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RESPONSE TO PARTIAL REPLACEMENT OF YELLOW CORN IN RAHMANI LAMBS RATIONS WITH GROUND DATE SEEDS ON GROWTH RATE, DIGESTION COEFFICIENTS, RUMEN FERMENTATION AND CARCASS TRAITS.

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ABSTRACT

A total of 24 male Rahmani lambs (24.33 ± 0.34 kg body weight) were used in this study that lasted for 126 days. The aim was to investigate the effects of partial substitution of yellow corn (YC) in the daily ration by ground date seeds (DS) at zero (control), 25 or 50% levels. Lambs were randomly allotted into 3 treatment groups each including 8 lambs.

Results indicated that the control lambs reached higher body weight ($P<0.05$)by the end of the experiment by 9 and 11.9% than lambs fed on 25 or 50% DS diets, respectively. Similar trends were observed for average daily gain and relative growth rate. Feed and nutrient intake as DM, TDN or DCP decreased ($P<0.05$)due to DS feeding. However, when feed consumption was expressed as g/w $^{0.75}$ or as %of body weight, there were no significant differences among the groups. Feed conversion (kg DM, TDN or DCP/ kg gain) was the best in the case of control lambs followed by those on 25% DS rations and thereafter those on 50% DS diet. Feeding lambs on DS rations increased ($P<0.05$)water consumption.

Nutrients digestibility of DS rations were lower resulting in lower nutritive values as TDN or DCP compared to the conventional control ration. N balance of lambs and also apparent N utilization (N balance % of N intake) were the highest for the control diet compared to the other rations. Rumen pH and NH3-N decreased ($P<0.05$)while total VFA tended to increase as the level of DS increased in the rations.

Weights of hot carcass and its prime cuts were the heaviest in lambs fed the control ration ($P<0.05$)compared to those fed DS diets with the exception of loin weight which was significantly higher for the 50% DS ration. Dressing % on fasting or empty BW followed similar trend. Kidney, stomach and tail fats and also total internal fat and total fatty tissue were more in the control carcasses compared to the other groups. Weights of liver, kidney, spleen, lungs, testes and total offals decreased with DS feeding, however % offals based on hot carcass weight was similar for all groups.

Weights of 9-10-11th rib section in control carcasses were heavier and contained higher amounts of meat and fat as absolute weights compared to the other groups. However, % meat, fat, bone and boneless meat and also meat : fat ratio in ribs were similar for all groups.

It is concluded that substitution of YC in Rahmani lambs rations by ground DS either at 25 or 50% levels resulted in decreasing nutrient digestibility, negatively affected rumen fermentation and N utilization, growth rate and carcass weight and income decreased.

Keywords: *Date seeds, Rahmani lambs, digestibility, rumen fermentation, growth and carcass characteristics.*

INTRODUCTION

The annual production of dates in Egypt is estimated by 1,113,270 ton (Ministry of Agriculture, 2002). Moreover, it was reported (Nour ***et al.*** ,1986 and El Kassas, 1986) that date pits (seeds) comprise about 10% of fruit weight of some cultivars. Hence, significant amounts of date seeds (about 111,327 ton) can be available annually as a by-product. In contrast, there is a gap between animal needs and the available animal feeds in Egypt. Moreover, yellow corn which is a feed ingredient in most animal rations is mainly imported and expensive. On the other hand, Al-Yousef ***et al.*** (1994) have shown that date pits had a high value of TDN (73.19%). But the high hardness of date seeds limits its use as animal feed unless physical treatments e.g. grounding is applied.

So, this study was conducted to investigate the effects of partial substitution of yellow corn in the daily rations of growing Rahmani lambs by ground date seeds at 25 or 50% levels on growth, nutrient digestibility, rumen fermentation and carcass characteristics.

MATERIALS AND METHODS

This study was carried out at Sheep and Goat Research Unit that belongs to Animal Production Department, National Research Centre, Dokki, Cairo. Twenty-four male Rahmani lambs (24.33 ± 0.34 kg body weight) were divided into 3 similar groups of 8 lambs in each according to live weight and allotted randomly to 3 tested rations (treatments). Tested rations were a control ration (T1) containing yellow corn (YC) and no date seeds (DS) and two other rations in which ground DS substituted YC of the control ration at 25% (T2) or 50% (T3) levels, respectively as to represent 3 levels of DS being zero, 7.5 and 15% of the total rations, respectively (Table 1). All rations were isocaloric –iso nitrogenous and all were containing ground nut hay as a roughage source at 30% of the whole ration. Date seeds were ground before mixing in the tested rations. All ingredients of each ration including the roughage were well mixed and pelleted. Chemical analysis of the feed ingredients and also the calculated nutrient value of the experimental rations are described in Table 2.

Feed was individually offered *ad libtum* two times daily, at 8 a.m. and at 2 p.m. while feed residues were removed and weighed once daily before morning feeding to estimate daily feed intake. Fresh water was freely available all time. Water consumption was measured twice daily , at 8 a.m. and at 2 p.m. . Lamb weights were recorded at the beginning of the experiment and thereafter at biweekly intervals till the end of the experiment after water and feed were withdrawn for 12 h.

