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UTILIZATION OF GRAPE MARC IN FORMULATING RATIONS FOR GROWING GOAT KIDS.

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ABSTRACT

For 98 days, 28 male Balady kids, 5 - 6 months old and average live body weight 15.77 kg were randomly distributed according to body weight to 4 groups, and fed on complete pelleted rations containing 0, 11, 22 and 33% (of DM) dehydrated grape marc (GM) instead of clover hay. Rations were fed individually *ad-libitum*. The results indicated that, the inclusion of GM in rations of growing kids decreased average daily gain, feed conversion ratio, but differences were not significant. Feeding ration contained 22 and 33% GM decreased ($P<0.01$) apparent digestibility, N retention and dressing percentage ($P<0.01$), while kids fed on 11% GM was better. Carcass characteristics showed higher proportion of lean and fat percentage for animals of control and 11% GM, than those fed 22 or 33% GM. Chemical composition of 9, 10 and 11[th] rib showed that protein and ether extract percentages on DM basis was significantly ($P<0.01$) lower in lean meat of kids fed on ration contained 33% GM, than those of kids fed on control ration or rations contained 11 and 22% GM, respectively. It is concluded that, dehydrated grape marc can replace in complete ration by 11 or 22% (of DM) instead of clover hay for feeding growing kids.

Keyword: Complete ration, nutritive value, grape marc, and goat kids

INTRODUCTION

Grape marc is considered one of important agro– industrial by – product. It represents the residue of grape after the juice being pressed out. Grape marc consists of stalks (20 – 25%), grape pulp (45 – 50%) and grape seeds (15 – 25%) (Aguilera, 1987). In the new reclaimed lands, wide areas are cultivated with grapes. In Egypt, the cultivated area with grape, according to the Ministry of Agriculture (2001), was estimated as 13694 feddans, which can produce round 84834.3-tons/ year fresh grape marc. Drying or ensiling are the suitable methods for preservation of this by – product. In earlier studies (Movrogenis *et al.,* 1973 and Economides, 1974) the effect of partially replacing dietary barley with grape marc on live weight gain of lambs and milk yield of dairy cows were examined. Analysis of feed to gain ratio in relation to the composition of diets suggests that, the nutritive value of GM is about half that of barley (Sanchez Vizcaino and Smilg, 1971; and Hadjipanayiotou and Louca, 1976).

The purpose of the present work was to study the effects of using different proportions of grape marc in place of clover hay in complete rations on the live weight gain, feed intake, digestibility coefficients, blood parameters and carcass characteristics as well as economical efficiency of Balady male kids.

MATERIALS AND METHODS

The present study was conducted at the sheep and goat research unit, Abdel-Moneim Riyadh village, El- Bosstan – Noubaria, National Research Center. A feeding trail for 98 days was carried out on twenty eight Balady goat kids of 5 –6 months old and weighing 15.77 ± 0.12 Kg (LBW). The animals were divided into 4 groups (7 kids each). The experimental groups were allotted randomly on four tested pelleted complete rations. The control ration (R1) contained 33% clover hay and 0% GM, GM replaced 33, 66 and 100% of the clover hay of the control ration to form diets R2, R3 and R4, respectively. Such substitution represented 11, 22, and 33% of the whole control ration. The percentages of ingredients of the tested rations are shown in (Table 1). The experimental animals were fed *ad. libitum*. Daily ration was offered individually at 8.00 a.m. and 4.00 p.m. in two equal portions. Feeds refused (if any) were daily collected. Offered amounts of feed mixtures were biweekly adjusted according to body weight change. Drinking water was freely available at all times. At the end of the feeding trails four digestibility trails were done; three animals were chosen randomly from each group to be subjected to digestibility and nitrogen balance trail for 14 successive days, where 7 days were a preliminary period and 7 days for feces and urine collection. At the end of each trail, samples of rumen liquor were withdrawn from each animal by a stomach tube at 3 hrs after feeding. Collected samples of rumen liquor were immediately determined for pH, NH_3 - N concentration, and total VFA'S concentration.

Table 1: Components of the experimental rations (on DM basis).

