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PARTIAL SUBSTITUTION OF DISCARDED DATES FOR CORN AND BARLEY IN DIETS FOR GROWING CAMELS (*Camelus dromedarious*)

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ABSTRACT

Sixteen male Maghraby camels (*Camelus dromedarious)* averaged 172 ± 3.4 kg body weight and of about 15 months old were used in a 126-day growth trial to study the effect of partial substitution of discarded dried dates for yellow corn and barley in their diets at 0% (diet 1, control), 13% (diet 2), 26% (diet3) and 39% (diet 4), respectively,which represents zero, 25, 50 and 75% from each of yellow corn and barley . At the end of the growth trial, a digestion and N balance trial was carried out using three camels of each group chosen randomly.

Results indicated that average daily gain, (ADG), relative growth rate and dry matter intake (DMI) were almost similar for groups fed diets 1, 2 and 3 being significantly higher than those fed diet 4. Similar trends were observed for DM, OM, EE and NFE digestibilities. Digestibility coefficients of NDF, ADF, hemicellulose, cellulose and ADL significantly decreased with increasing level of discarded dates in the diets . Nutritive value as TDN was similar for diet 1, 2 and 3 being higher ($P< 0.01$) than that of diet 4, while DCP value decreased as the level of discarded date increased in the diets.

Nitrogen intake was almost similar for diets 1, 2 and 3, being higher than that of diet 4. Urinary N of camel group fed diet 2 did not differ than those fed the control diet, while a significant decrease was observed as the level of discarded date increased from 13 up to 39% in the diets. Nitrogen balance as % of intake was similar for camels fed diets 1, 2 and 3, being significantly higher than those fed diet 4.

Feed conversion (kg DM or TDN / kg gain) was the best for diet 2 but differences among all dietary groups were not significant. Feed conversion as g DCP/ kg gain decreased with diet 2 and 3 (insignificant), being the best with diet 4 ($P < 0.01$) compared to the control . Feeding camels on diets containing discarded dates resulted in a reduction ($P<0.01$) in feeding cost for producing one kg body weight gain. Also the economic efficiency improved by increasing level of discarded dates in the diets.

In conclusion, substitution of discarded dates for yellow corn and barley up to 26% in growing camel diets achieved better or similar performance with better economic efficiency compared to the diet containing yellow corn and barley, whereas the level of substitution of 39% reduced animal performance. The low price of discarded dates compared to yellow corn and barley suggests that substitution of discarded dates for corn and barley is considered an economic advantage.

Keywords: Camel, discarded dates, growth, digestion, N utilization and economic efficiency

INTRODUCTION

Recently there was increasing interest of camel as an important source of milk, meat, hides and wool in many African and Asian countries. For future, the role of camel would be increased for its capacity to produce

milk and meat. Indeed, more emphasis laced on using camels for meat production in Egypt and other Arab countries (Shalash, 1979). Little information is available on the growth performance of camels under intensive feeding system. Mohamed *et al.*,(1997) reported that daily gain of male Maghraby camels ranged from 550 to 980 g/d, while, Shawket (1999) found that daily gain of male camels fed different energy sources ranged between 692 to 750 g/d.

Feed is the most important cost item for livestock production. Tayler and Field (1998) reported that feed cost represented 50 to 70% of the total cost of beef cows production. Under intensive and indoor rearing systems, grains, e.g. corn, barley, sorghum and oats, are the primary sources of high energy feed for livestock. Yellow corn and barley grains are the most important sources of carbohydrates for rations of ruminants. Because of the shortage and high price of yellow corn and barley grains, one of alternatives to solve this problem is using non-conventional ingredients as a partial replacement of corn and barley in rations of camels. Dates contain high amounts of sugars, proteins, pectins, vitamins and minerals (Attalla and Harraz, 1996). In addition, significant amounts of discarded dates (which are unsuitable for human consumption) are available in Egypt, which can be utilized as a cheap non-conventional ingredient in ruminants diets. Egypt produced 517063 tons of dried date from upper Egypt and Newly reclaimed lands (Ministry of Agriculture, 2002). Moreover the quantity of discarded dates is estimated by about 20% of all produced dates (AL-Yousef *et al.*,1994 a). This means that about 103412 tons of discarded dates are available annually for animal consumption.

