Comparative Study and Feed Evaluation of Sprouted Barley Grains on Rice Straw Versus Tamarix Mannifera on Performance of Growing Barki Lambs in Sinai

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Abstract: In arid and semi arid areas Tamarix mannifera (Tm) was considered one of the principal feed resources , rice straw (Rs) one of agriculture wastes produced in a large amount but they have low nutritive value so several treatments were applied to ameliorate the utilization of Tamarix and rice straw. The objective of this study was to investigate the effect of sprouted barley on Tm , Rs and mixture of them. Thirty five growing femal Barki lambs of about four months old with an average live body weight (L.B.W) of 16 $\pm$ 0.5kg were divided into five treatments (7 animals each) to receive one of the following experimental roughages: treatment T_1 : rice straw (Rs) ad-lib (untreated) as control; T_2:dried Tamarix ad-lib(Tm)as control ;T_3 : sprouted barley grains on rice straw ad-lib (BRs) ; T_4 : sprouted barley grains on driedTamarix ad- lib (BTm) ; T_5 : sprouted barley grains on 50 % Rs + 50 % Tm ad-lib (BRs+ BTm) . The experimental growing trial lasted for about 180 day. All animal treatments were fed 60% of total energy requirement as concentrate feed mixture (CFM). At the end of the growing trial five digestibility trial were conducted to evaluate the digestibility of the experimental roughages. Results showed that the treatments with sprouted barely increased CP, Ash and NFE while DM, OM, EE, CF, NDF, ADF and ADL contents, were decreased. Sprouted barely on Tamarix (BTm) or rice straw (BRs) revealed a significant ($P \leq 0.05$) improvement in OM, CP, EE and cellulose digestibility with an insignificant higher in CF, NDF and hemicellulose digestibility. Nutritive values expressed as TDNg/Kg B.W. and DCP% increased significantly ($P \leq 0.05$) with treatments T_2, T_3 and T_4 than untreated T_1 (Rs) and T_5 (Tm). Also, ewes fed the treated roughages retained higher ($P \leq 0.05$) nitrogen values than untreated treatments. Ewes fed sprouted barely had significantly higher ($P \leq 0.05$) values of total volatile fatty acids (VFA), ruminal ammonia (NH3- N) concentration, serum total proteins. Albumin and urea, was insignificantly increased, while serum globulin and creatinin were insignificantly decreased GOT, GPT activity than untreated roughages. The highest ($P \leq 0.05$) value of average daily gain , feed conversion (g feed/ g gain) and economical feed efficiency were recorded for T_4. However the lowest ($P \leq 0.05$) values were recorded for T_1. In conculusion we can produce green fodder by utilizing dried Tamarix and rice straw by simple methodology using crop sprouts (barley).

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1. Introduction:

In Egypt there is a large amount of agricultural wastes produced annually, after harvesting of grains. One of these wastes is rice straw which produced in an average of 3.5 million ton on year (Khattab *et al.,* 2009). Rice straw is of poor nutritive value for ruminants related to its low protein content, high fiber content and low palatability. Abig amount of rice straw is disposed by burning , so, air pollution increased which reflect on human health. Few attempts were tried to improve nutritive value of rice straw (Ibrahim *et al*., 2001, El- Tahan *et al*., 2003 and Mohammadi *et al*., 2007).

Halophytes are considered as an important source of nutrients for most desert ruminants. some of them are less or unpalatable. Kandil and El-Shaer (1990) reported that Tamarix mannifera and other range plants containe high level of neutural detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) which could be depressed the voluntary intake and nutritive value and they appeared to be less or unpalatable halophytic species. Forage intake is related to fiber digestibility because intake is reduced when indigestible fiber is increased in the digestive tract. (Mertens., 1993).

Many investigators treated range plants by several chemical and physical treatments to improve their nutritive values (El-Essawy 2008., Fayed *et al*., 2008, and Fayed 2009).

Sprouting activities in the seeds have many changes as in seed protein converted to essential amino acids, carbohydrates are converted to sugars and fats are converted to essential fatty acids. These activities increase as a result of increasing enzymes levels (Chavan and Kadam 1989). Due to their activities enzymes, sprouts are much easier to be digested than dry seeds. (Goodwin and Mercer 1993). The objective of the present work is to study the effect of using dried Tamarix mannifira and rice straw as media for growing barely seeds to produce green fodder in dried seasons to increase the nutritive value, palatability of Tamarix and rice straw. Green fodder was fed to growing sheep to study their effects on growth, digestibility, some rumen and blood parameters of sheep.