At the end of the experiment, 3 lambs out of each group were chosen randomly and used to carry out a digestibility and nitrogen balance trial. Animals were housed in metabolic cages for ten days as a preliminary period followed by a seven days collection period. Feces and urine were quantitatively collected.

On the last day of the digestibility trial, ruminal content samples were taken at 3 hrs post feeding via stomach tube and strained through four layers of cheesecloth. Samples were separated into 2 portions, the first was used for immediate determination of ruminal pH

Table (1) : Feed composition of the experimental rations.

Ingredient, %	Rations		
	Control	25% date seeds	50% date seeds
Sunflower seed meal	20	20	20
Soyabean meal	5	5	5
Wheat bran	9	9	9
Yellow corn	30	22.5	15
Ground date seeds	0	7.5	15
Sugarcane molasses	3	3	3
limestone	1.5	1.5	1.5
Sodium chloride	1	1	1
Minerals& vit. Mixture*	0.5	0.5	0.5
Ground nut hay	30	30	30

* Vitamin and mineral premix contained per kilogram: vit A, 2,000,000 IU; vit D_3 15000 IU; vit E 8.33 g; vit B_1 0.32 g; vit B_6 1.7 mg; vit B_{12} 1.0 g; vit K 0.033 mg; pantothinic acid 3.33g; biotin 33 mg; folic acid 0.83 mg; choline chloride 200 mg; Mg 66.7g; Ca 0.5 g; Se 16.6 mg; Zn 11.7 g and Fe 12.5 g.

Table (2) : Nutrients composition and calculated gross energy (GE*) of ingredients and experimental rations.

Item	DM, %	Nutrients%, on DM basis						GE, MJ /Kg DM
		OM	Ash	CP	CF	EE	NFE	
Yellow corn	83.99	98.49	1.51	8.14	2.61	1.33	86.41	18.18
Date seed	91.01	95.99	4.01	7.84	13.76	2.88	71.51	18.24
Ration 1	87.74	92.59	7.41	14.19	14.04	2.41	61.95	17.85
Ration 2	88.36	92.40	7.60	14.16	14.81	2.83	57.90	17.44
Ration 3	88.91	92.21	7.79	14.14	15.71	3.24	56.78	17.58

* Calculated according to MAFF (1975), using the following equation: GE, MJ/ Kg DM= 0.0226 CP+0.0407 EE+0.0192 CF+0.0177 NFE.

using digital pH-meter and ammonia-nitrogen (NH3 N) according to AOAC (1996) while the 2nd portion was stored at –20°C after adding few drops of toluene and a thin layer of paraffin oil till analyzed for total VFA according to Warner (1964).

At the end of the experiment, the remainder 5 lambs in each group, which were not used in the metabolism trial, were fasted (only feed was removed) for 18 hrs before slaughtering according to the Islamic method to obtain carcass information. The 9-10-11th rib section was removed from both sides of each carcass and was physically evaluated while the eye muscle (*Longimissimius dorsi*) was chemically analyzed. Feed, feces, urine and meat were analyzed according to AOAC (1996) methods.

Data were subjected to statistical analysis using SAS (1998) for personal computers while differences among means were tested using Duncan (1955).

RESULTS AND DISCUSSION

Growth performance

Growth performance of lambs fed rations with different levels of date seeds (DS) is given in Table 3 while feed intake (DM) during the trial (in 2 weeks intervals) is illustrated in figure 1. Initial body weights were similar for all lamb groups but at the end of the experiment, lambs fed the control ration were heavier ($P<0.05$)by 9 and 11.9 % over those fed the rations containing date seeds to substitute yellow corn (YC) at 25 or 50% levels, respectively. On the other hand, lambs fed on 25% DS ration showed a slightly higher final weights (2.6%) relative to those received 50% DS diet. Similar trends were observed for total weight gain , daily gain and relative growth rate of lambs as % of initial weights. Lambs received 25 or 50% DS rations consumed less feed DM by 6.9 and 9.1% ($p<0.05$), respectively compared to the control lambs. Nutrient intake expressed as TDN or DCP followed similar trend. However, the daily feed consumption (DM) was almost similar for all groups, when expressed as g / kg $BW^{0.75}$ or as % of BW. Differences in DM intake as % of body weight between the control lambs and those on 25 or 50% DS rations were 0.9 and 2%, respectively. Furthermore, figure (1) showed that differences in feed intake (DM) between the control and experimental (DS) groups were observed at the early period of the trial which might indicate that lower performance of DS groups could be at least in part the result of low feed intake (because of the bad palatability of DS). With this respect, Al-Yousef *et al.* (1994) reported that date pits has a laxative effect and low palatability so can not be fed alone to animals. In contrast, Sabbah *et al.* (1997) found no significant differences in concentrate mixture intake of cows due to replacing half of the corn by ground DS. Also, Sayeda *et al.* (1999) found no significant differences in the intake of concentrate in Friesian calves due to substitution of corn with DS. Similar findings were also reported with sheep fed 41% DS replacing concentrate mixture (Mohamed and Salman, 1985). In accordance with the present results, Sayda *et al.* (1999) found a slight insignificant decrease in ADG of Friesian calves due to replacing half or all the corn of the concentrate mixture by DS.

