J. Agric. Sci. Mansoura Univ., 25 (12): 7521 - 7528, 2000.

NUTRITIONAL STUDIES ON GRAPE PRESSING BY-PRODUCTS AS FEEDSTUFF FOR GROWING LAMBS

Mohamed, S.G.A*; M.I. Mohamed and I.M. Awadalla ****

*** Department of Animal Prod.; Faculty of Agriculture, AL-Azhar University; Assiut Branch**

**** Department of Animal, Poultry Nutrition and Production, National Research Centre, Dokki, Giza, Egypt**

ABSTRACT

The experiment was carried out at the experimental station of the faculty of Agriculture Al-Azhar University, Cairo Egypt, to evaluate the grape pressing by-products as a unconventional feed stuff in rations of growing ossimi lambs. A feeding trial of 16 weeks period was carried out with 12 growing ossimi lambs aging 7-8 months and weighing 25.4 kg on the average. The experimental lambs were devided into three groups 4 animals each to represent three nutritional treatments. The first group (G_1) control was offered a complete concentrate feed mixture (G_1). While the other two groups (G_2,G_3), were fed concentrate feed mixture plus 15% grape pressing by-products (G_2) and the second was offered the feed mixture plus 30% grape pressing by-products (G_3) respectively. The bean straw was offered *ad-libitum*, while concentrated feeds were fed at a rate of 3% of LBW to the three groups. Three digestibility trails were carried out at the end of the feeding trial to evaluate the three rations. Results obtained can be summarized as follows :

1) There were no significant differences among the groups fed diets containing grape pressing by-products is final weight, total gain and daily gains.
2) Conversion of TDN and DCP calculated as kg required for each kg live weight gain were found to be 7.62, 7.38, 6.67 and 1.20, 1.18 and 1.12 for the groups G_1, G_2 and G_3 respectively.
3) The highest feed costs for each kg live weight gain were recorded by the G_1, followed by G_2, and G_3 groups; respectively.
4) Treatments applied showed no significant effects on digestibities of DM; OM; CP; CF; EE and NFE..

Further investigation on grape pressing by- products are required especially on the area of treatment of this feed stuff to get red of the tannines presented in it (3-7% of the DM) Also applications of this feed stuff should be studied on the large scale in the practice .

Keywords: Grape pressing by-products; sheep diets; economical efficiency of lambs.

INTRODUCTION

Grape pressing by-products had a higher lignin + coutin and lower hemicellulose content than hay or straw (Larwence and Yahiaoui, 1983). About half of the soluble CP (15-20% of CP) was of nature protein and 21.8% of soluble CP was bound in the lignin + coutin fractions. Sugar contents was faund to be 2.5 – 6.7% DM and tannin content represented 8,8- 14,4% DM, of which 95% was in form of condensed tannins. Calcium: phosphorus ratio was about 2:1 and copper content which was acceptable for sheep (Fegeros, and Kalaissakis, 1987).

MATERIALS AND METHODS

1- Animals and management :

Twelve male ossimi lambs of about 25.4 kg live body weight (LBW) were randomly divided into three similar groups of 4 lambs each. The experimental groups were assigned at random to receive one of the three experimental rations. Animals were weighed biweekly to the nearest 100g (during the feeding trial). Animals were weighed in the morning before drinking and feeding and fasting weights were recorded.

The experimental animals were kept under the routine veterinary supervision of the station throughout the duration of the experiment.

2- Experimental rations :

Three experimental diet were applied in the present study the first group (G_1) had served as a control group and received a diet (Table 1) containing a concentrate feed mixture (CFM) with bean strow *ad-libitum*. The second group (G_2) was fed on a diet containing 85% CFM plus 15% grape pressing by-products and offered the bean atraw *ad-libitum*. The third group (G_3) was fed on the diet containing 70% CFM plus 30% (GPP) and offered bean straw *ad-libitum*. An experimental groups offered the CFM alone (G_1) or with the GPP (G_2 and G_3) at a ratio of 3% of the body weight daily. The experiment lasted 16 weeks after start.

Table (1): Chemical composition of bean straw (BS), grap pressing by-products (GPP) and experimental diets %, on DM basis.

