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NUTRIVE VALUE OF ABOU-RUKBA (*Digitaria sanquinalis* L.) HAY COMPARED WITH UREA TREATED AND UNTREATED ROUGHAGES.

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ABSTRACT

It is extremely necessary to utilize the locally available resources in order to face the shortage in feed resources. This study was carried out to examine the feed value of Abou-Rukba (*Digitaria sanquinalis* L) as a local feed resource and animal performance when fed this grass.

Fifteen mature Rahmani rams (Ave. 46.2 ± 1.08 Kg live body weight) were divided into five groups of there animals each and used repeatedly in 15 metabolism trails. Several roughages (Abou – Rukba hay, corn stalks, bean straw, wheat straw) were used as basic feedstuffs for sheep along with concentrate feed mixture (CFM). All roughages except for Abou-Rukba were urea –treated. Roughage portion rations of offered *ad – lib* whereas CFM portion was fed at 1% or 1.5% of body weight, Abou-Rukba rations, tended to increase nutrient digestibility, feeding values, nitrogen balance, blood plasma parameters over other roughages, especially when CFM level increased from 1% to 1.5%. The rumen liquor parameters (pH, VFA's, and NH_3-N) were nearly similar among groups. Therefore, it may be concluded that, Abou-Rukba hay may be used in sheep rations when it is available for feeding.

Keyword: roughages, treatment, sheep, performance.

INTRODUCTION

In order to meet the increasing demand of animal protein, especially in developing countries, it becomes extremely necessary to utilize the locally available resources.

In Egypt, the shortage of feeds for animals is a serious problem especially during summer season (about 6 month).

Abou-Rukba (*Digitaria sanquinalis* L) is one of the spread grasses in summer agriculture which makes it reduce the production of basic harvest and due to its dense presence, and its multi rotary, it was thought that it is possible to assess it and utilize as animal feed. It has 90% OM, 8% CP, and 47% NFE similarly to many feed resources in the market. If the cultivated area of Abou-Rukba was 2 million feddans, then, the expected yield is seven million tons of green grass. The DM of Abou-Rukba is 17%, then the dry matter yield is 1,190,000 tons. Assuming that Abou-Rukba has 56.88% TDN, then the yield would be 676,87 tons of TDN. This can cover 19% of the feed gap in Egypt which is estimated by 3.5 million tons. Abou-Rukba, then, represents an added value if utilized as an animal feed.

Therefore, the present study was carried out to evaluate the effect of Abou-Rukba hay with or without two levels of concentrate feed mixture and compare it with urea treated or untreated roughages (corn stalks, wheat straw and bean straw) on nutrient digestibilities, feeding values, N balance and some blood and rumen parameters of sheep.

MATERIALS AND METHODS

This study was divided into three stages. In the first stage three different rations were compared. Abou-Rukba hay alone or with CFM at two levels (1% or 1.5%of live body weight (L.B.W).

In the second and third stages, three different roughages (corn stalks, bean straw and wheat straw) either untreated or urea treated, respectively were compared to Abou-Rukba at two levels of CFM, 1% and 1.5% of L.B.W. All feed components were fed ad lib except for the concentrate portion. Straws were cut at 3 cm of length except for Abou-Rukba which was not cut and made in the form of hay. Chemical analysis of the ration ingredients is show in Table (1).

Table (1). Chemical composition of tested ingredients fed to sheep.

Ingredient	OM	CP	CF	EE	Ash	NFE
CFM	90.48	14.11	12.11	3.19	9.52	61.07
Abou- Rukba hay	90.56	8.01	33.11	1.81	9.44	47.63
Corn stalks (CS)	85.44	4.31	37.42	1.59	14.56	42.12
Wheat straw (WS)	87.12	3.81	37.41	1.31	12.88	44.59
Bean straw (BS)	85.56	5.28	39.11	1.30	14.44	39.87
* Ureated C.S.	83.87	7.69	37.17	1.42	16.13	37.59
* Ureated W.S.	85.64	7.31	36.36	1.36	14.36	40.61
* Ureated B.S.	83.17	9.11	38.91	1.53	16.83	33.62

*** Corn stalks, wheat straw and bean straw were chopped to a length of 3 cm, then treated with 4% urea (4 Kg urea / 50 ml of H_2O /100 Kg of roughage.**

Fifteen Rahmani mature rams were divided into groups of three animals each according to body weight (46.2 ± 1.08 Kg). Animals were repeatedly used in fifteen metabolism trails with three animals / treatment. Adaptation period was two weeks while the collection period lasted for seven days. Animals were allowed to rest and adapt to new rations between experiments for two weeks.

All animals were drenched to control internal parasites. Animals were kept in metabolic cages fitted with stainless steel separators. Diets were given twice daily at 8.00 and 15.00 hrs, and water was available to animals all day. Feed intake, feces, urine and water consumption were measured daily at 7.00 h. Blood samples were with drawn before feeding, allowing blood to flow into acid washed heparinized tubes. Blood samples were immediately centrifuged at 4000 rpm for 20 minutes. Plasma samples were then frozen at –20 °C until analysis. Rumen liquor samples were taken by stomach tube at 0, 3 and 6 hrs post feeding.

