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IMPROVING SUGAR BEET PULP THROUGH BIOLOGICAL TREATMENT AND ITS USE IN SHEEP RATION

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SUMMARY

The main objectives of the present experiment were to investigate the effect of biological treatments on chemical composition and utilizability of treated sugar beet pulp (SBP) in sheep ration. Twenty crossbred Suffolk male lambs, 3 months old and mean body weight 21.4 kg were distributed into four similar groups. The treated SBP was to replace 0, 50. 75 or 100% of corn grain included in the concentrate feed mixture fed to growing lamb groups T1, T2, T3 and T4 respectively. The experimental period lasted for 120 days.

Results indicated that DM, OM and CF digestibility values of T4 were significantly highest, while highest NFE digestibility was that of T3. No significant differences were recorded for CP or EE digestibility for different feeding treatments. Different lamb groups showed positive nitrogen balance.

Total body gains, mean daily gains and DMI as well fed efficiency values were very similar for different treatments. However the least feed cost/kg gain was that of lamb treatment (4).

Keywords: sugar beet pulp, biological treatments, sheep, digestibility, nitrogen balance, daily gain.

INTRODUCTION

There is a wide gap between the available feed stuffs and farm animal requirements in Egypt. This was estimated shortage of 3.1 million tons of TDN per year. Sugar beet pulp (SBP) is a by-product remains after extraction of sugar from sugar beet tubers (Talha *et al.*, 2002). This by-product has high content of crude fiber (17-22%) and low content of crude protein (8-11%) (Bhattacharya and Sleiman, 1971; Abdel-Hamid, 1992; Eweedah *et al.*, 1999 and Eweedah 2001). Also it contents a high parentage of pectic substance with high water holding capacity, therefore animals fed high quantity from beet pulp consumed more water and conversely the rumen liquid,

feed intake and rate of passage must be reduced.

In Egypt, the annual production of these residues was estimated to be more than 170.000 tons in year 2000 (Statistics of Delta Sugar Company 2000)

Feeding is the most important cost tem for livestock production which epresents about 70% of the total suing oroduction costs (Borhami and Yacout 001).

The use of biologicaly treated SBP specially combined trichoderma viride nd saccharomyces cerevisiae) in goat ations is useful and did not cause any bnormal condition on rumen activity, ver, kidney functions and animal erformance (Khorshed, 2000).

This study was conduted in order to lleviate the negative infect of pectin nd evaluate the effect of combined iological treatments (T. viride F-416) nd S. Cerevisiae) of sugar beet pulp on rowth performance and feeding costs f growing lambs.

IATERIALS AND METHODS

This study was carried out at El-emmaiza Experimental Station, nimal Production Research Institute, linistry of Agriculture, Egypt to ontinue the previous work included aboratory and in vitro study to chose ne best combination of microorganisms nd its best conditions affecting the hemical composition and dry matter isappearance of treated (SBP) (Fadel *et l.*, 2005) In this regard, twenty rowing crossbred lambs (averaged 1.40 kg) were divided into 4 similar roups (each group of 5 lambs) the rowth trails lasted for 120 days. The experimental concentrate feed mixtures are shown in Tables (1 and 2). The body weight change was individually determined biweekly and feeding rations of the experimental lambs were changed every 2 weeks according to body weight change according to in NRC (1985) for sheep requirements. Treated sugar beet pulp was offered to lambs for 2 weeks as an adaptation period before the beginning of the growth trail. Fresh water was available all times for experimental animals. Feed intake, daily weight gain, and feed efficiency (feed/gain) values were calculated.

Four digestibility and N-balance trials were carried out using mature Ossimi rams aged 2.5-3 years old and 53 kg live body weight. The experimental treatments were: T_1 (control), T_2, T_3 and T_4. The animals of these groups received the experimental feed mixture R_1, R_2, R_3, and R_4 (Table 2) respectively. The concentrate mixture composed 70% of the daily ration, while Berseem hay composed 30% on DM basis.

