J. Agric. Sci. Mansoura Univ., 28(8): 5999 - 6010, 2003

UTILIZATION OF MUNG BEAN STRAW AS A NEW ROUGHAGE SOURCE FOR RUMINANT FEEDING

Salman, Fatma, M.*
Animal Production Department, National Research Center, Tahrir Street, Dokki, Egypt

ABSTRACT

Mung bean straw (MS) was treated with 3% urea solution (UTMS) or supplemented with urea + vitamins + mineral mixture (MSMS). The three mung bean straw forms were offered to mature males Baladi goats averaged 20 kg live body weight *ad lib.* as a sole diet (exp. I) or with a supplement of concentrate feed mixture (CFM) to cover 50% of energy maintenance requirements according to NRC, 1981 (exp.II).

The results showed that the two treatments applied to MS increased CP content and decreased ADF and improved almost all nutrients digestibility and nutritive values in terms of TDN and DCP. Both treatments significantly ($p<0.05$ or 0.01) increased DM, TDM and DCP intakes. Goats given UTMS alone or rations containing MS, MSMS or UTMS+ CFM could cover their maintenance requirements of TDN and DCP according to NRC (1981), while goats received MS and MSMS as a sole diet could not cover their maintenance requirements of TDN and DCP with one exception that animals given MSMS could cover their maintenance requirements of DCP

Animals given rations containing CFM + MSMS or UTMS showed significantly ($p<0.05$ or 0.01) higher nitrogen balance in terms of either g/animal/day or as % of N intake or digested and ruminal NH3 and VFA's concentrations compared with those fed rations containing CFM +MS. No significant differences were detected among all treatments with regard to serum creatinine, GOT and GPT concentrations.

The present study suggests the possibility of using mung bean straw as a new roughage source in ruminant feeding. Intake and utilization of mung bean straw could be improved by goats using urea treatment or urea + vitamins + mineral mixture supplement to cover maintenance requirements without any adverse effect on kidney and liver functions.

Keywords: mung bean straw, urea treatment, urea+ vitamins+ mineral mixture, goats, digestibility.

INTRODUCTION

The shortage of animal feeds in Egypt specially in summer season is the most limiting factor for animal production development. Low quality roughages represent a large potential source of feed energy in ruminants rations. Improving the nutritive value of poor quality roughages such as straws, stovers and stalks is a necessary target to overcome the insufficiency of available feed specially in summer.

* the author would like to thank the project of evaluation of mung bean crop productivity under Egyptian conditions, financed by Egyptian Academy of Scientific Research and Technology (1994-

1998) for given mung bean straw used in this study.

Mung bean (*vigna radiata (L.) Wilczek)* is a summer legume crop natives in India and recently introduced in Egypt as a summer legume seed crop (Ashour *et al,* 1992 and Selim,1996). The mung bean straw yield/feddan is similar to that of other straws (Kadlag *el al.*,1998). With increasing the cultivated area of mung bean, huge amounts of its straw could be available to ruminant feeding. There is a lack of information about the nutritive value of mung bean straw. However, an attempt have been done in India to evaluate the effect of supplementation of legume straws such as mung bean at catalytic level on *In sacco* rumen degradability of rice straw, feed intake, nutrients utilization and rumen fermentation pattern in buffaloes (Reddy, 1997).

Attempts have been done to improve feed intake and nutritive value of poor quality roughages using urea treatment as a source of ammonia (Salman,1991; Shoukry *et al*,1992a and 1993 ; Salman *et al*, 1998 and Abd El- Fattah,2002) or using urea + vitamins + mineral mixture supplementation (El-Shinnawy, 1989).

Therefore, the present study was carried out to investigate the nutritive value of mung bean straw as a new roughage source and the possibility of improving its utilization by goats, using two different methods of urea treatment, i.e. spraying +ensiling or supplementing with urea + vitamins + mineral mixture.

MATERIALS AND METHODS

This study was carried out at the Animal Production Farm Station, Faculty of Agriculture, Ain Shams University at Shobra El-Kheima and Animal Production Department, National Research Center, Dokki.

Urea treated mung bean straw:

Chopped Mung bean straw *(vigna radiata (L.) Wilczek)* was sprayed with a solution of urea (50L/100kg of the straw), calculated to provide 3 kg urea/100kg of straw. Sulfur was added to the urea solution before being sprayed to provide an amount of sulfur equal to 10% of urea nitrogen used (140g/100kg of the straw). The materials were mixed concurrently to achieve uniform wetting. The treated straw was stored for 4 weeks in ground room (1m length ×1m width × 0.75m height). A plastic sheet was placed under the treated straw to minimize soil contamination. Another plastic sheet was placed over the straw. The ground room was opened at the end of ensiling period and an adequate amount of treated straw were taken daily and aerated only to allow the excess ammonia to diffuse from the treated roughage for 6-8 hrs before feeding it to the animals in digestibility trials.

