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INFLUENCE OF TREATED SOME POOR QUALITY ROUGHAGES WITH UREA, LIME AND MOLASSES ON GROWING RAHMANY LAMBS PERFORMANCE.

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SUMMARY

A feeding trial lasted for 105 days was conducted using 15 growing Rahmany lambs (average 25.5kg live weight and 5-6 months old) .The animals were randomly divided into three groups and fed at 3 % of live body weight on total mixed rations (mash) consisting of 75% concentrate mixture and 25% roughage. In the first group (control, R1), the roughage was clover hay, while, in the other two groups it was treated bean straw (5 % urea, 0.25% agricultural sulfur, 8 % lime and 10% molasses at 50%, moisture for 4 weeks reaction time, R2) and treated sugarcane bagasse (R3). At the end of the feeding trial nutrients digestibility, nutritive value and nitrogen balance of the tested rations were determined. Results indicated that digestion coefficients of all nutrients, except CP and EE, and nutritive value as TDN for control ration (R1) were significantly higher than those in treated bean straw ration (R2) or treated bagasse ration (R3). There were no significant differences among the three tested groups in nitrogen balance, average daily body weight gain and feed conversion (g DMI/ g gain), being (4.17, 4.39 and 4.26 g/head/day); (130.1, 121.5 and 120.8 g) and (7.00, 7.44 and 7.60), respectively. Feeding cost (LE/kg gain) in R2 and R3 was comparable (10.21 and 10.18) but lower than that of R1 (11.22). Therefore, clover hay can be substituted by bean straw or sugarcane bagasse when treated with 5 % urea, 0.25% agricultural sulfur, 8 % lime and 10% molasses at 50 % moisture for 4 weeks incubation period in growing lambs rations without adverse effect on productive performance and economical efficiency. It could be recommended that farther researches may be required to study the effect of increasing the level of improved roughages used in lambs rations more than 25%.

***Keywords:** urea, lime, molasses, treated roughage, performance, lambs*

INTRODUCTION

Agricultural by products have been used as livestock feed since ancient times. In Egypt, there is a large amount of these agricultural by products was produced annually (about 25 million tons, according to Ministry of Agriculture and Land Reclamation, 2008). These by products are poor in nutritive value for ruminants owing to their low nitrogen content, high fiber content and low palatability. Mostly, it's a source of environmental pollution, whereas it may be used as a fuel to get energy.

It has been known that the alkali treatment can improve the nutritive value of these by-products (Ford, 1978; Akin and Hartly, 1992; Oliveros *et al.*, 1993; Sirohi and Rai, 1994; Farghaly *et al., 2003 and* El-Gendy *et al.*, 2008). Numerous studies have demonstrated the effectiveness of NaoH and ammonia treatments in improving the nutritive value of agricultural by products (Wanapat *et al.*, 1985; Mason *et al.*, 1990 and Moss *et al.*, 1990). In many countries, however, ammonia is not available for agricultural uses, whereas NaoH causes soil salinity problems and places a high Na load on the animal (Haddad *et al.*, 1995). As well as both NaoH and ammonia are costly and dangerous to handle, especially in the developing countries. On the other hand, calcium hydroxide ($Ca(oH)_2$) and urea compared with NaoH and ammonia are cheaper and easy to handle (Waiss *et al.*, 1972; Mason *et al.*, 1990; Zaman *et al.*, 1993; Zaman and Owen, 1995 and Granzin and Dryden, 2003). However, one problem was identified by several researchers such as Owen *et al.*, 1984 noted that $Ca(oH)_2$ - treated material becomes moldy with time. Urea treated materials are generally mould free because ammonia released from urea inhibits mould growth. So, treatment of roughages with urea is subsequently hydrolyzed to ammonia has been investigated in many countries (Haque *et al.*, 1983 and Doyle, 1984) and it has been found that urea serves as a good preservative for treatment of roughages.

It's known that sugarcane molasses consider a carbohydrate source for urea utilization by ruminants and improving the palatability (White *et al.*, 1973; Church and Santos, 1981 and Brown *et al.*, 1987)

This study was carried out to study the effect of substitution clover hay by treated bean straw and bagasse for growing lambs rations on growth performance and economical efficiency.

MATERIALS AND METHODS

The present study was carried out at the Experiments Station, Department of Animal Production, Faculty of Agriculture, Cairo University, Giza, Egypt.

