Egyptian J. Nutrition and Feeds (2008) 11 (2) : 309-328

USING OF OLIVE TREES BY-PRODUCTS TREATED BIOLOGICALLY OR CHEMICALLY FOR SHEEP FEEDING IN SINAI.

Hend A. Aziz[1]; M. A. El-Ashry[2]; Afaf M. Fayed[1]; M. M. A. Khorshed[2] and Ab. N. Khattab[3].

[1] *Animal Nutrition Department, Desert Research Center, Cairo, Egypt.*
[2] *Animal Nutrition Department, Faculty Of Agriculture, Ain Shams University. Shoubra El-Khaima, Egypt.*
[3] *Genetic and Cytology Department, National Research Center, Dokki, Cairo, Egypt.*

(Received 25/2/2008, Accepted 30/5/2008)

SUMMARY

This work was carried out to study the effect of treated olive trees pruning by-products (leaves and twigs) biologically and chemically on its chemical composition, fiber constituents, rumen fermentation, nutrients digestibility ruminal protozoa count and blood parameters. Laboratory trials were carried out to choose the perfect period for fungus to be growing. Six digestibility trials were carried out using the following treatments: T1: Concentrate feed mixture (CFM) + Berseem hay (Control). T2: CFM+ Air-dried olive trees by products untreated. T3: CFM + olive trees by products treated with 4% urea. T4: CFM + olive trees by products treated with 50% *Phanerochaete chrysosporium* + 50% *Saccharomyces cerevisiae*. T5: CFM+ olive trees by products treated with 50% *Trichoderma viride* + 50% *Saccharomyces cerevisiae*. T6: CFM+ olive trees by products treated 25% *Phanerochaete chrysosporium* + 25% *Trichoderma viride* + 50% *Saccharomyces cerevisiae*. The data of the Laboratory trials showed that inoculation for fungi and yeast with olive by-products for 20 days had the best results for chemical composition and fiber fraction. The main results showed that urea and biological treatments tended to increase ($P<0.01$) total dry matter intake more than untreated group T2 being 956.25 and 954.92 vs 894.37 g/h/d; respectively. The digestibilities of DM and OM were significantly differed. All treatments tended to increase ($P<0.01$) CP, CF and it's fractions digestibilities more than untreated group. Control group T1 followed by urea treatment T3 and biological treatment with *T. vi.* and *S. ce.* (T5) had the highest CP, CF and it's fractions digestibilities. Urea treatment had the highest values of TDN and DCP (% of intake). Water balance showed highly significant difference among treatments. Nitrogen balance was higher in treated groups than untreated group being 4.88, 4.14 and 3.09 for T3, T5 and T2; respectively. Biological treatment had the highest value of ruminal pH. Urea treatment T1 increased ($P<0.01$) ruminal TVFA's being 8.24 vs 6.57 for untreated. All treatments increased ($P<0.01$) ruminal total nitrogen, NPN, ammonia and total ruminal protozoa count more than untreated group. Biological treatments and urea treatment increased ($p<0.01$) serum total proteins, albumin, globulin, urea, creatinine, GOT and GPT more than control. It can be concluded that feeding sheep on olive trees pruning by products treated biologically or chemically improved rumen fermentation, nutrients digestibility ruminal protozoa count and blood parameters.

Keywords: *biological treatments, urea, digestibility, blood and ruminal parameters and protozoa count.*

INTRODUCTION

In Sinai where livestock depend mainly upon grazing of natural pastures animals suffer from a shortage of feed during most of the year. In such areas, the possibility of using the agro-industrial by products as a part of concentrate mixture, in addition to the native range forages is of more than passing interest. Large areas are cultivated by olive trees, especially in Sinai and the North-western coast zone, therefore, there are great amounts of olive by products without beneficial usage and are considered as wastes. It has been estimated that each olive tree could produce 22 kg leaves and twigs per year and 25 kg olive cake per 100 kg olive fruits (Nefzaoui, 1995) that using olive trees by products as animal feed could participate in solving the problems of feed shortage which is particularly realized at drought seasons and hence the selling price of animals products.

As a solution for the shortage of animal feeds scientists suggested the use of ammonia and urea to increase the crude protein contents of the poor quality roughages to improve their nutrients digstibilities (Fouad *et al.*, 1998). Biological treatments using *Trichoderma viride*, (Abdul-Aziz *et al.*, 1997, El-Ashry *et al.*, 1997 and Khorshid, 2000) were tested to improve the nutritive value and digestibility of poor quality roughages. El Asshry *et al.*, (2003) showed that enzymatic hydrolysis by fungi and the biological conversion of cellulosic materials and improve the nutritive value of residues especially crude protein and crude fiber. Yeast treatment was used to improve rumen digestibility of nutrients especially crude fiber, elevation fermentation and more activation of rumen microorganisms (Dawson, 1992).

The objectives of this work were to study the possibility of utilizing the olive trees pruning by products (olive leaves and twigs) as an unconventional feed source for ruminants (sheep) and try to improve its chemical composition and nutritive value by using some biological and chemical treatments.

MATERIALS AND METHODS

The field experiment was carried out at Ras Sudr Research Station, Desert Research Center (DRC) in South Sinai Government. Olive leaves and twigs were pruning and chopped to 2-3 cm then air-dried and packed till used. This study included two parts of experiments.

The first part (Laboratory trials):

The first part was a laboratory trials were carried out to study the effect of using biological treatments (combined fungi plus yeast) and chemical treatment (urea treatment) on chemical composition and fiber constituents of olive trees pruning by-products and choosing the perfect period for fungus to be growing. *Trichoderma viride* F-516 (*T.vi*), *Phanerochaete chrysosporium (P. ch)* and *Saccharomyces cerevisiae* (*S. ce*) were obtained from the Genetic and Cytology Department, National Research Center, Dokki, Cairo, Egypt. The microorganisms were maintained on agar medium composed of (g/l) yeast extract, 3.0; malt extract, 30; peptone, 5.0; sucrose 20 and agar 20.

The laboratory trials were designed as follow:-

T1: Air-dried olive by-products treated with 4% urea+10% molasses solution.
T2:Air-dried olive by-products inoculated with 50% *P. ch.* + 50% *S. ce.* for 10 days.
T3:Air-dried olive by-products inoculated with 50% *P. ch.*+ 50 % *S. ce.* for 20 days.
T4:Air-dried olive by-products inoculated with 50% *P. ch.* + 50 % *S. ce.* for 30days.
T5: Air-dried olive by-products inoculated with 50% *T. vi.*+ 50% *S. ce.* for 10 days.

T6: Air-dried olive by-products inoculated with 50% *T. vi.*+ 50% *S. ce.* for 20 days.
T7:Air-dried olive by-products inoculated with 50% *T. vi.* + 50% *S. ce.* for 30 days.
T8: Air-dried olive by-products inoculated with 25% *P. ch.* + 25% *T. vi.* + 50% *S. ce.* for 10 days.
T9: Air-dried olive by-products inoculated with 25% *P. ch.* + 25% *T. vi.*+ 50% *S. ce.* for 20 days.
T10: Air-dried olive by-products inoculated with 25% *P. ch.* + 25% *T. vi.* + 50% *S. ce.* for 30 days.
All the samples were analyzed for chemical composition and fiber fraction.

The second part (Digestibility trials):

The objective of this work was to study the effect of feeding Olive trees pruning by products treated with 4% urea or with biological treatments on nutrients digestibilities, rumen protozoa count and blood parameters. From the results of the laboratory trials, the best period for inoculation from each biological treatment was 20 days. This treatment was choosing to carry out in six digestibility trials as follow:
T1: Concentrate feed mixture (CFM) + Berseem hay.
T2: CFM+ Air-dried olive by products untreated.
T3: CFM +Air-dried olive by products treated with 4% urea.
T4: CFM+ Air-dried olive by products treated with 50% *P. ch.* + 50% *S. ce.* for 20 days.
T5: CFM+ Air-dried olive by products treated with 50% *T. vi.* + 50% *S.ce.* for 20 days.
T6: CFM+ Air-dried olive by products treated 25% *P. ch.* + 25% *T. vi.* + 50% *S. ce.* for 20 days.