Each trail lasted 27 days, 21 days as a preimimary period and 6 days as a collection period for feces, urine. Chemical analysis, proximate analysis for feed, feces and urine was carried out according to A.O.A.C (1990). Rumen liquor samples were taken at zero, 3, and 6 hours post morning feeding, Ruminal pH was measured using pH meter, Ammonia nitrogen (NH_3-N) was determined according to Conway (1962), while samples for the determination of volatile fatty acids (TVFA's) were stored at (-20°C) and determined according to Abou-Akkada and El-Shazly (1964). Volatile fatty acids fractions were determined using HPLC according to Bush *et al.* (1979).

Table (1): Composition of experimental concentrate feed mixtures (kg/ton).

Ingredient	Experimental concentrate mixtures			
	R1	R2	R3	R4
A) Feed ingredient				
Yellow corn	400	200	100	-
Treated sugar beet pulp	-	200	300	400
Undecortecated cottonseed meal	80	65	65	55
Soybean meal	150	130	115	105
Wheat bran	270	305	320	340
Moufeid*	65	65	65	65
Calcium carbonate	20	20	20	20
Sodium chloride (NaCL)	15	13	13	13
Sulfur	-	2	2	2

* 91% molasses, 2.5% urea, 6.5% mineral and vitamins

Table (2): Chemical composition of experimental rations on DM basis.

Items	Rations %			
	R_1	R_2	R_3	R_4
DM	88.75	88.68	88.63	88.12
OM	89.81	90.37	90.21	90.07
CP	17.0	16.95	16.97	17.09
CF	14.78	16.99	20.13	23.35
EE	2.54	2.25	2.23	2.00
NFE	55.49	54.18	50.88	47.63
Ash	10.19	9.63	9.79	9.93
NDF	56.41	56.53	59.23	59.76
ADF	28.74	33.47	34.49	39.60
Hemi-cell	27.67	23.06	24.74	20.16
Cellulose	24.82	28.70	28.66	32.70
ADL	3.92	4.77	5.83	6.90

All data were subjected to analysis of variance using linear models (GLM) producer of MSTAT (1987) as the following model :-

$$Y_{ij} = \mu + T_i + e_{ij}$$

Where Y_{ij}: is the dependent variable, μ: is the overall mean, T_i: is the effect of treatment, e_{ij}: is the residual error.

RESULTS AND DISCUSSION

The data of chemical composition of the control and treated sugar beet pulp, are presented in Table (3). OM content of treated SBP with Trichoderma viride F-416 and Saceharomyces cerevisiae F-125 showed lower values, of OM which might be due to the inorganic matter utilized by microorganisms (Zadrazil, 1980).

On the other hand, the CP and true protein (TP) values were increased in the biologically treated SBP (Table 3). These results are in agreement with those reported by Chawla and Kunda (1985); Shoukry *et al.* (1985); Gupta and Langer (1988); Ali (1996); Gado (1999). On the other hand a decrease in hemi-cellulose, celluose, lignin and pectin were recorded as a result of biological treatment Table (3). CF content was decreased in biologically treated sugar beet pulp compared with control SBP. These results agreed with those obtained by Ali (1996); Abdel Aziz *et al.* (1997), Gado (1999), El-Ashry *et al.* (2002); and Salem (2003).

This decrease may be due to the fact that fungus depends on carbohydrates including CF as carbon sources to grow μp and convert them into microbial protein.

Digestibility coefficients and nutritive value:-

Data concerning digestibility coefficients and nutritive values of the different experimental rations are presented in Table (4).

Data showed that group T4 recorded ($P<0.05$) the highest DM, OM and CF digestibility compared to the other treatments.

No significant differences were found among the four experimental groups in CP and EE digestibility fiber fraction digestibility also tended to increase with the treatment of T4 in NDF, ADF, cellulose and ADL. The improvement in fiber fraction digestibility as a result of biological treatments may be due to the effect of the cellulose enzyme of fungi, which may be responsible for the stepwise hydrolysis of cellulose to glucose. Similar results were reported by Hanafy (1997) who found that the NDF digestibility increased ($P<0.05$) with yeast culture supplementation than with control.