Chopped bean straw and bagasse (0.5 - 1cm long) were treated with a combination of 5% urea, 0.25% agricultural sulfur, 8 % lime (Cao) and 10% molasses (w/w). This combination was added to 100 liters of water and sprayed on 100 kg lots of tested roughages. The treated roughages were kept in double polyethylene bags at room temperature for 4 weeks and finally dried in sun rays.

In a feeding trial which lasted for 105 days, 15 growing Rahmany lambs (average 25.5kg live weight and 5-6 months old) were randomly assigned into one of the three total mixed rations (mash). The first one (control, R1) consists of 75% concentrate mixture and 25% clover hay. While, in the other two rations, lambs were fed on 75% of the same concentrate mixture and 25% treated bean straw (R2) or bagasse straw (R3) as shown in Table (1).Animals in all groups were fed at the level of 3% of live body weight to cover the growth requirements according to NRC, 1994 for sheep. Fresh drinking water was available freely. Daily fed intake, daily body weight gain, fed conversion (g DMI , TDNI or DCPI/g weight gain) and economical efficiency were calculated. At the end of the feeding trial, three animals of each group were used in digestion trial for determining nutrients digestibility and nutritive value of the tested rations. Each animal was fed on 900 g of the tested ration in the same order of the feeding trial to cover the maintenance requirements according to NRC, 1994 for sheep. Water was available all the time. Feces and urine were daily collected through 7 days and were taken for analysis. Samples of feeds, feces and urine were analyzed according to A.O.A.C. (1995).

Data were statistically analyzed using the general liner model procedure, SAS (2000). Significant differences among means were tested by using Duncen's multiple range test (Duncen, 1955).

RESULTS AND DISCUSSION

Chemical composition of the experimental rations are presented in Table (1). These experimental rations were somewhat similar in their chemical composition.

Table (1): Composition and nutrient content of the experimental total mixed rations.

Item	Experimental rations		
	R1	R2	R3
Components, %			
Soybean meal	15.00	15.00	15.00
Wheat bran	15.00	15.00	15.00
Yellow corn	42.35	43.85	43.85
Common salt	0.75	0.75	0.75
Lime stone	1.50	....	....
Minerals & vitamins mixture*	0.40	0.40	0.40
Clover hay	25	....	....
Treated bean straw	....	25	....
Treated bagasse	....	....	25
Nutrient content ,%(DM basis)			
DM	93.92	95.06	95.01
OM	92.60	91.45	92.50
CP	14.52	14.66	14.38
CF	11.67	12.21	10.88
EE	3.19	3.12	3.05
NFE	63.22	61.46	64.19
Ash	7.40	8.55	7.50

Minerals &vitamins mixture per kg contained Co 0.1g, Cu 8g, Fe 35g, I 0.5g, Mn 35g, Se 0.6g, Zn 35g , vitamin . A 20,000,000 IU, vitamin D_3 2,000,000 IU and vitamin E 2g.

Nutrients digestibility and nutritive value:

Data concerning digestibility and feeding value as shown in Table (2) indicated that digestibility values of DM and OM in R1 were significantly higher (P<0.05) than those recorded in R2 and R3, being 82.09, 75.53 and 78.37% for DM and 84.74,80.17 and 82.37% for OM, respectively. These results might be due to the increasing of ash content in R2 and R3 by 15.54 and 1.4 % compared with R1. This result was confirmed those obtained by Mohamed *et al., (1987)* and Abd El - Aziz *et al.,* (2001). On the other hand, the digestibility of crude protein was significantly (P<0.05) higher in R2 and R3, compared to R1, being 80.58 and 82.85 vs. 77.25% .These increases might be due to urea treatment as suggested by Herrera *et al.*, (1983). There were significant (P<0.05) differences in the digestibility of crude fiber among the tested rations, being 67.80, 58.69 and 64.11 % in R1, R2 and R3, respectively. This variation in the digestibility of crude fiber might be due to the variation in the fiber fractions (Sirohi *et al.*, 1995 and Abd El-Aziz *et al.*, 2001). There was a significant (P<0.05) decrease in the digestibility of NFE in R2 and R3 by 2.80 and 5.44 %, respectively compared to R1.While, there was a significant (P<0.05) increase in the digestibility of EE in R2 and R3 by 4.90 and 5.36 %, respectively compared to R1.

Table (2): Digestion coefficient, nutritive value and nitrogen balance of experimental rations.