Feed conversion of the control lambs as kg DM, TDN or DCP/kg gain was the best followed by those fed on 25 or 50% DS rations, respectively. Differences in DM conversion between the control lambs ($p< 0.05$) and those on 25 or 50% DS rations were 8.3 % and 10.9%, respectively. The corresponding

Table (3) : Performance of growing Rahmani lambs fed rations containing different levels of date seeds.

Item	Treatments		
	Control	25 % date seeds	50 % date seeds
Initial body weight, kg	$24.4^{a}\pm0.58$	$24.3^{a}\pm0.58$	$24.4^{a}\pm0.58$
Final body weight, kg	$52.5^{a}\pm0.69$	$48.2^{b}\pm0.69$	$47.0^{b}\pm0.69$
Total weight gain, kg	$28.2^{a}\pm0.63$	$23.9^{b}\pm0.63$	$22.6^{b}\pm0.63$
Average daily gain, g	$224^{a}\pm5$	$190^{b}\pm5$	$179^{b}\pm5$
Relative growth rate, %[1]	$116.4^{a}\pm4.3$	$99.3^{b}\pm4.3$	$92.9^{b}\pm4.3$
DM intake, g/d	$1750^{a}\pm35$	$1630^{b}\pm35$	$1590^{b}\pm35$
DM intake, g/k $W^{0.75}$	$113.3^{a}\pm1.9$	$110.5^{a}\pm1.9$	$109.0^{a}\pm1.9$
DM intake, % of BW	$4.55^{a}\pm0.08$	$4.51^{a}\pm0.08$	$4.46^{a}\pm0.08$
TDN intake, kg/d	$1.27^{a}\pm0.03$	$1.16^{b}\pm0.03$	$1.12^{b}\pm0.03$
DCP intake, g/d	$173^{a}\pm4$	$154^{b}\pm4$	$148^{b}\pm4$
Feed conversion			
kg DM /kg gain	$7.90^{a}\pm0.26$	$8.61^{ab}\pm0.26$	$8.87^{b}\pm0.26$
kg TDN/kg gain	$5.75^{a}\pm0.19$	$6.10^{a}\pm0.19$	$6.22^{a}\pm0.19$
kg DCP /kg gain	$0.78^{a}\pm0.03$	$0.81^{a}\pm0.03$	$0.83^{a}\pm0.03$
Water intake l/head /d	$4.65^{a}\pm0.09$	$4.93^{b}\pm0.09$	$5.25^{c}\pm0.09$
Water intake l/kg $W^{0.82}$	$0.24^{a}\pm0.005$	$0.26^{b}\pm0.005$	$0.28^{c}\pm0.005$
Drinking water ml/g DMI	$2.66^{a}\pm0.07$	$3.03^{b}\pm0.07$	$3.31^{c}\pm0.07$

Means in the same row with different letters are significantly different ($p<0.05$).
[1](Weight gain / initial body weight) *100

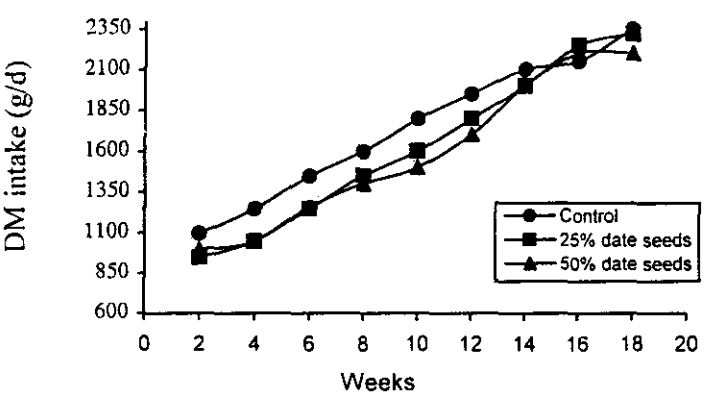

Fig. (1): Feed intake of Rahmani lambs fed rations containing different levels of date seeds

differences in TDN and DCP conversion values ($p< 0.05$) were 5.7% and 7.6% for TDN and 4.1% and 6.6% for DCP between the same groups. These results are in agreement with those reported by Sayeda *et al.* (1999) who found a slight increase in DM conversion of Friesian calves due to replacing half or all the corn of the concentrate mixture by DS.

Daily water consumption of lambs increased significantly ($p< 0.05$) with the increase in DS level in the rations. Moreover, water intake expressed as l / kg $w^{0.82}$ followed a similar trend. Also, drinking water (ml/g DM intake) increased significantly ($p< 0.05$) as the level of DS increased in the rations.