Ingredients,%	R1 Control	R2 11% GM	R3 22%GM	R4 33% GM
Soybean meal	15	16	17	18
Yellow corn	22	21	20	19
Wheat bran	22	22	22	22
Hay	33	22	11	00
Grape marc	00	11	22	33
Molasses	5	5	5	5
Limestone	1.7	1.7	1.7	1.7
Common salt	1.0	1.0	1.0	1.0
*Vit. & Min. mix.	0.3	0.3	0.3	0.3

*Each kilogram contains: Phosphorus 40 g, Sulfur 12 g, Potassium 10 g, Magnesium 5g, Iron 7g, Zinc 4.5 g, Manganese 4.5 g, Copper 2 g, Iodine 300 mg, Cobalt 50 mg, Selenium 12 mg, Sodium chloride 57%, Vit. A 400,000 IU, Vit.D. 40,000 IU, Vit. E 8000 IU, Choline chloride 600 IU, Niacin 40 mg, Pantothenic acid 8 mg, Vit. B1 7 mg, Vit. B2 3 mg and B6 3

Blood samples were collected from each group during the digestibility trail. Serum was separated and stored at (-18 to –20 c°) until assayement. The other four kids from each group were weighed in three successive days, then slaughtered after being prevented from feed and water withdrawal for 16 hr prior. Hot carcass weight, carcass cuts (fore quarter, hind quarter and neck), and edible offal's (head, liver and kidneys), of each animal were recorded to calculate the dressing percentage. Samples of eye muscle *(Longissmus dorsi)* at the end of 9th to 11th ribs were taken for physical and chemical analysis.

Analytical procedures:

Chemical analysis of feeds:

Proximate c hemical a nalysis o f f eeds, ingredients, feces and urine were done according to A.O.A.C. (1990). Fiber fraction (NDF, ADF and ADL) were determined according to Georing and VanSoest, 1970. NH3-N concentration was determined according to Conway (1963) method, and total VFA'S concentration according to Warner (1964).

Blood serum:

Serum total protein (TP) was determined according to Henry (1964), serum albumin (A) according to Doumas and Blggs, 1972, Creatinine was determined according to Bartels, 1971 and urea according to Patton and Grouch, 1977.

Meat:

Proximate chemical analyses of meat samples (moisture, CP, EE and Ash) were done according to A.O.A.C. (1990). Physical analysis; fat thickness (FT) and eye muscle area (EMA) were determined according to Volovinskaia and Kelman (1962).

Statistical analysis :

The data of all traits were statistically analyzed according to Snedecor and Cochran (1980) in one way analysis of variance design using general linear model (GLM) procedure by computer program of Costat (1985) as the model :$X_{ij} = \mu + A_i + e_{ij}$ **where**:

X_{ij} = r epresents o bservation, μ = Overall mean, A_i = effect of treatments (rations) and e_{ij} = experimental error (common error).

RESULTS AND DISCUSSION

Chemical composition:

Data in Table (2) of the dried grape marc, clover hay and the different experimental tested rations show that, dried grape marc compared with hay was higher in CF (32.05% vs. 30.17%), EE (6.93%vs2.37%), NDF and ADL (63.90% vs. 61.80% and 9.12% vs. 8.27%), while it was lower in crude protein (10.51% vs. 14.12%) and NFE (39.34% vs. 45.59%). Dry matter contents of GM. found by Economides and Hadjidemetrion, 1974 was; 12.3, 35.4, 8.5, 4.6 and 39.2% for CP, CF, EE, Ash and NFE, respectively, while the digestibility coefficient (in-vivo) was: 28.4 and 19.5% for DMD and

DCP, respectively. Larwence and Yahiaoui (1983), reported that, the presence of tannins and links between protein and lignocellulose reduce dramatically the protein availability and N solubility because very low for extracted grape marc, representing 1 – 2% of total N. On the other hand, increasing levels of grape marc in the experimental rations led to increase EE, ADF and ADL levels and to decreased NFE. This because GM was poor source in energy and protein as indicated by their high degree of lignification, and low content of available nitrogen (Fegeros and Kalaissakis, 1987). In Egypt, Abou El-Nasr *et al.*, (1990) pointed that crude fiber was particularly high in grape pulp (23.15%) and also ether extract content (16.33%). Consequently, a high energy value was calculated (20.70 MJ/kg DM).

Table 2: Chemical composition of tested materials and experimental rations (On DM basis)

Item	DM	OM	CP	CF	EE	NFE	Ash	NDF	ADF	ADL
Hay	88.12	89.88	14.12	30.17	2.37	45.59	10.12	61.80	41.60	8.27
GM	90.42	88.87	10.51	32.05	6.3	39.34	11.13	63.90	40.70	9.12
R1	90.12	93.15	16.00	14.00	2.79	60.36	6.85	54.15	33.70	6.76
R2	90.66	93.03	15.95	14.17	3.11	59.27	6.92	55.00	33.90	6.94
R3	91.18	92.97	15.93	14.31	3.98	59.18	7.03	56.12	35.60	7.17
R4	91.28	92.88	15.90	14.57	4.12	58.29	7.12	57.01	36.17	7.37

R1: containing 0% grape marc.

R2: containing 11% grape marc instead of clover hay .

R3: containing 22% grape marc instead of clover hay .

R4: containing 33% grape marc instead of clover hay .