In general T4 recorded the best TDP compared to other treatments, This may be attributed to better digestibility results of most nutrients recorded by this treatment.

Nitrogen balance:-

The data presented in Table (5) clearly indicate that T3 showed the highest value in nitrogen balance and NB/NI. Similar trends were recorded by Langer *et al.* (1982), Ahuja *et al.* (1986), Gupta and Langer (1988), Bakshi and Langer (1991), El-Ashry *et al.* (1997) and Salem (2003).

Table (3): Effect of biological treatment on chemical composition of sugar beet pulp.

Items	Untreated sugar beet pulp	Treated sugar beet pulp
DM%	91.10	80.09
DM composition %:		
OM	94.37	91.26
CP	8.78	20.1
TP	8.78	15.43
NPN	-	4.67
EE	1.09	0.94
CF	26.78	23.46
NFE	57.72	46.76
Ash	5.63	8.74
Cell wall constituents %:		
NDF	62.40	50.04
ADF	27.6	23.60
Hemi-cellulose	34.8	26.44
Cellulose	24.70	21.65
ADL	2.90	1.95
Pectin	21.52	8.66
Afla-toxin Mic. G/kg	14.00	13.50

Table (4): Digestion coefficients and nutritive values of the experimental rations (on DM basis).

Item	Experimental rations			
	R1	R2	R3	R4
DMI (g/h/d)	1693	1693	1693	1693
Apparent digestibility, %				
Dry matter	72.66^{ab}	71.14^{b}	73.25^{ab}	75.12^{a}
Organic matter	74.07^{ab}	73.23^{b}	75.69^{ab}	76.64^{a}
Crude protein	76.34	73.69	75.23	79.32
Ether extract	77.59	71.32	72.89	73.07
Crude fiber	58.32^{b}	57.01^{b}	63.30^{b}	75.61^{a}
N-free extract	77.45^{ab}	78.40^{ab}	80.82^{a}	76.40^{b}
Fiber fraction, %				
NDF	69.42^{b}	67.58^{b}	72.76^{a}	75.73^{a}
ADF	56.08^{b}	59.0^{b}	71.61^{a}	73.07^{a}
Hemi-cellulose	83.07	79.72	74.32	80.71
Cellulose	51.12^{b}	54.17^{b}	70.12^{a}	69.95^{a}
ADL	71.81^{a}	63.01^{b}	67.98^{b}	79.70^{a}
Nutritive value, %				
Total digestible nutrients (TDN)	68.17	67.33	69.47	70.01
Digestible crude protein (DCP)	12.68	12.15	12.45	13.19

a, b, means in the same raw with different super script are significantly ($P<0.05$) different. R1: Control ration, R2: 50% treated SBP, R3: 75% treated SBP and R4: 100% treated SBP.

Each value is a mean of 3 samples from 3 animals

Table (5): Effect of experimental treatments on nitrogen balance

Item	Experimental rations			
	R1	R2	R3	R4
Live body weight Kg	54.67	51.00	54.67	51.00
Metabolic body size kg $w^{0.75}$	20.1	19.08	20.1	19.08
N-intake				
g/head	16.53	15.09	16.11	15.09
g/kg L.B.W	0.30	0.30	0.30	0.30
g/kg $w^{0.75}$	0.82	0.79	0.80	0.79
N-excreted, g/d/h				
1-In feces	3.91	3.97	3.99	3.12
2-In urine	8.76	8.65	7.35	9.05
Total N-excreted				
g/head	12.67	12.62	11.34	12.17
g/kg L.B.W	0.24	0.25	0.21	0.24
g/kg $w^{0.75}$	0.63	0.66	0.56	0.64
Nitrogen balance				
g/head	3.86	2.48	4.77	2.89
g/kg L.B.W	0.07	0.05	0.08	0.06
g/kg $w^{0.75}$	0.19	0.13	0.24	0.15
NB/NI %	23.35	16.43	29.61	19.15

Each value is a mean of 3 samples from 3 animals

Table (6): Effect of experimental treatments and sampling time on rumen liquor parameters.