Management and feed schedule:

24 adult male sheep weighing 38.5-42.0 kg live body weight and about 3-3.5 years old were used in a digestibility trial. The animals were randomly assigned among six experimental treatments (4 animals each treatment). The experiment lasted for 21 day preliminary period followed by 7 days collection period. All animals were fed on the concentrate feed mixture (CFM) at 30 % of maintenance and roughage (olive leaves and twigs or berseem hay) was given ad lib. Animals through the experiment were fed their daily ration according to their live body weight according to Kearl (1982), daily rations were offered individually in two equal portions at 7 a.m. and 7 p.m. Fresh water had excess to the animals twice daily at 7 a.m. and 1 p.m. Feces and urine samples were collected manually at 7 a.m. for five successive days from each animal.. Ten percent of collected faeces was taken as samples and dried in oven at 80 °c for 24 hours. The dried fecal samples from each animal were mixed and saved for chemical analysis. Urine samples were daily collected with thymol and 10 % daily samples were taken as representive samples. The representive samples from each animal were mixed and saved for chemical analysis. offered, feed refusals and faeces samples were analyzed for moisture, crude protein, ether extract, ash, crude fiber according to A.O.A.C (1990). Nitrogen free extract was calculated by difference. The fiber fractions determinations were carried out as follows: Neutral detergent fiber (NDF) according to Van Soest and Wine (1967). Acid detergent fiber (ADF) according to Van Soest (1963) and Acid detergent lignin (ADL) according to Van Soest and Wine (1968).

Rumen fluid was taken before feeding and then at 3 and 6 hours after morning feeding for three sequenced days. pH was immediately measured with pH meter, then strained and immediately ammonia nitrogen concentration was determined by applying

Conway (1957), then samples stored until analysis for the total volatile fatty acid (TVFA's) according to Warner (1964), total nitrogen and non-protein nitrogen (NPN) according to A.O.A.C (1980) while true protein nitrogen was calculated by subtracting the non-protein nitrogen content from total nitrogen content.

The ruminal fluid was obtained to count and classify the rumen protozoa as described by Naga *et al.*, (1968). Blood samples were taken and separate serum then kept till analyzed.

Statistical analysis:

General linear model procedure was used for statistical analysis through SAS software (SAS, 1998), Duncan's multiple test was applied for comparison of means (Duncan, 1955).

RESULTS AND DISCUSSION

Laboratory trials:

Data of chemical composition and fiber fractions of the olive leaves and twigs treated in the laboratory trials are represented in Tables (1 and 2). The data showed that among the three times for inoculation, there were no differences among the chemical compositions and fiber fraction for inoculation for 20 days and 30 days, that means that inoculation for fungi and yeast with olive leaves and twigs for 20 days is a sufficient period to obtain the best results for chemical composition and fiber fractions and that encourage to use the period of 20 day as a period for inoculation in the digestibility trails. Shoukry *et al.*, (1985) treated sugarcane bagass by four different microorganisms (*T. viride* 253, *Basidiomycetes sp.*, 1 and 11 and *Gliocladium sp.* Q230) for 21 day and found a decrease in CF, NDF, ADF, ADL and hemicellulose. Khorshed (2000) showed that different crop-residues fermented with fungi or a combined of fungi and yeast for 21 day were recorded the highest values of TDN for than control group.

Table (1): Chemical composition of the treated olive by products (leaves and twigs) in the Laboratory trials.

Item	DM	Ash	EE	CP	CF	NFE
Olive by products treated with urea	92.92	14.53	5.95	14.91	16.74	47.87
Olive by products treated with *P. ch.+ S.ce*						
10 days	94.34					
20 days	94.42	15.00	5.07	7.50	21.52	50.91
30 days	94.00	15.15	5.34	7.85	20.79	50.87
Olive by products treated with *T. vi. + S. ce.*		15.15	5.24	7.73	20.81	51.07
10 days	94.13	14.63	5.19	9.29	18.83	52.06
20 days	94.02	14.71	6.54	10.68	16.30	51.77
30 days	94.41	14.12	6.41	10.62	16.36	52.49
Olive by products treated with *P. ch.+ T. vi.+ S. ce.*						
10 days	93.89	14.93	4.54	6.81	19.00	54.72
20 days	93.77	14.95	5.96	7.83	17.79	53.47
30 days	93.93	14.95	5.87	7.85	17.82	53.51

Table (2): Fiber fractions of the treated olive by-products (leaves and twigs) in the Laboratory trials.

Item	NDF	ADF	ADL	Cellulose	Hemicellulose	Leginin
Olive by products treated with urea	54.60	33.50	7.70	25.80	19.10	12.00
Olive by products treated with *P. ch.*+ *S.ce*						
10 days	63.75	40.56	11.30	29.26	23.19	12.50
20 days	62.90	40.00	10.90	29.10	22.90	12.40
30 days	62.90	40.00	10.87	29.13	22.90	12.40
Olive by products treated with *T. vi.* + *S. ce.*						
10 days	59.75	38.62	10.45	28.17	21.13	12.35
20 days	55.20	35.20	8.00	27.20	20.00	12.10
30 days	55.19	35.20	7.98	27.22	19.99	12.10
Olive by products treated with *P. ch.*+ *T. vi.*+ *S. ce.*						
10 days	61.85	40.00	10.70	29.30	21.85	12.25
20 days	60.00	38.60	9.68	28.92	21.40	12.20
30 days	59.96	38.58	9.66	28.92	21.38	12.20

Digestibility trials:

Chemical composition and fiber fractions:

Data of chemical composition and fiber fractions of the olive leaves and twigs used in the digestibility trails are presented in Table (3 and 4). The data showed that control treatment (T1) had the lowest DM content while biological treatments had the highest value of DM content. Biological treatment with *P. ch.* and *S. ce.* (T4) had the highest value of ash, while Biological treatment with *T. vi.* and *S. ce.* (T5) had the highest value of EE. The highest value of CP was for urea treatment followed by biological treatment with *T. vi.* and *S. ce.* (T5), while treatment with *P. ch.*and *S. ce.* (T4) or with combination of *Ph. Ch.* + *T. vi.*+ *S.ce.* (T6) were almost the same. The data showed that (T3) had the lowest value of CF and its fraction followed by T5 then T6 and T4. Biological treatment with *P. ch.* + *T. vi.* + *S. ce.*(T6) had the highest value of NFE followed by T5 then T4 and T1. As for fiber fraction (Table 4) the data showed that urea treatment and all biological treatments decreased all fiber fractions more than untreated group. Also the biological treatments decreased cellulose content more than control but they have higher content of ADL, hemicellulose and leginin more than control.

The present results coincided with those obtained by Ballet *et al.*, (1997) when they noticed that ammonia or urea treatments are considered as valuable alternatives to increase both nitrogen supply and energy value for animals. El-Shinnawy *et al.*, (1999) found that urea treatment improved crude protein content of treated maize stalks being three times as that of untreated. However, DM, NFE, OM and CF were decreased. Also, El-Sayed *et al.* (2001) indicated that urea treatment (3%) decreased DM, CF, NFE, NDF, ADF and hemicellulose and increased CP content of rice straw.

Shoukry *et al.*, (1985) treated sugarcane bagass by four different microorganisms (*T. viride* 253, *Basidiomycetes sp.*, 1 and 11 and *Gliocladium sp.* Q230) and found increases in CP, EE and ash contents and a decrease in CF, NDF, ADF, ADL and hemicellulose. Hamissa *et al.*, (1985) treated the fermented bagass (*T.viride* fungi) with NaOH or sodium hypochlorite then it was sprayed with urea solution (4%), all treatments significantly increased the CP and decreased CF, NDF,

Table (3): Chemical composition of concentrate and experimental roughage used in the digestibility trials.