Experimental diets	OM %	CP %	CF %	EE %	Ash %	NFE %
BS	89.30	4.46	34.55	1.28	10.70	49.01
GPP	89.11	14.64	31.59	6.75	10.89	36.13
G_1	92.76	15.90	12.54	4.60	7.24	59.72
G_2	92.22	15.72	15.40	4.92	7.78	56.18
G_3	91.66	15.53	18.26	5.25	8.34	52.62

BS : Bean straw
GPP : Grap pressing by-products.
D : 100% Concentrate feed Mixture (control).
D_1 : 85% concentrate feed mixture plus 15% grap pressing by- products
D_2 : 70% concentrate feed Mixture plus 30% grape pressing by-products.

3- Metabolism trials :

At the end of the experimental period (16 weeks) three digesttibility and nitrogen balance trials were carried out to study the effect of the different treatments on nutrients digestibility and N balance. Three representative lambs from each experimental group were used. The lambs were individually placed into metabolism cages. Each trial expanded for 17 days where the first 10 days were considered as preliminary period and during consequent seven days feces and urine were collected for analysis.

4- Analytical Methods :

Representative samples of feed, feces and urine were analyzed according to A.O.A.C. methods (1980).

Economical efficiency of the experimental diets was calculated as price of gain over price of feed consumed, and calceulated by using the following equation

$$\text{Economic efficiency \%} = \frac{\text{Gain costs (LE)}}{\text{Feed cost (LE)}} \times 100$$

5 Statistical Analysis :

The data were analyzed statistically according to Snedecor and Cochran, (1980) and the significance among experimental groups were tested by Duncan, Multiple range test (1955).

RESULTS AND DISCUSSION

Chemical composition and feeding value of the experimental diets.

Results presented in Table (1) show the chemical composition of the experimental diets G_1 (control diet containing concentrates plus bean straw ad-lib); G_2 (concentrates plus 15% grape pressing by-products plus bean straw) and G_3 (concentrates plus 30% grape pressing by-products plus bean straw). Results revealed that the OM contents of the experimental diets ranged between 92.76 (G_1); 92.22 (G_2) and 91.66 (G_3). Concerning the CP contents the values were 15.90% (G_1); 15.72% (G_2) and 15.53% (G_3) respectively, indicating that differences in CP among the groups were insignificant. On the other hand the CF contents in the diets increased with each increase in the level of grape pressing by-products in the diets. Ether extract contents showed a slight increase in the grape pressing by-products diets compared to the control group. The same trend was observed with ash content. Results of Table (1) show that the NFE contents decreased with increasing the dietary level of grape pressing by-products in the diets due to the high CF contents in the grape pressing by-product diets.

In general results presented in Table (1) indicate that incorporation of grape pressing by-products in the diets of growing lambs caused an increase in the CF contents which increased with each increase in the level of grape pressing by-products. (Morgan and Trinder, 1980 and Mohamed ,2000).

Growth performance :

Data shown in Table (2) illustrate the economical parameters of the treatment groups. As presented in this Table averages of initial body weight had ranged between 25.4 to 25.6 kg and differences among treatment groups were in significant. Average final body weights were 37.6; 37.2 and 36.6 kg on average for groups G_1; G_2 and G_3 respectively (Table 2).

The analysis of variance for final body weight among the treatment groups indicated that the differences were found to be in significant Results of table (2) show also that groups fed on diets containing 15% grape pressing by-products showed heavier final weight compared to that fed on the diet containing 30% grape pressing by-products, however differences among there groups were insignificant. The same trend was observed in total gain in live thus differences among the treatment groups were insignificant. Averages of growth rate for G_1; G_2 and G_3 were found to be 49.21; 45.31 and 44.09% respectively indicating that growth rate decreased with each increase in the level of dietary grape pressing by-products. These results are in agreement with those obtained by Larwence and Yahiaoui (1983) and Mohamed (2000).