Item	Time of sampling (hrs)	Experimental rations			
		T1	T2	T3	T4
NH3-N	0	19.60	21.00	19.60	20.53
(mg/100 ml	3	30.33^{b}	37.33^{ab}	42.00^{a}	45.73^{a}
rumen liquor	6	26.13^{b}	30.87^{b}	27.53^{b}	37.33^{a}
	Mean	25.34^{b}	29.71^{ab}	29.71^{ab}	34.53^{a}
TVFA's	0	5.00^{a}	4.50^{a}	2.83^{b}	3.33^{b}
(meq/100 ml	3	9.08^{a}	9.92^{a}	7.08^{b}	7.47^{b}
rumen liquor	6	8.17^{a}	8.33^{a}	6.00^{b}	6.17^{b}
	Mean	7.41^{a}	7.57^{a}	5.30^{b}	5.68^{b}
Rumen pH	0	7.38^{ab}	7.29^{b}	7.37^{ab}	7.48^{a}
	3	6.39^{a}	6.45^{a}	6.18^{b}	6.21^{b}
	6	6.84	6.56	6.51	6.67
	Mean	6.87	6.56	6.69	6.78

a,b,...Means in the same raw with different super script are significantly ($P<0.05$) different.

Each value is a mean of 3 samples from 3 animals

Rumen activity:-

Results in Table (6) showed that the inclusion of biologically treated sugar beet pulp in growing lambs diets resulted higher mean NH3-N concentration values compared with those fed the control ration. The present results are in agreement with those of (Khorshid, 2000).

In this respect, NH3-N concentration was found to be the highest with T4. It might be an increase in rumen liquor protein degradation with ration contained increasing percentage of biologically treated sugar beet pulp. There were significant ($P<0.05$) differences among sampling times. The highest value was recorded at 3 hrs after morning feeding.

It is clear from the results presented in Table (6) that NH3-N concentrations were increased by 50, 75 and 110% compared to control with increasing the time from 0 to 3 hr after morning feeding for T2, T3 and T4 respectively.

Smith *et al.* (1980) attributed the increase in ammonia-nitrogen concentration in the rumen media ether to reduced ammonia-nitrogen absorption by rumen epithelium or to a decrease in the efficiency of microbial protein synthesis.

Reddy *et al.* (1989) reported the peak concentration of ammonia-nitrogen at 3 hrs after feeding. This may due to the degradation of protein and hydrolysis of NPN substances.

Ruminal TVFA's values are presented in Table (6) analysis of variance showed thatT1 and T2 had ($P<0.05$) higher values of TVFA's at 0, 3 and 6 hours sampling time compared with T3 and T4. This reduction in the concentrations of TVFA's as a result of decreasing corn grain levels in the tested rations may be attributed to the high concentration of soluble carbohydrates in yellow corn grains compared to corresponding soluble and insoluble carbohydrates in biologically treated sugar beet pulp. In other words T1, T2, T3 and T4 showed a significant increased with increasing the time from 0 to 3 hr.

A significant increases of ruminal TVFAs' concentration were reported by Saleh *et al.* (2001) and Eweedah (2001) with rations contained 50% replacement of corn. El Badawi *et al.* (2003) found a significant increase in TVFA's concentration when the level of non treated SBP was increased from 25 to 50% replacing corn grains.

However, the pH values for all tested rations are found to be within the normal range. The variation in pH values between control T1 and T2, T3 and T4 as affected by the treatment may be related to sulfur addition that react with acids in rumen and reduced pH with groups fed TSPP. Prasad *et al.* (1972) found that rumen pH is the one of the most important factors affecting the fermentation in the rumen and influences its functions. It varies in a regular manner depending on the nature of the diet and on the time that is measured after feeding and reflects changes of organic acids quantities in the ingesta.