Item	Experimental rations			±SE
	R1	R2	R3	
Apparent digestibility,%(DM basis)				
DM	82.09^{a}	75.53^{c}	78.37^{b}	1.11
OM	84.74^{a}	80.17^{c}	82.37^{b}	0.88
CP	77.25^{c}	80.58^{b}	82.85^{a}	0.99
CF	67.80^{a}	58.69^{c}	64.11^{b}	1.44
EE	84.14^{b}	88.26^{a}	88.65^{a}	0.92
NFE	88.35^{a}	84.49^{b}	83.54^{b}	0.93
Nutritive value, %(DM basis)				
Total digestible nutrients(TDN)	^1.01^{a}	77.10^{c}	78.60^{b}	0.81
Digestible crude protein (DCP)	11.22^{b}	11.81^{a}	11.91^{a}	0.31
Nitrogen balance:				
Nitrogen intake, g/head/day	20.90	21.11	20.71	0.58
Feces nitrogen, g/head/day.	4.76	4.10	3.55	0.34
Urine nitrogen, g/head/day	11.97	12.62	12.90	0.32
Nitrogen balance:				
g/head/day	4.17	4.39	4.26	0.29
% of nitrogen intake	19.95	20.80	20.57	0.59

a,b,c means on the same row with different superscripts are significantly different (P<0.05).

Data indicated that nutritive value as DCP was significantly higher with R2 and R3 than that of R1, being 11.81 and 11.91 vs. 11.22%. This improvement may be due to the higher CP digestibility in R2 and R3. Nevertheless, the values of TDN were lower (P<0.05) with R2 and R3 compared to R1. The respective recorded values were 77.10, 78.60 and 81.01% (Table, 2). The results here in were supported with those reported by Farghaly *et al.* (2003) and El-Gendy *et al.* (2008) who noticed an improvement in DCP when flax straw was treated with urea at 4% for Barki sheep.

Nitrogen balance:

Data in Table (2) indicated that there were no significant (P<0.05) differences among the three tested groups in nitrogen balance either as g/head/day or % of nitrogen intake. However, the recorded values were higher with R2 and R3 than those of R1, being 4.39, 4.26 and 4.17 g/head/day and 20.80, 20.57 and 19.95 % of nitrogen intake, respectively. These findings are in good agreement with those reported by El-Gendy *et al* (2008) who noticed an improvement in nitrogen balance when flax straw was treated with urea at 4% for Barky sheep compared to the control group, being 5.29 vs. 4.08 g/ head/day and 21.06 vs. 19.39% of nitrogen intake.

Growth performance and economical efficiency:

There was no significant (P<0.05) difference in the final body weight, total body weight gain and average daily body weight gain, being 39.16, 13.66 Kg and 130.1 g; 38.08, 12.76 Kg and 121.5 g; and 38.40, 12.68 Kg and 120.8 g in R1, R2 and R3, respectively (Table 3). These results might be due to that there was no significant (P<0.05) difference among the difference groups in the DM intake, TDN intake and nitrogen balance, being 911, 785.8 and 4.17 g; 904,733.2 and 4.39 g and 914, 756.1 and 4.26 g in R1, R2 and R3, respectively.

Table (3): Productive performance of lambs fed the experimental rations.

Item	Experimental rations			±SE
	R1	R2	R3	
Body weight changes:				
Initial live body weight, kg	25.50	25.32	25.72	1.34
Final live body weight, kg	39.16	38.08	38.40	1.97
Total body weight gain, kg	13.66	12.76	12.68	0.91
Daily body weight gain, g	130.1	121.5	120.8	10.00
Feed intake, g/head/ day:				
DM	911	904	914	5.00
TDN	785.8	733.2	756.1	40.00
DCP	108.8	112.3	114.6	5.70
DM	7.00	7.44	7.60	0.62
TDN	6.04	6.04	6.26	0.54
DCP	0.84	0.92	0.95	0.80
Economical efficiency:				
Daily feed cost, LE	1.46	1.24	1.23	
Feed cost, LE/Kg gain	11.22	10.21	10.18	
Relative feed cost, LE/Kg gain, %*	100	91.00	90.73	

The prices (LE/Ton) were, concentrate feed mixture, 1600; clover hay, 1200; treated bean straw, 400 and treated bagasse, 300.

* Relative feed cost, LE/ Kg gain, % = Feed cost, LE/ Kg gain (R2 or R3) / R1

There were no significant (P<0.05) differences in the values of feed conversion (g DMI/g gain, g TDNI/g gain or g DCPI/g gain) among the three tested rations, being 7.00, 7.44 and 7.60 for DMI; 6.04, 6.04 and 6.26 for TDNI and 0.84, 0.92 and 0.95 for DCPI in R1, R2 and R3, respectively.