Item	DM	Ash	EE	CP	CF	NFE
Concentrate feed mixture	93.59	7.94	3.10	12.51	11.35	65.10
Berseem hay (control T1)	91.24	11.99	2.55	14.00	32.64	38.82
T2	93.95	13.50	5.88	6.48	24.66	49.48
T3	92.92	14.53	5.95	14.91	16.74	47.87
T4	94.42	15.15	5.34	7.78	20.79	50.94
T5	94.02	14.71	6.54	10.70	16.30	51.75
T6	93.77	14.95	5.96	7.83	17.79	53.74

Table (4): Fiber fractions of concentrate and experimental roughage used in the digestibility trials.

Item	NDF	ADF	ADL	Cellulose	Hemicellulose	Lignin
Concentrate feed mixture	30.65	17.56	6.85	10.71	13.09	6.82
Berseem hay (control T1)	62.96	44.44	7.13	37.31	18.52	7.11
T2	64.50	41.00	11.70	29.30	23.50	12.53
T3	54.60	33.50	7.70	25.80	19.10	12.00
T4	62.90	40.00	10.90	29.10	22.90	12.40
T5	55.20	35.20	8.00	27.20	20.00	12.10
T6	60.00	38.60	9.68	28.92	21.40	12.20

ADL, NFE and hemicellulose contents of bagass, while the cellulose and ADF contents were similar. The treated bagass contained ash higher than untreated bagass. Fouad *et al.*, (1998) reported increases in DM, CP, EE, NFE, hemicellulose and decreases in CF contents after fungal treatments of roughage. Also, Khorshed, 2000; El-Ashry *et al.*, 2001 and Hamza *et al.*, 2006 conclusion that fungal treatments of roughage improve its chemical composition and structure.

Feed intake:

Data of Table (5) showed that concentrate, roughage and total dry matter intake TDMI (g/h/d and g/kgBW$^{0.75}$) was significantly (P<0.01) differed among treatments. Urea treatment and biological treatments tended to increase (P<0.01) concentrate, roughage and total dry matter intake TDMI (g/h/d), urea treatment had the highest value followed by biological treatment with *T. vi.* and *S. ce.* (T5), while untreated group (T2) had the lowest value. Biological treatments increased (P<0.01) concentrate, roughage and total dry matter intake TDMI (g/kgBW$^{0.75}$) more than urea treatment, untreated group and control group. The highest value was for biological treatment with *P. ch.* and *S. ce.* (T4), while the lowest value was for control group (T1). It seems that urea and biological treatments increased feed intake more than control and untreated group. These results are in agreement with those obtained by Kholif *et al.*, (2005) who indicated that dry matter intake (DMI) slightly increased in goats fed banana wastes treated with *panicillium funiculusms* or *S. cerevisiae*, while *T. viride* slightly decreased DMI compared with control. Lewis *et al.*, (1999) suggested an increase of DMI with fungal or enzymatic treatments.

Table (5): Effect of chemical treatment with urea and biological treatments on dry matter intake of sheep.

Item	Treatments						±SE
	T1	T2	T3	T4	T5	T6	
No. of animals	4	4	4	4	4	4	
Live body weight	40.70^{c}	38.56^{f}	42.0^{a}	39.56^{e}	41.43^{b}	40.55^{d}	0.238
Dry matter intake g/h/d							
concentrate	202.50^{d}	198.75^{e}	212.50^{a}	211.25^{b}	215.55^{a}	210.00^{c}	0.383
Roughage	708.75^{e}	695.62^{f}	743.75^{a}	725.60^{d}	739.37^{b}	735.00^{c}	0.169
Total	911.25^{e}	894.37^{f}	956.25^{a}	936.85^{d}	954.92^{b}	945.00^{c}	0.456
Dry matter intake g/kg BW $^{0.75}$							
Concentrate	12.57^{f}	12.84^{e}	12.88^{d}	13.39^{a}	13.20^{b}	13.07^{c}	0.029
Roughage	43.98^{f}	44.95^{e}	45.08^{d}	46.00^{a}	45.28^{c}	45.74^{b}	0.103
Total	56.55^{f}	57.80^{e}	57.96^{d}	59.39^{a}	58.48^{c}	58.81^{b}	0.131

Means with the same letter are not significantly different (P<0.01).

Digestibility coefficients and nutritive values:

Data of Table (6) indicated that the digestibilities of DM and OM were significantly (P<0.01) increased for urea treatment (T3) followed by biological treatment with *T. vi.* and *S. ce.* (T5) then control (T1), while untreated group (T2) had the lowest value. All treatments increased (P<0.01) the digestibility of EE more than control T1. The digestibilities of CP and NFE were significantly affected by the treatments, all treatments tended to increase (P<0.01) CP and NFE digestibilities more than untreated group, T3 had the highest value followed by T5 and control T1. The digestibilities of CF and it's fractions (NDF, ADF, ADL, cellulose, hemicellulose and lignin) were the same trend, urea treatment and all biological treatments increased the digestibilities of CF and it's fractions more than untreated group; the highest values were for control group (T1) followed by urea treatment (T3) and biological treatment with *T. vi.* and *S. ce.* (T5).

The improvement in nutrients digestibility in particular CP and CF was recorded for urea treatment does not appear to be only due not to satisfy the requirements of nitrogen for rumen microbes which may have been at least partially or completely met (Balch, 1967), but possibility to an additional effect of ammonia (released from urea hydrolysis in the silo) on roughage cell wall or changes that may have occurred in the lignocellulose bonds (Horton, 1981). In addition, Shoukry *et al.*, (1993) reported that urea treatment of poor quality roughages increased digestibility or degradability of cell wall constituents. Also, Hassan *et al.*, (2005) reported that the average digestibility coefficients of CF, NDF and cellulose were higher (P<0.05) in ureated banana wastes compared with control but lower than biologically treated groups.

As for nutritive values, data showed that urea treatment (T3) and biological treatment with *T. vi.* and *S. ce.* (T5) increased TDN and DCP (% of DMI) more than control groupT1, other biological treatments and untreated group (T2), respectively. The differences among treatments were significant (P<0.01). It seems that urea and biological treatments increased digestibility coefficients more than control and untreated group.

Table (6): Effect of chemical treatment with urea and biological treatments on digestibility coefficient and nutritive values by sheep.

Item	Treatments						±SE
	T1	T2	T3	T4	T5	T6	
Digestibility coefficient % :							
DM	67.08^{c}	60.87^{f}	72.81^{a}	62.64^{e}	71.73^{b}	64.02^{d}	0.414
OM	68.48^{c}	60.03^{f}	72.85^{a}	63.09^{e}	71.80^{b}	63.54^{d}	0.411
EE	82.51^{f}	91.67^{c}	92.79^{b}	89.26^{d}	93.18^{a}	87.30^{e}	0.519
CP	58.09^{c}	42.14^{f}	67.66^{a}	49.96^{e}	65.64^{b}	57.37^{d}	0.162
CF	63.40^{a}	43.08^{f}	58.02^{b}	44.19^{e}	57.86^{c}	54.21^{d}	0.111
NFE	73.99^{c}	59.20^{f}	76.74^{a}	70.69^{d}	75.67^{b}	68.35^{e}	0.104
NDF	64.08^{a}	40.85^{f}	58.04^{b}	41.54^{e}	55.92^{c}	54.26^{f}	0.358
ADF	63.41^{a}	41.24^{f}	57.74^{b}	41.41^{e}	55.88^{c}	55.66^{d}	0.123
ADL	69.09^{a}	47.39^{f}	63.78^{b}	47.66^{e}	59.17^{c}	58.54^{d}	0.895
Cellulose	62.25^{a}	38.97^{f}	55.79^{b}	41.08^{e}	54.54^{c}	48.97^{d}	0.710
Hemicellulose	65.65^{a}	40.17^{f}	55.99^{b}	41.76^{e}	54.66^{c}	51.86^{d}	0.526
Lignin	64.50^{a}	39.93^{f}	56.13^{b}	40.99^{e}	55.44^{c}	50.98^{d}	0.838
Nutritive value,%							
TDN	63.64^{c}	58.70^{f}	69.50^{a}	59.95^{e}	69.05^{b}	61.05^{d}	0.133
DCP	42.63^{c}	32.34^{f}	57.86^{a}	34.36^{e}	50.04^{b}	41.91^{d}	0.104

Means with the same letter are not significantly different (P<0.01).