Data of VFA's fraction are presented in Table (7). Acetic acid concentration was the highest in T3 ($P<0.05$) while the lowest was for T2. No significant differences among treatments with percentage of propionic, A/P ratio and butyric acid. These differences may be due to the differences in CF content and cell wall

Table (7): Effect of experimental rations and sampling time on VFA fractions.

Item	Time of sampling (hrs)	Experimental rations			
		T1	T2	T3	T4
Acetic	0	48.76 ^{bc}	44.49 ^{c}	55.02 ^{a}	52.03 ^{ab}
	3	48.93	47.73	52.72	51.78
	6	50.39 ^{ab}	51.77 ^{ab}	52.71 ^{a}	48.74 ^{b}
	Mean	49.36 ^{ab}	47.86 ^{b}	53.48 ^{a}	50.85 ^{ab}
propionic	0	27.57 ^{a}	27.07 ^{ab}	22.72 ^{b}	24.32 ^{ab}
	3	26.87	29.34	27.92 ^{b}	27.34
	6	27.71 ^{ab}	26.15 ^{ab}	25.28 ^{b}	30.31 ^{a}
	Mean	27.37	27.52	25.31	27.32
A\p ration		1.80	1.74	2.11	1.86
Butyric	0	18.40	22.84	18.75	20.64
	3	23.35 ^{a}	21.40 ^{ab}	17.49 ^{b}	19.68 ^{ab}
	6	19.47	16.92	19.56	20.49
	Mean	20.41	20.38	18.60	20.32

a,b,...Means in the same raw with different super script are significantly ($P<0.05$) different.

Each value is a mean of 3 samples from 3 animals

Table (8): Effect of experimental rations on growth performance of lambs.

Item	Experimental rations			
	T1	T2	T3	T4
Initial live body weight (I.B.W), Kg	21.40	21.00	21.60	21.80
Final live body weight (F.B.W), Kg	39.80	39.20	39.40	39.40
Total body gain, Kg	18.40	18.20	17.80	17.60
Daily gain, g	153.3	151.7	148.3	146.7
Feed intake/day:				
Concentrate (DMI), g	1087	1087	1087	1087
Roughage (DMI), g	606	606	606	606
Total DMI, g	1693	1693	1693	1693
TDN, g	1155^{b}	1140^{c}	1120^{a}	1186^{a}
TDN Kg $w^{0.75}$	70.94	71.55	69.30	72.96
DCP, g	214.7^{b}	205.6^{c}	211^{c}	223.4^{a}
DCP, g/Kg $w^{0.75}$	13.20	12.90	13.06	13.75
Feed efficiency, intake/gain:				
DMI Kg/Kg gain	11.04	11.16	11.42	11.54
TDN intake Kg/Kg gain	7.53	7.51	7.55	8.08

Daily gain: Total gain, g/120 days

a, b, Means in the same raw with different super scrip are significantly ($P<0.05$) different

Each value is a mean of 3 samples from 3 animals

Table (9): Effect of incorporation of treated sugar beet pulp in ration on economical efficiency of growing lambs.

Items	Treatment			
	T1	T2	T3	T4
DMI (g/h/d)	1693	1693	1693	1693
Concentrate (DMI), g	1087	1087	1087	1087
Roughage (DMI), g	606	606	606	606
Av. daily gain (Kg/h/d)	0.153	0.151	0.148	0.146
Av. feed cost (h/d/LE)	1.53	1.41	1.36	1.32
Av. revenue of daily gain (LE)	2.448	2.416	2.368	2.336
Net feed revenue (LE)	0.918	1.006	1.008	1.016
Economic feed efficiency (%)	60	71.34	74.11	76.96
Relative economic efficiency (%)	100	118.9	123.51	128.26

Price of ton CFM T1 = 1050 LE, T2 = 939.25 LE, T3= 900 LE and T4 = 860 LE (including 100 LE/ton as cost for biological treatment + manufacture).
Price of 1 ton clover hay 650 LE
Price of 1 ton sugar beet pulp 585 LE
Market price of 1 kg live body weight in (2003) = 16 LE

constituents between biologically treated SBP and yellow corn.

