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THE NUTRITIVE VALUE OF ATRIPLEX LENTIFORMIS AS AFFECTED BY DROUGHT AND ITS IMPACT ON SHEEP PERFORMANCE

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ABSTRACT

The present work was conducted at Ras Suder Research station (Desert Research Center) South Sinai to study the effect of feeding *Atriplex lentiformis* (Quail salt bush) , irrigated in different irrigation intervals (15,30 and 45 days) on feed intake , nutrients digestibility ,nutritive values , nitrogen balance , water balance , serum biochemical parameters and body weight changes of experimental animals (sheep) .

Fifteen mature Barki male sheep were divided into three equal groups with an average body weight 34.2 kg. The first group fed *ad libitium* on Quail salt bush(*Atriplex lentiformis)* irrigated every 15 days. The second was fed *ad libitium* on Quail salt bush irrigated every 30 days. The third was fed *ad libitium* on Quail salt bush irrigated every 45 days. All groups of sheep were supplemented with ground date seeds to cover 25% of their energy maintenance requirements .The experiment comprised two trials .The palatability trial which extended for 30 days followed by a digestibility trial for 15 days.

Data indicated that voluntary feed intake was gradually increased and recorded the maximum values at the fourth week then remain constant to the end of the palatability trial . There was a noticeable decrease in body weight from the beginning of experiment to the end of palatability trial , and the body weight loses ranged from 4.4 to 7.2 kg .With regard to crude protein (CPI),neutral detergent fiber(NDF) intakes, no significant differences were detected among animal groups and their values were comparable during the digestibility trial. The same trend was observed for dry matter (DM), crude protein (CP), crude fiber (CF), and organic matter (OM) digestibility coefficients and total digestible nutrients percentage (TDN%). On the other hand, digestible crude protein percentage (DCP%) significantly varied due to type of ration effect and recorded the higher value (9.23%) for ration 1 (R1) followed by R2 and R3 in descending order. Nitrogen balance was negative for all animal groups. Water balance did not significantly vary and recorded comparable values for the three animal groups.

There were no significant changes in serum alanine aminotransferase (ALT) among animal groups whereas; serum aspartate aminotransferase (AST) showed a significant increase. Total proteins concentrations decreased ($p< 0.05$) especially in-group 1 which fed ration 1(R1). Serum albumin recorded similar values for the animal groups, which fed the conventional ration (R1) and ration 2 (R2) respectively. Serum globulin level showed the same trend of total proteins. Blood urea-nitrogen, creatinine, cholesterol, calcium and potassium significantly increased for the three animal groups which fed R1, R2 and R3 compared to the control group which fed the conventional ration but serum sodium showed insignificant variation among animal groups.

Sheep cannot depend only on *Atriplex lentiformis* cultivated under conditions of Wadi Sudr in their feeding for long time as a basic diet even with 25% of its energy maintenance requirements from date stone. Further studies should be directed twards improving the feeding value of *Atriplex* by ensiling or treatment biologically or chemicals and energy supplementation i.e.barley grains .

Key words: Sheep, drought, *Atriplex* , palatability , digestibility , feed intake, digestibility coefficients, nutritive value, nitrogen balance, water balance, liver and kidney functions, serum sodium, potassium, calcium and serum cholesterol levels.

INTRODUCTION

The rapidly increasing demand of animal products, as well as, parallel increase in importing feed grains have drawn the attention towards intensification of efforts to develop the indigenous livestock and feed resources, particularly at the newly reclaimed land and desert area. Animal flocks under desert conditions mainly depend on grazing the natural vegetation in South Sinai Governorate. Because of the low seasonal erratic rainfall (30-150-mm/year) forage resources are considerably seasonal , greatly fluctuate in both quantity and quality (El-Shaer 1981). Shortage in feedstuff is considered the main constrain to increase and improve animal productivity. Intensive efforts have been directed to improve the present situation of the natural ranges and its utilization by sheep. Rehabilitation of such range lands with suitable shrubs, grasses, legumes and trees can considerably provide low cost fodders for animals (El Shaer, 1995).These fodders should be salt tolerant or / and drought resistant to be adaptable for propagation under salt and arid condition. *Atriplex lentiformis* shrubs is chosen among such fodders to be cultivated in Ras Sudr Research Station for being salt tolerant and / or drought resistant and also giving great biomass all round the year.

The present work was focused on two main objectives. The first objective was to investigate the effect of irrigation intervals(15, 30, 45 days) on the nutritive values of *Atriplex lentiformis* and its utilization .The performance of sheep fed rations containing *Atriplex lentiformis* was also studied as a second objective.