Both blood and rumen samples were taken on the last day of the collection period. Samples of feeds, feces and urine were analyzed according to A.O.A.C 1990. Blood plasma was using special kits for protein (Henery *et al.*, 1974), albumin (Doumas *et al.*, 1977), globulin concentrations were obtained by difference and urea according to Patton and Crouch (1977). The pH value of rumen liquor was measured immediately after collection by using pH meter. Rumen fluid samples were analyzed for total VFA by steam distillation (Warner 1964) and ammonia N (Abou-Akkada and Osman, 1967) Data were statistically analyzed according to S.A.S. (1992) by factorial method using GLM procedures.

RESULTS

Stage (1):

In the first stage, three different rations were compared, Abou-Rukba hay alone and with two level of CFM at 1% and 1.5% of LBW.

Table (2) shows the effect of level of concentrates on some nutritional parameters. Absolute values of daily total DMI as well as relative value on basis of metabolic body size or live body weight showed increasing trend as the level of concentrates increased ($P<0.05$). When the level of concentrates was high, the abou-Rukba hay intake (g/h/d) and water intake/ DMI decreased significantly ($P<0.05$).

The effect of level of concentrates on the nutrient digestion coefficients is reported in Table (2). There was a tendency to increased digestibilities of most nutrients except CF when levels of concentrates increased. Nutritive values expressed as total digestible nutrients (TDN) and digestible crude protein (DCP) of diets increased as the levels of concentrates increased (Table 2). The same trend was applicable for nitrogen balance.

Results in Table (2) indicated that the concentration of total protein (gm%) and albumin (gm%) were higher ($P<0.05$) when levels of concentrates increased. However, no significant differences were found among different experimental groups with respect to plasma globulin (gm%) or plasma urea N (mg%).

Ruminal pH values increased and ruminal total VFA's concentration decreased with increasing roughage in the diet. On the other hand, the statistical analysis revealed that, there were no significant differences among all tested rations on NH_3 – N concentrations (Table 2).

Stage (2):

In the second stage, three different untreated roughages (corn stalks, bean straw and wheat straw) were compared to Abou-Rukba hay with two levels CFM, 1% and 1.5% of live body weight (L.B.W.).

Feed and water intakes and nutrient digestibilities of tested rations are represented in Table (3). It was clear that daily total DM intakes by sheep from Abou-Rukba hay fed groups (G1 and G2) were significantly ($P<0.05$) lower than those from either corn stalks, bean straw or wheat straw.

Dry matter intake from C.S, B.S and W.S were higher than that from Abou-Rukba hay. The differences in water intake (L/h/d) between tested rations were significant.

Whereas, water intake /DM intake for Abou-Rukba hay rations was higher than the other rations. In addition, when the level of concentrates was increased the roughage intake decreased significantly while, values of TDMI, and water intake increased ($P<0.05$).

Results obtained in Table (3) showed that significant differences among rations in DM, OM, CP, CF and NFE digestibility. Most of nutrient digestibilities of Abou-Rukba hay rations (G1 and G2) were significantly higher than those for corn stalks, bean straw and wheat straw rations. On the other side, results in table (3) revealed that DM, OM and EE digestibility increased and CP and NFE digestibility increased significantly ($P<0.05$) and CF digestibility decreased with each increase in the level of concentrate by 1.5% in rations.

Table (2). Voluntary dry matter intake, nutrient digestibilities, nutritive value, nitrogen balance, blood metabolism and some rumen parameters of sheep fed Abou Rukba hay with different levels of CFM.

Items[1]	Level of concentrate		
	0 (G1)	1% (G2)	1.5% (G3)
Intakes			
TDMI, g/h/d	806.31^{b}	1069.83^{a}	1214.13^{a}
TDMI /Kgw$^{0.75}$, g/h/d	45.50c	60.37^{b}	68.52^{a}
TDMI/L.B.W %	1.75^{c}	2.32^{b}	2.63^{a}
Abou Rukba hay intake g/h/d	806.31^{a}	658.19^{b}	596.67^{b}
Water intake L/h/d	3.533^{b}	4.183^{b}	4.467^{a}
Water intake/DMI	4.38^{a}	3.92^{b}	3.69^{b}
Digestibilities, %			
DM	57.76^{b}	65.68^{a}	67.25^{a}
OM	61.18^{b}	69.03^{a}	70.27^{a}
CP	56.45^{c}	63.54^{b}	66.15^{a}
CF	58.67^{b}	63.01^{a}	59.54^{b}
EE	65.33^{b}	70.82^{a}	70.84^{a}
NFE	63.08^{b}	72.62^{a}	75.55^{a}
Nutritive value, %			
TDN	56.88^{b}	64.57^{a}	65.62^{a}
DCP	4.68^{c}	6.26^{b}	6.86^{a}
Nitrogen balance, g/h/d	0.81^{b}	1.96^{a}	2.32^{a}
Blood metabolites			
Total protein gm%	6.22^{b}	6.29^{ab}	6.47^{a}
Albumin gm%	3.13^{b}	3.25^{ab}	3.31^{a}
Globulin gm%	3.09	3.04	3.16
Urea mg%	26.67	25.21	25.15
Rumen parameters[2]			
Intervals (hrs)			
pH 0	6.90	6.89	6.80
3	6.35	6.27	6.23
6	6.59	6.54	6.52
average	6.61^{a}	6.57ab	6.52^{b}
TVA'smeq% 0	3.79	3.82	4.18
3	6.25	6.58	6.71
6	5.29	5.50	5.55
average	5.11^{b}	5.30a^{b}	5.48^{a}
Ammonia-Nmg% 0	14.46	14.37	14.21
3	27.48	27.34	27.23
6	19.50	17.83	17.64
average	20.48	19.85	19.69

1 a,b and c means with different super script in the same row differ significantly (P<0.05).
2 a,b and c means with different super script in the same column differsignificantly (P<0.05).