The objective of this study was therefore to assess the value of discarded dried dates as an energy substitute for yellow corn and barley in diets for growing camels.

MATERIALS AND METHODS

This study was carried out at the Camel Research Unit, El-Bostan , El-Nubaria area which belongs to the Animal Production Department, National Research Center. Nubaria area is a new reclaimed land in the western desert of Egypt.

Sixteen growing male Maghraby camels of approximately 15 months old, and 172 ± 3.4 kg live body weight were used in the present study. Camels were purchased from the local Bedwins around the experimental area. Camels were randomely divided into four similar groups (4 in each) according to body weight and age . Each camel was housed individually in a separate semi-opened pen during the period of the experiment which lasted 18 weeks. Each group was fed on one of four isocaloric and isonitrogenus experimental complete feed mixtures.The control ration (diet 1) contained 36% corn and 16% barley grains (0% discarded dates),while the discarded dates replaced 25%, 50% or 75% of each of corn and barley grains of the control diet to form diets 2, 3 and 4, respectively. Such substitution represented 13, 26 and 39% of the whole control diet. Discarded dried dates

were obtained from El-Sahel, Rod-El-Farag, Shoubra and was crushed without any treatment in a desk crucher. Experimental diets were manipulated to be iso – nitrogenous by adding 0.2 , 0.4 and 0.6% urea to the diets containing dried dates. Feed ingredients of the experimental diets were mechanically well mixed and pressed to form complete diets (Factories of Atmida company, Meet Ghamr, Dakhalya Province). Formulation of the experimental diets is shown in Table (1). Experimental diets were offered twice daily at 8.00 a.m. and 2.00 p.m. Camels were fed the experimental diets individually on *ad libitum* basis in separate troughs, while fresh water was freely available all times. Residues (if any) were daily collected, weighed and kept in nylon bags to determine their chemical composition. Daily feed intake was recorded. All camels were weighed biweekly before morning feeding and after removal of water for 12 hrs. At the end of the growth trial, a digestibility and nitrogen balance trial was carried out on three camels of each group chosen randomly, using the special digestion units described by Mohamed *et al.* (2003), to collect feces and urine separately from each camel. The proximate analysis of feeds, feed refusals, feces and total nitrogen in urine were determined according to A.O.A.C methods (1996).

Table (1): Formulation of the experimental diets (as fed).

Ingredient, %	Experimental diets[1]			
	1	2	3	4
Undecorticated cotton seed cake	15	15	15	15
Yellow corn	36	27	18	9
Barley	16	12	8	4
Discarded dried dates (Ddd)	-	13	26	39
Groundnut hay	30	29.8	29.6	29.4
Urea	-	0.2	0.4	0.6
Limestone	1.7	1.7	1.7	1.7
Sodium chloride	1.0	1.0	1.0	1.0
Minerals & Vit. mix. *	0.3	0.3	0.3	0.3

*** Vitamin and mineral premix contained per kilogram: vit A, 2.000.000 IU; vit D_3 15000 IU; vit E 8.339 mg; 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 3.339; biotin 33 mg; folic acid 0.83 mg; choline chloride 200 mg; Mg 66.7 g; Ca 0.59 g; Se 16.6 mg; Zn 11.7 g and Fe 12.5 g.**

[1] Diet 1: The control (zero % Ddd)
Diet 2: Ddd replaced 25 % of each of corn and barley of the control.
Diet 3: Ddd replaced 50 % of each of corn and barley of the control.
Diet 4: Ddd replaced 75 % of each of corn and barley of the control.

The NDF and cell wall constituents were determined according to Georing and Van Soest (1970).

Data were statistically analyzed as one way analysis of variance using the SAS. (1996) Duncan's (1955) test was used to compare the treatment means.

RESULTS AND DISCUSSION

Chemical composition:

The chemical composition and fiber constituents of the feed ingredients and the experimental diets are presented in Table (2). The results

indicated that discarded dried dates had lower content of crude protein (3.62%) as compared with yellow corn or barley grains. This value was higher than that reported by Al-Yosef *et al.* (1994a) who found that CP of discarded dates was 2.39%. On the other hand discarded dates had nearly similar value of GE compared to yellow corn or barley grains, being slightly higher for the grains. The data (Table 2) showed that all experimental diets were similar in crude protein, ether extract and nitrogen free extract contents and also GE value. However, crude fiber content increased with increasing level of discarded dates in the diets, due to the lower content of CF in yellow corn compared to discarded dates. Therefore, decreasing the percentage of yellow corn in the diets was associated with increasing CF.