MATERIALS AND METHODES

The present study was conducted at Ras Sudr Research station, Desert Research Center (DRC), to study the effect of feeding sheep on *Atiplex lentiformis* ,which was exposed to three irrigation intervals (15, 30 and45 days) on feed intake , digestibility coefficients of nutrients ,nutritive value, nitrogen balance, water balance , some serum biochemical parameters and body weight changes of animals . The period of exposing Atriplex to saline water irrigation was six monthes. The experiment was conducted for 45 days during the dry season, (summer). It comprised two trials. The palatability (feeding) trial, which extended for 30 days followed by digestibility trial for 15 days.

Experimental animal and their management

Fifteen mature Barki rams similar in age (18 month) and with an average weight of 34.2 ± 1.63 kg were used in the present study. During the palatability trials, animals were housed in shaded pens and fed as group feeding. Meanwhile, they were individually placed and fed in metabolic cages during the digestibility trial.

Experimental treatments

Blood serum samples were taken from fifteen mature rams which was fed conventional ration (clover hay plus concentrate feed mixture)before starting the experiment. These animals considered as a control group. After that the same animals were divided into three uniform animal groups (5 animals / each) and randomly assigned to three experimental rations. All animals in the three groups were fed Quail saltbush as a basal ration in addition to 150 gram date seeds / head / day as feed supplement to cover 25% of its total digestible nutrients (TDN) maintenance requirements according to the recommendation of Kearl, (1982). The basal rations were Quail salt bush (*Atriplex lentiformis*) which was exposed to three irrigation intervals: 15, 30 and 45 days, denoted as AL 15, AL 30 and AL 45, respectively.

Palatability and digestibility trials

Edible parts of the forage (leaves and succulent soft branches) were daily collected and chopped at feeding time then introduced to the animals. Each animal group was offered the tested rations twice daily at 8.00 a.m and 16.00 p.m hours for 30 days . Amounts of feed offered and refused were daily recorded to calculate feed intake. Fresh drinking water was available at fixed time for one hour (13.00 p.m hours). Animals were weighed at the beginning of experiment then on biweekly intervals. Body weight changes were recorded for each animal. At the end of the palatability trial, when feed intake reached the peak and became stable, the animals were placed in metabolism cages for 15 days of which the first 8 days were adaptation period and 7 days as a collection period. The average voluntary feed intake during the last week of the palatability trial was offered to animals during the digestibility trial. The accurate voluntary intake was measured and quantitative collection of faeces and urine was recorded. Drinking water intake was measured and recorded daily.

Analytical procedures

Representative samples from feed offered, residues and faeces were taken , dried at 65◦ C and kept in plastic bags for chemical analysis using the official method of A. O. A. C. (1990 The cell walls constituents, neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) were determined according to the method described by Goering and Van Soest (1970).Some macro elements (Na , K and Ca)were determined (A.O.A.C.,1990).). Urinary nitrogen was determined using Kjeldahl modified method (A.O.A.C.,1990) .

Biochemical analyses

Blood serum samples were taken from the control animal group(15 animal) which was fed on control ration (clover hay + concentrate feed mixture)before starting the experiment and also those fed on R1, R2 and R3 (un-conventional rations).Blood serum samples were prepared and stored at - 20؛؛C for the determination of the some biochemical parameters. Alanine aminotransferase (ALT) and aspartate aminotransferase(AST)was estimated (Reitman and Frankel,1957).Determination of total protein was carried out by the method of Armstrong and carr (1964). Albumin was estimated (Doumas *et. Al.,* 1971).Blood urea nitrogen and blood creatinine levels were determined according to the methods of Patton and Crouch(1977) and Henry(1974).Serum sodium (Na)and potassium (K) concentrations was estimated by flame photometer according to A.O.A.C.(1990) meanwhile, serum calcium was estimated by atomic absorption (A.O.A.C.1990).Cholesterol determination was carried out according the methods of Richmond (1973).

Statistical analysis

All parameters were statistically analyzed as completely randomized block design using SAS (1990). Differences among the means were compared by Duncan's Multiple range test (1955)

RESULTS AND DISCUSSION

Chemical composition and fiber constituents of feed components and the tested rations are presented in Table (1). Data indicated that dry matter (DM), ash, crude fiber (CF), neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) of *Atriplex lentiformis* were increased as a result of increasing irrigation intervals from 15 to 45 days. Their corresponding values were 44.8, 22.5, 16.5, 48.9, 23.4 and 7.5 % for AL 15 versus 48.9, 29.8, 18.4, 53.0, 26.1, and 9.9 % for AL 45. The opposite trend was true for crude protein (CP), nitrogen free extract (NFE), and organic matter(OM). The chemical composition of the tested rations (R1, R2, R3) showed the same trend of feed components.

Table (1): Chemical composition and fiber constituents of feed ingredients and the experimental ratios (% on DM basis).