Acetic acid proportion increased with increasing time in T1 and T2 while decreased with increasing time in T3 and T4.

Gray and Piligrim (1959) reported many factors that affect the molar percentages and concentrations of individual VFA's like the rate of production of these acids in the rumen, the rate of absorption from the rumen wall the rate of its passage from the rumen to the abomasums. The rate of dilution with saliva and the rate of its metabolites utilization in rumen.

Growth performance:

Live body weight gain:

The data in Table (8) show that in significant difference in the average daily gain among treatments. Talha *et al.* (2002) reported no significant differences among lambs fed rations either containing 50 or 75% dried sugar beet pulp in replacement of corn grains.

Feed efficiency:

These results showed that there were no significant differences among feed efficiency for T1, T2, T3, and T4. Gado (1999) found that, there was tendency of improvement in TDNI and DCDI g/g gain for goat especially in case of treated bagasse.

Economical study:

In this study (Table 9) the results of economical study showed that the feed cost/kg weight gain (P.T) of the control treatment (T1) showed the highest values while the lowest cost was for T4. The best relative economical efficiency was detected with (T4).

These results are in agreement with the result obtained by Deraz (1996) who indicated that the chemical and chemo-fungal treatment decreased the cost of feed used to produce kg live body weight gain. Abd El-Aziz (2002) observed that replacing 40% of the CFM by biologically treated rice straw reduced the cost of feeding by 28.8%.

REFERENCES

A.O.A.C. (1990). Association of Official Analytical Chemists. Official Methods of Analysis. 13 ed. Assoc. of Anal. Chem. Washington, DC.

Abd El-Aziz, M.Y. (2002). Nutritional studies on biological treatment of agricultural by-product on ruminants. M. Sc. Thesis, Faculty of Agric, Zagazig University. Egypt.

Abdel-Hamid, A.M. (1992). Feeding value of sugar beet pulp from Egyptian production. J. Anim. Nutr. 42:365-370.

Abdel-Aziz, G.M.; Y.E. El-Talty and M.A. Ali (1997). Biological treatments of straws in animal nutrition. Egyptian J. Nutrition and Feed, 1(Special Issue):225-234.

Abou Akkada, A.R. and K. El-Shazly (1964). Effect of absence of ciliate protozoa from the rumen on microbial activity and growth of lambs. Appl. Microbiol., 12:284.

Ahuja, A.K.; H.S. Garcha, and O.S. Mokkar (1986). Spent paddy straw as a basal roughage for sheep. Ind. J. Anim. Sci. 56 (2): 285-287.

Ali, M.A. (1996). Upgrading straw biologically for animal feeding. M.

Sc. Thesis, Faculty of Agric., Cairo University, Egypt.

Bakshi, M.P.S. and P.N. Langer (1991). *Agaricus bisporus* harvested spent wheat straw as livestock feed. Indian J. Anim. Sci. 61 (6): 653-654.

Bhattcharya, A.N and W.T. Seleiman (1971). Beet pulp as a grain replacement for dairy cow and sheep. J. Dairy Sci., 54-89.

Borhami, B.E.A and M.H., Yacout (2001). Is the animal protein essential for better utilization of plant protein in ruminants?. Egypt J. Nutr. and Feed. 4 (special issue):25.

Bush, K.J.; R.W. Russell and J.W. Young (1979). Quantitative sepation for volatile fatty acids by high pressure liquid hromatography J. Liquid Chromat., 2: 1367.

Chawla, A and S.S. Kundu (1985). Studies of fungal degradation of wheat straw. Ind. J. Anim. Nut., 2:57.