Table (2): Average live body weight, daily gain, feed conversion and economic feed efficiency for growing lambs

Item	G_1	G_2	G_3
Initial weight (kg)	25.2[a]	25.6[a]	25.4[a]
Final weight (kg)	37.6[a]	37.2[a]	36.6[a]
Total gain (kg)	12.4	11.6	11.2
Av. daily gain (g)	110.71	103.57	100.00
Growth rate	49.21	45.31	44.09
Averag daily feed intake			
TDMI g/h	1149.51	1163.34	1144.52
Roughage g/h	290.24	292.71	304.86
Concentrate g/h	859.27	870.63	849.66
TDNI g/h	843.86	764.31	667.48
DCPI g/h	132.31	122.62	111.82
Feed conversion			
Kg DM / kg gain	10.38	11.23	11.45
Kg TDN/ kg gain	7.62	7.38	6.67
Kg DCP /kg gain	1.20	1.18	1.12
Feed cost			
Total feed costs /kg Gain (L.E)	4.47	4.38	3.96
Economical efficiency %	2.01	2.05	2.27

Economical efficiency % = $\frac{\textbf{Gein costs/kg}}{\textbf{Feed costs kg}}$ **x 100**

The economical evaluation of results was carried out according to market prices in 2000 in LE. Price of kg gain was 9.00 LE as the market at time of the experiment.

Results presented in table (2) show that the total DM intake (roughages plus concentrates) calculated as g/h/day for groups G_1, G_2 and G_3were 1149.51; 1163.34 and 1144.52 respectively. The TDN g/h/day intake for the same groups were 843.86; 764.31 and 667.48.48g/h/day respectively. Results of TDN intakes revealed its values decreased with each increase in the grape pressing by-products level compared to the control group G_1 however DM intake of G_2 group was the highest followed in a decreasing order by G_1 and G_3 respectively. Results of DCP intake (g/h/day) behaved similar to TDN intake, where the lowest value was reported by the G_3 group (111.82 g/h/day) and the highest one was obtained by the control G_1 (132.31 g/h/day). These results are in agreement with those reported by Aguilera (1986) and Mohamed (2000).

Results of feed conversion ratio calculated as kg of DM required for each kg gain in live weight gain for the G_1, G_2 and G_3 groups were 10.38; 11.28 and 11.45respectively (table 2) these results indicate that the best feed conversion ratio (kg DM required for each kg/gain in live weight) was showed with the control group G_1 (10.38) followed by that G_2 (11.23) and G_3 groups (11.45). Results of TDN conversion ratio for the experimental groups showed that the best TDN conversion ratio was showed with the G_3 (6.67) group followed by the G_2 (7.38) and G_1 (7.62) groups.

The same trend was observed with the protein utilization efficiency (calculated as kg of dietary protein required for each kg gain), Values for DCP conversion were 1.20; 1.18 and 1.12 for G_1; G_2 and G_3 groups respectively indicating a slight improvement in the protein utilization efficiency in the groups fed diets containing grape pressing by-products.

The total feed costs (L.E) for each kg gain in live weight was found to be the highest with group G_1 (control) followed in decreasing order by the G_2 and G_3 groups, respectively (Table 2). These results indicate that incorporation of grape pressing by-products in diets of growing lambs caused a reduction in weight compared to the G_1 control group, however the best group in economical efficiency value were 2.27 for G_3 group compared with those of G_2 (2.05) and G_1 (2.01) respectively. These results are in agreement with those reported by Alicata *et al*., (1989) using pelleted diets containing whole grape seed meal, and Mohmaed (2000) who found that the use of grape pressing by-products in the ration for goats may help in the problem of feed shortage and decrease the cost of feeding. Also Raharjo *et al*., (1986) confirmed these results.

Digestibility coefficients :