Likewise, the highest nutritive values in terms of TDN and DCP% (Table 4) were observed with Abou-Rukba hay rations followed by other tested rations. The results in Table (4) showed that the increase of concentrate level resulted in increases in TDN and DCP %. All experimental diets resulted in positive nitrogen balance. None of the four roughages in question or the percent of CFM had exerted significant effect nitrogen balance.

Nitrogen digested as percent of nitrogen intake increased as the Abou-Rukba hay rations or as the CFM levels increased (Table 4).

There ware some significant differences among animal groups. Results in Table (4) showed that the total protein concentration (gm%) and the urea concentration in plasma (mg%) were highest ($P<0.05$) in sheep fed Abou-Rukba hay rations. On the other hand albumin and globulin for Abou-Rukba hay rations increased with no significant difference in comparison with other rations. Data revealed that T.P, albumin and globulin concentrations in plasma increased and urea concentration decreased with diet containing higher CFM (Table4).

Effects of sampling time and the type of ration of ruminal pH, total volatile fatty acids (TVFA's) and ammonia-N concentrations were found for all rations (Table 5). Straw fed groups showed lower ruminal pH values and ruminal ammonia-N. concentrations and higher ruminal TVFA's concentrations than Abou-Rukba hay fed groups. On the other side, ruminal pH values, TVFA's and ammonia-N concentrations were not affected significantly with increasing levels of CFM (Table 5).

Stage (3)

In the third stage, three different ureated roughages, corn stalks (UCS), bean straw (UBS) and wheat straw (UWS) were compared to Abou- Rukba hay with two levels CFM, 1% and 1.5% of live body weight (L.B.W). The results are summarized in Tables 6 and 7.

Intakes as total DM, roughage, water intake and water intake / DM intake showed significant differences were found between tested rations. In Table (6) the data of the effects of types of ureated bulky feeds on intakes are shown. The TDMI, ureated roughages intake (g/h/d) and water (L/h/d) of ureated bean straw were significantly the higher ($P<0.05$) values than ureated wheat straw, ureated corn stalks and Abou-Rukba hay respectively. The increase of CFM levels resulted in highest TDMI, water intake and lowered roughage intakes (Table 6). Apparent digestion coefficients of all nutrients (DM, OM, CP, CF, EE and NFE) were significantly different for experimental diets. The results (Table 5) also indicated that Abou-Rukba hay rations were the higher in DM, OM, EE and NFE digestibilities and lower in CP and CF digestibilities than the other ureated roughages. There was a tendency to increase digestibilities except CFD when levels of CFM increased (Table 6).

As was the case with most nutrient digestibilities, the total digestible nutrient (TDN) and digestible cured protein (DCP) values (Table 7) were high for Abou-Rukba hay ration and for higher percent of CFM. Nitrogen balances of all rations were positive.

Plasma total protein, albumin, globulin and urea values were within normal ranges (Table 7). Also, animal groups affected their values significantly with the type of roughages or percent of CFM.

Effect of feeding experimental rations on some ruminal parameters is presented in Table (8). Data showed that there were no significant differences in ruminal NH_3-N concentrations (mg%) of sheep fed ureated roughages compared with AR hay, or the level of CFM.

Table 3. Total dry matter intakes and digestibility coefficients of sheep fed Abou-Rukba hay compared to other untreated roughages with two levels of CFM