Mixture urea supplemented mung bean straw:

Mung straw was mixed concurrently to achieve uniform wetting in a very simple way with solution containing urea, vitamins and mineral mixture. The solution was freshly prepared by dissolving the dried preparation of a special bag (0.9kg urea plus 0.25kg vitamins and mineral mixture) in 2 liters

of water and 2.5kg of molasses. The final solution (5 liters) was sprayed and mixed well with 30kg of mung bean presently before feeding.

Two experiments were carried out to evaluate the untreated, urea treated or supplemented mung bean straw. In each experiment, three digestibility and nitrogen balance trials were carried out using four mature males Baladi goats averaged 20kg live body weight. In the 1st experiment, untreated (MS) or urea treated (UTMS) or mixture supplemented mung straw (MSMS) were offered to the animals *ad lib.* as sole diet. While in the 2nd one, the animals were offered the different mung straw treatments *ad lib.* and a supplement of concentrate feed mixture (CFM) to cover 50% of energy maintenance requirements according to NRC (1981). The animals were kept individually in wooden metabolic crats for 21 days as a preliminary period followed by 7 days for total faeces and urine collection. During the preliminary period, the animals were gradually offered the experimental rations to avoid any anti-nutritional problems. Faeces and urine were collected once daily at 07.00. The animals were usually offered their diets once daily at 08.00 and water and salt block were always available to the animals. Residual rations if any were recorded and feed intake were also recorded daily. Total digestible nutrients (TDN), and digestible crude protein (DCP) of the experimental rations were calculated according to Abou-Raya (1967).

Rumen fluid samples were taken individually from the four animals of each treatment at the end of digestibility trials before feeding and at four hours post-feeding using stomach tube. The pH values were determined immediately after sampling using EIL digital combination electrode pH meter. The liquor was filtered through two layers of fine muslin for determining ammonia-nitrogen concentration according to Conway and O'Malley (1942) method and total volatile fatty acids (VFA) according to Warner (1964).

Blood samples were collected from each animal at the end of digestibility trials. The samples were withdrawn from the jugular vein only at four hours post-feeding. The blood was directly collected into clean dried glass tubes centrifugated at 4000 rpm for 20 minutes. The blood serum was separated into clean dried glass vials and stored at 20 °c till analyzed for total protein, urea and creatinine.

Serum total protein was measured colorimetrically by the biuret reaction using Wiener laboratories (Argentina) Kits according to Armstrong and Carr (1964). Serum urea was determined colorimetrically using commercial Kits purchase from Biomerieux (France) according to Patton and Crouch (1977). Serum creatinine was determined using Wiener laboratories Kits according to Husdan (1968).

Dry matter, CP, CF, EE and ash of dietary ingredients, faeces and feed residues along with urinary nitrogen were determined according to A.O.A.C. (1990). Nitrogen free extract (NFE) was calculated by difference. Neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) were determined according to Goering and Van Soest (1970).

Data obtained were statistically analyzed according to Snedecor and Cochran (1980). A simple one-way classification analyzes followed by least significant difference test for testing the significance among means were conducted.

RESULTS AND DISCUSSION

Chemical analysis:

As shown in Table (1) the chemical composition of mung bean straw was nearly similar to that of broad bean straw (see CLFF, 2001) however, its CP content was somewhat higher and ADF was lower than that of bean straw. The chemical composition of MS was agreed well with that reported by Reddy (1997), who stated that green gram straw (mung bean straw) in India have 8.7, 6.1, 63.5, 47.2, 4.8, 16.3 and 42.4 % CP, ash, NDF, ADF, ADL, hemicellulose and cellulose, respectively. The high ash content of MS obtained in the present study may be related to soil contamination during air drying process. As expected urea treatment or supplementing mung bean straw with urea + vitamins + mineral mixture increased its CP content by about 40 or 30.6%, respectively. The two experimental treatments appeared to have somewhat lower NFE and ADF contents compared with untreated mung bean straw. Similar results have been reported by Shoukry *et al* (1992a and 1993)and Salman *et al* , (1998) for different poor quality roughages treated with urea solution and El-Shinnawy (1989) for rice straw supplemented by urea + vitamins + mineral mixture.