Averages of digestibility coefficients (DC) for the DM; OM; CF; EE and NFE are illustrated in table (3). Results revealed that DM digestibility was the highest with the control group G_1 followed by values of G_2 and G_3 groups respectively, however differences among the experimental groups in this trait were insignificant. The same trend was observed in the OM digestibility coefficient. Concerning the CP digestibility the highest value was recorded by the control group (G_1) 83.79 followed decreasing order G_2 and G_3, respectively without any significant differences. On the other hand digestibility coefficient of CF was the highest in group G_2 which fed on the diet containing 15% grape pressing by-products followed in a decreasing order by G_1 and G_3, respectively, however differences in CF digestibility among the treatment groups were insignificant (Table 3). These result, may indicate that incorporation of grape pressing by-products (GPP) in diets of growing lambs caused a slight improvement in the digestibility of crude fiber, while a level of 30% of GPP reduced the digestibility of crude fibers digestibility. As presented in table (3) digestibility coefficients of EE obtained by the G_2 (76.26) group was the highest followed in an insignificant decreasing order by the G_3 and G_1groups respectively. As presented in table (3), NFE digestibility coefficient of the G_1 (control) group was the highest followed is an insignificant decreasing order by the (G_2) and G_3) groups, respectively.

In general digestibility coefficient of DM; OM; CP and NFE of diets containing grape pressing by-product is reduced due to the presence of tannine as well as N-Lignocellulose links. These results agreed with the findings of many workers. Fegeros, and Kalaissakis, (1987) who showed that N content, of grape pressing by-products is not enough to cover rumen microflora requirements, the supplementation with available source of N is expected to cause significant increases of the organic matter digestibility also (Larwence and Yahiaoui, 1983) and Merino and Carabano (1992) reported similar results.

Table (3): Effect of feeding grape pressing by-products on the digestibility of the experimental rations.

Groups	Digestibility %					
	DM	OM	CP	CF	EE	NFE
G_1	74.42 [a]	75.27 [a]	83.79 [a]	71.06 [a]	71.44 [a]	74.01[a]
G_2	66.96 [a]	67.74 [a]	82.65 [a]	76.21 [a]	76.21 [a]	63.88[a]
G_3	61.04 [a]	62.34 [a]	77.67 [a]	59.87 [a]	73.11 [a]	58.74 [a]
± SEM	3.26	3.42	2.08	3.78	2.28	3.77

Feeding values :

Averages of TDN %; DCP%; N.R. and NB g/h/day are illustrated in Table (4) Data of this Table revealed that the highest TDN % was recorded by the control (G_1) followed in a decreasing order by the G_2 and G_3 groups, respectively, however differences among the experimental groups were insignificant. The higher TDN% obtained by the group G_2 compared to the group G_3 may attribute to the higher contents of the first form NFE, however both rations G_2 and G_3 showed reduced TDN compared to the central group. As presented in the same Table DCP% for the G_1; G_2 and G_3 groups were 11.51; 10.54 and 9.77% respectively. The reduction in DCP% due to the incorporation of GPP in growing lamb diets may be attributed to the presence of lignocellulose which bind about 1-2% of the total nitrogen and reduced its solubility (Lawrance and Yahiaoui 1983). The analysis of variance for results show that differences in TDN % and DCP% among the treatment group were insignificant indicating that grape pressing by-products at levels 15 and 30% diet.

Results of table (4) show that NR-1 decreased insignificantly with each increase in GPP level in the duit. On the other hand the N.B g/h/day was the highest for the G_1 group followed in a insignificant decreasing order by the G_2 and G_3 groups, respectively. The decrease in NR-1 in diets G_2 and G_3 may be due to the faet the GPP contains tannins and N-lignocellulose which reduced the availability of the protein nitrogen in the GPP supplemented jut compared to the central diet.

Based on results obtained in the present study (GPP) as untraditional feed stuff could be incorporated in growing lambration at a level of 15% or lower without any hazards on animals.

Table (4): Effect of feeding grape pressing by-products on feeding values and N balance of the experimental rations.

Groups	TDN %	DCP %	NR :-1	N,B g/h/day
G_1	73.41 [a]	11.51 v	5.38 [a]	6.95 [a]
G_2	65.70[a]	10.54 [a]	5.23 [a]	5.50 [a]
G_3	60.70 [a]	9.77 [a]	5.21 [a]	4.31 [a]
± SEM	3.27	0.41	0.17	0.64

TDN : Total digestible nutrients
DCP : Digestible crude protein
NR : Nutritive ratio = TDN/DCP -1
NB : Nitrogen balance

ACKNOWLEDGEMENT

The authors would like to thank Prof. Dr. Soliman. M. Soliman the principal investigator of the project No : 1-1-2-2-5, National Research Centre, for financing the present work.