Item	Intakes				Digestibilities, %					
	TDMI, g/h/d	Roughage, g/h/d	Water, l/h/d	WI/DMI	DM	OM	CP	CF	EE	NFE
Rations										
AR + 1% CFM	1069.8^{b}	658.2^{b}	4.183^{b}	3.92^{a}	65.68^{ab}	69.54^{ab}	63.54^{bc}	63.01^{a}	70.82^{a}	72.82^{ab}
AR + 1.5% CFM	1214.1^{b}	596.7^{b}	4.467^{a}	3.69^{a}	67.25^{a}	70.27^{a}	66.15^{a}	59.54^{ab}	70.84^{a}	75.55^{a}
CS + 1% CFM	1183.3^{b}	771.7^{ab}	4.067^{b}	3.43^{ab}	63.96^{bc}	66.94^{bc}	60.58^{d}	63.10^{a}	68.96^{a}	70.19^{b}
CS + 1.5% CFM	1332.8^{a}	715.3^{ab}	4.111^{b}	3.08^{b}	65.62^{ab}	67.26^{bc}	65.31^{ab}	60.22^{ab}	71.02^{a}	70.95^{b}
BS + 1% CFM	1294.9^{ab}	883.3^{a}	4.333^{ab}	3.35^{ab}	63.31^{bc}	64.95^{c}	61.05^{d}	62.73^{ab}	67.88^{a}	66.95^{c}
BS + 1.5% CFM	1432.8^{a}	815.3^{a}	4.476^{a}	3.12^{b}	64.05^{bc}	66.36^{bc}	64.74^{ab}	59.12^{b}	69.41^{a}	70.30^{b}
WS + 1% CFM	1225.6^{ab}	814.0^{a}	4.083^{b}	3.33^{ab}	62.36^{c}	66.43^{bc}	60.55^{d}	61.33^{ab}	67.82^{a}	70.28^{b}
WS + 1.5% CFM	1367.1^{a}	749.7^{ab}	4.323^{ab}	3.16^{b}	63.31^{bc}	67.83^{abc}	62.28^{cd}	59.20^{b}	68.71^{a}	73.00^{ab}
Effect of type of roughage										
AR hay	1141.9^{c}	627.4^{c}	4.325^{ab}	3.81^{a}	66.47^{a}	69.65^{a}	64.85^{a}	61.28^{a}	70.83^{a}	74.19^{a}
CS	1258.1^{b}	743.5^{b}	4.089^{c}	3.26^{b}	64.79^{b}	67.10^{b}	62.95^{ab}	61.66^{a}	69.99^{a}	70.57^{bc}
BS	1363.9^{a}	849.3^{a}	4.405^{a}	3.24^{b}	63.68^{c}	65.66^{b}	62.90^{ab}	60.93^{a}	68.65^{a}	68.63^{c}
WS	1296.4^{b}	781.8^{b}	4.203^{b}	3.25^{b}	63.66^{c}	67.13^{b}	61.42^{b}	60.27^{a}	68.27^{a}	71.64^{b}
Effect of level of CFM										
1.0%	1193.4^{b}	781.8^{a}	4.167^{b}	3.51^{a}	63.83^{a}	66.84^{a}	61.43^{b}	62.54^{a}	68.87^{a}	70.06^{b}
1.5%	1336.7^{a}	719.3^{b}	4.345^{a}	3.26^{a}	64.64^{a}	67.93^{a}	64.62^{a}	59.52^{b}	70.00^{a}	72.45^{a}

a, b, c, and d: means with different superscripts in the same column differ significantly ($P<0.05$)

Table 4. Nutritive values, nitrogen balance and blood parameters of sheep fed Abou_ Rukba hay compared with three urea treated roughages with two levels of CFM.

Item	Nutritive values, %		N balance			Blood metabolites, gm%		
	TDN	DCP	NB, g/h/d	ND/NI	TP	AI.	GI.	Urea, mg%
Rations								
AR + 1% CFM	64.57^{a}	6.26^{a}	1.96^{a}	63.43^{bc}	6.29^{ab}	3.25^{a}	3.04^{a}	25.21^{a}
AR + 1.5% CFM	65.82^{a}	6.86^{a}	2.32^{a}	66.15^{a}	6.47^{a}	3.31^{a}	3.16^{a}	25.15^{a}
CS + 1% CFM	60.02^{bc}	4.17^{c}	1.81^{a}	60.60^{d}	6.04^{d}	3.14^{a}	2.90^{b}	20.15^{b}
CS + 1.5% CFM	61.11^{b}	5.44^{b}	1.91^{a}	65.31^{ab}	6.26^{bc}	3.21^{a}	3.05^{ab}	20.11^{b}
BS + 1% CFM	58.15^{c}	4.57^{c}	1.80^{a}	61.04^{d}	6.13^{bcd}	3.16^{a}	2.97^{ab}	20.78^{b}
BS + 1.5% CFM	60.27^{bc}	5.81^{ab}	2.00^{a}	64.73^{ab}	6.29^{ab}	3.21^{a}	3.08^{ab}	20.60^{b}
WS + 1% CFM	60.49^{bc}	4.33^{c}	2.04^{a}	60.55^{d}	6.07^{cd}	3.17^{a}	2.90^{b}	20.69^{b}
WS + 1.5% CFM	61.97^{b}	4.94^{bc}	2.25^{a}	62.28^{cd}	6.25^{bcd}	3.23^{a}	3.02^{ab}	20.57^{b}
Effect of type of roughage								
AR hay	65.20^{a}	6.56^{a}	2.14^{a}	64.79^{a}	6.38^{a}	3.28^{a}	3.10^{a}	25.18^{a}
CS	60.57^{bc}	4.81^{b}	1.86^{a}	62.96^{b}	6.15^{b}	3.18^{a}	2.97^{a}	20.13^{b}
BS	59.21^{c}	5.19^{b}	1.90^{a}	62.89^{b}	6.21^{ab}	3.19^{a}	3.02^{a}	20.69^{b}
WS	61.32^{b}	4.64^{b}	2.15^{a}	63.81^{b}	6.16^{b}	3.20^{a}	2.96^{a}	20.63^{b}
Effect of level of CFM								
1.0%	60.81^{a}	4.83^{b}	1.83^{a}	61.41^{b}	6.13^{b}	3.18^{a}	2.95^{b}	21.71^{a}
1.5%	62.29^{a}	5.76^{a}	2.01^{a}	64.62^{a}	6.32^{a}	3.24^{a}	3.08^{a}	21.61^{a}

a, b, c, d, and e: means with different superscripts in the same column differ significantly (P<0.05)

Table 5. Rumen liquor parameters of sheep fed Abou_Rukba hay compared with three urea treated roughages with two levels of CFM.