Nutrient digestibility

Nutrient digestibility and nutritive values of experimental rations are given in Table 4. Digestibility values of all nutrients were decreased as the level of DS increased in the rations, compared to the conventional control ration which showed the best digestibility of all nutrients. Differences in nutrients digestibility between the control ration and those of the 25% DS ration ranged from 1.7%(EE) to 4.35%(CP). The corresponding range between the control and the 50% DS rations were from 3.05% (NFE) to 4.63% (CP), significant differences were observed only for OM, CP and NFE digestibility. Nutrient digestibility was lower on the high DS level compared with the low level, slight insignificant differences ranged from 0.27 (CP) to 2.03% (EE). The insignificant decrease in CF digestibility associated DS feeding may be due to the lower pH in the rumen. Al-Yousef *et al.* (1994) found that CP digestibility of DS was so low as to be almost half that recorded for alfalfa hay (36.03 *vs* 70.63%). Also Abo El-Nor *et al.* (1995) reported significant decreases in CP and CF digestibility when 30% of berseem hay was replaced by DS as compared with berseem hay as a sole feed for goats. Moreover, Sabbah *et al.* (1997) also found a decrease in nutrients digestibility of rations fed to cows in which DS substituted YC at 100% level (20% of the concentrate mixture). Sayeda *et al.* (1999) also found insignificantly lower CP and CF digestibility when the rations of Friesian calves included DS as a substitution of YC at 50% level.

Significant decreases were observed in estimated TDN and DCP values of 25 and 50% DS rations compared to the control diet which are mainly attributed to the decrease in digestibility of CP and other nutrients since all rations were iso nitrogenous. Differences in TDN and DCP values between the control ration ($P<0.05$)and those of the 25 and 50% DS rations were 2.78 and 3.85% for TDN and 4.58 and 5.03% for DCP, respectively. The present results are in accordance with those of El-Sayed (1994) who found a decrease in DCP when replaced half of the concentrate mixture in a control ration of sheep by DS. Also Sabbah *et al.* (1997) found that substitution of YC in cows diets with DS at 100% level (20% of the concentrate mixture) decreased TDN and DCP values of the diets. In addition, Sayeda *et al.* (1999) found a slight decrease in TDN of the rations of Friesian calves due to substitution of YC by DS at 50% level while they found a significant decrease in DCP when the level of substitution was 100% (20% of the concentrate mixture).

Nitrogen balance and rumen fermentation

Nitrogen balance and rumen fluid parameters of Rahmani lambs fed rations with different levels of DS are given in Table 5. Daily N intake of lambs fed on 25% or 50% DS rations was lower by

Table (4) : Nutrients digestibility and nutritive values of rations containing different levels of date seeds.

Item	Treatments		
	Control	25 % date seeds	50 % date seeds
Body weight, kg	52.0^{a}±1.0	48.0^{b}±1.0	47.0^{b}±1.0
DM intake, g/d	1820^{a}±36	1630^{b}±36	1580^{b}±36
DM intake, g/k $W^{0.75}$	113.3^{a}±1.9	110.5^{a}±1.9	109.0^{a}±1.9
Digestibility, %			
DM	70.6^{a}±0.55	68.9^{ab}±0.55	67.5^{b}±0.55
OM	70.3^{a}±0.75	68.3^{ab}±0.75	67.5^{b}±0.75
CP	69.1^{a}±0.83	66.2^{b}±0.83	66.1^{b}±0.83
CF	63.2^{a}±0.78	61.7^{a}±0.78	61.0^{a}±0.78
EE	83.2^{a}±0.97	81.8^{a}±0.97	80.2^{a}±0.97
NFE	80.2^{a}±0.60	78.4^{ab}±0.60	77.8^{b}±0.60
Nutritive values			
GE, kcal/ g DM	17.85^{a}±0.55	17.92^{b}±0.55	17.99^{c}±0.55
TDN, %	72.85^{a}±0.42	70.88^{b}±0.42	70.15^{b}±0.42
DCP, %	9.81^{a}±0.12	9.38^{b}±0.12	9.34^{b}±0.12

Means in the same row with different letters are significantly different ($p<0.05$).

Table (5) : Nitrogen balance and rumen fluid parameters of Rahmani lambs fed rations containing different levels of date seeds.

Item	Treatments		
	Control	25 % date seeds	50 % date seeds
N intake, g/d	41.3^{a}±0.75	36.9^{b}±0.75	35.6^{b}±0.75
Fecal N, g/d	12.8^{a}±0.69	12.5^{a}±0.69	12.1^{a}±0.69
Digested N, g/d	28.6^{a}±0.30	24.5^{b}±0.30	23.5^{b}±0.30
Urinary N, g/d	16.4^{a}±32	14.7^{b}±32	14.0^{b}±0.32
N balance, g/d	12.20^{a}±0.28	9.77^{b}±0.28	9.47^{b}±0.28
Apparent N utilization[1]	29.6^{a}±1.1	26.5^{a}±1.1	26.6^{a}±1.1
Rumen fluid parameters			
pH	6.86^{a}±0.12	6.41^{b}±0.12	6.17^{b}±0.12
Ammonia-N, mg/100 ml	19.2^{a}±0.42	16.4^{b}±0.42	14.6^{c}±0.42
Total VFA, meq /100 ml	7.76^{a}±0.19	8.01^{a}±0.19	8.23^{a}±0.19