2. Material and Methods:

Animals and management:

This study was conducted in Ras Sudr Research station, south Sinai Governorate and lasted for six months. Thirty five female Barki lambs of four months old and average 16±51 kg live body weight were divided randomly into five equal groups. A feeding experiment followed by a metabolism trial was conducted. Animals were weighed on biweekly basis. Nutrient requirements were adjusted to the changing in the body weight every two weeks. At the end of the experimental feeding four animals from each group were randomly selected for the metabolism trial, fifteen day adaptation period followed by 5 days collection period. During the collection period, fecal and urine samples were collected daily (10% by weight of daily samples). At the end of collection period of the metabolism trial, rumen, liquor was sampled by stomach tube at 0, 3, 6, 9 hours after feeding, blood samples were taken from jugular vein at 0, 6 hours after feeding.

Experimental feed:

Dried Tamarix mannifera was collected and chopped into 2-3 cm and rice straw also, was chopped into 2-3 cm, soaked in tap water over night and used as bedding media.

Production method for seed sprouts was tray method as described by Mohammadi et al., (2007) using about 10 cm thich layer of chopped rice straw (Rs) or Tamarix mannifera (Tm) as a sprouting media. Barley grains were washed and soaked in tap water and stored in a dark area for 12 hr. (overnight) to allow for initial germination. At the end of soaking period soaked seeds were spread evenly on the top of Tamarix (Tm) or Rs media. Germination period on the media surface lasted about 10 days to get shoot sprouts, shoot length was 10- 15 cm, barley seeds were used at 20% density of roughage (rice straw and Tamarix)

Animals were fed concentrate feed mixture (CFM) to cover 60% of maintenance energy requirements according to Kearl (1982) and the roughage portion was left free choice for animals :

The tested treatments were as follows:

T_1 : CFM + rice straw (Rs)

T_2: CFM + Tamarix (Tm)

T3: CFM + sprouted barely grains on rice straw (BRs)

T_4: FM + sprouted barley grains on Tamarix (B Tm)

T_5: CFM + sprouted barley grains on 50 % (Rs) + 50 % (Tm).

Analysis:

The proximate constituents of feeds, feed refusals, feces and total nitrogen in urine were determined according to A.O.A.C.(1990). Neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin ADL were determined according to Goering and Van Soest (1970). Rumen total volatile fatty acids (TVFA,s) were analyzed according to Warner (1964), ammonia nitrogen according to A.O.A.C. (1990).

Blood samples were collected from jugular vein, serum was obtaind after centrifugation at 3000 r.p.m., stored at–20^0 c till analysis and used to determine total serum protein according to (Armstrong and Carr 1964), albumin according to (Doumas., et al 1971), globulin (was obtained by substracting the albumin values from the total proteins) creatinine according to (Henry 1965), urea according to (Patton and Crouch (1977).. Blood serum analysis was conducted using Jenway Spectrophotometer (UK) and using kits purchazed from Human Co. (Germany).

Statistical analysis:

General linear model procedure was used for statistical analysis using SAS (1998). The used design was one way analysis. Duncan's multiple tests (1955) were applied for comparison of means.

3. Results and Discussion:

Chemical composition of the tested rations:

As shown in Table (1) cleared that Dry matter (DM) content was lower in treated than untreated rice straw (Rs) and Tamarix (Tm). While rice straw had higher DM than Tamarix. Organic matter (OM) content was higher in rice straw than those for Tamarix which may due to the increase in ash content of Tamarix. The crude protein (CP) content in Rs or BRs was lower by 62.45, 26.78 than that in Tamarix, respectively. Also, BRs, BTm and 50% BRs + 50% BTm were higher in CP %, nitrogen free extract (NFE) and ash% and lower in ether extract (EE) and crude fiber (CF) contents. These results are in the same line noticed by Ibrahim *et al.*, (2001) . The CF% in BTm was lower by 42.3 than Tm and was lower in BRs by 33.2% than Rs . However, BRs + BTm had the medium level of CF than rice straw or Tamarix alone . Natural detergent fiber (NDF) , acid detergent fiber (ADF) , acid detergent lignin (ADL) and Hemicellulose percentage were higher in untreated and treated rice straw than in treated and untreated Tamarix resp. , while NDF, ADF, ADL, cellulose and Hemicellulose percentage were lower in BRs and BTm than untreated and treated rice straw and untreated Tamarix. This finding may be attributed to increase of the activity of sprouted barley hydrolytic enzymes and lead to improvements in chemical composition of rice straw and Tamarix. Similar results were obtained by Chavan and Kadam (1989).