Feed Intake:

Data presented in Table (3) illustrate that, average DM intake expressed as daily DMI, or total DM intake was significantly higher (P<0.01) with kids fed control and complete ration contained 11% GM (R1 and R2) than with those fed the other tested rations contained 22and 33% GM (R3 and R4). On the other hand, total DMI/ BW, %, also, was higher (P<0.01) with ration contained 11% GM (R2) followed by (R1) and (R3), while R4 (33% GM) recorded the lowest value. Belibasakis *et al.*, 1996, noted that feed consumption of diet contained 20% GM was not affected by diet of dairy cows. Manterola *et al.*, (1997), also mentioned that, DM intake was not significantly affected by GM inclusion, however a tendency towards lower intake was noted in treatments with GM. On the contrary, Mavrogenis *et al.*, 1973; and Hadjipanayiotou and Louca, 1976, revealed that feed intake increased with increasing level of grape marc in the diet and apparently the calves were capable of consuming more feed to compensate the energy defect.

Daily Gain:

Data in Table (3) illustrated that, kids fed control and complete ration contained 11% GM (R1 and R2) recorded the higher (P<0.01) final body weight, total gain and average daily gain than kids fed complete rations contained (22% and 33% GM (R3 and R4). These results might be attributed to the deficiency of DM, TDN and DCP from the diets containing higher levels of GM. These results are in agreement with those obtained by Taie *et al.*, (1998) who found that feeding high energy diets resulted in greater daily body weight gain. Also, these results are in harmony with those obtained by Danner *et al.*, (1980) and Perry and Cecava (1995). In beef cattle the inclusion of either 15 or 30% grape by – products, tended to reduce live weight gain at the higher level and to reduce killing – out percentage (Hadjipanayiotou and Louca, 1976). The use of grape by – products seems to be useful for sheep, as higher levels of inclusion proved adequate for moderate production (Reyne and Garambois 1977 and Larwence *et al.* 1984). Negouanovic *et al.*, (1993) mentioned that average daily growth of lambs was similar with control and complete diets containing 15% (of DM) dehydrated seedless grape marc, while were 5.5 and 28.5% less than control when diets contained 25and 50% grape marc, respectively.

Table 3: Average values of weights, gains and feed efficiency of goat kids fed the experimental rations.

Item	Experimental rations				±SE	
	R1	R2	R3	R4		
No. of animals	7	7	7	7		
Exper. Period, d	98	98	98	98		
Initial BW, kg	15.65	15.51	15.89	16.00	0.25	NS
Final BW, kg	26.40 ^{a}	26.00 ^{a}	24.86 ^{b}	24.72 ^{b}	0.37	**
Total gain, kg	10.71 ^{a}	10.49 ^{a}	8.97 ^{b}	8.74 ^{b}	0.26	**
Average daily gain (g)	109 ^{a}	107 ^{a}	92 ^{b}	89 ^{b}	2.77	**
Daily DM intake (g)	936 ^{a}	938 ^{a}	859 ^{b}	8.41 ^{b}	3.53	**
Average of BW, kg	21.04	20.76	20.37	20.37	0.29	NS
Total DM intake, kg	91.7 ^{a}	91.91 ^{a}	84.21 ^{b}	82.46 ^{b}	1.33	**
Total DMI/BW, %	4.36 ^{b}	4.43 ^{a}	4.13 ^{c}	4.05 ^{d}	0.02	**
Feed efficiency:						
Kg DM/KG gain	8.56 ^{b}	8.77 ^{ab}	9.49 ^{a}	9.49 ^{b}	0.27	*
Kg TDN/kg gain	5.89	6.01	6.38 ^{a}	6.23 ^{a}	0.18	NS
Kg DCP/kg gain	0.984	1.001	1.020 ^{a}	0.983 ^{a}	0.03	NS
Relative growth rate: -						
Gain/IBW, %	68.43 ^{a}	67.72 ^{a}	56.59 ^{b}	54.65 ^{b}	1.97	**
Gain/Final BW, %	40.61 ^{a}	40.35 ^{c}	36.01 ^{b}	35.26 ^{b}	0.81	**
Gain/IBW + FBW), %	25.48 ^{a}	25.28 ^{a}	22.00 ^{b}	21.43 ^{b}	0.60	**

Dissimilar superscripts (a, b, c and d) at the same row are significantly differ (P<0.01).

Digestibility Coefficients:

Apparent OM, CP, EE and ADF digestibility coefficients decreased (P<0.01) with increasing grape marc levels, while NDF and ADL, digestibility coefficients were increased with increasing grape marc levels in rations (Table 4). The lowering of OM digestibility of grape marc increased may be attributed to the high tannin content and low crude protein solubility. (Larwence *et al.*, 1986).