Table (2): Chemical composition and fiber constituents of tested ingredients and the experimental diets fed to growing camels.

Item	Tested ingredients			Experimental diets			
	Discarded dried dates	Yellow corn	Barley grains	1	2	3	4
DM, %	86.37	86.18	87.64	91.40	89.96	88.53	88.06
Composition on DM basis (%)							
OM	95.31	97.84	96.12	93.01	93.11	93.17	93.12
CP	3.62	8.05	10.19	12.95	12.91	12.87	12.71
CF	5.86	2.47	6.12	12.74	13.44	14.15	14.74
EE	2.26	1.86	3.81	2.98	3.09	3.21	3.13
NFE	83.57	85.46	76.00	64.34	63.67	62.94	62.54
Ash	4.69	2.16	3.88	6.99	6.89	6.83	6.88
Fiber constituents, %							
NDF	29.10	9.3	24.34	50.11	52.12	54.15	56.17
ADF	13.25	2.1	9.50	31.60	32.81	34.00	35.26
Hemicellulose[1]	15.85	7.2	14.85	18.51	19.31	20.15	20.91
Cellulose[2]	9.15	1.7	6.65	20.20	21.04	21.96	22.81
ADL	4.10	0.4	2.85	11.40	11.77	12.04	12.45
GE[3], MJ/kg	17.65	18.17	18.48	18.49	18.03	18.07	18.05

[1] NDF- ADF
[2] ADF - ADL
[3] Gross energy concentration (MJ/Kg DM), calculated according to MAFF (1975) using the following e quation: G E M J/Kg D M: 0 .0226 C P + 0 .0407 E E + 0 .0192 C F + 0 .0177 N FE. Where CP, EE, CF and NFE are presented as g/Kg DM.

Data indicated higher NDF, ADF and cellulose with moderate level of ADL in discarded dates than yellow corn or barley. The fiber constituents of the experimental diets in Table (2) indicated that all cell wall constituents increased linearly with increasing the level of dates in the diets. Contents of NDF ranged between 50.11 to 56.17% in the tested diets indicating that these diets were of good quality (concentration of NDF less than 60% should not affect intake or digestibility of feeds, Van Soest, 1964).

Growth performance:

Effect of experimental diets on growth performance and feed intake are presented in Table (3), while the development of body weight for camels in experimental groups with advancing feeding period is illustrated in Fig. 1.

Initial body weight was similar for all camel groups, but at the end of the experiment, camels fed diets 1, 2 and 3 showed almost similar weights being higher ($P< 0.01$) than camels fed diet 4. Camels fed on diets 1, 2 and 3 gained more weight than those fed on diet 4 by about 20 %. Similar trends were observed for daily gain and relative growth rate.

The results of total gain and average daily gain indicated that diets containing moderate amounts from discarded dates (26%) could induce higher average daily gain in camels compared to the diet of traditional concentrate (yellow corn and barley). Similar results were reported by El-Gasim *et al.* (1986) who fed sheep on rations containing 0, 20 and 30% of dates and Al-Ani *et al.* (1991) who found that daily gain of Awassi sheep was the highest with rations containing 15 or 30% dried date pulp (in place of barely) than the control ration or a ration containing 45% dried date pulp.

Table (3): Body weight changes and voluntary feed intake of growing camels fed the experimental diets.