The chemical composition of the three experimental rations were nearly similar with one exception for CP contents of rations II and III were slightly higher than that of ration I (control).

Table (1): Chemical composition of dietary ingredients and experimental rations.

Item	MS	MSMS	UTMS	CFM*	Ration I	Ration II	Ration III
Moisture, %	7.1	12.0	7.9	7.8	7.4	10.5	+ 7.9
Chemical composition, % DM:							
CP	8.5	11.9	11.1	16.1	11.7	13.4	±13.4
CF	46.9	45.5	49.5	22.4	36.6	37.0	±36.9
EE	2.7	2.3	1.5	2.6	2.7	2.4	±2.0
NFE	29.0	27.3	25.6	44.9	35.7	33.8	±34.6
Ash	12.9	13.0	12.3	14.0	13.3	13.4	±13.1
Cell Wall constituents, %DM:							
NDF	66.3	67.1	67.5	66.1	66.2	66.7	±66.9
ADF	43.6	41.8	41.4	43.4	43.5	42.4	±42.4
ADL	8.6	9.1	9.4	9.2	8.9	9.1	±9.4
Cellulose	35.0	32.7	31.9	34.2	34.6	33.3	±33
Hemicellulose	22.8	25.3	26.1	22.7	22.7	24.3	+24.5

* **Consisted of undecorticated cotton seed cake 25%, wheat bran 44%, yellow corn 15%, extracted rice bran 8.5%, molasses 3%, limestone 3% and common salt 1.5% .**

Nutrients digestibility:

The nutrients digestibility and nutritive values obtained in the present study for mung bean straw were very close to those values for the common roughages such as other straws and stovers.

Table (2): Mean values with their SE* of nutrients digestibility and nutritive values for untreated, mixture supplemented or urea treated mung bean straw.

Item	Untreated mung bean straw (MS)	Mixture supplemented mung bean straw (MSMS)	Urea treated mung bean straw (UTMS)	SE
Nutrients digestibility ,%:				
DM	33.8^{a}	39.9^{a}	50.4^{b}	± 4.5
OM	35.6^{A}	38.6^{A}	53.5^{B}	± 3.2
CP	35.4^{A}	49.7^{B}	54.2^{C}	± 3.6
CF	36.2^{A}	37.9^{A}	58.7^{B}	± 3.0
EE	$39.4^{A,B}$	47.4^{A}	28.5^{B}	± 5.2
NFE	34.3^{a}	34.1^{a}	45.0^{b}	± 3.9
NDF	29.2^{A}	$39.5^{A,B}$	55.6^{B}	± 6.3
ADF	24.7^{a}	$38.0^{a,b}$	44.0^{b}	± 6.6
ADL	12.9^{a}	$27.8^{a,b}$	34.4^{b}	± 7.3
Cellulose	27.5^{a}	$41.0^{a,b}$	46.7^{b}	± 6.6
Hemicellulose	38.1^{A}	42.0^{A}	73.9^{B}	± 7.8
Nutritive value,%:				
TDN	31.7^{A}	34.9^{A}	47.5^{B}	± 2.1
DCP	3.1^{A}	5.9^{B}	6.0^{B}	± 0.4

*** SE : standard error of the means.**

- A, B, C means at the same row with different superscripts are significantly (p<0.01) different.

- a,b means at the same row with different superscripts are significantly (p<0.05) different.

Results concerning nutrients digestibility and nutritive values of untreated or mixture supplemented or urea treated mung bean straw (Table 2) showed that the two treatments applied to mung bean straw improved almost all nutrients digestibilities, however the improvements were insignificant for MSMS and significant (P<0.05 or 0.01) for UTMS. The same trend was observed for cell wall constituents digestibilities, TDN and DCP.

The two experimental ration containing MSMS or UTMS recorded significantly (P<0.5 or 0.01) higher values for all nutrients digestibilities compared with the control ration which containing MS (Table 3).

The highest improvement in nutrients digestibilities were recorded for ration containing UTMS. Similar trend was recorded for cell wall constituents digestibilities and the nutritive values in terms of TDN and DCP.