Similar results were reported on sheep by Aguilera 1987, who reported that digestibility of grape marc by – products is reduced by the presence of tannins as well as N – lignocellulose links. Also, Larwence *et al.*, 1984, attributed the low organic matter digestibility of grape by – products to the N content of grape by – products which is just enough to cover rumen microflora requirements. Thus supplementation with a source of available N is expected to cause significant increases in the organic matters digestibility as observed by Laurence and Berthe (1981) and Larwence and Yahiaoui (1983).

Table 4: Apparent digestibility and nutritive values of the experimental rations by goat kids during metabolism trial.

Item	Experimental rations				±SE	
	R1	R2	R3	R4		
IBW, kg	27,13[a]	26,53 [ab]	26,13 [b]	24,20 [c]	0.28	**
Daily voluntary feed Intake (g/h/d)	970[a]	930 [ab]	900 [b]	852 [b]	25.7	*
Apparent Digestibility %						
DM	71.77 [a]	71.77 [a]	67.23 [b]	66.30 [b]	0.56	**
OM	73.66 [a]	73.66 [a]	70.06 [b]	66.43 [c]	0.43	**
CP	71.97 [a]	71.97 [a]	67.35 [b]	65.15 [c]	0.50	**
CF	72.49 [a]	72.49 [a]	69.86 [b]	67.08 [c]	0.40	**
EE	72.05 [a]	72.05 [a]	70.18 [b]	67.99 [c]	0.52	**
NFE	70.71 [a]	70.71 [a]	68.49[b]	67.27 [c]	0.32	**
NDF	45.53 [a]	45.53 [b]	46.97[ab]	47.90 [a]	0.49	**
ADF	58.57 [a]	58.57 [a]	47.53 [c]	47.33 [c]	0.24	**
ADL	28.40 [a]	28.40 [a]	34.0 7 [b]	36.13 [a]	0.22	**
Feeding values%						
TDN	68.86 [a]	68.52 [a]	67.18 [b]	65.65 [a]	0.24	**
DCP	11.52 [a]	11.42 [a]	10.73 [b]	10.36 [a]	0.08	**

Dissimilar superscripts (a, b, c and d) at the same row are significantly differ (P<0.01).

Results in Table (4) showed that TDN and DCP of control and R2 rations, were of higher values (P<0.01) than R3 and R4 rations, which can attributed to both the high degree of lignification and deficit of soluble N accompanied the increased GM in ration. Also, Aboaysha *et al.*, (1982) found that the high EE content decreased the ration digestibility, while Van Soest (1982) indicated that increased levels of ADL decrease the ration digestibility.

Fegeros and Kalaissakis (1987) showed that diet digestibility coefficients of OM, EE and CF increased when GM was included at 10% level compared with control, but those of CF and CP were decreased when GM was included at 20% or above. They added that EE digestibility increased to 86% when GM was included at 20%.

Feed Efficiency:

Kids of control and R2 recorded higher (P<0.05) feed efficiency expressed as DM/kg gain than R3 and R4, whereas feed efficiency expressed as TDN and DCP/kg gain were not differed significantly (Table 3).

15, 25 and 50% (of DM) dehydrated seedless grape marc. In contrary, inclusion of grape marc at 15 and 30% in the diet increased feed intake at both levels resulting in poor feed utilization (Hadipanayiotou and Louca, 1976). Mohamed *et al.*, (2000) illustrated that the best feed efficiency was showed with the control group followed by that contained 15% and 30% GM groups, while TDN efficiency showed that the best with lambs fed ration contained 30% GM followed by 15% GM.

Nitrogen Utilization:

As shown in (Table 5); N balance was significantly in lower to control ration (3.94) and that included the lowest level of GM (R2 = 3.42). However, increasing GM level in the ration decreased significantly N - retained in the body but still of positive values (R3 = 3.25 and R4 = 3.16). In this respect, Mohamed et al., (2000) revealed the highest NR (nitrogen retention) were recorded by the control followed in a decreasing order by the diet contained 15% GM then 30% GM groups, respectively.

Ruminal Parameters:

Influence of feeding rations containing grape marc, 3 hr after feeding on pH, NH3 –N and VFA'S concentrations in rumen liquor of kids are presented in Table (6). Significant (P<0.01) higher pH value was obtained for the control ration (R1) followed by (R3), while (R2 and R4) recorded the lowest values. On the other hand, the results showed no significant differences among the experimental rations in NH3 – N values. Concerning VFA'S concentration, significant (P<0.01) higher VFA'S value was recorded for R4 (100% GM.), with no significant differences among the other groups.

Table 5: Nitrogen utilization of experimental rations by goat kids.