These improvements are associated with increasing the digestion in fibrous materials particularly hemicellulose in addition to the increased bacterial digestion of cell wall content (Hassan *et al.*, 2005). Also, these results reflected the values obtained for rations digestibility which were higher for treated rations compared with the untreated rations. The present results agreed well with those by many workers (Horton, 1981; Abd El-Aziz 1986 and El-Kady, 1989), that the improvement of the nutritive values of low quality roughages with ammonia or urea treatment is associated with the increased in digestion of fibrous material or degradation of cell content.

Also the present results agreed well with those reported by Shoukry *et al.*, 1999 that urea treatment improved (P<0.05) the TDN % values by about 6% units and DCP% values by about 3% units compared with untreated banana hay rations. Khorshed, (2000) that fungi treatment and combined fungi and yeast treatment were recorded the highest values of TDN for different crop-residues than control group. Hassan *et al.*, (2005) that the nutritive value of TDN and DCP were significantally higher (P<0.05) in biologically treated banana wastes compared with ureated banana wastes and control.

Water intake:

The data of Table (7) indicated that control group (T1) tended to increase (P<0.01) free drinking water (ml/h/d) more than other treatments. Urea treatment T3 had the highest (P<0.01) value of metabolic water (ml/h/d) followed by biological treatment with *T. vi .+ S. ce.* T5 and T1, respectively. The lowest value was for untreated group T2. As for fecal water (ml/h/d), untreated group followed by urea treatment had higher values more than biological treatments. Control T1 group.

Table (7): Water consumption and balance of sheep affected by experimental rations.

Item	Treatments						±SE
	T1	T2	T3	T4	T5	T6	
Water intake:							
Free drinking water, ml/h/d	5124^{a}	3303^{bc}	3640^{b}	1762^{d}	2287^{cd}	2657^{bcd}	380
Combined water, ml/h/d	15.19^{f}	67.46^{c}	68.49^{a}	67.00^{c}	67.41^{d}	67.64^{b}	0.00
Metabolic water, ml/h/d	492^{a}	391^{b}	532^{a}	461^{ab}	515^{a}	467^{ab}	30.0
Total water intake, ml/h/d	5632^{a}	3761^{bc}	4247^{b}	2291^{d}	2870^{d}	3192^{bcd}	399
Water excretion							
feacal water, ml/h/d	48^{b}	61^{a}	57^{a}	34^{c}	36^{c}	48^{b}	1.51
Urinary water, ml/h/d	164va	52^{1b}	528^{b}	327^{b}	524^{b}	557^{b}	133
Total excreted water, ml/h/d	169^{oa}	58^{vb}	58^{eb}	361^{b}	560^{b}	606^{b}	133
***Water balance, ml/h/d**	3937^{a}	317^{oab}	3656^{a}	1930^{c}	2310^{bc}	2586^{bc}	342

Means with the same letter are not significantly different (P<0.01).
**Metabolic water was calculated from TDN intake a yield of 0.6 g. water per g. (Farid et al., 1986).*
**Including insensible water loss.*

Increased (P<0.01) urinary water more than all treatments and the difference among other treatments were not significant. Total excreted water (ml/h/d) had the same trend of urinary water. Control group T1 followed by urea treatment T3 showed the best value of water balance (ml/h/d). it seems that control and urea treatments increased water balance more than other treatments.

Nitrogen utilization:

Table (8) showed that nitrogen intake (g/h/d) was significantly differed. The value obtained from urea treatment T3 was higher than other groups, also control group and biological treatments had higher values than untreated group. As for fecal nitrogen excretion as g/h/d, it seems that biological treatment with *P. ch.+ S. ce.* T4 had the highest value, while urea treatment, other biological treatments and control group decreased (P<0.01) fecal nitrogen excretion as a percentage of intake more than untreated group T2.

Urine nitrogen excretion (g/h/d or as a percentage of intake) was significantly lower (P<0.01) in untreated group T2 followed by T4 than that in other biological treatments, urea treatment and control groupT1. The data indicated that control group had the highest value of urine nitrogen excretion as percentage of intake.

Addition of *T. vi. + S. ce.* T5 reduced total nitrogen excretion (g/h/d) more than other treatments; the difference between T5 and untreated group T2 was not significant, control group had the highest (P<0.01) value of total nitrogen excretion. As for total nitrogen excretion % of intake the data clearly showed that untreated group had the highest (P<0.01) value, while urea treatment followed by T5 had the lowest (P<0.01) value.

Treatment with urea and biological treatment with *T. vi. + S. ce.* T5 increased (P<0.01) nitrogen balance (g/h/d or % of intake) more than control group and other groups. Untreated group had the lowest (P<0.01) nitrogen balance. This increases were a result of less nitrogen excretion especially as fecal nitrogen in sheep group fed olive leaves and twigs treated with urea and *T. vi. + S. ce.* T5 compared with other groups. The results indicated that benefits of adding urea and biological treatments are emphasized by improving the negative nitrogen balance to positive. It can be concluded that urea and biological treatments improved nitrogen utilization more than control and untreated groups.

The higher nitrogen retention by feeding urea treatment could be due to the higher improvement in CP intake and digestibility and the higher utilization of urea nitrogen by

sheep. Similar results have been recorded by Abd El-Aziz 1986; El-Kady, 1989, Gad, (1993); El- Shinnawy *et al.*, (1999) and Shoukry *et al.*, 1999, that urea supplementation of poor quality roughages increased retained nitrogen with animals.

Biological treatments improved the chemical structure and composition of the treated wastes and by-products (Kakkar *et al.*, 1991; Abd El-Aziz *et al.*, 1994 and El-Ashry *et al.*, 2001). Therefore, these treatments improve also the intake, digestibility, feeding value and N-balance (Singh *et al.*, 1990; Khorshed, 2000; El-Ashry *et al.*, 2001; El-Wakeel, 2004 and Hamza *et al.*, 2006). Also, Singh *et al.*, (1990) and Walli *et al.*, (1991) found a positive N-balance, when they fed calves on fungal treated wheat straw. This observation was in agreement with Kakkar *et al.*, (1991) and El-Ashry *et al.*, (1997). Khorshed, (2000) that biological treatments with *T. viride, S. cervevisiae* or combined of them for cotton stalks or wheat straw feeding for goats showed positive nitrogen balance.

Table (8): Nitrogen utilization for sheep affected by experimental rations.

Item	Treatments						±SE
	T1	T2	T3	T4	T5	T6	
No. of animals	4	4	4	4	4	4	
N. intake g/h/d	19.93^{b}	11.19^{f}	22.00^{a}	13.26^{e}	16.97^{c}	13.41^{d}	0.877
fecal N:-							
g/h/d	8.35^{a}	5.60^{d}	7.11^{c}	7.67^{b}	5.83^{e}	5.72^{f}	0.207
% of Intake	41.91^{d}	50.04^{b}	32.34^{f}	57.85^{a}	34.36^{e}	42.63^{c}	1.119
urinary N:-							
g/h/d	7.65^{b}	2.50^{e}	10.00^{a}	2.35^{f}	7.00^{c}	4.25^{d}	0.192
% of Intake	38.39^{c}	22.34^{e}	45.46^{a}	17.72^{f}	41.24^{b}	31.69^{d}	1.267
Total N excretion							
g/h/d	16.00^{b}	8.10^{f}	17.11^{a}	10.02^{d}	12.83^{c}	9.97^{e}	0.331
% of Intake	80.29^{a}	72.38^{f}	77.80^{b}	75.58^{d}	75.60^{c}	74.32^{e}	1.830
N Balance:-							
g/h/d	3.93^{c}	3.09^{f}	4.88^{a}	3.24^{e}	4.14^{b}	3.44^{d}	0.651
% of Intake	19.71^{f}	27.62^{a}	22.20^{e}	24.42^{c}	24.40^{d}	25.68^{b}	1.830

Means with the same letter are not significantly different (P<0.01).