Conway, E.F. (1962). Micro diffusion Analysis and Volumetric Error. Rev. Ed. Lockwood, London, U.K.

Deraz, T.A. (1996). The production of microbial protein from some agricultural wastes and its utilization in ruminant. Ph.D. Thesis, Faculty of Agric. Ain Shams University, Cairo, Egypt.

El-Ashry, M.A.; M.F. Ahmed; S.A. El-Saadany M.E.S. Youssef; I.A. Gomaa and T.A.A. Deraz (1997). Effect of microbial 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-Alamy; M. Fadel; El-Sayed and S.M. Kholif (2002). Effect of biological treatment on chemical composition and in vitro and vivo digestibility of poor quality roughages. Egyptian J. Nutrition and Feed. 5(Special issue):435-436.

El-Ashry, M.A.; A.M. Kholif; M. Fadel; H.A. El-Alamy and H.M. El-Sayed (2003). Effect of biological treatments on chemical composition, in vitro and in vivo nutrients digestibility's of poor quality roughages. Egyptian J. Nutrition and Feed. 6 (2):113-126.

El-Badawi; M.H.M. Yacout and H.E.M. Kamel (2003). Effect of replacing corn with sugar beet pulp on ruminal degradation kinetics and utilization efficiency of kations by growing sheep. Nutritive value. Egyptian. Journal of Nutrition and Feed. 6 (special issue): 1349-1363.

Eweedah, N.M. (2001). Dried sugar beet pulp as a source of energy in sheep rations. Egyptian Journal of Nutrition and Feed. 4: 241-250.

Eweedah, N.M.; S.A. Mohamed; G. El-Santiel and M.F. Ali (1999). Utilization of sugar beet by-products in feeding animals. 1-digestibility, rumen fermentation and nutritive value. Egyptian Journal of Nutrition and feed. 2 (special issue): 121-129.

Fadel, M.; S.M. Allam; T.M. Al-Bedawi; H.H. El-Amary and S.H. Mohamed (2005). Nutritive value improvement of sugar beet pulp through biological treatment. 1-

Seletion and optimization of culture condition for selected fungal strain performance. New Egyptian J. Microbiology, 11:125-134.

Gado, H. (1999). The effect of treating rice straw and bagasse with steam and *trichoderma reesel* on chemical composition and nutritional value for Baladi Goats. Egyptian. J. Nutrition and Feeds, 2 (1):9-16.

Gupta, V.K. and P.U. Langer (1988). Pleurotus Floride for upgrading the nutritive value of wheat straw. Biological wastes, 23:57-64.

Gvay, F.V. and A.F. Pilgrim (1959). Fermentation the rumen of the sheep. II. The production and absorption of volatile fatty acids rumen. J. Exp. Biol., 28:83-87.

Hanafy, M.A. (1997). Effect of yeast culture supplementation in ruminant diet on feed utilization, rumen fermentation and growth performance. J. Anim. Sci. Mansoura Univ., 22 (4): 1047-1055.

Khorshed, M. (2000). Different treatments for improving nutritional quality of some crop residues used in ruminant nutrition. Ph.D. Thesis, Faculty of Agric., Ain Shams University, Egypt.

Langer, P.N.; J.P. Sebgal; V.J. Rana, M.M. Silgh and K. Garcha, (1982). Utilization of Agaricus bisparus-cultivated spent wheat straw in the ruminant diet. Indian J. Anim. Sci., 52 (8): 627-643.

MSTAT Version 4. (1987). Software Program for the design and analysis of agronomic research experiments. Michigan St. Univ., M.S., U.S.A:

NRC (1985). Nutrient Requirements of Domestic Animals: Nutrient Requirements of Sheep. 5th Ed. National Academy of Sciences. National Research Council, Washington D.C., USA.

Prasad, J., S.S. Ahluwalia and B.P. Josh (1972). Climito biochemical studies in indigestion in cattle and buffalo. Indian. J. Anim. Sci., 42 (11): 911-922.