Item	Experimental diets				± SE
	1	2	3	4	
No. of animals	4	4	4	4	
Experimental period, week	18	18	18	18	
Initial body weight, Kg	172	172	173	170	6.89NS
Final body weight, Kg	298^{a}	301^{a}	303^{a}	278^{b}	7.74*
Total gain, Kg	126^{a}	129^{a}	130^{a}	108^{b}	5.91*
Average daily gain, Kg	1.000^{ab}	1.024^{a}	1.032^{a}	0.857^{b}	0.05*
Relative growth rate %[1]	73.25^{a}	75.00^{a}	75.14^{a}	63.53^{b}	4.17**
Mean daily DM intake, kg/h	6.81^{a}	6.90^{a}	7.09^{a}	5.96^{b}	0.17**
DM intake, % of BW	2.90^{a}	2.92^{a}	2.98^{a}	2.66^{b}	0.03**
DM intake, g/Kg $w^{0.75}$	114^{ab}	114^{ab}	117^{a}	108^{b}	1.03*
TDN intake, Kg/h/d.	4.93^{a}	4.98^{a}	5.18^{a}	3.89^{b}	0.12**
TDN intake, g/kg $w^{0.75}$/ d	80.8^{a}	82.4^{a}	83.4^{a}	70.7^{b}	0.73**
DCP intake, Kg/h/d	0.66^{a}	0.63^{a}	0.63^{a}	0.46^{b}	0.02**
DCP intake, g/kg $w^{0.75}$ /d	10.91^{a}	10.45^{a}	10.47^{a}	7.79^{b}	0.05**

a,b,c, means with different superscripts in the same row are significantly different.
NS: Not significant *: ($P < 0.05$) **: ($P < 0.01$)
[1] **(Weight gain / initial body weight) × 100**

The decrease in daily gain noticed with feeding diet 4 (0.857 kg). may be due to the low intake from this diet . The present results agree with the findings of Al-Yousef *et al.* (1994b), who found that sheep rations containing a moderate amount of discarded dates (25%) increased body weight and daily gain compared to other groups fed rations containing 0, 15 or 35% dates. They also found that sheep fed ration containing 35% dates replacing barley recorded the lowest daily gain. The reduction ($P < 0.05$) observed in

live weight gain of camels fed the 39% dates in diet 4 may also be related to the high content of ADF and ADL (Table 2) which caused a significant reduction in OM digestibility and N retention (Tables 4 and 5).

However, El-Hag and El Khanjari (1992) reported that Zebu dairy cattle fed diet containing 40% dates instead of barley recorded high dry matter intake, high daily gain and better feed conversion compared with the control .The high values of daily gain for camel in the present study may be due to the high feed consumption. These results agree with those reported by Degen *et al.* (1987) and Faye *et al.* (1992) who found that diets of young camels which contain a concentrate mixture led to increased daily gain. Daily gain of camels observed in this study ranged from 0.857 to 1.032 kg which was higher than those reported by Mohamed *et al.*. (1997) who found that average daily gain of male Maghraby camels fed rations containing olive pulp and grape by product ranged from 0 .550 to 0.980 kg and Shawket (1999) who found that daily gain of camel calves fed different level of fresh saltbush ranged from 0.692 to 0.750 kg. These differences may be due to the effect of the differing in ingredients in the experimental rations.