Item	Rumen liquor parameters											
	pH values				TVFA'c, meq %				Ammonia N, mneq%			
	0	3	6	Ave.	0	3	6	Ave.	0	3	6	Ave.
Rations												
AR + 1% CFM	6.89	6.27	6.54	6.57[a]	3.82	6.58	5.50	5.30[a]	14.37	27.67	17.83	19.96[a]
AR + 1.5% CFM	6.80	6.23	6.52	6.52[a]	4.18	6.71	5.55	5.48[a]	14.21	27.23	17.64	19.69[a]
CS + 1% CFM	6.76	6.20	6.50	6.49[a]	4.41	6.81	5.64	5.62[a]	14.30	22.48	18.14	18.31[b]
CS + 1.5% CFM	6.74	6.12	6.40	6.42[a]	4.56	7.16	6.05	5.92[a]	14.41	22.43	17.71	18.81[b]
BS + 1% CFM	6.74	6.24	6.47	6.48[a]	4.52	6.66	5.77	5.65[a]	14.08	22.13	17.64	17.95[b]
BS + 1.5% CFM	6.76	6.18	6.44	6.46[a]	4.39	6.89	5.89	5.72[a]	14.08	22.00	17.81	17.96[b]
WS + 1% CFM	6.77	6.25	6.45	6.49[a]	4.34	6.63	5.82	5.60[a]	14.00	21.84	17.21	17.68[b]
WS + 1.5% CFM	6.76	6.12	6.43	6.44[a]	4.49	7.14	5.93	5.85[a]	14.04	21.71	17.15	17.63[b]
Effect of type of roughage												
AR hay	6.84	6.25	6.53	6.54[a]	4.00	6.65	5.53	5.39[b]	14.29	27.45	17.74	19.83[a]
CS	6.75	6.16	6.45	6.45[b]	4.49	6.99	5.85	5.77[a]	14.36	22.46	17.93	18.25[b]
BS	6.75	6.21	6.46	6.47[b]	4.46	6.78	5.83	5.69[a]	14.08	22.07	17.73	17.96[b]
WS	6.77	6.19	6.44	6.47[b]	4.42	6.89	5.88	5.73[a]	14.02	21.78	17.18	17.66[b]
Effect of level of CFM												
1.0%	6.79	6.24	6.49	6.51[a]	4.27	6.67	5.68	5.54[a]	14.19	23.53	17.71	18.48[a]
1.5%	6.77	6.16	6.45	6.46[a]	4.41	6.98	5.86	5.75[a]	14.19	23.34	17.58	18.37[b]

a, b, c, d, and e: means with different superscripts in the same column differ significantly (P<0.05)

Table 6. Intakes and digestibility coefficients of sheep fed Abou-Rukba hay compared to other treated roughages with two levels of CFM

Item	Intakes				Digestibilities, %					
	TDMI, g/h/d	Roughage, g/h/d	Water, l/h/d	WI/DMI	DM	OM	CP	CF	EE	NFE
Rations										
AR + 1% CFM	1069.8^{c}	658.2^{c}	4.183^{b}	3.92^{a}	65.68^{ab}	69.03^{ab}	63.54^{cd}	63.01^{ab}	70.82^{a}	72.82^{ab}
AR + 1.5% CFM	1214.1^{b}	596.7^{c}	4.467^{a}	3.69^{a}	67.25^{a}	70.27^{a}	66.15^{abc}	59.54^{c}	70.84^{a}	75.55^{a}
CS + 1% CFM	1269.6^{b}	858.0^{ab}	4.303^{ab}	3.39^{b}	64.21^{b}	66.63^{cd}	66.48^{ab}	63.89^{a}	67.97^{bc}	68.28^{cd}
CS + 1.5% CFM	1346.8^{ab}	729.3^{b}	4.430^{a}	3.29^{b}	65.76^{ab}	67.41^{bcd}	67.88^{a}	60.87^{c}	69.92^{ab}	71.33^{bc}
BS + 1% CFM	1361.3^{ab}	949.7^{a}	4.450^{a}	3.27^{b}	65.34^{ba}	65.91^{d}	65.54^{abcd}	63.80^{a}	68.03^{bc}	67.41^{d}
BS + 1.5% CFM	1441.5^{a}	824.0^{ab}	4.603^{a}	3.19^{b}	65.48^{ba}	66.54^{cd}	67.58^{a}	61.16^{bc}	70.45^{a}	69.47^{cd}
WS + 1% CFM	1290.3^{b}	878.7^{ab}	4.344^{ab}	3.37^{b}	64.96^{ab}	68.41^{abc}	63.21^{d}	63.65^{a}	67.57^{c}	72.48^{ab}
WS + 1.5% CFM	1403.5^{a}	786.0^{b}	4.517^{a}	3.22^{b}	65.10^{ba}	68.90^{ab}	64.41^{bcd}	61.10^{bc}	69.18^{abc}	73.68^{ab}
Effect of type of roughage										
AR hay	1141.9^{c}	627.4^{c}	4.325^{c}	3.81^{a}	66.79^{a}	69.65^{a}	64.85^{b}	61.28^{a}	70.83^{a}	74.19^{a}
CS	1308.2^{b}	793.7^{b}	4.367^{bc}	3.34^{b}	64.99^{b}	67.02^{c}	67.18^{a}	62.38^{a}	68.95^{b}	69.81^{b}
BS	1401.4^{a}	886.8^{a}	4.527^{a}	3.23^{b}	65.41^{b}	66.23^{b}	66.56^{a}	62.48^{a}	69.24^{b}	68.44^{b}
WS	1346.9^{b}	832.3a^{b}	4.431^{ab}	3.30^{b}	65.03^{b}	68.66^{b}	63.81^{b}	62.38^{a}	68.36^{b}	73.08^{a}
Effect of level of CFM										
1.0%	1247.8^{b}	836.1^{a}	4.320^{b}	3.49^{a}	65.05^{a}	67.50^{a}	64.69^{b}	63.59^{a}	68.60^{b}	70.25^{b}
1.5%	1351.5^{a}	734.0^{b}	4.504^{a}	3.35^{a}	65.90^{a}	68.09^{a}	66.51^{a}	60.67^{b}	70.10^{a}	72.51^{a}