Criteria	Chemical composition							Fiber constituents		
	DM	Ash	CP	CF	EE	NFE	OM	NDF	ADF	ADL
AL15	44.8	22.5	13.8	16.5	2.40	44.8	77.5	48.9	23.4	7.50
AL 30	47.3	25.1	13.1	16.9	2.39	42.51	74.9	49.5	24.5	8.90
AL 45	48.9	29.8	11.9	18.4	2.25	37.6	70.2	53.0	26.1	9.90
GDS	89	5.28	7.6	13.6	3.87	69.65	94.7	73.9	45.0	12.9
R_1	48.3	20.0	12.9	16.1	2.61	48.4	80.0	52.5	26.5	8.29
R_2	51.0	22.0	12.2	16.4	2.63	46.8	78.0	53.3	27.7	9.47
R_3	52.7	25.9	11.2	17.6	2.51	42.8	74.1	56.3	29.1	10.3

AL15 = Quail saltbush irrigated at 15 days intervals.
AL 30= Quail saltbush irrigated at 30 days intervals.
AL 45= Quail saltbush irrigated at 45 days intervals.
GDS = Ground date seeds, R_1 = Consists of AL 15 plus GDS.
R_2 = Consists of AL 30 plus GDS. R_3 = Consists of AL 45 plus GDS.

Body weight changes and average daily feed intake, total digestible nutrients (TDN) and digestible crud protein (DCP) intakes during the palatability trial are summarized in Table 2 and Fig.(1, 2). Daily feed intake was gradually increased and reached the peak at the end of the third week and remain constant to the end of the palatability trial as shown in Fig.1. The first animal group (AL 15+ date seeds) consumed the highest value from DM, TDN and DCP. Their corresponding value were 56.5, 23.8 and 6.15 g/ kg $w^{0.75}$ indicated that such ration (R1) was more palatable and nutritious rather than rations R2 and R3.

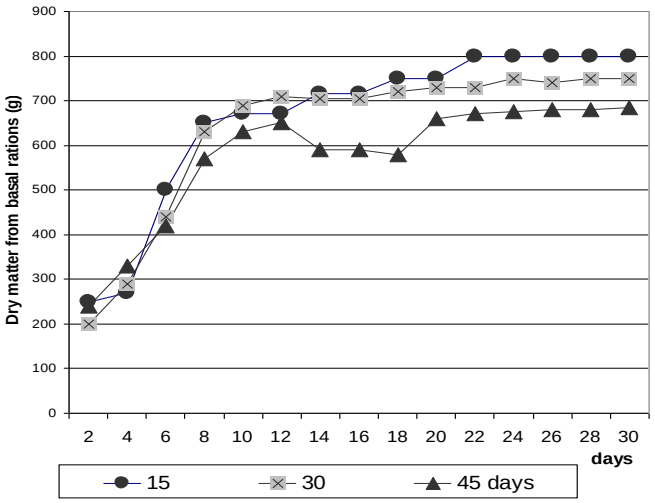


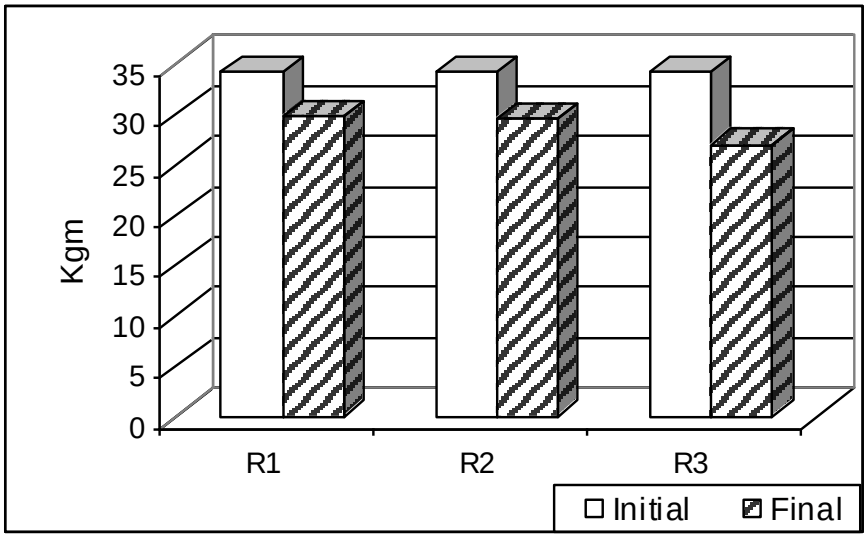
Fig (1): Voluntary feed intake from basal ration during the palatability

The lowest intakes expressed as gram per kilogram metabolic body size (g/ kg $w^{0.75}$) from DM, TDN and DCP (50.4, 19.4 and 4.81) were recorded for those fed R3 (AL 45 + date seeds). The animals in the second group showed intermediate values. Despite that the animals fed the tested rations (R1, R2 and R3) received more double DCP than their maintenance requirements, they covered only 74.1, 67 and 60,4 % of their energy maintenance requirements according to the recommendation of Kearl (1982).