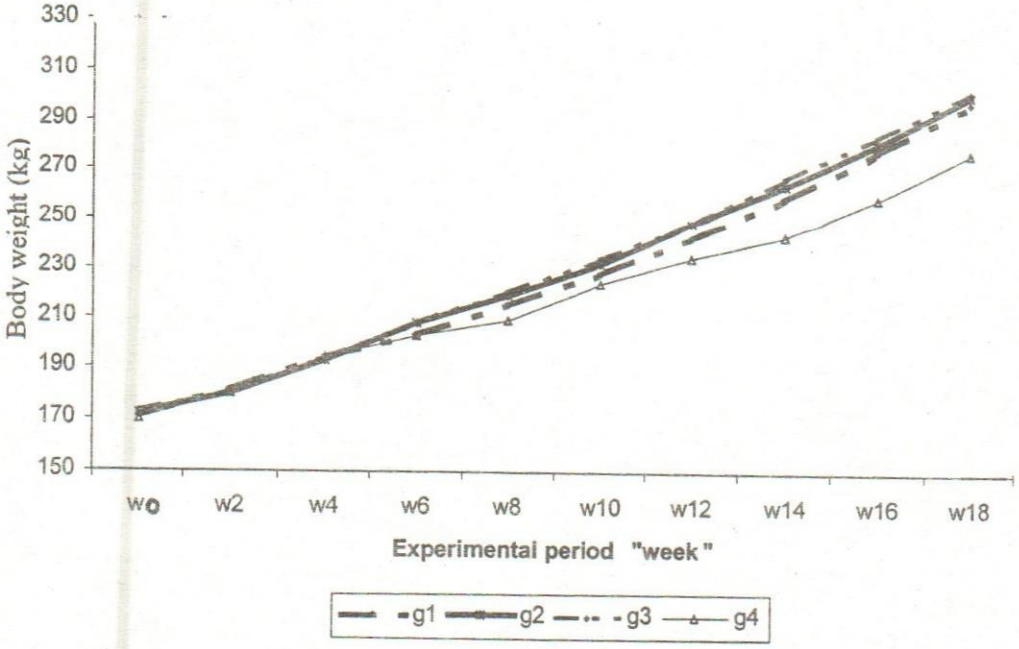

Fig. (1) Development of body weight for camel fed experimental diets.

There were no significant differences in DM intake as % of BW among groups fed diets 1, 2 and 3, being higher ($p< 0.01$) than those fed diet 4. Similar trend was also found with the TDN and DCP intakes, supporting that diets 2 and 3 were better than the other diets. The values of daily gain in the present study indicated a positive relation between body weight gain and dry matter intake as a percentage of body weight. Similar results were obtained by Bahgat, (1992) who found that male dromedarious camels raised for meat production and kept under a semi-intensive system of nutritional managament consumed a total DM intake equivalent to 2.5% of their body weight. Also, Shawket (1999) found in a growth study that camels ate 2.47, 2.23 and 2.10% of live body weight and there was a positive relation between body weight gain and DM intake.

Nutrients digestibility coefficients:

Nutrient digestibility coefficients and nutritive values of the experimental diets are presented in Table (4). The DM and OM of diet 4 were less digested ($P < 0.01$) than those of the other three diets being similar. On the other hand, increasing the level of dates in the diets had no significant effect on CF digestibility.

The apparent digestibility of CP significantly decreased with inclusion of dates at 13 and 26% levels, being appreciably depressed with the 39% level. The difference between the control (diet 1) and diet 4 in CP digestibility was about 14%. On the other hand, EE digestibility was similar for diets 1, 2 and 3, being significantly decreased with diet 4. The present results are in agreement with those reported by Al – Yousef *et al.* (1994 b) for nutrient digestibility by sheep fed 0, 15, 25 and 35% discarded dates replacing barley. The NDF, ADF, hemicellulose, cellulose and ADL digestibility coefficients significantly decreased as the level of discarded dates increased in the diets. Differences reached significant values with diets 3 and 4, compared to the other diets. This may be due to the high concentration of ADL of diets 3 and 4. This depression in digestibility coefficients could be due to the decrease in ruminal fiber digestion that may occur with increasing level of dates and ADF contents in diets 2, 3 and 4 compared to the control which resulted in an increase in rate of passage of digesta from the rumen (Bull *et al.* 1979).

Furthermore, the high level of sugar in dates (Attalla and Harraz, 1996) may cause a reduction in rumen pH and hence negatively affect fiber digestion. The present results are similar to those obtained by Al-Ani *et al.* (1991) who reported lower ($P<0.01$) digestibility coefficients of DM, OM, NDF and ADF by lambs at 30 and 45% levels of dried date pulp compared to the control.

The TDN values of the experimental diets were similar for diets 1, 2 and 3, being decreased ($P < 0.01$) with diet 4. The DCP values significantly decreased with the increase of level of discarded dates in the diets.

Table (4) : Nutrient digestibility coefficients and feeding values of experimental diets fed to growing camels.