a, b, c, and d: means with different superscripts in the same column differ significantly (P<0.05)

Table 7. Nutritive values, nitrogen balance and blood parameters of sheep fed Abou_ Rukba hay compared with three urea treated roughages with two levels of CFM.

Item	Nutritive values, %		N balance		Blood metabolites, gm%			
	TDN	DCP	NB, g/h/d	ND/NI	TP	AI.	GI.	Urea, mg%
Rations								
AR + 1% CFM	64.57^{a}	6.26^{d}	1.96^{a}	63.43^{cd}	6.29^{a}	3.25^{a}	3.04^{a}	25.21^{a}
AR + 1.5% CFM	65.82^{a}	6.86^{ab}	2.32^{a}	66.15^{abc}	6.47^{a}	3.31^{a}	3.16^{a}	25.15^{a}
CS + 1% CFM	59.18^{de}	6.22^{d}	2.07^{a}	66.48^{ab}	6.29^{a}	3.22^{a}	3.07^{a}	25.05^{a}
CS + 1.5% CFM	60.56^{cd}	6.65^{bc}	2.24^{a}	67.89^{a}	6.42^{a}	3.29^{a}	3.13^{a}	24.89^{a}
BS + 1% CFM	58.07^{e}	6.58^{bc}	2.11^{a}	65.53^{abcd}	6.36^{a}	3.24^{a}	3.12^{a}	24.27^{a}
BS + 1.5% CFM	59.25^{de}	7.07^{a}	2.13^{a}	67.57^{a}	6.45^{a}	3.27^{a}	3.18^{a}	23.94^{a}
WS + 1% CFM	61.15^{bc}	5.52^{b}	2.04^{a}	63.21^{d}	6.36^{a}	3.26^{a}	3.10^{a}	24.50^{a}
WS + 1.5% CFM	62.49^{b}	6.36^{cd}	2.25^{a}	64.41^{bcd}	6.41^{a}	3.26^{a}	3.15^{a}	24.36^{a}
Effect of type of roughage								
AR hay	65.20^{a}	6.56^{a}	2.14^{a}	64.79^{b}	6.38^{a}	3.28^{a}	3.10^{a}	25.18^{a}
CS	59.87^{c}	6.44^{a}	2.15^{a}	67.19^{a}	6.36^{a}	3.26^{a}	3.10^{a}	24.97^{a}
BS	58.67^{c}	6.83^{a}	2.12^{a}	66.55^{a}	6.41^{a}	3.26^{a}	3.15^{a}	24.11^{a}
WS	61.82^{b}	5.94^{b}	2.95^{a}	63.81^{b}	6.39^{a}	3.26^{a}	3.13^{a}	24.43^{a}
Effect of level of CFM								
1.0%	60.74^{a}	6.15^{a}	2.05^{a}	64.66^{b}	6.32^{a}	3.24^{a}	3.08^{a}	24.76^{a}
1.5%	62.03^{a}	6.74^{a}	2.24^{a}	66.51^{a}	6.44^{a}	3.28^{a}	3.16^{a}	24.59^{a}

a, b, c, d, and e: means with different superscripts in the same column differ significantly (P<0.05)

Table 8. Rumen liquor parameters of sheep fed Abou_Rukba hay compared with three urea treated roughages with two levels of CFM.