Because of all animal groups did not cover their energy maintenance requirements, They lost weight (146, 156 and 240 gm/head/day for those fed R1, R2 and R3, respectively). It could be concluded that animals should be supplemented with more than 150 g date seeds or barley grains as source of energy and *Atriplex lentiformis* should be processed (dried, ensiled) or mixed with some grasses prior offering to the animals . The obtained results are very close to the findings of Hassan and Abd El- Aziz (1979); Kandil and El-Shaer (1988) ; El- Shaer and Kandil (1990) and Abou El Nasr *et al.* (1996).

Voluntary feed intake from dry matter (DM),crude protein (CP) and neutral detergent fiber (NDF) of the experimental rations during the

digestibility trial are summarized in Table(3). Concerning the above



parameters no significant differences were detected among animal groups.
Fig (2): Body weight changes during palatability trial.

Table (2): Body weight changes and daily voluntary intake by sheep during the palatability trail.

Items	R_1	R_2	R_3
No. of animals	5	5	5
Initial live body weight (Kg)	34.2	34.2	34.2
Final live body weight (Kg)	29.8	29.5	27.0
Body weight changes (Kg)	-4.4	-4.70	-7.2
Body weight changes (g/day)	-146	-156	-240
Dry matter intake ,g/Kgw$^{0.75}$			
Atriplex lentiformis	47.1	45.2	41.0
Date seeds	9.44	9.44	9.44
Total ration	56.5	54.6	50.4
TDN intake (g/Kgw $^{0.75}$)	23.8	21.5	19.4
MR TDN (g/ Kgw $^{0.75}$)	32.1	32.1	32.1
% MR	74.1	67	60.4
DCP intake (g/kgw$^{0.75}$)	6.15	5.47	4.81
MR DCP (g/ kgw$^{0.75}$)	2.74	2.74	2.74
% MR	224	199	175

MR : maintenance requirements (*Kearl, 1982)*Dry matter intakes from *Atriplex lentiformis* for animal fed R1 and R3 were similar (62.6 vs 62.7 g/kg w$^{0.75}$) but those fed R2 consumed the lowest amount (57.9 g/kg w$^{0.75}$).

These values are close to the findings of Abou El Nasr , *et al.* (1996) who studied the nutritive value of *Atriplex nummularia* (Salt bush) in its green , hay and silage forms using adults rams. The maximum intake

from CP (9.45 g /kg $w^{0.75}$) were achieved for rams fed R1 followed by those fed R2 and R3 in decreasing order. The higher crude protein intake from ration (R1) was mainly due to its higher crude protein contents (12.9 %) as shown in Table (1) . Owing to the similar dry matter intake from R1 and R3 , but R3 contained the higher NDF (56.3 vs 52.5 %) than R1, therefore the NDF intake from R3 was higher than R1 (33.2 vs 30.6 g/kg $w^{0.75}$). On the other hand , NDF intake from R2 was the lowest . This may be mainly attributed to its lower dry matter intake (57.9 vs 62.7 g/kg w $^{0.75}$) compared to R1 and R3, respectively . It could be concluded that there was no any significant effect of irrigation intervals (15, 30 and 45 days) on intakes from dry matter, CP and NDF .The results in this study are in harmony with those obtained by Abou El-Nasr *et al*. (1996).

Data of nutrients digestibility, nutritive value and digestible nutrients intakes from the tested rations during the metabolism trial are presented in Table (4). With regard to all nutrients digestibility , no significant differences were detected among the animal groups . Their means values within the normal range and agreed with the results of many investigators (Hassan and Abd El Aziz ,1979 ; El -Shaer and Kandil 1990 ; Abou El- Nasr *et al*., 1996. and Shawkat, 1999). Nutritive value (TDN %) of *Atriplex lentiformis* insignificantly decreased as a result of increasing irrigation intervals from 15 day up to 45 day. Their corresponding values were 46.2 , 43.7 and 41.2 % for R1, R2 and R3. On the other hand , digestible crude protein percentage (DCP%) significantly decreased due to increasing irrigation intervals . The greatest DCP % was recorded for R1 followed by R2 and R3 in descending order, being 9.23, 8.86 and 7.69%. Higher digestible crude protein percentage of R1 may be attributed to its higher CP content (12.9 %) of such ration and *vice versa* for R3. The intake from DCP and OM of the tested ration followed the same pattern of its nutritive value. The higher intake from TDN (33.9 g/kg w $^{0.75}$) was recorded for sheep fed R1 whereas those fed R2 and R3 showed similarity in their intake . These results are close to data obtained by many investigators(Kandil and El-Shaer , 1988 ; El- Shaer and Kandil , 1990; Abou El Nasr *et al*.,1996 and Shawkat ,1999).