Item	Experimental diets				± SE
	1	2	3	4	
No. of animals	3	3	3	3	-
Mean body weight, Kg.	300[a]	309a	301a	262[b]	6.25**
Daily DM intake, g.	8083[a]	8417a	8150a	6567[b]	163**
DMI / MBW(Kg/Kg)	2.69[a]	2.71a	2.73a	2.51[b]	0.01**
Nutrient digestibility, %					
DM	73.24[a]	74.13[a]	75.81[a]	62.79[b]	1.24**
OM	73.56[a]	73.48[a]	74.86[a]	58.48[b]	1.37**
CP	74.21[a]	71.72[b]	69.53[b]	60.72[c]	0.97**
CF	62.68	62.38	61.77	60.72	0.58NS
EE	70.94[a]	72.98[a]	73.82[a]	68.98[b]	0.86**
NFE	77.75[a]	77.64[a]	79.62[a]	70.70[b]	0.73**
Fiber fraction digestibility,%					
NDF	64.88[a]	65.92[a]	62.18[ab]	57.55[b]	1.43*
ADF	64.61[a]	61.88[a]	59.53[ab]	53.55[b]	2.29*
Hemicellulose	68.50[a]	67.73[a]	69.18[a]	60.75[b]	1.20**
Cellulose	69.26[a]	67.18[a]	70.59[a]	62.18[b]	1.29**
ADL	34.20[a]	32.90[a]	30.10[ab]	28.14[b]	1.21**
Feeding values (on DM),%					
TDN	72.38[a]	72.16[a]	73.13[a]	65.34[b]	0.52**
DCP	9.61[a]	9.13[b]	8.95[b]	7.64[c]	0.12**

a,b,c, means with different superscripts in the same row are significantly different .

NS : Not significant * : (P < 0.05) ** : (P < 0.01)

The depression of all nutrients digestibility coefficient of diet 4 (39% dates + 0.6 % urea) and hence TDN and DCP values may be due to the effect of the high concentration of readily fermentable date sugar (Attalla and Harraz, 1996) that is fast fermented in the rumen and hence depress rumen pH which in turn negatively affect digestion. Hungate (1966) found that increasing sugar or starch lead to a reduction in the rumen pH, which is accompanied by a shift in the rumen microbial populations from cellulolytic to amylolytic bacteria (Mould and Ørskov, 1984). Although urea is utilized better with the presence of readily fermentable energy source e.g. date sugar because the faster degradation of urea into ammonia can be coupled by the faster fermentation of date sugar, this may be not sufficient to compensate for the negative effect of the high concentration of dates (sugars) on rumen pH and digestion particularly with the low level of urea (0.6%) used in diet 4.

Nitrogen balance:

Data on N intake and its excretion and retention (Table 5) showed similar N intake for diets 1, 2 and 3 with significantly lower value for diet 4 as a reflection of DM intake. However, fecal N increased significantly with the three diets containing discarded dates compared to the control (diet 1). This may be due to the laxative effect reported by Al-Yousef *et al* .(1994b) for

dates . Furthermore, diet 1 recorded the highest (P<0.01) value for CP digestibility. Urinary N was similar for diets 1 and 2 being significantly decreased as the level of date increased in diets 3 and 4, which may indicate a balanced absorbed amino acids from discarded date diets. Furthermore, the availability of date sugar i.e. fast fermentable carbohydrate in diets 3 and 4 can couple the fast degradation of urea in these diets. Hence the produced ammonia can be efficiently used in building microbial protein rather than absorption form rumen wall. So, the level of urinary N was not increased. All camels were in positive nitrogen balance being similar for diets 1, 2 and 3 and significantly decreased with diet 4. Camels fed diet 4 retained lower N by 35% than those in diets 1, 2 and 3. Nitrogen balance as percentage of NI did not differ significantly among diet 1, 2 and 3 but decreased (P<0.01) with diet 4. This may be a reflection to the higher CP digestibility in diets 1, 2 and 3 compared to diet 4. In accordance with the present results, Mohsen *et al.*, (1999) reported that increasing level of urea in diets of growing goats to 0.4 % level resulted in decreasing (P < 0.01) NB as % of N intake. Nitrogen balance obtained in this study were close to that reported by Yacout and El-Badawi (2001) who found that N balance of camels fed diet containing 12% CP was 71.4 g/d.