Table (1): Chemical composition of the experimental rations (as DM basis)

Items	CFM	Rs	Tm	BRs	BTm	50% BRs + 50%BTm
DM	93.80	91.20	85.28	85.63	81.31	86.98
OM	88.98	80.66	75.17	77.85	72.65	75.27
Ash	11.02	19.34	24.83	22.15	27.35	24.73
CP	11.02	3.09	8.23	8.07	11.02	9.67
CF	12.20	33.26	28.85	22.21	16.64	21.79
EE	3.27	2.01	2.44	1.55	2.16	1.92
NFE	62.39	42.30	35.65	46.02	42.83	41.89
NDF	36.05	71.31	64.21	59.57	51.40	56.23
ADF	24.64	53.14	50.15	40.85	38.58	40.22
ADL	5.42	14.61	12.05	11.89	10.13	10.36
Cellulose	11.41	38.53	38.10	28.96	28.45	29.86
Hemicellulose	19.22	18.17	14.06	18.72	12.82	16.01

CFM:concentrate feed mixture Rs: rice straw. Tm: Tamarix mannefera.
BRs: sprouted barley on rice straw. BTm: sprouted barley on dried Tamarix.
DM: dry matter. OM: organic matter. CP: crude protein. CF: crude fiber.
EE: ether extract. NFE: nitrogen free extract. NDF: natural detergent fiber.
ADF: acid detergent fiber ADL: acid detergent lignin.

Apparent digestibility and nutritive value:

As shown in Table (2) showed that DM and OM digestibility was not affected by the type of roughage while DM, OM, CP, EE and NFE digestibility were significantly ($P \leq 0.05$) higher with sprouted barley on Tamarix and rice straw (T_4, T_5 and T_3) than untreated Rs and Tm . Also, CF and ADL digestibility was insignificant higher in both BTm, BRs and mixture of them (T_5) than those of untreated, rice straw and Tamarix . These findings may be due to an increase in the enzymes of germination of barley grains which lead to increase in the nutrients digestibility. Agreement results were reported by Shipard (2005) who found that feeding sprouted grains provided animals with living feed which has a rich supply of enzymes which results in all nutritional components being highly digestible and extremely nutritious.

On the other hand, the digestibility coefficients of all nutrients were higher in untreated Tamarix (T_2) than that of untreated rice straw (T_1). This may be due to the chemical composition of Tamarix which contain more CP and EE% and lower content of CF, NDF, ADF, ADL and Hemicellulos than those of rice straw. These findings agree with that reported by Talha *et al*., (2005) who reported that the variation in the digestibility due to the change in the chemical composition and were inversely related to the content of nutrient in the diet.

The CF digestibility of T_4 was insignificantly higher than that of T_3, T_5, T_2 and T_1 in descending order.

On the other hand, the cellulose digestibility significantly ($P \leq 0.05$) increased in T_3 (BRs) followed by T_5 and T_4 respectively. NDF, ADF and Hemicellulose digestibility were insignificantly higher in T_3 (BRs) and T_4 (BTm) than the other treatments. This may be attributed to increase in the bioactive catalysts which assist in the digestion and metabolism of feeds and the release of energy. Similar findings were noticed by Shipard (2005). In general, most of nutrients digestibility was increased with sprouted barely grains on Tamarix or rice straw. Similar trends were observed by Ibrahim *et al.*, (2001) who found that the digestibility coefficients of all nutrients for rice straw + sprouted barley were higher than that of untreated rice straw.