Table (3): Daily voluntary feed consumption of sheep fed the tested rations during the digestibility trial

Items	R_1	R_2	R_3	± SE	Ftest
No. of animals	5	5	5		
Live body weight (Kg)	29.8	29.5	27.0	1.45	N.S.
Voluntary intake (g/ $kgw^{0.75}$)					
Atriplex lentiformis	62.6	57.9	62.7	1.94	N.S.
Date seeds	10.7	10.6	11.4	0.37	N.S.
Total	73.3	68.5	74.1	2.24	N.S.
Crude protein intake(g/ Kgw $^{0.75}$)					
Atriplex lentiformis	8.64	7.59	7.46	0.28	N.S.
Date seeds	0.81	0.81	0.86	0.028	N.S.
Total	9.45	8.40	8.32	0.3	N.S.
NDF intake (g/ Kgw $^{0.75}$)					
Atriplex lentiformis	30.6	28.6	33.2	1.07	N.S.
Date seeds	7.93	7.86	8.44	0.27	N.S.
Total	38.5	36.5	41.6	1.30	N.S.

NS = not significant at (P>0.05).

Table (4): Nutrients digestibility, nutritive value and digestible nutrients intake from the tested rations by sheep during the digestibility trial.

Items	R_1	R_2	R_3	+ S.E.	F.Test
No. of animals	5	5	5	-	-
Initial Live body weight (Kg)	29.8	29.5	27.0	1.45	N.S.
Digestibility Coefficients, %					
DM	54.5	59.8	61.0	1.11	N.S.
CP	71.5	72.5	68.4	0.76	N.S.
CF	36.6	38.3	39.3	1.94	N.S.
EF	35.4	37.7	31.6	1.7	N.S.
NFE	59.9	56.1	58.5	1.56	NS
OM	56.3	54.4	54.4	1.38	N.S.
NDF	49.2	50.4	54.9	1.62	N.S.
ADF	38.6	36.9	47.8	2.59	N.S.
Nutritive Value %					
TDN	46.2	43.7	41.2	1.24	N.S.
DCP	9.23^{a}	8.86^{a}	7.67^{b}	0.21	***
Digested nutrients intake (g/ $Kgw^{0.75}$ / day)					
TDN	33.9	30.1	30.8	1.58	N.S.
DCP	6.77	6.07	5.73	0.24	N.S.
OM	33.1	29.1	30.1	1.55	N.S.

NS= not Significant (p> 0.05), * = (P< 0.001).**
a,b,c Means with different superscripts in the same row are significantly different.

There was no significant effect of irrigation intervals on nitrogen intake, expressed as mg/kg BW which ranged from 578 for animals fed R2 to 653 for those fed R1 (Table 5). Nitrogen intake (1511mgN/Kg w 0.75) was the greatest for animals fed R1 (AL15 plus date seeds) mainly due to its higher (12.9%) crude protein content as shown in Table(1) .

Table (5): Daily nitrogen balance by sheep fed the tested rations during the digestibility trial.

Items	R_1	R_2	R_3	± S.E.	F.Test
No. of animals	5	5	5	-	-
Live body weight (Kg)	29.8	29.5	27.0	1.45	N.S.
Nitrogen intake:					
mg/kg b.w	653	579	587	25.7	N.S.
mg/kg $w^{0.75}$	1511	1341	1331	48.1	N.S.
Nitrogen excreted in faeces:					
mg/kg b.w	185	158	184	8.03	N.S.
mg/kg $w^{0.75}$	428	366	418	15.2	N.S.
% of intake	28.3^{ab}	27.3^{b}	31.5^{a}	0.77	*
Nitrogen excreted in urine:					
mg/kg b.w	493	509	478	24.5	N.S.
mg/kg $w^{0.75}$	1137	1185	1084	51.4	N.S.
% of intake	75.4	88.0	81.4	3.49	N.S.
Total nitrogen excretion:					
mg/kg b.w	678	667	662	28.7	N.S.
mg/kg $w^{0.75}$	1565	1551	1502	56.2	N.S.
% of intake	103.7	115.3	112.9	3.42	N.S.
Nitrogen balance:					
mg/kg b.w	-25	-88	-75	19.2	N.S.
mg/kg $w^{0.75}$	-54	-210	-171	45.3	N.S.
% of intake	-3.0	-16.4	-13.2	3.42	N.S.
% of digested	-3.70	-15.3	-12.9	4.80	N.S.