The improvement in nutrients digestibilities and subsequently the nutritive values recorded for UTMS and its ration does appear to be due not only to the microbial requirements for nitrogen that may have been at least partially or completely met (Balch, 1967 and Kempton and Leng, 1979) but possibly to an additional effect of ammonia on roughages cell wall or changes that may have occurred in the lignocellulose bonds (Hartly and Jones, 1978 and Buettner *et al*, 1982). Moreover, the experiments of Dias – Da- Silva and Sundstol (1986); El- Shinnawy (1989); Reddy *et al*, (1989); Salman (1991); Shoukry *et al*, (1993) and Salman *et al*, (1998) showed that the nutrients digestibility and nutritive value of urea ensiled poor quality roughages were higher than those of urea sprayed or supplemented roughages. These results agreed well with those reported in the present study.

Table (3): Mean values with their SE* of nutrients digestibility and nutritive values recorded with goats given rations containing untreated, mixture supplemented or urea treated mung bean straw.

Item	Ration (I) MS+CFM	Ration (II) MSMS+CFM	Ration (III) UTMS+CFM	SE
Nutrients digestibility ,%:				
DM	42.7^{A}	50.1^{B}	63.2^{C}	± 1.6
OM	$43.5^{a,A}$	$50.7^{b,A}$	65.9^{B}	± 3.1
CP	54.1^{A}	64.6^{B}	62.0^{B}	± 1.4
CF	22.9^{A}	38.4^{B}	55.7^{C}	± 2.1
EE	46.1^{A}	65.7^{B}	41.0^{A}	± 4.1
NFE	60.7^{A}	57.7^{A}	79.7^{B}	± 2.3
NDF	37.8^{A}	55.5^{B}	68.2^{C}	± 3.4
ADF	34.8^{A}	$52.2^{a,B}$	$61.5^{b,B}$	± 3.3
ADL	24.4^{A}	42.9^{B}	46.7^{B}	± 3.1
Cellulose	37.6^{A}	$54.8^{a,B}$	$65.6^{b,B}$	± 3.5
Hemicellulose	43.6^{A}	61.2^{B}	79.2^{C}	± 4.2
Nutritive value, % :				
TDN	39.2^{A}	45.9^{B}	58.3^{C}	± 1.5
DCP	6.3^{A}	8.7^{B}	8.3^{B}	± 0.3

* SE : standard error of the means.
- A, B, C means at the same row with different superscripts are significantly ($p<0.01$) different.
- a,b means at the same row with different superscripts are significantly ($p<0.05$) different.

Feed intakes:

The results obtained (Tables 4 and 5) showed that the two treatments used for MS significantly ($P<0.05$) increased DM intake of MS either as a sole diet (Table 4) or with concentrate feed mixture (Table 5).

Table (4): Mean values with their SE* for DM, TDN and DCP intakes recorded with goats given untreated, mixture supplemented or urea treated mung bean straw.

Item	Untreated mung bean straw (MS)	Mixture supplemented mung bean straw (MSMS)	Urea treated mung bean straw (UTMS)	SE
DM intake:				
g/animal/day	469	592	576	± 57
g/ Kg $w^{0.75}$/ day	52.0^{a}	67.1^{b}	$63.6^{b,a}$	± 5.4
TDN intake:				
g/animal/day	$148.9^{A,a}$	206.1^{b}	$272.7^{B,c}$	± 23.7
g/ Kg $w^{0.75}$/ day	$16.5^{A,a}$	23.4^{b}	$29.9^{B,c}$	± 2.5
DCP intake :				
g/animal/day	14.7^{A}	35.0^{B}	35.0^{B}	± 4.2
g/ Kg $w^{0.75}$/ day	1.63^{A}	3.97^{B}	3.84^{B}	± 0.39

* SE : standard error of the means.
- A, B means at the same row with different superscripts are significantly ($p<0.01$) different.
- a, b,c means at the same row with different superscripts are significantly ($p<0.05$) different.

DM intake from mung bean straw recorded for goats given UTMS was greater than that recorded for those given MSMS as a sole diet, however, the reverse was occurred when MSMS or UTMS was given to the animals in combination with the concentrate feed mixture (ration II and III). These results were in harmony with the results obtained herein for nutrients digestibility. The increased intake may have been related to improved N- status of animals (Kempton and Leng, 1979) and to an increased rate of breakdown of feed particles in the rumen due to the effect of ammonia (Oji *et al*, 1979). This may have been responsible for the increased rate of passage of roughages and subsequently feed intake.

Table (5): Mean values with their SE* for DM, TDN and DCP intakes recorded with goats given rations containing untreated, mixture supplemented or urea treated mung bean straw.