Mean effects of dietary treatments on nutritive values of the experimental rations (Table 2) showed that Tamarix significantly ($P \leq 0.05$) increased total digestible nutrients (TDN g/kg B.W), digestible crude protein (DCP %) value by 82.5, 61.5, 70.9, 78% than that of untreated and treated rice straw, respectively. These results may be attributed to low digestibility of most nutrients of rice straw than that of Tamarix. TDN g/kg BW or TDN % and DCP g/kg B.W. or DCP% for sprouted barley on Tamarix or rice straw were higher than those for untreated roughages. Similar results were obtained by Ibrahim *et al.* (2001).

Table (2): Digestion coefficients and nutritive values of lambs fed the experimental roughages

Items	T_1	T_2	T_3	T_4	T_5	±SE
DM %	53.83^b	55.16^b	64.01^a	65.83^a	64.67^a	3.14
OM %	55.92^c	59.65^{bc}	67.85^b	74.57^a	65.40^b	2.90
CP %	48.53^c	60.85^b	60.24^b	75.04^a	70.38^a	2.76
CF %	42.16	48.73	52.89	55.93	52.69	6.44
EE %	62.45^c	65.21^c	81.97^{ab}	83.18^a	76.02^b	3.65
NFE %	60.39^b	64.95^b	73.20^a	76.19^a	70.30^a	2.03
NDF %	40.37	45.86	49.41	48.66	41.47	5.41
ADF %	38.82	43.18	44.47	42.81	36.43	5.33
ADL %	12.65	14.77	17.84	18.01	18.09	3.22
Cellulose %	34.26^c	38.12^c	57.70^a	41.28^b	43.79^b	4.55
Hemicellulose	46.98	45.16	61.87	48.69	52.87	5.60
Nutritive- values						
TDNg/kg B.W	11.76^c	14.25^b	15.06^b	21.23^a	15.69^b	1.49
TDN%	47.96	49.67	60.85	63.87	59.25	2.65
DCP g/kg. Bw	1.23	1.52	2.09	2.12	1.89	0.12
DCP%	4.29^c	6.98_b	6.64^b	8.51^a	7.46^{ab}	0.38

T_1 : untreated rice straw (Rs) T_2 : untreated Tamarix (Tm) T_3 : sprouted barely on rice straw (BRs)
T_4 : sprouted barley on Tamarix (BTm) T_5 : 50 % BRs + 50 % BTm.
a,b,c Means with different superscripts in the same raw are significantly different at ($P \leq 0.05$)

Nitrogen balance**:**

As shown in Table (3); nitrogen intake (NI mg/kgB.W) was significantly ($P \leq 0.05$) higher with T_3 (3312.8) followed by T_5 (3200.0) while the lowest was recorded for T_1. The higher nitrogen intake was due to the higher dry matter intake while the lambs fed T_1, T_3 excreted more ($P \leq 0.05$) nitrogen in feces and lambs fed T_3 , T_5 had significant ($P \leq 0.05$) higher amounts of urinary nitrogen compared to T_4 and T_2 perhaps it could be attributed to the low Cp digestibility of rice straw than of Tamarix. Lambs fed BTm retained higher ($P \leq 0.05$) nitrogen than the other treatments. Nitrogen retention (NR)was higher for both BTm, BRs + BTm and BRs than untreated Tm or Rs while lambs fed Tm (T_2) retained nitrogen more than those fed Rs (T_1) which could be low in its content of nitrogen. Nitrogen retention as a percent of total nitrogen intake (NR% of NI) for T_4 was significantly ($P \leq 0.05$) higher than the other lambs fed the experimental roughages. This finding may be related to higher improvement in CP intake and its digestibility in Tamarix than rice straw (Table 2). Agreement results were reported by Fayed *et al.* (2009).

Table (3): Nitrogen utilization mg/kgB.W of femal lambs fed the experimental roughages.