Means in the same row with different letters are significantly different ($p<0.05$).
[1] (N balance / N intake)

11.9 and 16%, respectively compared to the control lambs which can be attributed mainly to lower feed intake. The corresponding differences in Fecal N between the control lambs and those on 25 or 50% DS rations were relatively smaller being 2.4 and 5.2%, respectively, which resulted in greater differences in daily digested N (P<0.05)in favor of the control lambs (the corresponding differences were 16.7 and 21.5%, respectively). Urinary N followed a similar trend with corresponding differences between the control lambs and those on 25 or 50% DS diets were 11.3 and 16.6%, respectively. The differences in N balance between the control and experimental diets were 24.9 (25% DS) and 28.8 %(50% DS), respectively. Furthermore, values of the apparent N utilization (N balance % of N intake) indicated that lambs can utilize N of the control ration more efficiently by 11.9 and 11.2% than N of rations included 25 or 50% DS, respectively. In agreement with the present results, Abo El-Nor *et al.* (1995) found that goats fed on a diet with 30% DS and 70% berseem hay were in negative balance during the digestion trial compared to goats fed on berseem hay as a sole feed which were in positive N balance.

Rumen pH decreased as the level of DS increased in the rations (Table 5). Differences between the control lambs (P<0.05)and those on 25 or 50% DS rations in rumen pH were 7 and 11.2%, respectively. Rumen NH3 N concentration decreased (P<0.05)while concentration of total VFA tended to increase as the level of DS increased in the rations. The lower ruminal pH associated DS feeding was partially a result of higher concentration of total VFA. Moreover, the decrease in rumen NH3 N due to DS feeding may indicate low ruminal activity, which was reflected on lower digestibility. Also it may be due to the low digestible protein content of DS (Al-Yousef *et al.,* 1994). However, the ruminal pH on DS rations was not so low (not below 6) to inhibit the activity of cellulolytic bacteria as reported by Hungate, (1966) and Meherez *et al.* (1983). With this respect, Kholif *et al.* (1996) reported significant decreases in rumen pH with DS inclusion in goat rations.

Carcass characteristics

Carcass characteristics of slaughtered Rahmani lambs fed different levels of DS are given in Table 6. Hot carcasses of the control lambs were heavier by 14.1 and 16.8% than those of lambs fed on 25 or 50% DS diets, respectively. This may be related to the heavier body weights of the control lambs. Omar and Houria (1994) and Houria *et al.* (1995) found that carcass weight was increased with body size. Dressing % of the control lambs, expressed as hot carcass without edible organs as % of fasting or empty BW were higher (p <0.05) than those of lambs fed the 25 or 50% DS diets. This may be due to higher TDN value of the control ration. Taie *et al.* (1998) found that increasing energy content of sheep ration improved dressing percentage.

Although, hot carcasses of lambs on 25 or 50% DS diets were smaller in weights than those of the control lambs, loin and brisket + flank weights of lambs on 25 or 50% DS diets were heavier as absolute weights by 3.3 (not significant) and 11.9% (P<0.05)for loin and 33.5 and 22.6% (P<0.05) for brisket + flank, respectively than those of the control. On the other hand, weights of shoulder, hind legs, rack and neck of the control lambs were heavier (P <0.05) than those of lambs on 25 or 50% DS diets. Weights of prime cuts of the control carcasses were heavier (P<0.05)by 18.5 and 22.1% than those of

Table (6) : Carcass characteristics of slaughtered Rahmani lambs fed rations containing different levels of date seeds.