Item	Ration (I) MS+CFM	Ration (II) MSMS+CFM	Ration(III) UTMS+CFM	SE
DM intake:				
Total(g/animal/day)	618	689	655	± 86
Total(g/ Kg $w^{0.75}$/ day)	$65.7^{A,a}$	$82.6^{B,b}$	78.5^{b}	± 4.8
Mung bean straw (g/animal/day)	364	440	366	± 73.4
Mung bean straw(g/ Kg $w^{0.75}$/ day)	38.5^{a}	52.8^{b}	$43.1^{a,b}$	± 4.6
TDN intake:				
g/animal/day	243.2^{a}	$315.9^{a,b}$	381.1^{b}	± 44.5
g/Kg $w^{0.75}$/ day	25.9^{A}	$37.9^{B,a}$	$45.9^{B,b}$	± 3.3
DCP intake:				
g/animal/day	39.2^{a}	59.7^{b}	54.4^{b}	± 6.7
g/Kg $w^{0.75}$/ day	4.17^{a}	7.17^{b}	$6.56^{a,b}$	± 1.01

* SE : standard error of the means.
- A, B means at the same row with different superscripts are significantly ($p<0.01$) different.
- a,b means at the same row with different superscripts are significantly ($p<0.05$) different.

Intakes of TDN and DCP expressed as g/animal/day or g/kg $w^{0.75}$/ day significantly increased with urea or mixture supplement treatment by the dual effects of the two treatments applied on gross intake and digestibility on MS and large improvement in animal production may be expected. No significant differences were detected in TDN and DCP intakes recorded for animals given either MSMS or UTMS either alone or with CFM.

The results obtained indicated that goats given UTMS alone or rations containing MS, MSMS or UTMS could cover their maintenance requirements of TDN and DCP according to NRC (1981), while, goats given MS and MSMS as a sole diet could not cover their maintenance requirements of TDN and DCP with one exception that animals given MSMS could cover their maintenance requirements of DCP.

Nitrogen balance:

Results presented in tables 6 and 7 indicated clearly that animals given MSMS or UTMS either alone or with CFM showed significantly ($P<0.05$ or 0.01) higher nitrogen intake compared with those given MS. Animals fed on MS, MSMS or UTMS as a sole diet showed to have nearly similar equable nitrogen balance (Table6).

Table (6): Mean values with their SE* for nitrogen intake and nitrogen retention recorded with goats given untreated, mixture supplemented or urea treated mung bean straw.

Item	Untreated mung bean straw (MS)	Mixture supplemented mung bean straw (MSMS)	Urea treated mung bean straw (UTMS)	SE
Nitrogen intake (g/animal/day)	6.38 ^{A}	11.27 ^{B}	10.23 ^{B}	± 1.1
Fecal nitrogen (g/animal/day)	4.05	5.68	4.70	
Urinary nitrogen (g/animal/day)	2.41	5.46	5.50	
Nitrogen retention : g/animal/day	-0.08	+0.13	+0.03	± 0.10

*** SE : standard error of the means.**

- **A, B means at the same row with different superscripts are significantly (p<0.01) different.**

Table (7): Mean values with their SE* for nitrogen intake and nitrogen retention recorded with goats given rations containing untreated, mixture supplemented or urea treated mung bean straw.

Item	Ration (I) MS+CFM	Ration (II) MSMS+CFM	Ration(III) UTMS+CFM	SE
Nitrogen intake (g/animal/day)	11.57 ^{a}	14.77 ^{b}	14.04 ^{b}	± 1.3
Fecal nitrogen (g/animal/day)	5.24	5.18	5.34	
Urinary nitrogen (g/animal/day)	5.11	6.99	5.85	
Nitrogen retention :				
g/animal/day	+1.22 ^{a}	+2.60 ^{b}	+2.85 ^{b}	±0.56
% of N intake	10.5 ^{A}	17.6 ^{B}	20.3 ^{B}	±1.53
% of N digested	19.3 ^{A}	27.1 ^{B}	32.8 ^{B}	±2.60

*** SE : standard error of the means.**

- **A, B means at the same row with different superscripts are significantly (p<0.01) different.**
- **a, b means at the same row with different superscripts are significantly (p<0.05) different.**

Animals given rations containing CFM + MSMS or UTMS showed significantly (P<0.05 or 0.01) higher nitrogen balance in terms of either g/animal/day or as % of N intake or digested. No significant differences were observed between goats given MSMS or UTMS rations, however, animals fed on UTMS showed higher values. Similar results have been reported by Reddy *et al.*, (1989); Salman (1991) and Salman *et al.*, (1998) who found that animals given rations containing urea treated roughages showed higher N balance than those given rations containing urea supplemented roughages.