Items	T_1	T_2	T_3	T_4	T_5	±SE
Nitrogen intake (NI)	2669.9^c	2765.2^b	3312.8^a	3004.8^b	3200.0^a	0.97
Fecal nitrogen (FN)	1599.3^b	951.2^b	1308.6^a	862.4^b	1107.2^{ba}	0.50
Urinary nitrogen (UN)	691.5^c	1211.2^b	1325.5^a	1183.9^b	1379.2^a	0.55
Total nitrogen excretion (TNE)	2290.8^c	2162.4^b	2634.1^a	2046.3^b	2486.4^a	0.63
Nitrogen retention (NR)	379.1^c	602.8^b	678.7^a	958.5^a	713.6^a	0.58
FN% of NI	59.91^a	34.38^{ba}	39.54^{ab}	28.67^b	34.58^{ba}	3.17
UN % of NI	25.91	43.83	40.01^a	39.44	43.12	3.94
NR % of NI	14.18^c	21.79^b	20.45^b	31.90^a	22.30^b	2.77

T_1 : untreated rice straw (Rs) T_2 : untreated Tamarix (Tm) T_3 : sprouted barely on rice straw (BRs)
T_4 : sprouted barley on Tamarix (BTm) T_5 : 50 % BRs + 50 % BTm.
a,b,c Means with different superscripts in the same raw are significantly different at ($P \leq 0.05$)

Rumen and blood parameters:

Data of rumen total volatil fatty acids (TVFA,s) (Fig 1) revealed that sprouted barely grains on Tamarix or rice straw and mixture of them T_4, T_5 and T_3 respectively, increased ($P \leq 0.05$) TVFA,s concentration in the rumen than untreated T_1 and T_2. While T_4 (BTm) had an increase ($P \leq 0.05$) in TVFA,s concentration (8.69 meq/ 100 ml) compare to T_5 and T_3 which have comparable values of TVFA,s (7.49 , 7.06 meq/ 100 ml) respectively . The lowest ($P \leq 0.05$) values of TVFA,s were showed in T_1 and T_2 (untreated) 4.02 and 4.49 meq/ 100 ml, these results are in harmony with those reported by Ibrahim *et al*., (2001) who reported that TVFA,s concentration were higher ($P \leq 0.05$) for sprouted barely on rice straw and bagasse than untreated. The increase in TVFA,s concentration with sprouted barley may due to sprouts provide a good supply of vitamins, enzymes which serve as bioactive catalysts to assist in metabolism of feed and the release of energy (Shipard 2005). Concentration of VFA,s increased after feeding and reach its peak after 3 hr post feeding. Similar results were obtained by Fayed (2009) when he treated Tamarix and Acacia with two strains of pleurotus. While the untreated rice straw treatment (T_1) reach its peak at 6 hr post feeding. Similar trends were observed with nitrogen ammonia (NH_3 –N) concentration (Fig 2). Thus the greatest value of NH_3–N was recorded for lambs fed T_4. This is may be due to such treatment contained high level of protein and its degradability. Where T_1 showed the lowest values of NH_3–N.