Item	Treatments		
	Control	25 % date seeds	50 % date seeds
No, of animals	5	5	5
Fasting BW, kg	$52.4^{a}\pm1.09$	$48.0^{b}\pm1.09$	$47.0^{b}\pm1.09$
Empty BW, kg	$45.8^{a}\pm1.14$	$41.4^{b}\pm1.14$	$40.4^{b}\pm1.14$
Hot carcass, kg *	$24.1^{a}\pm0.48$	$21.1^{b}\pm0.48$	$20.7^{b}\pm0.48$
Hot carcass, kg **	$25.5^{a}\pm0.49$	$22.4^{b}\pm0.49$	$21.8^{b}\pm0.49$
Dressing, % [1]	$46.0^{a}\pm0.09$	$44.0^{b}\pm0.09$	$44.0^{b}\pm0.09$
Dressing, % [2]	$52.6^{a}\pm0.33$	$51.2^{b}\pm0.33$	$51.2^{b}\pm0.33$
Dressing, % [3]	$48.6^{a}\pm0.11$	$46.7^{b}\pm0.11$	$46.4^{b}\pm0.11$
Dressing, % [4]	$55.6^{a}\pm0.39$	$54.2^{b}\pm0.39$	$54.1^{b}\pm0.39$
Shoulder, kg	$5.48^{a}\pm0.11$	$4.58^{b}\pm0.11$	$4.33^{b}\pm0.11$
Hind legs, kg	$7.83^{a}\pm0.14$	$6.17^{b}\pm0.14$	$5.91^{b}\pm0.14$
Loin, kg	$1.64^{a}\pm0.04$	$1.69^{a}\pm0.04$	$1.83^{b}\pm0.04$
Rack, kg	$5.09^{a}\pm0.10$	$4.46^{b}\pm0.10$	$4.34^{b}\pm0.10$
Neck, kg	$2.35^{a}\pm0.06$	$1.93^{b}\pm0.06$	$2.11^{b}\pm0.06$
Brisket & Flank, kg	$1.74^{a}\pm0.11$	$2.32^{b}\pm0.11$	$2.13^{b}\pm0.11$
Prime cuts, kg	$20.0^{a}\pm0.39$	$16.9^{b}\pm0.39$	$16.4^{b}\pm0.39$
Prime cuts, %	$83.1^{a}\pm0.12$	$79.9^{b}\pm0.12$	$79.4^{c}\pm0.12$
Kidney fat, g	$78.0^{a}\pm3.00$	$66.0^{b}\pm3.00$	$63.0^{b}\pm3.00$
Stomach fat, g	$89.0^{a}\pm3.00$	$71.0^{b}\pm3.00$	$67.0^{b}\pm3.00$
Tail fat, kg	$3.24^{a}\pm0.12$	$2.82^{b}\pm0.12$	$2.78^{b}\pm0.12$
Tail fat, %	$13.4^{a}\pm0.28$	$13.3^{a}\pm0.28$	$13.4^{a}\pm0.28$
Total internal fat, g	$167^{a}\pm6.0$	$137^{b}\pm6.0$	$130^{b}\pm6.0$
Total internal fat, %	$0.69^{a}\pm0.30$	$0.65^{a}\pm0.30$	$0.63^{a}\pm0.30$
Total fatty tissue, kg	$3.41^{a}\pm0.12$	$2.96^{b}\pm0.12$	$2.91^{b}\pm0.12$
Total fatty tissue, %	$14.1^{a}\pm0.27$	$14.0^{a}\pm0.27$	$14.1^{a}\pm0.27$

Means in the same row with different letters are significantly different ($p<0.05$).
*Without edible organs.
**With edible organs.
[1] (Hot carcass weight/fasting body weight) *100
[2] (Hot carcass weight/empty body weight) *100
[3] (Hot carcass weight with edible organs /fasting body weight) *100
[4] (Hot carcass weight with edible organs/empty body weight) *100

lambs fed on 25 or 50 % DS rations, respectively with the exception of loin weight which was significantly higher on the 50% DS ration. Such increase in prime cuts weights of the control carcasses was mainly due to greater slaughter weights compared to the 25 and 50% DS groups. Moreover, % prime cuts on hot carcass weight followed the same trend but with relatively smaller differences (insignificant) between the control and those of 25 and 50% DS diets being 3.9 and 4.6%, respectively.

Fat weights of kidney, stomach and tail of the control carcasses were higher ($p < 0.05$) than those of carcasses of lambs on 25 or 50% DS diets. Similar trends were observed for total internal fat or total fatty tissue. The higher fat weights in carcasses of the control group compared to those fed DS was related mainly to their larger weights since when fat were expressed as % of hot carcass weight, no significant differences were found among groups in tail fat, total internal fat, or total fatty tissue but there was a tendency for a decrease in total internal fat with the increase of DS level in the rations.

Weight of offals of slaughtered Rahmani lambs as affected by DS inclusion in the rations are presented in Table 7. Blood weight of slaughtered lambs fed on 25 or 50 % DS diets was lower ($P<0.05$)than those of lambs on the control diet. This was due to lower weights of DS fed groups. Weights of pelt, 4 legs and full and empty digestive tract tended to decrease due to DS feeding compared to the control. Heart weight was not affected by treatment. In contrast, weights of liver, kidneys, spleen, lungs and testes were decreased due to DS inclusion in lamb diets either at 25 or 50% level. The decrease of total offals weight was mainly due to the lower weights of DS fed groups since % offals on hot carcass weight was similar for all groups.

Results of physical evaluation of ribs and chemical analysis of eye muscle are given in Table 8. Weight of 9-10-11th rib section of the control carcasses was higher by ($P<0.05$)10.3 and 13.5% compared to those of lambs fed on 25 or 50% DS diets, respectively. The same trend was observed for meat and fat weights of the ribs, however bone weight of the ribs, % of meat, fat, bone, boneless meat and ratio of meat: fat in ribs were similar for all groups. On the contrary, ratio of meat : bone in ribs and also coefficient of meat tended to decrease with DS inclusion in the diets either at 25 or 50% levels. However, in lighter animals the ratio of bone is higher, so it is not sure that the lower meat: bone ratio is purely due to DS feeding. Meat, fat and bone% in the present study was close to those reported by Awadalla *et al.* (1997) for Rahmani lambs fed on Egyptian clover hay in addition to a concentrate feed mixture.

