets at the different periods are shown in Table (5). Data clearly showed no significant differences between Damsisa leaves supplemented diet (D2) and control diet (D1). However, mean value of damsisa seeds supplemented diet (D3) was lowest values ($P<0.05$).

The mean values of serum IgG and IgM of the experimental diets at different periods are shown in Table (5). Values of damsisa leaves and seeds supplemented diets were significantly higher ($P<0.05$) than control diet for serum IgG and IgM concentrations, respectively. This may be probably attributed to the gradual increase of immune system IgG and IgM antibodies molecules in lambs. Also, data in Table (5) clearly indicated that, there was a significant ($P<0.05$) difference of serum IgG a IgM concentrations between T1 and T2. Value of (T2) was higher than that of (T1) by about (12.5%). The present values of serum IgG and IgM concentrations are within the range reported by Farouk (1995).

Productive performance:

Results in Table (6) cleared that lambs fed damsisa seeds supplemented diet (D3) had nonsignificantly higher final weight, total gain and daily gain compared with other experimental diets. This might be due to the generally increase in nutrients digestibility and nutritive values of D3 diet (Table 3).

The lambs fed damsisa leaves supplemented diet (D2) also, showed a higher weight gain that the control diet (D1). These results are in a good agreement with Aboul-Fotouh *et al.* (1999), Bakhiet and Adam (1996) and Abd El-Mowlla (2007).

Table (6): Productive performance of lamb fed different experimental diets during the feeding trial.

Item	Experimental diets		
	D1	D2	D3
Weight changes:			
Initial weight, kg	23.3 ± 2.12	23.3 ±1.95	23.4 ± 2.41
Final weight, kg	48.7 ± 1.25	53.2 ± 3.24	54.2± 3.95
Total gain, kg	25.4 ± 2.44	29.9 ± 2.87	30.8± 2.77
Daily gain, kg	0.121 ±0.048	0.142 ±0.061	0.147 ± 0.035
Feed intake, kg			
DM	1.12	1.155	1.165
TDN	0.7	0.72	0.73
DCP	0.095	0.098	0.1
Feed efficiency:			
kg DM /kg gain	9.25	8.13	7.92
kg TDN /kg gain	5.78	5.07	4.96
kg DCP /kg gain	0.78	0.69	0.68
Economical efficiency:			
Daily feed cost, LE	1.135	1.307	1.307
Price of daily gain, LE	2.78	3.27	3.38
Feed cost LE/kg gain	9.38	9.20	8.89
Relative Economic efficiency	100	+1.92	+5.22

The price of feedstuffs and products, CFM/ton = 1800 (LE), berseem hay/ton = 950 (LE), Rice straw/ton = 150 (LE), Damisisa seeds or leaves, kg = 8 (LE) and live body weight, =23 (LE).

Concerning the feed intake, data in Table (6) clearly showed that lambs group fed damsisa seed supplemented diet (D3) recorded the best ($P>0.05$) DM, TDN and DCP intake. These results are supported by those reported by Abd El-Mowlla (2007) who found that feed intake as DM, TDN and DCP were in favor of diet containing *Artemisia absinthium* compared with control diets . On the other hand, results of feed efficiency expressed as the amount kg intake of DM, TDN and DCP to give one kg weight gain in Table (6) showed that the lambs group fed Damsisa seeds supplemented diet (D3) revealed better feed efficiency compared to damsisa leaves supplemented diet (D2) and control diet (D1). Improving feed efficiency of lambs group fed D3 diet might be attributed mainly to the higher daily gain and nutrients digestibility. These results agreed with those reported by Aboul-Fotouh *et al* (1999) and Abd El-Mowlla (2007). The economic efficiency of damsisa leaves and seeds supplemented diet recorded the highest

daily feed cost and price of daily gain compared with control rations, while, lambs fed damsisa seeds supplemented diet (D3) recorded the lowest feed cost / kg gain followed by lambs group fed damsisa leaves supplemented diet (D2), but lambs fed control diet (D1) had the most expensive daily feed cost/ kg gain. These results are inagreement with Tozyo *et al.* (1994), Aboul-Fotouh *et al.* (1999) and Abd El-Mowlla (2007) who found that medicinal plants in the diets reduced the price of feed needed to produce one kilogram of fat corrected milk especially that contained *Glycyrrhiza glarba* and *Artemisia absinthium*.

CONCLUSION

According to the circumstances of this experiment, it could be concluded that supplementing lambs diets with 2.5% of Damsisa leaves and seeds as a natural feed additives tended to improve growth performance, nutrients digestibility, feed values, feed and economic efficiency. Further study using higher addition level must be done.