Item	Experimental rations				±SE
	R1	R2	R3	R4	
Nitrogen intake, g/d	24.73[a]	23,73[ab]	22.43[b]	21,71[b]	0.66 **
Fecal nitrogen, g/d	11.16	11.03	11.38	11,93	0.43 NS
Digested nitrogen, g/d	1357[a]	12.71[a]	11.05[b]	9.78[b]	0.37 **
Urinary nitrogen, g/d	9,63[a]	9.29[a]	7.80[b]	6.63[b]	0.43 **
N – balance, g/d	3,94[a]	3.42[ab]	3.25[b]	3.16[b]	0.16 *

Dissimilar superscripts (a, b, c and d) at the same row are significantly differ (P<0.01).

Table 6: Rumen parameters of goat kids fed the experimental rations after 3 hrs.

Item	Experimental rations				±SE
	R1	R2	R3	R4	
PH	6.80^{a}	6.30^{c}	6.57^{b}	6.22^{c}	0.06 **
VFA'S (m.eq /dl)	10.48^{b}	10.13^{b}	10.73^{ab}	10.60^{a}	0.44 **
NH3 – N, (mg /dl)	18.50	18.83	19.93	21.30	0.43 NS

Dissimilar superscripts (a, b, c and d) at the same row are significantly differ (P<0.01).

Blood Parameters:

Data presented in Table (7) showed that, serum total protein of kids fed control and that ration contained 11% GM (R2) had higher (P<0.01) values than those contained 22 or 33% GM (R3 and R4). On the other hand, there was no significant difference among the experimental rations in serum albumin values. Values of total protein, albumin and globulin were in the normal ranges reported by Jiro (1989). On contrary, the present results showed that, creatinine and urea concentrations were affected significantly by the presence of GM in the complete ration. The highest values of creatinine and urea were 1.92 and 22.33 mg/dl, respectively with R4 followed by R3 (1.90 and 20.79 mg/dl) and the lowest values for control group (1.46 and 20.06 mg/dl). Serum urea of R1 also, recorded significant higher differences (P<0.05), while no significant differences among the other experimental groups. Belibasakis *et al.,* 1996 found no significant differences in concentrations of total protein, albumin and urea.

Table 7: Blood parameters of goat kids fed the experimental rations.

Item	Experimental rations				±SE
	R1	R2	R3	R4	
Total protein, g/100ml	8.21^{a}	8.32^{a}	7.92^{b}	7.83^{b}	0.07 **
Albumin g/100ml	3.62	3.62	3.63	3.77	0.15 NS
Globulin g/100ml	4.59^{a}	4.70^{a}	4.28^{ab}	4.03^{b}	0.12 *
Creatinine g/100ml	1.46^{a}	1.52^{b}	1.90^{a}	1.92^{a}	0.04 **
Urea-N g/100ml	20.37^{a}	20.06^{b}	20.79^{b}	22.33^{a}	0.42 *

Dissimilar superscripts (a, b, c and d) at the same row are significantly differ (P<0.01).

Carcass Traits and Edible offal's:

The effect of the tested diets on carcass cuts and dressing percentage of kids are presented in (Table 8). The results show that kids fed on R1 and R2 rations are higher in fasting body weight, hot carcass weight and empty body weight than those fed on R3 or R4 rations. The differences were highly significant (P<0.01).

Dressing percentage expressed as hot carcass with or without offal's based on fasting or empty body weight were estimated as (25.40 and 25.25) for R1 and 19.65 and 19.49) for R2, respectively. This shows that, kids fed

R1 and R2 rations were similar but higher than R3 or R4 groups. The carcass weights were differed among the four rations. Also, the results in (Table 8) indicated that weight of neck was not differed significantly but it was higher in R2 group (0.830 kg) than R1, R3 and R4, being 0.803, 0.733 and 0.740 kg, respectively. The group fed R3 showed the best distribution of muscles between the hinde and fore quarters. It had the heaviest quarter (P<0.01) and the best fore quarter (not significantly).

Table 8: Carcass characteristics of goat kids fed the experimental rations.

Item	Experimental rations				±SE
	R1	R2	R3	R4	
Fasting BW, kg	25.40^a	25.25^a	24.50^b	23.00^c	0.24 **
Hot carcass W, kg HC	11.06^a	10.99^a	10.25^b	9.63^c	0.11 **
HC + Edible offals*, W, kg	11.64^a	11.56^a	10.80^b	10.19^c	0.17 **
Empty BW, kg	19.65^a	19.65^a	18.84^b	17.88^c	0.18 **
Dressing, %:					
HCW/Fasting BW	43.54^a	43.53^a	41.84^b	41.85^b	0.35 **
HCW/Empty BW	56.28^a	56.40^a	54.42^b	53.85^b	0.51 **
HCW+EO/Fasting BW	45.80^a	45.76^a	44.08^b	44.30^b	0.35 **
HCW+EO/Empty BW	59.20^a	59.30^a	57.33^b	57.00^b	0.52 *
Carcass cuts, W, kg:					
Hind quarter, kg	5.58^a	5.41^a	5.58^a	4.90^b	0.13 **
Fore quarter, kg	4.68^a	4.75^a	4.17^b	3.99^b	0.09 **
Neck W, kg	0.803	0.850	0.733	0.740	0.82 NS
Carcass cuts, % from HCW:					
Hind quarter	50.45^b	49.27^b	54.36^a	50.92^b	0.92 *
Fore quarter	42.28	43.17	40.70	41.40	0.95 NS
Neck	7.27	7.56	7.15	7.56	0.33 NS
Carcass cuts, % from HCW+ Edible offal's:					
Hind quarter	47.97^b	46.86^b	51.60^a	48.10^b	0.88 *
Fore quarter	40.20	41.07	38.63	39.11	0.89 NS
Neck	6.91	7.19	6.78	7.27	0.33 NS