NS= not Significant at (P>0.05) ; * = (P< 0.05).
Means in the same row bearing different superscripts differed significantly (p< 0.05)

For this reason, nitrogen lost in their faeces was also the greatest one. Both nitrogen excreted in faeces and digestible nitrogen intake were significantly influenced due to irrigation intervals when expressed as % of nitrogen intake. Nitrogen lost in urine resembled the higher percentage than nitrogen excreted in faeces. Their corresponding values were 74.7, 89.1 and 88.7% of intake against 28.3, 27.3 and 31.5 for animals fed R1, R2 and R3, respectively. Salt bushes (*Atriplex Spp*) in general are rich in its crude protein (CP) and ash contents but their contents from soluble carbohydrates in the form of nitrogen free extract and ether extract are poor. Deficiency of soluble carbohydrates together with the rapid hydrolysis of its crude protein (CP) in the rumen led to accumulation of ammonia which is inefficiently utilized in the rumen, giving rise to blood urea nitrogen consequently increase urinary nitrogen excretion *(*Weston *et al*. 1970 and Hassan and Abd El Aziz 1979)**.** Date seeds or barley grains as energy source are suggested to correct the misuse of ruminal ammonia nitrogen and to stimulate salt bush intake (Hassan and Abd El Aziz, 1979; El-Shaer and Kandil, 1990 and Shawket *et al*.,1998). The total nitrogen excretion via faeces and urine did not significantly vary among animals groups. Their values ranged from 662 mg/ Kg BW for animals fed R3 to 678 mg/Kg BW for those fed R1 (AL15 plus date seeds). Since the animal fed R1 tended to consume the greatest amount of nitrogen they excrete more nitrogen than other groups. Nitrogen balance was negative for all animal groups but in favour of those fed R1 (Table5). Similar trend was reported by many investigators **(** Kandil and El-Shaer 1988; El-Shaer and Kandi, 1990 and Warren *et al*., 1991)**.** *Atriplex lentiformis* either (Al 15) or (AL 30) could be suggested for to be used as salt roughage .Since the animals were unable to cover 75% of their maintenance energy requirements from Atriplex , more than 25% of the maintenance energy requirements should be covered from concentrate or by imroving the feeding value of *Atriplex* by ensiling.

Concerning water intake, excretion and balance, no significance differences were detected among the animal groups (Table6). Drinking water (free water) was comparable for animals fed R_1, R_2 and R_3 . This observation may be due to that ash content of such rations were comparable. The total water intake followed the same pattern of drinking water.

Water excreted in faeces represented small percentage from water. Its corresponding values as % of water intake were 7.67, 6.67 and 7.12 for animals fed R1, R2 and R3, respectively. On the other hand, Urinary water excretion values as % of water intake were 48.5, 51 and 49.9 for animals fed R1 , R2 and R3 ,showing that large amounts of water were excreted in urine . Water excreted *via* faeces and urine resembled the total water excretion. Their corresponding values when expressed as % of intake were similar for the three tested rations. (average 57.0 %). Water retained in body fluid and water excreted in sweat and respiration resembled water balance. Average values of water balance recorded comparable values for animals fed the experimental rations. The higher value (87.5 ml/kg BW) of water balance was attained for animals fed R1 whereas those fed R2 and R3 showed similar values average 76.4 ml/kg BW. Therefore, animals fed R1 were more adapted for thermoregulation under heat stress of the deserts.

Mean values of some blood parameters are summarized in Table 7. Data of alanine aminotransferase (ALT), albumin and sodium levels showed that no significant differences were detected as result of feeding sheep on *Atriplex lentiformis* in the three animal groups compared to those fed on clover hay (Control ration). The average values of ALT were within the normal range and recorded the highest values for animals fed ration 2 (R2) followed by those fed R1 whereas its values are similar for animals fed R3 and those fed the control ration. Their corresponding values were 9.00, 7.75, 6.5 and 6.58 IU/L for animals fed R2, R1, R3 and control ration, respectively.

Table (6): Daily water Balance by sheep fed the tested rations during the digestibility trial.

Items	R_1	R_2	R_3	± S.E.	F.Test
No. of animals	5	5	5		
Live body weight (Kg)	29.8	29.5	27	1.45	N.S.
Free water intake:					
ml/kg Bw	156.8	142.6	144.8	5.49	N.S.
ml/kgw $^{0.82}$	286.6	261.9	261.9	9.4	N.S.
ml /g D MI	4.94	4.88	4.51	0.18	N.S.
Combined water intake:					
ml/kg Bw	33.9	28.4	26.7	1.5	N.S.
ml/kgw $^{0.75}$	61.9^{a}	52.0^{ab}	48.1^{b}	2.56	*
Metabolic water intake:					
ml/kg Bw	8.82	7.78	8.18	0.48	N.S.
ml/kg w $^{0.82}$	16.1	14.2	14.7	0.79	N.S.
Total water intake:					
ml/kg Bw	199.5	178.7	179.7	6.97	N.S.
ml/kgw $^{0.82}$	364.7	328.2	324.8	11.7	N.S.
Faecal water excretion:					
ml/kg Bw	15.3	11.93	12.8	0.69	N.S.
ml/kg w $^{0.82}$	27.9	21.9	23.1	1.22	N.S.
% of intake	7.67	6.67	7.12	0.29	N.S.
Urinary water excretion:					
ml/kg Bw	96.8	91.3	89.7	4.00	N.S.
ml/kgw $^{0.82}$	177	167.8	162	7.1	N.S.
% of intake	48.5	51	49.9	1.18	N.S.
Total water excretion:					
ml/kg Bw	112.1	103.2	102.5	4.33	N.S.
ml/kgw $^{0.82}$	204.9	189.7	185.1	7.58	N.S.
% of intake	56.2	57.7	57.0	1.18	N.S.
Water balance:					
ml/kg Bw	87.5	75.5	77.2	3.82	N.S.
ml/kgw $^{0.75}$	159.7	438.4	139.7	6.43	N.S.
% of intake	43.8	42.3	43.0	1.18	N.S.