REFERENCES

Aguilera, J.F. (1986). Improvement of olive cake and grape by-products for animal nutrition. Proceedings of a workshop held in Leystad, Netherland, 17-20 March 1986. [edited by Meer, J.M. Van der; Rijkens, B.A.; Ferranti, M.P.].

Alicata, M.M.L.; A. Bonanno; P. Giaccone and G. Leto (1989). Use of whole grape seeds in the feeding of meat rabbits. Nut. Abs. And Rev (1990) p 476.

Association of official Agricultural Chemists (AOAC) (1980). *Official methods of Analysis*, 10th Ed, Washington, D.C.

Duncan, D.B. (1955). Multiuple. F-test. Biometrics 11: 1.

Fahmy A.A.M. (1990). Sordan grass alone or with concentrate in fattening buffalo calves. J. Egypt. Vet. Med. Ass. 50, No. 4, 449-464 (1990)

Fegeros; K. and Kalaissakis; P. (1987). World –Review of Animal – production 23, (3): 17-22.

Larwence, A. and A.Yahiaoui (1983). Cited from Aguilera, J.F. Improvement of olive cake and grape by-products for animal nutrition. Proceedings of a workshop held in Leystad, Nettherland, 17-20 March 1986. [edited by Meer, J.M. Van der; Rijkens, B.A. Ferrantti, M.P].

Merino, J.M. and R. Carabano (1992): Effect of type of Fiber on ileal and fecal digestibilities. J. Appl. Rabbit. Res., 931-937.

Mohamed, S.G. (2000): Nutrional studies on grape pressing by products As Feed stuff for growing mave goats. Egypt. J. Appl. Sci., 15 (10) 2000.

Morgan, D.E. and Trinder, H., (1980): *By-products and Wastes in Animal Feeding.* (Ed. E.R. Orskov). British society of Animal production. Occasional publication. No. 3, P. 91.

Rahario, Y.C.; P.R. Cheeks; N.M. Potton and K. Suoriyati (1986): Evaluation of tropical forges and by-product feed for rabbit production. J. Appl. Rabbit Res.(5): 9-16.

Snedecor, G.W. and W.G. Cochran (1980). Statistical Methods, 7th Ed. Allied Pacific, Bombay.

دراسات غذائية على مخلفات عصر العنب كمادة علف لذكور الأغنام النامية

صابر جمعة عبده * ، ممدوح إبراهيم محمد ** و إبراهيم محمد عوض الله**
*** قسم الإنتاج الحيوانى- كلية الزراعة -جامعة الأزهر - فرع أسيوط**
**** قسم تغذية وإنتاج الحيوان والدواجن – المركز القومى للبحوث – الدقى جيزة**

أجريت هذه الدراسة فى محطة تجارب كلية الزراعة جامعة الأزهر بمدينة نصر وذلك لدراسة تأثير تغذية مخلفات عصر العنب (تفل العنب) على أداء ذكور الأغنام وأستمرت التجربة لمدة ١٦ أسبوعاً على (١٢ كبش)

قسمت إلى ثلاثة مجاميع متماثلة حيث تم تغذية المجموعة الأولى (المقارنة) على ٣% من وزن الجسم مخلوط علف مصنع مع تبن الفول لحد الشبع والمجموعة الثانية على ٣% عليقة تحتوى على (٨٥% مخلوط علف مصنع + ١٥% تفل عنب) وتبن الفول لحد الشبع والمجموعة الثالثة على ٣% من وزن الجسم عليقة. تحتوى على ٧٠% مخلوط علف مصنع + ٣٠% تفل عنب) وتبن الفول لحد الشبع.

أوضحت النتائج المتحصل عليها أنه باستخدام تفل العنب حتى مستوى ٣٠% أمكن تقليل تكلفة كيلو النمو مع عدم تأثر صحة الحيوان ولكن كلما زادت نسبة تفل العنب فى العليقة انخفضت معاملات الهضم للمركبات المختلفة وذلك راجع إلى ارتفاع محتوى تفل العنب من اللجنين وارتباط البروتين الذائب به (٢١,٨% من البروتين الذائب مرتبط بالجنين).