Dissimilar superscripts (a, b, c and d) at the same row are significantly differ (P<0.01).
*** Edible offal's = liver + kidney + heart**

The analysis of carcasses data indicated that ribs weight and meat weight of ribs of control and R2 were significantly more than weights of R3 and R4 groups but without significant differences in-between each both (Table 10).

Meat ratio either to fat or bone was noticeably decreased in R4 group compared to other groups (P<0.01). Out of that no clear differences noticed among groups. This group had the highest carcass cuts % from HCW + Edible offal's (EO) than control group (43.54%) or R2 (43.53%). In this respect, (Hadjipanayiotou and Louca (1976) pointed that the dressed carcass weight and killing – out percentages of calves fed rations contained 30% GM tended to be lower than those fed other rations (control and 15% GM). Negovanovic *et al.*, (1993) pointed that, there were no significant differences in carcass quality between groups fed complete diets contained 0, 15, 25 and 50% GM Monterola *et al.*, (1997) mentioned that, carcass characteristics affected where, carcass yield (0%> 10% or 15% GM) dorsai fat (0% > 10% >15% GM) and eye muscle area (0% > 10% or 15% GM).

Organs:

Differences among most organs and edible offal's as shown in (Table 9) there was no significant differences among all of these parameters, except, percentages of edible offal's based on HCW or HCW + E0 where kids fed R2 had the highest (P<0.01) values. Also, empty digestion tract, spleen, lung, kidney fat and total intestinal fat values were not significantly differed, while weights of internal fat and Omental fat of kids fed R1 and R2 had highest (P<0.5) and (P<0.01) values, respectively, as a result of feeding the tested ration.

Table 9: Offal's weight and percentages of goat kids carcasses.

Item	Experimental rations				±SE
	R1	R2	R3	R4	
Organs, W, kg	4.13	4.15	4.06	4.00	0.08 NS
Head	1.848	1.845	1.750	1.788	0.04 NS
Pelt	1.523	1.545	1.508	1.408	0.05 NS
Feet	0.755	0.758	0.788	0.800	0.03 NS
[1] Organs, % from EBW	20.99	21.29	21.49	22.35	0.45 NS
Edible offal's, W, (g)	573	564	548	564	11.78 NS
Liver, W, (g)	289	286	279	293	6.17 NS
Kidneys, W, (g)	79	79	70	75	2.40 NS
Heart (g)	205	199	199	196	6.13 NS
[2] Edible offal's, %	5.18 ^{b}	513 ^{b}	5.35 ^{b}	5.86 ^{a}	0.13 **
[3] Edible offal's, %	4.93 ^{b}	4.88 ^{b}	5.08 ^{b}	5.54 ^{a}	0.12 **
Other offal's weight:					
Full digestive tract, kg	7.80 ^{a}	7.80 ^{a}	7.65 ^{a}	7.13 ^{b}	0.16 *
Empty digestive tract, kg	2.05	2.05	1.99	2.00	0.04 NS
Spleen	58	55	53	56	3.29 NS
Lungs	308	299	296	285	8.37 NS
Internal fat, W, (g)	1260 ^{a}	1210 ^{a}	1090 ^{ab}	10.28 ^{b}	54.71 *
Kidneys fat, (g)	285	298	278	256	12.87 NS
Omental, (g)	975 ^{a}	913 ^{ab}	813 ^{b}	773 ^{b}	48.37 **
[4] Total internal fat, %	11.40	11.03	10.65	10.67	0.57 NS
[5] Total internal fat, %	10.34	10.45	10.12	10.09	0.54 NS

1- Organs, W, kg (Head + Feet and Pelt) at the same row are significantly differ (P<0.01).
2 - Edible offal's, % (liver + kidney + heart) / HCW.
3- Edible offal's, % (liver + kidney + heart) / HCW + EO
4 – Internal fat (Kidneys fat + Omental fat).
5 – Total fat, % (Internal fat / HCW).