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.

Saleh, M.S., A.M. Eweedah, M.F. Ali and M.K. Mohsen (2001). Comparison between dried sugar beet pulp and yellow corn asa source of energy with berseem in rations of growing lambs. Egypt. J. Nutrition and Feeds, 4 (special issue):231.

Saleh, M.S.; A.M., Metwally; M.I., Bassiouni and M.A. Shora (2003). Utilization of water mealon vine in feeding ruminants 1- Effect of replacing berseem hay by watermelon vine hay in feeding lactating buffaloes. Egypt. J. Nutr. and Feeds, 6 (special issue): 617-626.

Salem, H.S. (2003). Utilization of cotton stalks chemically and biologically treated in sheep rations. M.Sc. Thesis, Faculty of Agric., Cairo University, Egypt.

Shoukry, M.M.; F.A. Hamissa; S. Mansour; 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 sugar cane bagasse. Egypt. J. Anim. Prod., 25:329.

Smith, N.E.; L.S. Collar, D.L. bath; W.L. Dunkley and A.A. Franke (1980). Whole cotton seed and extruded soybean for cows in early lactation. J. Anim. Sci., 53 (2): 217-226.

Talha, M.H.; R.I. Moawad; G. H. Zaza and E.E. Ragheb (2002). Effect of partial substitution of corn grains by dried sugar beet pulp in growing lambs rations on their productive performance. J. Agric. Sci. Monsoura Univ., 27 (8): 5193-5199.

Zadrazil, F. (1980). Conversion of different plant waste into feed by basidiony cetes. J. Appl. Microbial. Biotechnol., 9:243.

تحسين تقل بنجر السكر من خلال المعاملة البيولوجية و استخدامه فى عليقة الأغنام

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استخدم ٢٠ حمل نامي خليط (سافولك × اوسيمي) عمر ٣ شهور وبمتوسط وزن ٢١,٤ كجم ، قسمت إلي ٤ مجموعات كل ٥ حمل لدراسة تأثير المعاملة البيولوجية علي تقل بنجر السكر .

تم تغذية حيوانات المعاملة الأولي (T١)علي مخلوط من العلف المركز بالإضافة لدريس البرسيم (العليقة المقارنة) أما حيوانات المعاملة الثانية (T2) والمعاملة الثالثة (T3) والمعاملة الرابعة (T4) فقد تم إعطاءها مخلوط من العلائق المركزة احتوت علي تقل بنجر السكر المعامل بيولوجيا بفطر Trichoderma viride F-416 saccharomyces cervisiae F-125 لمعرفة تأثير أحلال ٥٠ ، ٧٥ ، ١٠٠% منه محل الذرة بمخلوط العلف المركز وذلك حسب مقررات NR 2 (١٩٨٥)

واستمرت التجربة ١٢٠ يوم وكانت أهم النتائج : -

١. سجلت المعاملة الرابعة T4 اعلي قيمة معنويا بالنسبة للمادة الجافة والمادة العضوية والألياف الخام المهضومه .

٢. مجموعة الحيوانات المغذاة علي المعاملة الثالثة سجلت الاعلي معنويا في معاملة هضم NFE .

٣. سجلت الدراسة علي انه لا يوجد فروق معنوية لكلا معامل هضم البروتين الخام والدهن الخام للمجموعات المختبرة .

٤. كذلك لا يوجد فروق معنوية بين المجموعات المختبرة لكلا من DCP,TDN.

٥. كل المجموعات المختبرة كانت سالبة ميزان النتروجين .

٦. لا يوجد اختلاف معنوي بين المجاميع في كل من الوزن النهائي للجسم ومتوسط الزيادة اليومية والمادة الجافة المأكولة والكفاءة الغذائية .

٧. أوضحت النتائج إن اقل تكلفة للغذاء / كجم وزن مكتسب كانت للمجموعة الرابعة ويزيد الربح .