Ruminal parameters:

The results obtained in Table (8) showed that pH values recorded before feeding (zero hr.) were higher than those recorded after feeding (4hr.), while total VFA's concentration followed by vice-versa trend. No significant differences were recorded in total VFA's concentration among all treatments before feeding, however, animals given MSMS showed significantly (P<0.05) higher values compared with the other two treatments.

Table (8): Effect of treatments on rumen liquor pH, total VFA's and ammonia-N concentrations recorded at different times on goats fed rations containing untreated, mixture supplemented or urea treated mung bean straw.

Item	Ration (I) MS+CFM	Ration (II) MSMS+CFM	Ration(III) UTMS+CFM	SE
Sampling time, hr (after feeding) pH:				
0	6.2^{a}	$6.7^{a,b}$	7.1^{b}	± 0.31
4	$5.6^{A,a}$	6.4^{B}	$6.1^{A,B,b}$	± 0.17
Total VFA's (meq/100ml RL):				
0	6.4	6.3	7.4	± 0.72
4	11.3^{b}	12.9^{a}	11.1^{b}	± 0.75
Ammonia-N (mg/100 ml RL):				
0	20.3	21.4	20.8	± 3.77
4	21.2^{a}	31.1^{b}	$25.8^{a,b}$	± 3.38

* SE : standard error of the means.
- A, B means at the same row with different superscripts are significantly (p<0.01) different.
- a, b means at the same row with different superscripts are significantly (p<0.05) different.

Ammonia nitrogen concentration recorded before feeding (0 hr.) for the three treatments were nearly the same, however NH3 nitrogen concentration at 4 hr. after feeding were significantly (P<0.05) higher on animals given MSMS or UTMS than those received MS. Similar results have been reported by Hadjipanayiotou (1982); Reddy *et al.*, (1989); Salman (1991)and Salman *et al.*, (1998). These results supported by those obtained herein for nutrients digestibility and nitrogen balance.

Blood parameters:

The results obtained (Table 9) showed that the two treatments applied with MS significantly (P<0.05) increased both serum total protein and urea concentration. Similar results have been reported by Yadav and Yadav (1988). Tawila (1991); Shoukry *et al.*, (1992b) and Salman *et al.*, (1998) found that urea treatment of poor quality roughages increased serum total protein and urea concentration in ruminants. The values recorded for either total protein or urea concentration in goats given MSMS or UTMS were nearly the same.

Table (9): Effect of treatments on some blood parameters recorded with goats given rations containing untreated, mixture supplemented or urea treated mung bean straw.

Item	Ration (I) MS+CFM	Ration (II) MSMS+CFM	Ration(III) UTMS+CFM	SE
Total protein(g/100ml)	5.4[a]	6.8[b]	6.6[b]	± 0.5
Urea(mg/100ml)	35.3[a]	43.2[b]	41.3[b]	± 2.6
Creatinine(mg/100ml)	2.2	2.6	2.3	± 0.3
GOT(unit/ml)	35.9	36.2	34.8	± 1.2
GPT(unit/ml)	23.8	24.1	24.6	± 1.1

*** SE : standard error of the means.**

- a, b means at the same row with different superscripts are significantly ($p<0.05$) different.

The results obtained for creatinine concentration agreed well with those reported by Tawila (1991) and Shoukry *et al.*, (1992b) and Salman *et al.*, (1998) which being lowest for untreated ration and somewhat higher for the two urea treatments used with no significant differences among all treatments. The values obtained for GOT and GPT concentration in all treatments were within the normal range reported by Mottalib *et al.*, (1980); Abd El-Karim (1990) and Salman *et al.*, (1998). The differences among treatments were not statistically significant indicating that urea treatment or supplementing could be recommended for practical application since it has no adverse effect on liver function. Similar results have been reported by Tawila (1991); Shoukry *et al.*, (1992b) and Salman *et al.*, (1998) with sheep given untreated or urea treated or supplemented poor quality roughages.

Finally the present study suggests the possibility of using mung bean straw as a new roughage source in ruminants feeding. Intake and utilization of mung bean straw could be improved by goats using urea treatment or urea + vitamins + mineral mixture supplement without any adverse effect on kidney and liver functions.

REFERENCES

Abd El-Fattah, Y.A. (2002). Nitrogen metabolism in ruminants. M.Sc. Thesis ,Fac. of Agric. El- Azhar Univ.

Abd El-Karim, F. A. (1990). Improvement the utilization of roughages by goats, Ph. D. Thesis, Fac. Agric. Cairo Univ., Egypt.