Rumen liquors parameters:

Data of Table (9) showed that biological treatment with *P. ch.*+ *S. ce.* T4 had the highest ruminal pH values, while there was no significant difference among other treatments. The lowest ruminal pH (P<0.01) was recorded at 3 hr post-feeding. This can be related to ruminal fermentation process by rumen microorganisms which took place on the soluble carbohydrates very soon producing more propionate, decreasing pH value. While fermentation of the structural carbohydrates needs more time producing more acetate delaying the decreased pH value. It seams that urea treatment T3 had the highest values of ruminal TVFA's (ml/equiv /100ml R.L), ruminal total nitrogen, ruminal true protein, non protein nitrogen and ruminal ammonia (mg/100 ml R.L) followed by biological treatment with *T. vi.* + *S. ce.* T5 and control. The data also showed gradual increase of ruminal total nitrogen, true protein NPN and ruminal ammonia after feeding gradually to reach the maximum value at 3hr post-feeding then decreased to the minimum value at zero time of feeding.

The increase in the rumen pH in biological treatments may be related to decrease in the concentration of lactic acid due to the presence of yeast. However, Hassan *et al.*, (2005) reported that ruminal pH was significantly (P<0.05) increased in for ureated banana wastes (3% urea) than that of biologically treated groups and control. While, El-Ashry *et al.*, (1997) found that biological treatments (fungi or enzymes) did not affecte rumen pH.

Also Kholif *et al.*, (2005) reported that pH values were not affected by biological treatments.

The high ruminal TVFA's concentrations at 3hr post-feeding are mainly due to the fermentation of unstructural carbohydrates of the ration. It could be noticed that the percentage of total VFA's was negative correlated with the pH values. These results are in agreement with the findings of Abd El-Malik (1972) that the total VFA's decreased generally with the rise in pH value. Increasing in VFA's with urea treatment may be resulted from the higher digestibility of CF, Doane *et al.*, (1997) indicated that VFA's production were correlated with NDF disappearance. Higher concentration of total VFA's in the rumen of biological groups may be a result of altered rumen microbial populations and microbial activity. The increase in the values of rumen TVF's and NPN suggested that the anaerobic fermentation of biological treatment (*T. viride* and *S. cerevisiae*) were more efficient and faster yielding more.

Table (9a): Overall means of ruminal parameters for sheep affected by experimental rations.

Item	Treatments						±SE
	T1	T2	T3	T4	T5	T6	
pH	6.62^{b}	6.50^{b}	6.49^{b}	6.80^{a}	6.56^{b}	6.52^{b}	0.04
TVFA's, ml equiv /100ml	8.07^{a}	6.57^{c}	8.24^{a}	7.01^{b}	8.12^{a}	7.19^{b}	0.07
Total nitrogen, mg/100 ml	118.46^{b}	99.35^{d}	137.49^{a}	107.08^{c}	137.13^{a}	118.33^{b}	0.61
True protein, mg/100 ml	39.90^{c}	34.26^{d}	46.17^{a}	35.85^{d}	46.32^{a}	43.18^{b}	0.62
NPN, mg/100 ml	78.56^{b}	65.08^{e}	91.31^{a}	71.23^{d}	90.80^{a}	75.15^{c}	0.60
Ammonia nitrogen mg/100 ml	37.41^{b}	30.99^{e}	43.48^{a}	33.91^{d}	43.24^{a}	35.78^{c}	0.28

Means with the same letter are not significantly different (P<0.01).

Table (9b): Overall means of ruminal parameters for sheep affected by experimental rations during different sampling times.

Item	Time			±SE
	0 hour	3 hours	6 hours	
pH	7.01^{a}	6.24^{c}	6.49^{b}	0.03
TVFA's, ml equiv /100ml	6.38^{c}	8.60^{a}	7.62^{b}	0.05
Total nitrogen, mg/100 ml	108.32^{c}	129.99^{a}	120.61^{b}	0.40
True protein, mg/100 ml	39.04^{b}	43.79^{a}	40.01^{b}	0.44
NPN, mg/100 ml	69.28^{c}	86.19^{a}	80.59^{b}	0.42
Ammonia nitrogen, mg/100 ml	32.99^{c}	41.04^{a}	38.37^{b}	0.20

Means with the same letter are not significantly different (P<0.01).

TVFA's than that in control (Kholif *et al.*, 2005). Also it may be due to the increase of digestibility of organic matter (El-Ashry *et al.*, 2003). Yeast increased the rate of rumen fermentation due to its increased the total and viable count of bacteria (Newbold *et al.*, 1996) and celluloytic bacteria (Kumar *et al.*, 1997). These results are agreed with the findings of, El-Ashry *et al.*, (1997), Kumar *et al.*, (1997), Khorshed (2000) and Hassan *et al.*, (2005)

El-Ashry *et al.*, (1997) Sharma *et al.*, (1998) reported that ruminal total nitrogen and microbial protein increased significantly with yeast culture supplementation to rations. The increase in NH_3-N concentration with post-feeding times may be related to degradation of dietary degradable protein. Also the increase of NH_3-N of urea treatment may be due to its high NPN content which is converted easily to NH_3-N during fermentation. These results are in a good agreement with the finding of El-Ashry *et al.*, (1997) and Khorshed (2000) who found a significant increase in rumen ammonia nitrogen with fungal treated residues

and with yeast culture treatment. Also, Hassan *et al.*, (2005) reported that ruminal NH_3-N was significantly increased (P<0.05) for ureated banana wastes than that of biologically treated groups and control. Kholif *et al.*, (2005) indicated that values of rumen TVF's and NPN increased significantly (P<0.05) with *T.viride* and *S. cerevisiae* compared with control, while, fungal treatments were insignificantly increased rumen total nitrogen concentration and did not affect the concentration of ammonia nitrogen.

Ruminal protozoa count:

Table (10) presented the data of ruminal protozoa count for all treatments at different sampling times. Total ruminal protozoa count (x10 ^{6} cell/ml rumen liquor) and all different species of Entodinum, Isotrchia, Dasytrachia, Polyplastron, Eudiplodinum, Epidinum, Ophryoscolox and Metadinum showed that the difference between urea treatment and control group was not significant. The highest count (P<0.01) were detected for urea treatment followed by biological treatments then untreated group. The overall means of ruminal protozoal count at different sampling times clearly showed that total ruminal protozoa count decreased by feeding at 3 hours post feeding more than at zero time of feeding then increased gradually to the highest count at 6 hours post feeding. Similar results were reported by Bhatia *et al.*, (1992) that total protozoa count in rumen of camels decreased at 3 hrs after feeding and increased significantly at 6 hrs post-feeding. The data also showed that Entodinum recorded the largest count (4.26 x10 ^{6} cell/ml RL) among all different species of ruminal protozoa. These findings agree with those reported by Franzolin and Deharty (1996) that Entodinum constituted approximately 90% of the total protozoal numbers. Also Ivan *et al.*, (2000) reported that Entodinum was the most detrimental of ciliate protozoa species.

Santra *et al.*, (1998) reported that numerically the most important groups of protozoa were small spirotrichs (65.6-70.1% of the total population) which account for only 4.8 to 9.4% of protozoa cell mass in the rumen of sheep and goats. Whereas Isotricha and large spirotricha are numerically fewer in number.

Table (10a): Ruminal protozoa count (x10 6 cell/ml rumen liquor) for sheep affected by experimental rations.