Regarding to economical efficiency, the obtained results as represented in Table (3) showed that feeding cost (LE/kg gain) in R2 and R3 was comparable (10.21 and 10.18) but it was lower than that of R1 (11.22). This may be due to the lower feed price of these two groups (1300 and 1275 LE/ton) than that of R1 (1500 LE/ton). Meanwhile the values relative feed cost had the same trend being 91 and 90.73 vs. 100%.

In view of the obtained results, it could be concluded that clover hay can be substituted by bean straw or sugarcane bagasse after treated, with 5 % urea, 0.25% agricultural sulfur, 8 % lime and 10% molasses at 50 % moisture for 4 weeks incubation period in growing lambs rations without adverse effect on the productive performance and economical efficiency. It could be recommended that farther researches may be required to study the effect of increasing the level of improved roughages used in lambs rations more than 25%.

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تأثير معاملة بعض مواد العلف الخشنة الفقيرة باليوريا و الجير و المولاس علي اداء الحملان الرحماني النامية

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تم استخدام ١٥ حمل رحمانى نامى (بمتوسط وزن ٢٥.٥ كجم وعمر ٥- ٦ اشهر) فى تجربة نمو استمرت ١٠٥ يوم . وقسمت الحيوانات عشوائيا لثلاثة مجموعات متماثلة. وغذيت الحيوانات بما يعادل ٣٪ من وزنها الحي علي مخاليط علائق متكاملة مكونة من ٧٥٪ علف مركز ، ٢٥٪ مادة علف خشنه. المجموعة الاولى (الكنترول) : علف مركز + دريس، المجموعة الثانية : علف مركز + تبن الفول المعامل، المجموعة الثالثة : علف مركز + مصاصة قصب السكر المعاملة. كانت المعاملة لمواد العلف الخشنه عبارة عن ٥٪ يوريا، ٠.٢٥٪ كبريت زراعي، ٨٪ جير حي، ١٠٪ مولاس قصب السكر (وزن/ وزن) بنسبة رطوبة ٥٠٪ ثم التحضين على درجة حرارة الغرفة لمدة ٤ اسابيع. وفى نهاية تجربة النمو قدرت معاملات هضم المركبات الغذائية و القيمة الغذائية وميزان الازوت للعلائق التجريبية الثلاثة.

ويمكن تلخيص النتائج المتحصل عليها كما يلى : كانت معاملات الهضم لجميع المركبات الغذائية (باستثناء البروتين الخام والمستخلص الايثيرى للدهن) والقيمة الغذائية فى صورة مركبات غذائية مهضومة كلية اعلى معنويا فى مجموعة الكنترول من مثيلتها فى المجموعتين الاخريتين. لوحظ عدم وجود فروق معنوية بين المجموعات التجريبية الثلاثة في ميزان الازوت، و الزيادة اليومية في وزن الجسم، و معامل التحويل الغذائي (جم مادة جافة/ جم نمو) حيث كانت النتائج (٤.١٧، ٤.٣٩، ٤.٢٦ جم/راس/يوم)، و (١٣٠.١، ١٢١.٥، ١٢٠.٨ جم)، و (٧.٠٠، ٧.٤٤، ٧.٦٠) علي الترتيب. كانت قيم تكلفة التغذية (جنيه /كجم نمو) مقارنه فى المجموعتين الثانيه والثالثة (١٠.٢١ ، ١٠.١٨) ولكنها كانت اقل من مثيلتها فى مجموعة الكنترول (١١.٢٢).

وعلى ذلك يمكن استبدال دريس البرسيم بتبن الفول او مصاصة القصب المعاملين ب ٥٪ يوريا، ٠.٢٥٪ كبريت زراعي، ٨٪ جير حي، ١٠٪ مولاس قصب السكر (وزن/ وزن) بنسبة رطوبة ٥٠٪ والتحضين على درجة حرارة الغرفة لمدة ٤ اسابيع، فى علائق الحملان النامية دون تأثير سلبي علي الأداء الانتاجي والكفاءة الأقتصادية. ونوصى بمزيد من الابحاث لدراسة مدى امكانية زيادة مستوى مواد العلف الخشنه الفقيرة المحسنه المستخدمة فى علائق الحملان لاكثر من ٢٥٪.