Item	Rumen liquor parameters											
	pH values				TVFA'c, meq %				Ammonia N, mneq%			
	0	3	6	Ave.	0	3	6	Ave.	0	3	6	Ave.
Rations												
AR + 1% CFM	6.89	6.27	6.54	6.57^{a}	3.82	6.58	5.50	5.30^{c}	14.37	27.67	17.83	19.96^{a}
AR + 1.5% CFM	6.80	6.23	6.52	6.52^{abc}	4.18	6.71	5.55	5.48^{abc}	14.21	27.23	17.64	19.69^{a}
CS + 1% CFM	6.79	6.19	6.44	6.47^{bc}	4.37	6.88	5.90	5.72^{ab}	14.86	22.81	19.00	19.56^{a}
CS + 1.5% CFM	6.80	6.17	6.45	6.47^{bc}	4.28	6.96	5.83	5.69^{ab}	14.69	24.41	18.54	19.21^{a}
BS + 1% CFM	6.84	6.28	6.50	6.54^{ab}	4.28	6.52	5.65	5.34^{bc}	14.56	24.65	18.82	19.34^{a}
BS + 1.5% CFM	6.75	6.13	6.43	6.44^{c}	4.00	6.12	5.92	5.84^{a}	14.27	24.64	18.78	19.23^{a}
WS + 1% CFM	6.77	6.27	6.45	6.50^{abc}	4.48	6.55	5.84	5.58^{abc}	14.66	24.71	18.66	19.34^{a}
WS + 1.5% CFM	6.77	6.12	6.40	6.43^{c}	4.36	7.15	6.05	5.84^{a}	14.26	24.63	18.82	19.24^{a}
Effect of type of roughage												
AR hay	6.84	6.25	6.53	6.54^{a}	4.00	6.65	5.53	5.39^{b}	14.29	27.45	17.74	19.83^{a}
CS	6.80	6.18	6.45	6.47^{b}	4.33	6.92	5.87	5.71^{a}	14.78	24.61	18.77	19.39^{a}
BS	6.80	6.21	6.47	6.49^{b}	4.24	6.82	5.79	5.62^{ab}	14.42	24.65	18.80	19.29^{a}
WS	6.77	6.20	6.43	6.47^{b}	4.35	6.85	5.95	5.72^{a}	14.46	24.67	18.74	19.29^{a}
Effect of level of CFM												
1.0%	6.82	6.25	6.48	6.52^{a}	4.14	6.63	5.72	5.50^{b}	14.61	25.46	18.58	19.55^{a}
1.5%	6.78	6.16	6.45	6.46^{b}	4.32	6.99	5.84	5.72^{a}	14.36	25.23	18.44	19.34^{a}

a, b, c, d, and e: means with different superscripts in the same column differ significantly (P<0.05)

DISCUSSION

Stage (1);

The first stage was carried out to evaluated AR hay without and with two levels from CFM. Data in Table (2) indicated that the average daily DM intake, water intake (l/h/d), digestibilities of nutrients expect CF, nutritive values as TDN and DCP, nitrogen retention, N. digested/N intake, plasma total protein and its fractions and ruminal total VFA concentrations were significantly higher when level of CFM increasing in ration (group 3). However, AR. hay intake, CF digestibility, plasma urea values, ruminal pH values and ruminal ammonia-N concentrations were the lowest when level of CFM increased.

These results were in agreement with that obtained by (Ghanem, 1986; Etman *et al*, 1988; Etman and Soliman, 1999; Shoukry *et al.*, 1999; Mohsen *et al.*, 1999 and Khattab *et al.*, 1999). Mehrez *et al.* 1993 found that, when the CFM level was increased in the ration, the DM intake from roughage was decreased.

Increasing the CFM proportion results in increasing digestibilities of DM, OM, and NFE. These may be attributed to increasing the activity of carbohydrates, fats and protein enzymes (Banerjee, 1988). The high nutrient digestibility coefficients improved the nutritive values expressed as TDN or DCP. This may have been due to a higher fermentation rate and better ruminal activity (Bartocci *et al.*, 1992)

The higher nitrogen retention was for group (3), this may be due to the highest nitrogen intake, this may be attributed to the increased level CFM with ration (3). Taie (1998), found that, nitrogen retention increased with increasing protein level in the diet for lambs. Consequently it resulted in increased plasma total protein and its fractions (Solouma, 1999).

Animals of group (3) had higher water intake. This may be due to the high content of NaCl and protein intake, this may be attributed to the increased CFM with ration (3) (Fouad, 1995).

Group (3) containing high level CFM resulted in lower ruminal pH value, higher total VFA concentrations and lower ammonia-N concentrations than other rations (Table 2). These effects are probably due to better utilization of dietary carbohydrates (Fadel *et al.*, 1987). Increasing TVFA's concentrations decreases pH values leading to decrease in the activity of cellulytic bacteria, therefore decreases CF digestibility (Mehrez, 1995).

Data in Table (2) revealed that, Abou-Rukba hay may higher feeding value as TDN than other roughages reported in feed Tables of General Department of Animal Production (1997), (Berseem hay, TDN 51.4%, Dried berseem cut 2, TDN, 46.6%) and to those recorded by Shcukry *et al.*, (1999) (Banana wastes as hay, TDN, 39.4%) and (Bendary and Younis, 1997), Dried maize stalks, TDN, 46.0%).

Stages (2) and (3):

In the second stage, three different untreated roughages, corn stalks (C.S.), bean straw (BS) and wheat straw (W.S.) were compared to Abou-Rukba hay with two levels of CFM.