Item	Treatments						±SE
	T1	T2	T3	T4	T5	T6	
Total protozoa count, cell/ml	6.25^{b}	6.27^{b}	6.11^{c}	6.37^{a}	5.95^{d}	6.35^{a}	0.03
Entodinum, cell/ml	4.18^{b}	4.20^{b}	4.09^{c}	4.26^{a}	3.98^{d}	4.25^{a}	0.01
Isotrchia, cell/ml	0.188^{b}	0.189^{b}	0.184^{c}	0.192^{a}	0.179^{d}	0.191^{a}	0.01
Dasytrachia, cell/ml	0.407^{b}	0.409^{b}	0.398^{c}	0.415^{a}	0.387^{d}	0.413^{a}	0.01
Epidinum, cell/ml	0.157^{c}	0.158^{bc}	0.153^{d}	0.160^{a}	0.149^{e}	0.159^{ab}	0.01
Polyplastron, cell/ml	0.345^{b}	0.346^{b}	0.337^{c}	0.351^{a}	0.328^{d}	0.350^{a}	0.01
Ophryoscolox, cell/ml	0.157^{c}	0.158^{bc}	0.153^{d}	0.160^{a}	0.149^{e}	0.159^{ab}	0.01
Eudiplodinum , cell/ml	0.219^{b}	0.220^{b}	0.215^{c}	0.224^{a}	0.209^{d}	0.223^{a}	0.01
Metadinum , cell/ml	0.594^{c}	0.596^{bc}	0.581^{d}	0.604^{a}	0.565^{e}	0.603^{ab}	0.01

Means with the same letter are not significantly different (P<0.01).

Blood serum parameters:

The data of Table (11) indicated that biological treatment with *T.vi. + S.ce.* (T5) and urea treatment (T3) increased (P<0.01) total serum proteins, albumin and globulin (g/dl) more than control group. Urea treatment (T3) had the highest value (P<0.01) of albumin: globulin ratio. However there was no significant difference among other treatments and control group. Serum total proteins reflect the nutritional status of the

animal and it has a positive correlation with dietary protein (Kumar *et al.*, 1980). These results are parallel with values of CP content in the experimental rations and crude protein digestibility. It is of interest to indicate that total protein in rumen liquor show the same trend of serum protein.

Table (10b): Ruminal protozoa count (x10 ^{6} cell/ml rumen liquor) for sheep affected by experimental rations during different sampling times.

Item	Time			±SE
	0 hour	3 hours	6 hours	
Total protozoa count, cell/ml	6.17^{b}	5.95^{c}	6.53^{a}	0.03
Entodinum, cell/ml	4.32^{a}	4.05^{c}	4.11^{b}	0.01
Isotrchia, cell/ml	0.185^{b}	0.149^{c}	0.228^{a}	0.01
Dasytrachia, cell/ml	0.401^{b}	0.357^{c}	0.457^{a}	0.01
Epidinum, cell/ml	0.154^{b}	0.119^{c}	0.196^{a}	0.01
Polyplastron, cell/ml	0.339^{b}	0.298^{c}	0.392^{a}	0.01
Ophryoscolox, cell/ml	0.154^{b}	0.119^{c}	0.196^{a}	0.01
Eudiplodinum, cell/ml	0.216^{b}	0.178^{c}	0.261^{a}	0.01
Metadinum, cell/ml	0.401^{b}	0.685^{a}	0.686^{a}	0.01

Means with the same letter are not significantly different (P<0.01).

Table (11a): Blood serum parameters for sheep affected by experimental rations.

Item	Treatments						±SE
	T1	T2	T3	T4	T5	T6	
Total proteins, g/dl	7.34^{d}	8.07^{b}	8.69^{a}	7.81^{c}	8.71^{a}	7.9^{b}	0.059
Albumin, g/dl	3.68^{d}	4.24^{bc}	4.97^{a}	4.02^{c}	4.30^{b}	4.02^{c}	0.07
Globulin, g/dl	3.66^{b}	3.83^{b}	3.72^{b}	3.78^{b}	4.41^{a}	3.96^{b}	0.09
Albumin:globulin ratio	1.02^{b}	1.12^{b}	1.34^{a}	1.07^{b}	0.98^{b}	1.01^{b}	0.04
Urea, mg/dl	34.53^{b}	29.36^{d}	38.41^{a}	29.14^{d}	31.17^{c}	28.57^{d}	0.55
Creatinine, mg/100ml	0.838^{ab}	0.721^{c}	0.856^{a}	0.706^{c}	0.812^{b}	0.705^{c}	0.01
GOT, U/L	23.50^{b}	23.62^{b}	24.75^{a}	23.12^{b}	24.87^{a}	24.50^{a}	0.19
GPT, U/L	6.00^{b}	4.25^{d}	7.00^{a}	5.12^{bcd}	5.00^{cd}	5.75^{bc}	0.28

Means with the same letter are not significantly different (P<0.01).

Table (11b): Blood serum parameters for sheep affected by experimental rations during different sampling times.

Item	Time		±SE
	0 hour	4 hours	
Total proteins, g/dl	8.36^{a}	7.85±0.03^{b}	0.03
Albumin, g/dl	4.42^{a}	3.99^{b}	0.04
Globulin, g/dl	3.94^{a}	3.85^{a}	0.05
Albumin:globulin ratio	1.14^{a}	1.04^{b}	0.02
Urea, mg/dl	37.05^{a}	26.68^{b}	0.30
Creatinine, mg/100ml	0.83^{a}	0.71^{b}	0.00
GOT, U/L	25.41^{a}	22.70^{b}	0.10
GPT, U/L	5.58^{a}	5.45^{a}	0.16

Means with the same letter are not significantly different (P<0.01).

The present values of total serum proteins are within the normal range and in good agreement with those obtained by El-Ashry *et al.* (1997), Khorshed (2000) in sheep and Khlif *et al.* (2005) in goats,

who reported that biological treatments increased serum total proteins. Also, Fouad (2001) and Mousa (2003) that urea treatment increased total protein, albumin and globulin in growing lambs.

Urea, creatinine and GPT concentrations of blood serum were significantly increased ($P<0.01$) by urea treatment T3 followed by control group T1 and biological treatment with *T.vi.* + *S.ce.* T5 at zero time of feeding and at 4h post-feeding comparing to untreated group T2. While, GOT activity (U/L) vales was significantly increased ($P<0.01$) by urea treatment T3, biological treatments with *T.vi.*+ *S.ce.* T5 and *P. ch.* + *T.vi.* + *S.ce.* T6 more than untreated group T2. Also it is of interest to note that all blood parameters concentrations were increased at 4hr post feeding more than at zero time of feeding except serum GPT activity no significant difference was noticed due to sampling time. The present results of serum urea for the different treatments are within the normal values for sheep and in agreement with those obtained by El-Ashry *et al.*, (1997) and Khorshed (2000) that there was a significant increase in serum urea nitrogen concentration with fungal treatments.

Generally, serum creatinine level is a useful indicator of glomerular filtration in the kidney. The previous data indicated that the values of serum creatinine for sheep were within the normal levels. Regarding to the results of serum urea nitrogen and serum creatinine concentration, it is clear that tested animals were not in catabolism situation and kidney function was not affected by biological treatments. Consequently, the animals were in good nutritional condition. Kholif *et al.* (2005) found that serum creatinine values were not affected by biological treatments in goats. Also, these results are in full agreement with El-Ashry *et al.* (1997) and Khorshed (2000) that serum GOT concentration increased significantly with fungal or yeast treatments in sheep. Kholif *et al.* (2005) found an increase in the activity serum GOT and GPT in goats fed banana wastes treated with *T. viride* or *S. cerevisiae*. However, Hassan *et al.* (2005) found no significant differences among groups concerning all the blood constituent for dairy cows fed biologically treated or ureated banana wastes.

CONCLUSION

Feeding sheep on rations containing olive trees by products treated with urea or *T. viride* + *S. cerevisiae*, *P. chrysosporium* + *S. cerevisiae* or *P. chrysosporium* + *T. viride* + *S. cerevisiae* improved their performance without any adverse effect on animals health as it is clearly resulted from digestibility coefficients, nutritive values, nitrogen balance, rumen fermentations, rumen microflora count and kidney and liver functions.

REFERENCES

Abd El-Aziz, A.A. (1986). The utilization of agricultural by-products in ruminants feeding. Ph. D. Thesis., Fac. of Agric., Ain Shams Univ.

Abd El-Aziz, G.M.; A.M. Abd El- Gawad and M.S. Farghaly (1994). Performance of growing goat kids fed on untreated rice straw. Egyption J. Amin. Prod., 31: 213-223.

Abd El-Malik, W.H. (1972). Some nutritional studies on silage making from clover ryegrass mixture for feeding dairy cattle. Ph. D. Thesis., Fac. of Agric., Cairo Univ.