NS= not Significant at (P>0.05), * = (P< 0.05).
Means in the same row bearing different superscripts differed significantly (p< 0.05)

These results are in harmony with that recorded by Ibrahim (2001). On the other hand, aspartate aminotransferase (AST) levels were increased (P<0.001) as result of sheep feeding on *Atriplex* based rations compared with those fed the control ration (clover hay + concentrate feed mixture). The highest level of AST (25.7 IU/L) was recorded for animals fed reation 3 (R3) versus 16.6 IU/L for those fed the control ration. These results agree with the findings of Molander *et al*.(1957) who reported that serum transaminase (AST & ALT) values increase with disturbances of liver function, where significant areas of hepatic cells undergo necrosis. These results also agree with those reported by Ibrahim (2001).

Table (7): Average values of some blood metabolites concentration for sheep fed Atriplex based rations.

Item	Control Ration	Unconventional rations			± S.E.	F-Test
		R1	R2	R3		
ALT, IU/L	6.58	7.75	9.00	6.50	0.46	N.S.
AST, IU/L	16.6 ^{c}	19.2 ^{bc}	25.7 ^{a}	23.3 ^{ab}	0.97	***
Totalprotein, mg/dL	7.11 ^{a}	5.83 ^{b}	6.54^{ab}	6.25 ^{ab}	0.16	*
Albumin, mg/dL	2.99	3.22	3.07	2.69	0.08	N.S.
Glubulin, mg/dL	4.11 ^{a}	2.61 ^{b}	3.47^{ab}	3.56 ^{ab}	0.19	*
Urea-nitrogen, mg/dL	25.8 ^{b}	60.6 ^{a}	61.0 ^{a}	56.7 ^{a}	3.23	***
Creatinine, mg/dL	0.97 ^{b}	1.30 ^{a}	1.00 ^{b}	1.21 ^{ab}	0.04	*
Cholesterol, mg/dL	72.1 ^{b}	76.9^{b}	81.4 ^{b}	100 ^{a}	2.68	***
Calcium, mg/dL	7.09 ^{b}	10.0 ^{a}	9.07 ^{a}	8.88 ^{a}	0.34	**
Sodium, mg/dL	314	328	294	294	1.79	N.S.
Potassium, mg/dL	7.09^{b}	10.03^{a}	9.06^{a}	8.90 ^{a}	0.07	**

Control ration (Conventional ration) consists of clover hay + concentrate feed mixture.
R1 Consists of Al 15 + date seeds.
R2 Consists of Al30 + date seeds.
R3 Consists of Al45 + date seeds.
N.S. = insignificant, * = (P < 0.05), ** = (P< 0.01) * = (P< 0.001).**
A,b,c, Means values in the same row bearing different superscripts differed significantly (P<0.05).

There was significant decrease (P< 0.05) in total proteins in all groups fed *Atriplex* based rations compared to the control group. This decreasing may be due such *Atriplex* based rations contained high levels of tannins which caused inhibition of both microsomal enzymes and protein synthesis(Singleton,1981) or the large losses of nitrogen in urine as showen in Table(5). Kumar et al., (1980) suggested that serum total protein can be used as an indicator to evaluate the ruminants nutrition when fed either adequate or low levels of crude protein. Serum globulin concentration showed the same trend of total protein. Its values decreased (P<0.05) due to sheep feeding on *Atriplex* based ration compared with those fed the control ration. The obtained results are compatible with that of Abd El-Samee *et al* ., (1994) and Ibrahim (2001). Data of kidney function showed a significant increase in both serum urea nitrogen and creatinine levels as result of *Atriplex lentiformis* inclusion in the ration of sheep. The average values of serum urea nitrogen of sheep fed *Atriplex* based ration were 2.5 times of those fed the control ration. This increase may be due to high tanins present in Atriplex or its high salt concentration which adversly affect the kidney function. The results agree with the findings of Ibrahim (2001) total cholesterol, serum calcium and potassium levels were significantly increased due to sheep feeding on *Atriplex* based ration compared with the control group. Meanwhile serum sodium levels not significantly vary among animal groups. The results are in harmony with the findings of Abd El-Samee *et al*., (1994) who reported that plasma calcium concentration was increased when male growing rabbits fed *Atriplex nummularia*. It could be concluded that sheep feeding on Atriplex lentiformis adversely affect on liver, kidney function and some blood constituents. Therefore *Atriplex lentiformis* should be processed (drying, ensiling or chemical treatment) before sheep feeding

and the animals should be supplemented with more than 150 gram barley grains or date seeds for the following reasons :

1- If mature sheep males fed salt bushs (*Atriplex lentiformis*) and supplemented with more than 150 gram date seeds , Their intake and nutrients digestibility coefficient could be increased as well as some secondry metabolites (tannins , oxalate and alkaloides..etc.) existing in *Atriplex lentiformis* could be decreased.