The chemical analysis of the eye muscle indicated that moisture and CP content were similar for the control and 25% DS fed groups meanwhile, moisture content decreased and CP content increased ($P<0.05$)due to 50% DS feeding. EE content increased ($P<0.05$)while ash content tended to decrease with DS feeding. However, when chemical analysis was calculated from fresh to dry matter basis, the only consistent difference was in the EE content of the meat of 25% DS group and not in the CP or ash contents.

Economic evaluation (Table 9) indicated that substitution of YC in lamb rations by DS decreased feed cost but without compensating the poor growth rate. So the income from lambs fed on 25 or 50% DS rations was only 82.4 and

Spleen, g	76^{a}±3	68^{ab}±3	67^{b}±3
Lungs, g	934^{a}±21	796^{b}±21	760^{b}±21
Testes, g	222^{a}±7	196^{b}±7	196^{b}±7
Offals, gm	2268^{a}±45	2055^{b}±45	1926^{b}±45
Offals, %*	9.40^{a}±0.20	9.74^{a}±0.20	9.33^{a}±0.20

Means in the same row with different letters are significantly different ($p<0.05$).
* (Offals weight / hot carcass weight)* 100

Table (8) : Physical evaluation of 9-10-11th rib section and chemical analysis of eye muscle of slaughtered Rahmani lambs fed rations containing different levels of date seeds.

Item	Treatments		
	Control	25 % date seeds	50 % date seeds
No of animals	5	5	5
Ribs, g	1180^{a}±35	1070^{b}±35	1040^{b}±35
Ribs meat, g	648^{a}±24	572^{b}±24	562^{b}±24
Ribs meat, %	54.9^{a}±0.81	53.5^{a}±0.81	54.0^{a}±0.81
Ribs fat, g	306^{a}±10	279^{ab}±10	262^{b}±10
Ribs fat, %	25.9^{a}±0.14	26.1^{a}±0.14	25.2^{b}±0.14
Ribs bone, g	226^{a}±9	219^{a}±9	214^{a}±9
Ribs bone, %	19.2^{a}±0.85	20.5^{a}±0.85	20.7^{a}±0.85
Boneless meat, %[1]	80.8^{a}±0.76	79.5^{a}±0.76	79.2^{a}±0.76
Meat: Fat ratio	2.12^{a}±0.04	2.06^{a}±0.04	2.14^{a}±0.04
Meat: bone ratio	2.86^{a}±0.18	2.61^{a}±0.18	2.69^{a}±0.18
Coefficient of meat [2]	4.22^{a}±0.24	3.89^{a}±0.24	2.93^{a}±0.24
Chemical analysis of eye muscle			
On fresh basis			
Moisture, %	75.96^{a}±0.36	75.64^{ab}±0.36	74.60^{b}±0.36
DM, %	24.04^{a}±0.36	24.36^{a}±0.36	25.40^{b}±0.36
CP, %	19.46^{a}±0.23	19.26^{a}±0.23	20.54^{b}±0.23
EE, %	3.35^{a}±0.14	3.79^{b}±0.14	3.73^{ab}±0.14
Ash, %	1.19^{a}±0.13	1.11^{a}±0.13	1.13^{a}±0.13
On dry matter basis			
CP, %	81.00^{a}±0.55	79.73^{a}±0.55	80.87^{a}±0.55
EE, %	14.09^{a}±0.23	15.70^{b}±0.23	14.68^{a}±0.23
Ash, %	4.89^{a}±0.48	4.57^{a}±0.48	4.43^{a}±0.48

Means in the same row with different letters are significantly different ($p<0.05$).
[1] (Meat weight + fat weight / ribs weight)* 100
[2] (Meat weight + fat weight / bone weight)

Table (9) : Economic efficiency of partial substitution of yellow corn by date seeds in the rations of Rahmani lambs.

Item	Treatments		
	Control	25% date seeds	50% date seeds
No of lambs	8	8	8
Initial body weight, kg	24.4	24.3	24.4
Final body weight, kg	52.5	48.2	47.0
Total weight gain/ lamb, kg	28.2	23.9	22.6
Total DM intake/ lamb, kg[1]	220.5	205.4	200.4
Total feed cost/ lamb, L.E.[2]	113.8	100.4	89.9
Price of weight gain/lamb, L.E.[3]	282	239	226
Income/ lamb, L.E.[4]	168.2	138.6	136.1
Relative economic efficiency[5]	100	82.4	80.9

[1] During the 126 days experimental period.
[2] On the basis of prices (L.E. / ton DM) of 571.5 for yellow corn, 219.8 for ground date seed, 516.3 for the control ration, 489 for 25% DS ration and 448.8 for 50% DS ration.
[3] Selling price was 10 L.E. for kg body weight.
[4] Price of total weight gain – total feed cost.
[5] Assuming that economic efficiency of the control equals 100.

80.9% of that of lambs fed the control ration.