Abou –Raya, A. K. (1967). " Animal and Poultry Nutrition. " Dar El-Maarif, Cairo, (Arabic Text Book).

A.O. A. C. (1990). Association of Official Analytical Chemists, Official Methods of Analysis (15th Ed.),Washington, D. C.

Armstrong, W. D. and C. W. Carr (1964). Physiological chemistry: Laboratory Directions, 3rd Ed. Burges Publishing Co. Minneapolis, Minnesota.

Ashour, N. I; T. G. Behairy; M. M. Selim and E. M. Abd El-Lateef (1992) . Mung bean *(Vigna radiata Rox b.)*. A new introduced crop in Egypt. 2. varietal differences in growth and yield Proc. 5th Conf. Agron; Zagazig, 13-15 Sept. 1:361.

Balch, C. C. (1967). Problems of predicting the value of non-protein nitrogen as a substitute for protein in rations for farm ruminants. Wld. Anim. Prod.,3:84.

Buettner, M. R.; V. L. Lechtenberg; K. S. Hendrix and J. H. Hertel (1982). Composition and digestion of ammoniated tall fescue *(Festuca arundimcea scherb)* hay. J. Anim. Sci., 54:173.

CLFF(2001). Feed Composition Tables for Animal and Poulty Feedstuffs Used in Egypt. Technical bulletin No. 1. Central Lab. for Food & Feed. ARC, Ministry of Agric.

Conway, E.J. and E.O.' Malley (1942). Micro diffusion methods. Ammonia and urea using buffered absorbants. Biochem. J., 36:655.

Dias-Da-Silva, A.A. and F. Sundstol (1986). Urea as a source pf ammonia for improving the nutritive value of wheat straw. Anim. Feed Sci. Techn., 14:67.

El-Shinnawy, M. M. (1989). The efficiency of feeding buffalo calves on low level of concentrates. Proc. 3rd Egyptian-British Conf. on Anim., Fish and Poultry Prod. Alex. 7-10 October.571.

Goering, H. K. and P. J. Van Soest (1970). Forage fiber analysis. U.S.D.A. Agric. Handbook No. 379. Washington. D. C.

Hadjipanayiotou, M. (1982). The effect of ammoniation using urea on the intake and nutritive value of chopped barley straw. Pasture & Forage Sci., 37:89.

Hartley, R. D. and E.C. Jones (1978). Effect of aqueous ammonia and other alkalis on the *In Vitro* digestibility of barley straw. J. Sci. Food Agric., 29:92.

Husdan, H. (1968). Chemical determination of creatinine with deproteinization. Clin. Chem., 14:222.

Kadlag, G.K; P.V. Wani and D.M. Sawant (1998). Comparative performance of different *pleurotus spp.*on gram and green gram straws. J. of Maharashtra- Agric. Univ. India., 23:1.

Kempton, T. J. and R. A. Leng (1979). Responses in growth and rumen function to supplementation of a low-protein cellulosic diet with either urea, casein or formaldehyde treated casein, Br. J. Nutr., 42:289.

Mottalib, A.A.; S. El-Amrousi; T. A. El-Allawy; Sannaa M. Nassar and A. A. Amer (1980). Blood and serum changes in rams over-fed with some local feed stubbles. Assiut Vet. Med., 7:235.

NRC (1981). Nutrition Requirements of Goats , National Academy of Science, Washington, D.C.

Oji, U. I.; D. N. Mowat and J. G. Buchanan- Smith (1979). Nutritive value of thermo-ammoniated and steam-treated maize stover. II. Rumen metabolites and rate passage. Anim. Feed Sci. Techn., 4:187.

Patton, C. J. and S. R. Crouch (1977). Spectrophotometric and kinetics investigation of the Berthelot reaction for the determination of ammonia. Ana. Chem., 49:464.

Reddy, C. N.; M. R. Reddy and G.V.N. Reddy (1989). Ammoniation of sorghum straw with urea/anhydrous ammonia for improved utilization among crossbred cattle. Indian J. Anim. Sci., 59:986.

Reddy, D. V. (1997). The effect of supplementation of legume straws on utilization of rice straw-poultry droppings-rice bran-fish meal based diet in buffaloes. Anim. Feed Sci. Techn., 69:305.

Salman, F. M. (1991). Nutritional evaluation of processed waste materials in rations for ruminants. Ph. D. Thesis, Fac. Agric., Ain Shams Univ.