Abdul-Aziz, G.M.; Y.E. El-Talty and M. A. Ali (1997). Biological treatments of straw in anmal nutrition. J Nutrition and Feeds, 1: (Special Issue):225.

A.O.A.C. (1980). "Official methods of analysis, 3rd ed. Association of analytical chemists Washington. D.C.,U.S.A.

A.O.A.C. (1990). Official methods of analysis of the Association of Official Agricultural Chemists. Washington. D.C., USA.

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

Ballet, N.; J.M. Besle and C. Demaryquilly (1997). Effect of ammonia and ura treatments on digestibility and nitrogen content of dehydrated Lucerne. Animal Feed Science and Technology. 67:69.

Beauchemin, K. A.; W. Z. Yang and L. M. Rode (1999). Effect of grain source and enzyme additive on site and extent of nutrient digestion in dairy cows. J. Dairy Sc., 82:378-290.

Bhatia, J.S; A.K. Ghosal; W.R. Allen,; A. J. Higgins,; I.G. Mayhew,; Snow, D.H. and Wade, J.F. (1992). Studies on fermentation in the camel (camelus dromedaries). Proc. of first inter. camle conf., Dubai, 2-6 Feb. 1992, 271-274.

Dawson, K. A. (1992). Current and future role of yeast cultures in animal production: A review of research overe the last six years. In: Supplement to the proceedings of Alltech's 8th Annual Symposium. 1:23.

Doane, P.H.; P. Schofield and A.N. Pell (1997). Neutral detergent fiber disappearance and gas volatile fatty acid production during the in vitro fermentation of six forages. J. Anim. Sci. 75:3342-3352.

Duncan, D.B. (1955). Multiple range and multiple F-test. Biometrics. 11:1-42.

El-Ashry, M.A.; M.F. Ahmed; S.A. El-Saadany; M.E.S. Youssef; I.A. Gommaa and T.A.A. Deraz (1997). Effect of mechanical vs. mechano-chemical or mechano-biochemical treatments of crop residues on their use in ruminant rations: Digestibility, nitrogen balance and some blood and rumen liquor parameters of sheep. Egyptian J. Nutrition and Feeds, 1: (Special Issue): 173-186.

El-Ashry, M.A.; A.M. Kholif; H.M. El-Sayed; M. Fadel and S.M. Kholif (2001). Biological treatments of banana wastes for lactating goats feeding. Proc 8th Conf. Animal Nutrition, 23-26 October, Sharm El-Sheikh, Egypt. 1: 397-398.

El-Ashry, M.A.; A.M. Kholif; M. Fadel; H.A. El-Alamy; H.M. El-Sayed and S.M. Kholif (2003). Effect of biological treatments on chemical composition and in vitro and in vivo digestibilities of poor quality roughages. Egyptian J.Nutr. and Feeds, 6:113-126.

El-Kady, R.I. (1989). Effect of types of supplement on the utilization of rice straw by ruminant animal. M. Sc., Fac. of Agric., Ain Shams Univ.

El-Sayed, H.M.; M.A. El-Ashry; H.M. Metwall; M. Fadel and M.M. Khorshed (2001). Effect of chemical and biological treatments of some crop residues on their nutritive value: 1- Effect of chemical treatments on chemical composition and in vitro disappearance. Egyptian J.Nutr. and Feeds 4 (Special Issue): 387-398.

El- Shinnawy, M.M.; A.A. Gabr; E.A. El-Ayouty and Fatma H. Abd El-Salam (1999). Effect of feeding different mixed rations (TMR) containing urea ensiled maize stalks and supplemented with different sources of carbohydrates on buffalo and Baladi bulls performance. Egyptian J.Nutr. and Feeds, 2(Special Issue):409-426.

El-Wakeel, E.A. (2004). Evalution of rumen nitrogen availability in liquid feeds and in vitro evaluation of fibrolytic enzymes for dairy feedstuffs. M.Sc. Thesis, Collage of Agric. Kansas State Univ., USA.

Farid, M.F.A.; H.M. Abou El-Nasr and N.I. Hassan (1986). Effect of dietary available carbohydrate level on feed and nitrogen utilization in sheep given urea in the drinking water. World Rev. of Animal Prod., 12: 3.

Fouad, R.T. (2001). Effect of replacing concentrate feed mixture by barely grains on Seedi lambs performance in upper Egypt. J Agric. Sci., Mansoura Univ., 26:7618.

Fouad, R. T; T. A. Deraz and A. A. Ismail (1998). Biological versus urea treatment of roughage for sheep. J. Agic. Sci., Mansoura Univ., 23: 103-116.

Franzolin, R. and B. A. Dehority, (1996). Effect of Prolonged High-concentrate feeding on Ruminal protozoa concentration. J. Anim. Sci. 74: 2803-2809.

Gad, Nadia A. (1993). Use of non conventional feed resources in feeding ruminants. Ph. D. Thesis., Fac. of Agric., Mansoura Univ.

Hamissa, F.A.; M.M. Shoukry; S.M. Ahmed; A.A. El Refe; H.M. Ali and Z.M.Z. Abdel-Motagally (1985). Nutritive improvement of some low quality roughages for ruminants. 11. The effect of spraying urea *vs.* microbial treatment on quality of sugar cane bagasse. J. Anim. Prod., 25:343.

Hamza, Akila S.; T.F. Mohammadi; A.A.H. El Tahan and M.M.El-Shannawy (2006). Effect of combining two biological treatments on chemical composition, digestibility and feeding values of cotton stalks fed to sheep. Egypt. J. Sheep, Goat and Desert Animals Sciences, 1: 187-197.

Hassan, A.A.; M.H.M. Yacout; M.KK. Mohsen; M.I. Bassiouni and M. Abd El-All (2005). Banana wastes (Musa acuminate L.) silage treated biologically or with urea for dairy cows feeding. Egyptian J.Nutr. and Feeds, 8 (Special Issue):49-61.

Horton, G.M.J. (1981). Comparison and digestion of cell components in cereal straws after treatment with anhydrous ammonia, Can. J. Anim. Sci. 61: 1059.

Ivan, M.; L. Neill; R. Forster; R. Alimon; T.L.M. Rode and T. Entz, (2000). Effects of *Isotricha*, *Dasytricha*, *Entodinium*, and total fauna on ruminal fermentation and duodenal flow in wethers fed different diets. J. Dairy Sci., 83: 776-787.

Kakkar, V.K.; H.S. Garcha; S. Dhanda and G.S. Makkar (1991). Mushroom harvested spent straw as feed for buffaloes. Indian J. Ani., Nutr., 7, 267-272.

Kearl, L.C. (1982). Nutrient requirement of ruminants in developing countries. Utah Agri. Exp. Sta. Utah State Univ., Logan, U.S.A.

Kholif, A.M.; M.A. El-Ashry; H.A. El-Alamy; H.M. El-Sayed; M. Fadel; and S.M. Kholif (2005). Biological treatments of banana wastes for feeding lactating goats. Egyptian J. Nutrition and feeds. 149-162.

Khorshed, M.M.A. (2000). Different treatments for improving nutritional quality of some crop residues used in ruminant nutrition. Ph. D Theseis, Fac. of Agric., Ain Shams Univ.

Kumar, U.; V.K. Sareen; S. Singh; U. Kumar and S. Singh (1997). Effect of yeast culture supplementation on ruminal microbial populations and metabolism in buffalo calves fed a high roughage diet. J. of Sci. of Food and Agric., 73: 231-236.

Kumar, N.U.; B. Singh and D.N. Verma (1980). Effect of different levels of dietary protein and energy on growth of male buffalo calves. Ind. J. Anim. Sci., 51:513.

Lewis, G.E.; W. K. Sanchez; C.W. Hunt; M.A. Guy; G.T, Pritchard ; B.I. Swanson and R.J. Treacher (1999). Effect of direct fed fibrolytic enzymes on the lactational performance of dairy cows. J. Dairy Sci., 82:611-617.