CONCLUSIONS

It is concluded that substitution of YC in Rahmani lambs rations by ground DS either at 25 or 50% levels resulted in decreasing nutrient digestibility, negatively affected rumen fermentation and N utilization which was reflected on poor growth rate and smaller carcasses. Although, such substitution decreased feed cost by 13.4 and 26.65%, respectively it can not compensate the poor growth and so income from lambs decreased to 82.4 and 80.9% of that of lambs fed the control ration.

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الاستجابة للإحلال الجزئى للذرة الصفراء فى علائق الحملان الرحمانى بنوى البلح المطحون على معدلات النمو، معاملات الهضم، تخمرات الكرش، وخصائص الذبيحة.

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استخدم فى هذه الدراسة والتى استمرت لمدة ١٢٦ يوما عدد ٢٤ من ذكور الحملان الرحمانى (متوسط وزن٢٤,٣٣± ٠,٣٤كجم). قسمت الحيوانات إلى ثلاث مجا ميع متساوية و متماثلة تبعا للوزن حيث وزعت عشوائيا على ثلاثة علائق تجريبية هى :(١) عليقه المقارنة واحتوت على الذرة الصفراء بدون أى استخدام لنوى البلح المجروش . عليقه (٢) حيث تم استبدال ٢٥ % من الذرة الصفراء لعليقه المقارنة بنوى البلح المجروش. عليقه (٣) حيث تم استبدال ٥٠ % من الذرة الصفراء لعليقه المقارنة بنوى البلح المجروش.

وقد أوضحت النتائج أن حملان مجموعة المقارنة كانت أثقل وزنا عند نهاية التجربة ( ) بمقدار ٩، ١١% و أعلى فى معدل النمو اليومى مقارنة بالمجاميع التى احتوت علائقها على ٢٥ أو ٥٠% نوى بلح على التوالى. وقد صحب استخدام نوى البلح بالعلائق إلى خفض المستهلك اليومى من الغذاء سواء كمادة جافة أو مجموع المركبات الكلية المهضومة أو بروتين مهضوم ولكن عند التعبير عن المادة الجافة المستهلكة كنسبة مئوية من وزن الجسم لم يكن هناك فروق معنوية بين المجاميع. وقد سجلت حملان المقارنة أحسن كفاءة تحويلية للغذاء. وقد ازدادت كمية مياه الشرب بزيادة نسبة نوى البلح فى العلائق.

وقد أوضحت النتائج أيضا أن معاملات هضم للعلائق المحتوية على نوى البلح المجروش كانت اقل معنويا عن عليقه المقارنة. وكان الميزان اليومى من الأزوت وكذلك نسبة الانتفاع بالأزوت كنسبة من المأكول أعلاها عند التغذية على عليقة المقارنة. وانخفض pH الكرش وكذلك تركيز الأمونيا بسائل الكرش بينما مال تركيز مجمل الأحماض الدهنية الطيارة للارتفاع مع زيادة نسبة نوى البلح بالعليقة.

وقد كان أعلى وزن للذبيحة وأعلى نسبة تصافى وأعلى نسبة للقطعيات الممتازة بالذبيحة هى لحملان مجموعة المقارنة. وكذلك كانت أوزان دهن الكلى، والمعدة والليةة، والدهن الداخلى الكلى، والنسيج الدهنى الكلى للذبيحة أعلاها فى حالة التغذية على عليقه المقارنة.انخفضت أوزان كل من الكبد، والكلى، والطحال، والرئتين، والخصيتين وكذلك الأسقاط الكلية بالتغذية على نوى البلح.ولكن النسبة المئوية للأسقاط كنسبة من وزن الذبيحة لم يختلف معنويا بين المجاميع.

وقد أوضحت النتائج أيضا أن وزن قطعية الضلوع ٩، ١٠، ١١ للذبيحة كانت أثقل وبها كمية أثقل من اللحم والدهن كوزن مطلق فى حالة ذبائح حملان عليقه المقارنة مقارنة ببافى المجاميع. ولكن النسبة المئوية لوزن اللحم والدهن كنسبة مئوية من الضلوع وكذلك نسبة اللحم : الدهن بالضلوع لم تختلف معنويا بين المجاميع. وقد أشار التحليل الكيماوى للعضلة العينية إلى ارتفاع المحتوى البروتيني ($p<0.05$) عند التغذية على مستوى ٥٠% نوى بلح بالعلائق. وأشار أيضا إلى زيادة المحتوى الدهنى بالتغذية على نوى البلح ($p<0.05$).

من هذه النتائج يمكن استخلاص استبدال الذرة الصفراء فى علائق الحملان الرحمانى بنوى البلح المجروش بنسبة ٢٥ أو ٥٠ % قد أدى الى خفض معاملات الهضم وأثر سلبيا على تخمرات الكرش مما انعكس على انخفاض فى النمو ووزن الذبائح. ورغم أن هذا الاستبدال قد أدى إلى خفض تكلفة التغذية ولكنه لم يعوض انخفاض النمو مما انعكس عل خفض الربح النهائى الى مايعادل ٨٢,٤ و ٨٠,٩ % على التوالى مقارنة بعليقة المقارنة المحتوية على ذرة صفراء فقط.