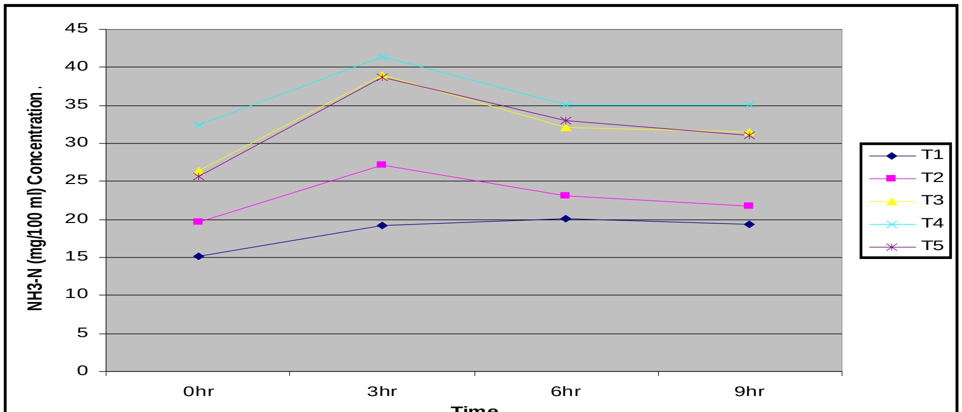

Figure (1): Rumen ammonia nitrogen of ewes

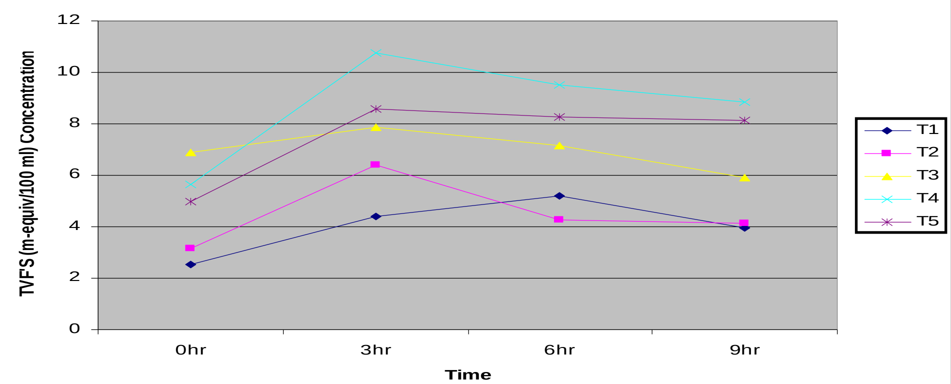

Figure (2):Rumen total volatile fatty acids of ewes

Data of Table (4) showed that total proteins concentration, Albumin- and A/G ratio were significantly elevated ($P \leq 0.05$) and globulin insignificantly affected by treatments. T_4 (BTm) and T_5 (BTm + BRs) increased ($P \leq 0.05$) serum total proteins, albumin and insignificant globulin more than the other treatments. The high level of glubulin of sprouted barely treatments may indicate good developed immunity status (Ibrahim *et al.,* 2001). A/G ration significantly ($P \leq 0.05$) increased with T_3 (BRs), while there were no significant differences between the other treatments. This was probably due to the high level of CP content in T4 and T5. This is in accordance with those reported by Kumar *et al*., (1980) who found a positive correlation between dietary protein and plasma protein concentration.

Also, overall means of serum urea increased significantly (P $\leq$ 0.05). However, serum creatinin was insignificantly increased with T4 and then T5. The lowest value of serum urea was with T1 and the lowest of creatinin was recorded for T2

Table (4): Some serum parameters of lambs fed the experimental roughages.

Items	T_1	T_2	T_3	T_4	T_5	±SE
Total protein g/d	6.31^{c}	6.79^{ac}	7.25^{b}	8.19^{a}	8.16^{a}	0.50
Albumin g/d	3.18^{c}	3.54^{b}	3.88^{b}	4.17^{a}	4.17^{a}	0.13
Globulin g/d	3.13	3.25	3.37	4.02	3.99	0.52
A/G ratio	1.02	1.09^{a}	1.19^{a}	1.04^{a}	1.08^{a}	0.14
Urea mg/d	35.73^{c}	40.56^{c}	50.70^{b}	67.30^{a}	57.68^{ab}	4.99
Creatinine mg/d	1.01	0.95	1.51	1.60	1.56	0.09

T_1 : untreated rice straw (Rs) T_2 : untreated Tamarix (Tm) T_3 : sprouted barely on rice straw (BRs)
T_4 : sprouted barley on Tamarix (BTm) T_5 : 50 % BRs + 50 % BTm.
a,b,c Means with different superscripts in the same raw are significantly different at (P $\leq$ 0.05)

Feed intake:

Data of Table (5) showed that animals fed T3 (BRs) consumed total DM and roughages intake more than other treatments (1051.67 , 357.55 g/head/ day respectively) followed by T1 and T5 which have comparable values of total DM and roughages. However the lowest was T2 (Tm) followed by T4 (BTm) . Sprouted barley grains increased roughage intake by 31.79%, on rice straw and by 34.3% on Tamarix which may be attributed to increase the palatability of BRs or BTm. Similar results were reported by Eshtayeh (2004).

All treatments were fed approximately similar amounts of CFM. The results of animal performance (Table 5) showed that lambs fed T1, T3, T5, T4 and T2 gained 58.49, 90.35, 80.91, 105.72 and 68.68% of initial body weight, respectively. The greatest value of daily gain was achieved with femal lambs fed T4 (Tamarix + SB). This may be due to its nitrogen retention was the highest (369.15mg/kg.B.W). On the other hand, the significant (p≤0.05) lowest daily gain was recorded for lambs fed the untreated roughages T1 and T2 in descending order .However differences of daily gain between the treated groups (T3, T5, T4) were not significant .The increase in weight gain of lambs received barley sprouts may attributed to enhancing of microbial activity in the rumen (Tudor *et al.*, 2003). Also, this observation may be due to lowest nitrogen retention and lowest digestibility of OM, CF, EE, NFE and ADF of untreated rice straw and Tamarix .