Mousa, K.M.M. (2003). Comparison of untreated and ureated barely straw in Baladi lambs feeding. Egyptian J. Nutrition and Feeds 6: 103-111.

Naga, M.A., A. R. Abou Akkada, and K. El-Shazly, (1968). Establishment of rumen ciliate protozoa in cows and water Buffalo (Bos bubalus L.) calves under late and early weaning system. J. Dairy Sci 52:110.

Nefzaoui, A. (1995). Feeding value of mediterranean ruminant feed resources. Syria 12-23 March 1995. Institut National de la Recherche Agronoique de Tunisia Rue Hedi Karray 2049 Ariana, Tunisie.

Newbold, C.J.; R.J. Wallace and F.M. McIntosh (1996). Mode of action of *Saccharomyces cerevisiae* as a feed additive for ruminants. British J. of Nutr., 76: 249-261.

Poyyamozhi, V.S. and R. Kadirvel (1986). The value of banana stalk as a feed for goats. Anim. Feed Sci. and Tech., 15: 95-100.

Rode, L.M.; W.Z.Yang and K. A. Beauchemin (1999). Fibrolytic enzyme supplements for dairy cows in early laction. J. Dairy Sci., 82:2121-2126.

Santra, A.; S.A. Karim; A.S. Mishra; O.H. Chaturvedi; R. Prasad. (1998). Rumen ciliate protozoa and fiber utilization in sheep and goats. Small Ruminant Research, 30: 13-18.

SAS (1998). SAS user guide: Statistics Version 5 Edition, SAS Institute Inc., Cary, NC.

Sharma R.; Q.P. Nagia; M. Gupta and R. Sharma (1998). Effect of yeast culture (*Saccharomyces cerevisiae*) plus growth medium supplementation on rumen fermentation in buffalo calves fed high roughage diet. International J. of Anim. Sc., 13:2,121-126.

Shoukry, M.M.; F. A.Hamissa; M. Sawsan; A. H. El- Refi; H.M. Ali and Z.M.Z. Abdel-Motagally (1985). Nutritive improvement of some low quality roughages for ruminants. 1) effect of different microbial and chemical treatments on quality of suger can bagasse. Egypt. J. Anim. Production, 25:329.

Shoukry, M.M.; F.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., 18:100.

Shoukry, M.M.; T.M. El-Bedawy; E.A. Gihad; F.M. Salman and R.I. El-Kady (1999). Utilization of banana wastes as hay and silage by sheep and goats. Egyptian J. Nutrition and Feeds, 2 (Special Issue): 199-221.

Singh, G.B.; B.N. Gupta and K. Singh (1990). Effect of microbial treatment of paddy straw on chemical composition and nutrient utilization in crossbred goats. Indian J. Anim. Nutr., 7: 251-256.

Van Soest, P.J. (1963). The use of detergents in the analysis of fibrous feeds: A rapid method for the determination of fiber and lignin. J. Assoc. Official. Agric. Chemi.46:829.

Van Soest, P.J. and R.H. Wine (1967). The use of detergents in the analysis of fiber feed IV. The determination of plant cell wall constituents. J. Assoc. Official. Agric. Chemi. 50: 50.

Van Soest, P.J. and R.H. Wine (1968). Determination of lignin and cellulose in acid detergent fiber with permanganate. J. Assoc. Official. Agric. Chemi. 51:780.

Walli, T.K.;Rai, S.N.; Gupta, B.N. and Singh, K. (1991). Influence of fungal treated and urea treated wheat straw on nutrient utilization in calves. Indain J. Anim. Nutr. , 8:227-230.

Yang W.Z.; K. A. Beauchemin and L. M. Rode (1999). Effects of an enzyme feed additive on extent of digestion and milk production of lactating dairy cows. J. Dairy. Sci., 82:391-403.

استخدام مخلفات تقليم أشجار الزيتون المعاملة بيولوجياً أو كيماوياً لتغذية الأغنام في سيناء

هند أحمد عزيز[1] ، محمد عبد المنعم العشرى[2] ،عفاف محمود فايد[1] ، محمود محمد على خورشيد[3] ، عبد الناصر خطاب[2]

[1] قسم تغذية الحيوان ـ مركز بحوث الصحراء ـ المطرية ـ القاهرة.

[2] قسم الإنتاج الحيوانى ـ كلية الزراعة ـ جامعة عين شمس ـ القليوبية

[3] قسم الوراثة والسيتولوجى ـ المركز القومى للبحوث ـ الدقى ـ الجيزة

تم إجراء هذا العمل لدراسة تأثير استخدام مخلفات تقليم أشجار الزيتون المعاملة بيولوجياً أو كيميائياً على التحليل الكيمائي و مكونات الألياف، تخمرات الكرش وأعداد برتوزوا الكرش و قياسات الدم. تم إجراء تجربة معمليه لاختيار أفضل فترة نمو لأنواع مختلفة من الفطر مع الخميرة. تم إجراء ٦ تجارب هضم كالتالي:-

معاملة (١): مخلوط مركزات+ دريس برسيم (مقارنة).

معاملة (٢): مخلوط مركزات+ مخلفات زيتون جافة هوائياً غير معاملة.

معاملة (٣): مخلوط مركزات+ مخلفات زيتون معاملة ب ٤٪ يوريا.

معاملة(٤): مخلوط مركزات+ مخلفات زيتون معاملة ب

50% *Phanerochaete chrysosporium* + 50% *Saccharomyces cerevisiae*.

معاملة(٥):مخلوط مركزات+ مخلفات زيتون معاملة ب

50% *Trichoderma viride* + 50% *Saccharomyces cerevisiae*.

معاملة(٦):مخلوط مركزات+ مخلفات زيتون معاملة ب

25% *Phanerochaete chrysosporium* + 25% *Trichoderma viride* + 50% *Saccharomyces cerevisiae*.

أظهرت نتائج الدراسة أن تحضين الفطريات و الخميرة على مخلفات الزيتون لمدة ٢٠ يوم هى أنسب مدة للحصول على أفضل نتائج التحليل الكيميائي و مكونات الألياف. كما أظهرت النتائج أن المعاملة باليوريا والمعاملات البيولوجية أدت الى زيادة المادة الجافة الكلية المأكولة أكثر من المجموعة غيرالمعاملة (٩٥٦.٢٥، ٩٥٤.٩٢ مقابل ٨٩٤.٣٧). و قد أختلف هضم المادة الجافة و المادة العضوية. كل المعاملات زادت هضم البروتين الخام و الألياف الخام و مكوناتها أكثر من المجموعة غير المعاملة و قد أعطت مجموعة المقارنة يليها معاملة اليوريا و المعاملة بفطر التريكودرما والخميرة أعلى معاملات هضم للبروتين و الألياف و مكوناتها. أدت المعاملة باليوريا الى زيادة قيم المواد الكلية المهضومة و البروتين الخام المهضوم. و قد أظهر ميزان الماء اختلافا معنوياً طفيفاً بين المعاملات. و قد كان ميزان النتروجين أعلى فى مجموعة المقارنة و المجاميع المعاملة أكثر من المجموعة الغير

معاملة (٤.٤٤ ، ٤.١٤ و ٣.٠٩ للمجاميع ٣.٥ و ٢ على التوالى. كما أدت المعاملات البيولوجية إلى زيادة حموضة الكرش بينما أدت معاملة اليوريا إلى زيادة الأحماض الدهنية الطيارة بالكرش. أدت كل المعاملات إلى زيادة نتروجين الكرش الكلى، المواد البروتينية غير النتروجنية، الأمونيا و العدد الكلى لبرتوزوا الكرش. أدت المعاملات البييولوجية و المعاملة باليوريا إلى زيادة بروتين السيرم، الألبيومين، الجلوبيولين، اليوريا، الكرياتنين و GOT, GPT أكثر من مجموعة المقارنة. يمكن استنتاج أن تغذية الأغنام على مخلفات أشجار الزيتون المعاملة بيولوجياً أو كيماوياً أدى الى تحسين تخمرات الكرش، معاملات الهضم، أعداد بروتوزوا الكرش و قياسات الدم.