Carcass Quality and Chemical Composition of Meat:

The effect of tested rations on carcass quality and chemical composition of *longismus dorsi (LD)* muscle of the experimental animals are summarized in (Table 10). The results show that the higher weight of ribs sample and *LD* was in kids fed on R2 ration, being 668 g than control, R3 or R4 rations (653, 548 and 573 g), respectively. The highest value of lean meat % of ribs sample was in kids fed on R1and R2, but the highest value of fat % ribs sample was in kids fed on R4, while the highest value of bone % of ribs sample was recorded for kids fed on R4. Negovanovic *et al.*, (1993) and Taie *et al.*, (1998) they mentioned that dressing percentage and dissectible fat both as weight increase with increasing level of energy, while bone percentage in carcass decrease of sheep.

Table 10: Carcass quality and chemical composition of the eye muscle (*Longsmus dorssi* (LD) of slaughtered kids.

Item	Experimental rations				±SE
	R1	R2	R3	R4	
Ribs sample, (9,10, 11)	653 ^{a}	668 ^{a}	548 ^{b}	573 ^{b}	22.5 **
Meat, W, (g)	414 ^{a}	414 ^{a}	338 ^{b}	315 ^{b}	11.83 **
Fat W, (g)	101	108	101	95	6.84 NS
Bone W, (g)	138	136	137	138	9.35 NS
Meat % of ribs sample	63.61 ^{a}	62.06 ^{a}	61.61 ^{a}	55.04 ^{b}	1.28 **
Fat % of ribs sample	15.44 ^{b}	17.64 ^{b}	17.32 ^{b}	15.44 ^{a}	0.72 **
Bone % of ribs sample	20.95	20.31	20.57	24.06	0.99 NS
Meat: Fat ratio	4.18 ^{a}	3.53 ^{a}	3.59 ^{a}	2.65 ^{b}	0.22 **
Meat: Bone ratio	3.08 ^{a}	3.10 ^{a}	3.03 ^{a}	2.25 ^{b}	0.21 *
Boneless meat	79.05	79.19	78.93	75.95	1.0 NS
Coefficient of meat	3.81	3.99	3.87	3.16	0.23 NS
Kg carcass / cm LD [1]	2.58 ^{b}	2.51 ^{c}	2.70 ^{a}	2.70 ^{a}	0.01 **
Kg carcass / cm LD [2]	2.72 ^{b}	2.64 ^{a}	2.04 ^{a}	2.86 ^{a}	0.01 **
g Internal fat / cm ^{2} LD	294	277	287	287	14.99 NS
Chemical composition:					
Moisture	75.39 ^{b}	75.58 ^{b}	76.60 ^{a}	75.32 ^{b}	0.13 **
CP%	81.48 ^{a}	81.45 ^{a}	81.28 ^{a}	80.67 ^{b}	0.12 **
EE%	16.07 ^{a}	16.05 ^{a}	15.61 ^{a}	15.10 ^{b}	0.17 **
Ash%	2.44 ^{b}	2.51 ^{b}	3.73 ^{a}	3.62 ^{a}	0.18 **
Eye muscle cm ^{2}	4.28 ^{a}	4.38 ^{a}	3.80 ^{b}	3.57 ^{c}	0.05 **

Dissimilar superscripts (a, b, c and d) at the same row are significantly differ ($P<0.01$).

1 - kg carcass / cm ^{2} LD (HCW/ Eye muscle cm ^{2}).

2 - kg carcass / cm ^{2} LD (HCW + EO/ Eye muscle cm ^{2}).

Kg carcass / cm^2 LD or kg carcass / cm^2 LD were highly significantly ($P<0.01$) lower in ribs sample of kids fed on control ration tan those of kids fed on complete ration containing 11 to 33% GM., while the differences among the experimental treatment in gm internal fat/cm2 LD was not significant.

Monterola *et al.*, (1997) mentioned that, carcass characteristics were affected significantly, carcass yield; (0%> 10% and 15% GM; dorsal fat 0% > 10% >15% GM. and eye muscle area (0% > 10% and 15% GM.

The protein percentage on DM basis was significantly (P<0.01) lower in lean meat of kids fed on R4 ration than those of kids on control, R2 or R3 rations. Also, the EE% on DM basis was significantly (P<0.01) lower in meat of kids fed on R4 ration than meat of kids fed on control or R2 and R3 rations. Negovanovict *et al.*, (1993) and Taie (1997) whom reported that sheep fed high protein diets had more lean and less fat percentage.

Eye muscle area was highly significantly (P<0.01) lower in ribs sample of kids fed on R4 (3.57) than of ribs sample of kids fed on control, R2 or R3 rations (4.28, 4.38 and 3.80 cm2).

Economic Efficiency:

Calculation in (Table 11) show that though addition of GM reduced daily gain and corresponding determined (L.E.) measurements, it succeeded to reduce feed cost / kg gain from L.E. 4.708 with control group to L.E. 4.530, 4.584 and 4.266 L.E. / kg gain as feeding cost per unit decreased significantly by replacing hay with GM.