2- The animals can covered their energy maintenance (TDN) requirements and nitrogen retention may change from negative to positive.

3- The animal's need for drinking water decreased as result of adding energy source (date seeds).

4- The animals can maintain them self without losses in their bodies weight.

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القيمة الغذائية للقطف العدسى المتأثر بالجفاف وتأثيره على أداء الأغنام

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أجرى البحث فى محطة بحوث رأس سدر التابعة لمركز بحوث الصحراء –محافظه جنوب سيناء لدراسة تأثير التغذية بالقطف العدسالذى تعرض لثلاث فترات رى (١٥-٣٠-٤٥ يوم) على الغذاء المأكول – معاملات هضم العناصر الغذائية – القيم الغذائية – ميزان النتروجين – ميزان الماء –بعض القياسات البيوكميائية فى الدم و التغير فى وزن الجسم للأغنام – تم تقسيم عدد ١٥ ذكر غنم بالغ الى ثلاثة مجموعات متماثلة فى الوزن (٣٤,٢ كجم) . تغذت المجموعة الاولى تغذية مفتوحة (لحد الشبع) على القطف الذى يروى على فترات كل ١٥ يوم بينما كانت تغذية الحيوانات فى المجموعتين الثانية والثالثة على القطف العدسى الذى يروى كل ٣٠ يوم و ٤٥ يوم على التوالى. زودت المجموعات الحيوانية الثلاثة بنوى البلح المجروش ليغطى ٢٥ % من الاحتياجات الحافظة من الطاقة . اشتملت الدراسة على تجربتين الأولى تجربة استساغة لمدة شهر اتبعت بتجربة هضم لمدة ١٥ يوم .

أظهرت النتائج أن المأكول من الغذاء اخذ فى التزايد تدريجيا الي أن وصل الى أقصى قيمة له في بداية الأسبوع الرابع ثم اخذ فى الثبات الى نهاية فترة الاستساغة . لوحظ انخفاض ملموس فى وزن جسم الحيوانات ترواح ما بين ٤,٤ –٢.٧ كجم . فيما يخص المأكول من البروتين الخام – NDF أثناء تجربة الهضم كانت القيم متقاربة ولم يلاحظ اى فروق معنوية بين المجموعات الحيوانية الثلاث . لوحظ نفس الاتجاه مع معاملات هضم المادة الجافة – البروتين الخام - الأليياف الخام – المادة العضوية و النسبة المئوية للمركبات المهضومة الكلية . وعلى الوجه الآخر فقد اختلفت انسبة المئوية للبروتين الخام معنويا بين المجموعات الثلاث وسجلت أعلى قيمة له (٩,٢٣ %)للعليقة رقم ١ ثم العليقة رقم ٢ ثم العليقة رقم ٣ فى ترتيب تنازلى . كان ميزان النتروجين سالبا لكل المجموعات الثلاث . لم يتأثر ميزان الماء معنويا وسجل قيم متقاربة .زادت تركيزات كلا من ALT , AST فى سيرم الأغنام المغذاة على القطف العدسى المتأثر بفترات الري المختلفة بمقارنتها بالأغنام المغذاة على العليقة التقليدية حيث كانت الزيادة معنوية للأول وغير معنوية للثاني .انخفض تركيز كلا من البروتين الكلى و الجلوبيولين انخفاض معنوي نتيجة تغذية الحيوانات في المجموعات الثلاث على القطف العدسى بمقارنتها بالمجموعة المغذاة على العليقة التقليدية .وعلى الجانب الآخر زادت تركيزات كلا من اليوريا – الكرياتينين - الكولسترول – الكالسيوم – البوتاسيوم بينما لم يتأثر تركيز الصوديوم .لاتستطيع الأغنام الاعتماد على القطف العدسى كعليقه أساسيه حتى مع امدادها بنوى البلح المجروش كمصدر طاقه ليغطى ٢٥%من احتياجاتها الحافظه من الطاقه على المدى الطويل ، لذلك ينصح باجراء المزيد من الدراسات لتحسين القيمة الغذائية للقطف العدسى بتحويلة الى سيلاج أو معاملتة بيولوجيا أو كيماويا مع دراسات أنسب الاضافات الغذائية لاغنائة بالطاقة مثل حبوب الشعير أو نوى البلح المجروش.