Feed conversion expressed as g feed/ g gain indicated that the lambs fed T4 (BTm) were more feed conversion as DMI (8.76), TDN (4.83) followed by T3 (BRs) and T5 (50% BRs+ 50% BTm) (12.11, 12.56, 6.61, 6.00) while the worest were the control treatments (T1, T2). These results agree with data showed by EShtayeh (2004) when sprouted barley grains on olive cake. On the other hand feed conversion was more with ewes fed BTm than ewes fed BRs. Also, lambs fed Tm were more efficient than that of Rs.

Table (5): Intake, body weights, gain and feed conversion of lambs fed the experimental roughages.

Items	T_1	T_2	T_3	T_4	T_5	±SE
No. of animals	7	7	7	7	7	-
Initial body weight (kg)	16.38	16.25	16.68	16.43	16.82	
Final body weight (kg)	25.96	27.41	31.75	33.80	30.43	
Total body gain (kg)	9.58^{c}	11.16^{bc}	15.07^{ab}	17.37^{a}	13.61^{b}	1.281
% of initial weights	58.49^{c}	68.68^{c}	90.325^{ab}	105.72^{a}	80.91^{b}	5.30
Average daily gain (gm)	53.22^{c}	62.00^{c}	83.73^{ab}	96.50^{a}	75.61^{a}	4.60
DM intake g/head/day						
Concentrate	681.45	677.23	694.12	640.15	669.88	
Roughage	248.23	134.76	357.55	205.11	245.91	
Total DMI g/head/day	929.68	811.99	1051.67	845.26	915.19	
TDN intake g/head/day	415.95	405.50	502.38	466.01	499.76	
Feed conversion gm feed/ gm gain						
DMI	17.37	13.10	12.56	8.76	12.11	
TDN	7.82	6.54	6.00	4.83	6.61	

T_1 : untreated rice straw (Rs) T_2 : untreated Tamarix (Tm) T_3 : sprouted barely on rice straw (BRs)
T_4 : sprouted barley on Tamarix (BTm) T_5 : 50 % BRs + 50 % BTm.
a,b,c Means with different superscripts in the same raw are significantly different at ($P \leq 0.05$)

Economical evaluation**:**

Economical efficiency was affected by type of roughages (Table 6). lambs fed sprouted barley grains on Tamarix (T_4) had better values of economical efficiency (1.71) than other experimental roughages T5, T3, T2 and T1 in descending order the values were 1.30, 1.26, 1.19 and 1.00, respectively. These results indicate that sprouted barley grains on Tamarix had minimum price for production one kilogram gain by about by 41.5, 26.3, 23.9 and 30.4% than T1, T3, T5 and T2 respectively. This may be attributed to the highest values of feed conversion as DMI, TDN/ kg gain , to that the price of rice straw was expensive than the price of collection Tamarix (Allam *et al* ., 2006) .

Table (6): Economical evaluation of lambs fed the experimental roughages.

Items	T_1	T_2	T_3	T_4	T_5	±SE
Price of feed intake h/day L.E*						
Concentrate	1.05	1.04	1.07	0.99	1.03	0.05
Roughages	0.10	0.006	0.26	0.14	0.13	0.21
Total price of feed intake	1.15	1.046	1.33	1.13	1.16	0.14
Feed cost/ daily gain L.E.						
Feed cosl/ kg gain	19.94^a	16.87^b	15.88^b	11.71^c	15.34^b	0.95
Economical feed fficiency**	1.00	1.19	1.26	1.71	1.30	0.03

a,b,c Means with different superscripts in the same raw are significantly different at ($P \leq 0.05$)
* Based on market price. The price of ton on DM basis was as follows: CFM, 1540, barely 1580 and rice straw, 400 L.E.
The price of 1 kg live body weight at selling time was 20 L.E.
** Economic feed efficiency expressed as the ratio between the price of total live body weight gain and the price of feed consumed to that gain.

4. Conclusion:

It could be concluded that in arid season we can produce green fodder by utilizing dried salt plants and rice straw by simple methodology using crop sprouts. Rice straw by-product could employ to produce forage feed instead of being burned and causing pollution.

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