Salman , Fatma, M.; M.M. Shoukry; M.G. Sawsan and M.A. Tawila (1998). Nutritional evaluation of urea treated corn stalks with different methods. J. Agric. Sci. Mansoura Univ., 23: 4259.

Selim, M.M. (1996). Effect of plant density on the yield and yield components of some mung bean varieties. Bull. NRC, Egypt, 21:227.

Shoukry, M.M.; H.M. Ali; M.A. El-Ashry and F.M. Salman (1992a). Effect of urea treatment level and ensiling period on the chemical composition, nitrogen fixation and nutritive value of some poor quality roughages. Zagazig J. Agric. Res., 19:1795.

Shoukry ,M.M.; F.M. Salman and H.M. Ali (1992b).Effect of feeding urea treated roughages with different methods on some blood parameters of sheep.J.Agric. Sci. Mansoura Univ., 17:3515.

Shoukry ,M.M.; Fatma, M. Salman and H.M. Ali (1993). Nutritional evaluation of urea treated bean straw,corn cobs, rice straw and peanut husk using the direct method. J. Agric. Sci. , Mansoura Univ., 18:106.

Snedecor, C. W. andW.G. Cochran(1980). Statistical methods. 7th Ed. Allied Pacific, Bombay.

Tawila, M. A. (1991). Studies on the possible methods for improving utilization of low quality roughages for ruminants. Ph. D. Thesis, Fac. Agric., Ain Shams Univ.

Warner, A. C. I. (1964). Production of volatile fatty acids in the rumen, method of measurements. Nutr. Abst. and Rev., 34:339.

Yadav, B.P.S. and I. S. Yadav (1988) . Nitrogenous Constituents in rumen metabolites and blood serum of adult cattle fed urea treated straw. Ind. J. Anim. Sci., 58:107.

الاستفادة من تبن فول المانج كمصدر جديد للمواد الخشنة فى تغذية المجترات

فاطمة منصور محمد سالمان

قسم الانتاج الحيوانى – المركز القومى للبحوث – الدقى – جمهورية مصر العربية

فى هذه الدراسة تم معاملة تبن فول المانج بطريقتين احدهما بمحلول اليوريا (٣كجم/١٠٠كجم تبن) ثم الكمر فى السيلو والاخرى عن طريق اضافة مخلوط اليوريا والفيتامينات والاملاح المعدنية النادرة بالاضافة للمولاس الى التبن عند التغذية مباشرة . وقد تم تقديم تبن فول المانج غير المعامل او المعامل بالطريقتين للتغذية حتى الشبع لذكور الماعز البلدى الناضجة (٤ رؤوس لكل معاملة) اما بمفرده او بالاضافة الى مخلوط العلف المركز لتغطية ٥٠% من الاحتياجات الحافظة للطاقة . وقد اوضحت النتائج ان كلا المعاملتين لتبن فول المانج ادت الى زيادة محتواه من البروتين الخام وانخفاض محتواه من الـ ADF ، كذلك ادت الى زيادة القيم الهضمية لمعظم المركبات الغذائية كما ادت الى تحسين القيمة الغذائية فى صورة مركبات مهضومة كلية وبروتين خام مهضوم ، كذلك ادت الى زيادة كمية المأكول من المادة الجافة والمركبات المهضومة الكلية والبروتين الخام المهضوم بشكل معنوى بالمقارنة بالتبن غير المعامل. وقد أمكن تغطية الاحتياجات الغذائية الحافظة للماعز من الطاقة والبروتين المهضوم عند احتواء العلائق التجريبية على العلف المركز بالاضافة الى تبن فول المانج غير المعامل و المعامل بالطريقتين بينما امكن تغطية الاحتياجات الحافظة من الطاقة والبروتين المهضوم عند التغذية على تبن فول المانج المعامل بمحلول اليوريا بالكمر ،وقد تحسن ميزان الأزوت للماعز عند معامله التبن بالطريقتين ، ولم تكن هناك فروق معنوية بين حيوانات المعاملات الثلاث بالنسبة لتركيز الكرياتينين وانزيمات GOT و GPT . وتشير نتائج الدراسة الى امكانية استخدام تبن فول المانج فى علائق الماعزكمصدر جديد للمواد الخشنة وخاصة فى شهور الصيف التى يقل بها المصادر العلفية مع امكانية تحسين القيمة الغذائية له باستخدام المعاملة بمحلول اليوريا او اضافة مخلوط اليوريا + الفيتامينات + الاملاح المعدنية لتغطية الاحتياجات الحافظة دون تاثير ضار على وظائف الكلى والكبد .