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تأثير إضافة أوراق نبات الدمسيسة الجافة أو البذور الى علائق الأغنام على أدائها الانتاجى

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أجريت تجربتان فى هذه الدراسة حيث أجريت التجربة الأولى بمعمل بحوث تغذية الحيوان بمعهد بحوث الإنتاج الحيوانى التابع لمركز البحوث الزراعية وذلك لتقدير معدل اختفاء المادة الجافة معمليا لإيجاد أفضل تركيز من أوراق وبذور الدمسيسة كإضافات غذائية إلى علائق الأغنام وذلك على أساس (المادة الجافة المأكولة) من العليقة (بمستويات من 0.5 إلى 4%) واعتمادا على نتائج التجربة الأولى. أجريت التجربة الثانية (الحقلية) بحظيرة التجارب التابعة لقسم بحوث تغذية الحيوان وذلك لتقييم الأداء الإنتاجي للحملان المغذاة على العلائق المضاف إليها أوراق وبذور الدمسيسة بالنسب المختارة.

استخدم فى هذه التجربة 15 حولى برقى خليط نامى (عمر 5 أشهر وبمتوسط وزن 23.3 كجم) وقسمت هذه الحيوانات عشوائيا إلى ثلاث مجموعات متماثلة (5 / مجموعة) لتتغذى على إحدى العلائق التجريبية التالية:-

المجموعة الأولى (الكنترول): غذيت على 50% علف مركز + 20% دريس برسيم + 30% قش أرز.

المجموعة الثانية (D2): الكنترول + 2.5% أوراق الدمسيسة كجزء مستبدل من المادة الجافة المأكولة.

المجموعة الثالثة (D3): الكنترول + 2.5% بذور الدمسيسة كجزء مستبدل من المادة الجافة المأكولة.

وغذيت الحملان طبقا لتوصيات NRC, (1994) الخاصة بالاحتياجات الحافظة + النمو لمدة 210 يوم. وفى نهاية التجربة تم تقدير معاملات هضم العناصر الغذائية المختلفة عن طريق إجراء تجارب الهضم وقياسات الكرش أما قياسات الدم فتم تقديرها فى بداية ونهاية تجربة النمو وأظهرت النتائج ما يلى:- تحسنت المادة الجافة المهضومة معمليا للعلائق المضاف إليها أوراق وبذور الدمسيسة المختبرة المقارنة بالعليقة الكنترول و زادت المادة الجافة المهضومة معمليا بزيادة مستوى تركيز أوراق وبذور الدمسيسة حتى تركيز 2.5% ثم حدث لها نوع من الثبات ثم قلت بزيادة التركيز حتى 4% من المادة الجافة المأكولة. التجربة الحقلية *in-vivo* . كما لوحظ أن إضافة أوراق وبذور الدمسيسة بمعدل 2.5% من المادة الجافة المأكولة أدى إلى زيادة غير معنوية فى جميع معاملات هضم العناصر الغذائية المختلفة وسجلت الحملان المغذاة على العليقة الثالثة المضاف إليه بذور الدمسيسة أعلى قيم لمعاملات الهضم على التوالى. و لوحظ وجود فروق غير معنوية فى درجة تركيز (pH) الكرش فيما بين العلائق التجريبية . و سجلت المجاميع التى غذيت على العليقة الثالثة و الثانية على التوالى أعلى تركيز لنتروجين الأمونيا مقارنة بالعليقة الكنترول . و كانت هناك فروق معنوية فى تركيز الأحماض الدهنية الكلية الطيارة فيما بين العلائق المختبرة . كما سجلت المجاميع التى غذيت على العليقة الثالثة والثانية أعلى تركيز من البروتين الكلى ، الألبيومين، الجلوبيلوين وكانت الفروق بين المجموعة الثانية والثالثة غير المعنوية عند مستوى 5%. و سجلت أيضا تلك المجاميع أعلى تركيز من اليوريا ، IgG ، وكذلك إنزيمات الكبد AST ، وأقل تركيز من ALT ولكن الفروق بين المجموعة الثالثة والثانية كانت معنوي. و سجلت المجموعة التى غذيت على العليقة الثالثة المضاف أعلى وزن نهائى ومعدل نمو يومى وأكبر كمية مأكولة من المادة الجافة ، والمركبات الغذائية المهضومة وكذلك البروتين المهضوم وأحسن كفاءة غذائية وأفضل كفاءة اقتصادية وأقل تكلفة تغذية لإنتاج كيلو جرام نمو يليها المجموعة الثانية التى غذيت على عليقة الأوراق ثم العليقة الكنترول.

و طبقا لظروف هذه التجربة يوصى بإضافة بذور وأوراق الدمسيسة بمعدل 2.5% من المادة الجافة المأكولة لعلائق الحملان البرقى الخليط النامية لما لها من تأثيرات إيجابية على معاملات الهضم وأداء الحملان والكفاءة الغذائية وكذلك الكفاءة الاقتصادية.