Total DM intake and daily intake by sheep from AR. hay was significantly lower than those of other roughages. However, most of nutrient digestibilities, feeding values of rations, N. retention, blood metabolism and rumen liquor parameters (Tables 3,4 and 5) of A.H. rations were significantly higher than other rations. On the other hand, the increasing level of CFM in rations had the same trend. While, in the third stage, three different ureated roughages were compared to AR. hay, also with two levels CFM, 1 and 1.5% of live body weight.

As shown in Table (6), the dry matter intake of the ureated roughages (CS, BS and WS) was considerably higher than those of the AR. hay. These findings clearly indicate those ureated roughages a quite reasonable positive effect on palatability and hence voluntary intake of roughages (Dias-Da-Silva and Sundstol, 1986 and Ahmed, 1992)

The highest values for CP and CF digestibilities were observed with ureated roughages (Table 5). This could be due to the effect of NH_3 on the cell wall constituents of roughages and as a result of supplying nitrogen for rumen micro-organisms, according improved CF digestion (Van Soest, 1982).

The improvement recorded for the different ureated roughages compared with untreated materials (Tables 3 to 9) were expected . These values agree with those reported by Hadjipanayiotou (1982), Ambar and Djajanegara , (1982), Jie *et al.*,(1987), Kouritt *et al.*,(1991), Abdel-Baki *et al.*, (1995) and Swidan *et al.*, (1996).

In Table (6) the N retention of the ureated roughages was considerably higher than untreated roughages (Table 4). This may be due to higher dietary nitrogen consumed from ureated roughages. Goehring *et al.* (1990) noticed that ammoniation improved the daily nitrogen balance.

Results obtained in Tables 3 to 8 shows that urea treatment did not negative effects on blood proteins and rumen liquor parameters. The values of rumen liquor parameters in the present study are within the range reported by Abdel-Gawad *et al.* (1993). Maximal requirements of ruminal ammonia-N have been reported to be 23 mg /d (Mehrez *et al.*, 1977). El-Ashry *et al.*, (1997), found that treating roughages with urea for sheep did not decrease the concentration of serum total protein or change the ratio among the protein fractions.

Table (9) shows that there were more than 41.13, 65.51, 69.67, 78.12, 86.00 and 88.56% reduction in the daily roughage intake cost of AR hay as compared to CS, UCS, BS, UBS, WS and UWS, respectively. Reducing costs to increase profitability has priority on most farms. The since Abou-Rukba hay is similar in the nutritive value of some green summer forages, its feeding value was better than the other roughages (corn stalks, wheat straw and bean straw), decreased a lot the nutritional costs.

It might be concluded that Abou-Rukba hay could be used to in summer as animal feed ingredient. However, the need for further studies to fully characterize Abou-Rukba hay as animal feed is evident.

Table (9). Roughages cost (piaster)

Items	Roughages g/h/d	Cost / piaster
		R. Intake as fed
Abou-Rukba hay	627	2.19
CS	744	3.72
UCS	794	6.35
BS	849	7.22
UBS	887	10.01
WS	782	15.64
UWS	832	19.14

The price (L.E.) of one Ton of:

CFM (690) C.S (50) T.C.S (80) Abou-Rukba H. (35) B.S (85)
T.B.S (115) W.S (200) T.W.S (230)

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القيمة الغذائية لدريس أبو ركبة ومقارنته بمواد علف خشنة معاملة أو غير معاملة باليوريا

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تمت هذه الدراسة بهدف عمل التقييم الغذائى لنبات ابوركبة وذلك لاستخدامه كمكسون علفى فى علائق الحيوانات المجترة

تم تقسيم ١٥ كبش رحمانى ناضج الى مجاميع من ثلاث حيوانات واستخدمت تكرارا لأداء ١٥ تجربة تمثيل غذائى لتقدير القيمة الغذائية لحشيشة ابوركبة ومقارنتها بانواع مختلفة من المواد الخشنة هى حطب الذرة – تبن القمح – تبن الفول غير معاملة أو معاملة باليوريا ، ثم تغذية المواد الخشنة حتى الشبع .. بينما أعطى معها علف مركز بمستويين ١% – ١,٥% من وزن الجسم و اثناء تجارب الهضم تم اخذ عينات دم وكرش من الحيوانات

أوضحت النتائج تفوق دريس حشيشة أبو ركبة عن باقى المواد الخشنة معاملة أو غير معاملة باليوريا فى معاملات الهضم والقيم الغذائية واحتجاز الأزوت ومكونات الدم ويزداد التفوق بزيادة نسبة العلف المركز .

أما بالنسبة لقياسات سائل الكرش فقد كانت هناك فروق طفيفة قد تكون معنوية بين المجاميع التجريبية وبعضها ، هذه النتائج قد تعطى دلالة على إمكانية استخدام دريس حشيشة أبو ركبة فى تغذية الأغنام خاصة فى حالة ارتفاع أسعار أو نقص المواد الخشنة ، مع وجوب مزيد من الدراسات الغذائية لإمكانية استخدامه فى علائق إنتاجية لكافة الحيوانات المجترة .