Table 11: Economic efficiency of goat kids fed the experimental rations.

Item	Experimental rations				±SE
	R1	R2	R3	R4	
Economic Evaluation:					
Daily feed cost (L.E.)	0.515[d]	0.484[c]	0.415[b]	0.378[a]	0.16 **
Price of daily gain (L.E.)	1.199[d]	1.177[c]	1.012[b]	0.979[a]	0.31 **
Feed cost (L.E.)/kg gain	4.708[c]	4.530[b]	4.584[b]	4.266[a]	0.14 NS
* Economic efficiency	2.328[a]	2.432[a]	2.439[b]	2.590[c]	0.22 *

Dissimilar superscripts (a, b, c and d) at the same row are significantly differ (P<0.01).
- Based on free market prices of feed ingredients, 2002, the cost of complete ration (CR) containing 11% grape marc (GM), CR containing 22% GM and CR containing 33% GM, being, 550, 516.5, 483 and 449.5 (L.E.), /ton, respectively and the price of one kg body weight on selling, 11.0 (L.E.).
*** Economic efficiency = a ratio between price of wt. gain and costs of feed consumed.**

However, observing economical efficiency estimates show that ration free of GM was the best followed by that obtained 11% GM, with non significant differences in-between, the ration R4 had significantly the lowest L.E. (4.266) followed by R3 (4.584). A trend evident for calves fed on diets contained 15% GM had detected by (Hadjipanayiotou and Louca (1976) who mentioned that the economic feasibility of using grape marc by – products in ruminant feeds depends of course on price relationship with other sources of ingredients and in particular, corn grain and clover hay. Same trend was observed by Alicate (1989) and Mohamed *et al.*, (2000) who illustrated also that the total feed cost for each kg gain in live weight was found to be the highest with control group, followed in decreasing order by the lambs fed 15% GM and those fed 30% GM group, respectively.

Accordingly, as replacing hay with GM did not show any considerable improvement in all parameters studied for metabolism and carcass traits and awarding to the economic evaluation, it could be suggested to replace 11% of clover hay with grape marc whereas similar situation to the present study.

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استخدام تفل العنب فى تكوين علائق لجداء الماعز النامية

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استخدم فى هذة الدراسة ٢٨ رأس من جداء الماعز البلدى عمر ٦ شهور و متوسط وزن حـى ١٥,٧٧ كجم لمدة ٩٨ يوما حيث وزعت الحيوانات عشوائيا على أساس وزن الجسـم الحـى الـى أربعـة مجموعات تجريبية و غذيت على عليقة متكاملة على هيئة مكعبات تحتـوى علـى صـفر & ١١ & ٢٢ & ٣٣% (على أساس المادة الجافة%) تفل عنب جاف بدلا من دريس البرسيم. غذيت الحيوانات فرديا الى حـد الشبع. أشارت النتائج الى أن وجود تفل العنب فى علائق الجداء النامية يقلل متوسط النمو اليـومى و معـدل التحويل الغذائى و لكن الأختلافات لم تكن معنوية. ان التغذية على علائق تحتوى ٢٢ &٣٣% تفل عنب تقل معنويا (١%) معاملات هضمها الظاهرى و النيتروجين المحتجز ويقلل معنويا (١%) نسبة التصـافى بينمـا كانت الجداء التى غذيت على عليقة تحتوى ١١% تفل عنب أفضل منهما. لوحظ أن أجزاء الذبيحـة كانـت أعلى فى نسبة اللحم الأحمر و نسبة الدهن لحيوانات مجموعة المقارنة و العلائق المحتوية على ١١% تفـل عنب عن الجداء التى غذيت على علائق تحتوى ٢٢ & ٣٣% تفل عنب. أظهر التركيب انكيمـاوى للحـم الأحمر للضلع التاسع و العاشر و الحادى عشر أن نسبة البروتين و المستخلص الأثيرى (على أساس المـادة الجافة) كانت أقل بصورة معنوية (١%) فى لحوم الجداء التى غذيت على العلائق التى تحتوى على ٣٣ % تفل عنب عن الجداء التى غذيت على عليقة المقارنة أو التى تحتوى علائقها على ١١ &٢٢% تفـل عنـب على التوالى. من هذة الدراسة يمكن أن نستنتج أنة يمكن استخدام تفل العنب الجاف فى العلائـق المتكاملـة بواقع ١١% (من المادة الجافة) بدلا من دريس البرسيم لتحسين القيمة الغذائية للغـذاء المـأكول و معـاملات الهضم و الكفاءة الغذائية و تصافى الذبائح وخواص ذبائح ذكور جداء الماعز النامية.