Table (5): Nitrogen utilization by camel fed the experimental diets

Item	Experimental diets				± SE
	1	2	3	4	
Nitrogen intake (NI) g/d	168^{a}	174^{a}	168^{a}	133^{b}	3.46**
Fecal nitrogen (FN), g/d	44^{b}	51^{a}	51^{a}	52^{a}	1.18**
Urinary nitrogen (UN), g/d	48^{a}	47^{a}	40^{b}	31^{c}	0.71**
Nitrogen balance (NB) g/d	76^{a}	76^{a}	77^{a}	50^{b}	2.15**
N excretion (FN+UN)	92^{ab}	98^{a}	91^{ab}	83^{b}	1.70**
NB/NI, %	45.24^{a}	43.68^{a}	45.83^{a}	37.59^{b}	1.01**

a,b,c, means with different superscripts in the same row are significantly different .
* : (P < 0.05) ** : (P < 0.01)

Feed conversion and economic evaluation:

Results of feed conversion and feed economic evaluation are presented in Table (6). Feed conversion as kg DM intake/kg gain was the worst with camels fed diet 4 (6.95kg DMI/kg gain), while it was nearly similar for the other three groups. This is mainly due to the lower ADG recorded for group 4. However, when feed conversion was expressed as kg TDN/kg gain or g DCP/kg gain, the best values were observed for camels on diet 4. This may be due to the lower content of TDN and DCP in diet 4 (Table 4). Similar results were reported by Al-Yousef *et al.* (1994b) who replaced discarded dates in place of barley at 15, 25 and 30% levels in rations of Awassi sheep and Al-Ani *et al.*, (1999) who fed Awassi lambs on dried date pulp instead of barley at 15, 30 and 45% levels. The average feed conversion as kg DMI/kg gain found in this study (6.84) was better than that recorded for male camel calves by Shawket (1999) and El-Badawi and yacout (1999).

Table (6):Feed conversion and economic evaluation of growing camels fed the experimental diets .

Item	Experimental diets				± SE
	1	2	3	4	
Feed conversion					
Kg DM/Kg gain	6.81	6.73	6.87	6.95	0.37NS
Kg TDN/Kg gain	4.95	4.86	5.02	4.54	0.25NS
g DCP/Kg gain	654^{a}	614^{ab}	616^{ab}	531^{b}	29.6*
Economic evaluation					
Daily feed cost (L.E)[1]	4.57^{a}	4.26^{b}	3.97^{c}	2.96^{d}	0.09**
Price of daily gain (L.E)[2]	7.00^{a}	7.17^{a}	7.22^{a}	6.00^{b}	0.17**
Feed cost (L.E.) / kg gain[3]	4.57^{a}	4.16^{a}	3.85^{b}	3.45^{c}	0.09**
Economic efficiency (E.E.)[4]	1.53^{c}	1.68^{b}	1.82^{ab}	2.03^{a}	0.05**
Improved of E.E.[5]	100c	110^{bc}	$119^{a.b}$	133^{a}	5.91**

a,b,c,d means with different superscripts in the same row are significantly different .
NS : Not significant * : (P < 0.05) ** : (P < 0.01)
[1] Price of dietary ingredient (L.E) X the amount consumed / d, on the basis of prices (LE /ton DM) of 796 for yellow corn, 776 for barley, 289 for discarded dates, 671 for diet 1 (Control), 617 for diet 2, 560 for diet 3 and 497 for diet 4.
[2] Daily gain, Kg X selling price (7.0 L.E for Kg live body weight).
[3] Daily feed cost / daily gain, Kg.
[4] Price of daily live weight gain / daily feed cost.
[5] Assuming that economic efficiency of the control equals 100.

Concerning the economic evaluation, data in Table (6) indicated that the daily feed cost (L.E) was significantly (P<0.01) reduced as the level of discarded dates increased. The highest feed cost/kg gain was recorded for the control group (4.57 L.E). The highest economic efficiency was recorded for camels fed diet 4 , while the lowest was recorded for camels fed diet 1 (control). The economic efficiency was improved by 10, 19 and 33 % for diets 2,3 and 4, respectively compared to the control.

In conclusion, substitution of discarded dates for corn and barley up to 26% in diets of growing male Maghraby camels resulted in better or similar performance, whereas substitution of these dates at 39% level reduced camel performance. The low price of discarded dates compared with corn or barley suggests that partial substitution of discarded dates for corn or barely would help in increasing economic returns.

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الإحلال الجزئى للتمور المستبعدة بدلا من الذرة والشعير فى علائق الجمال النامية (وحيدة السنام)

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استخدم فى هذه الدراسة عدد ٢٦ جمل مغربى وحيد السنام بمتوسط وزن ١٧٢ ± ٣,٤ كجم وعمر حوالى ١٥ شهر فى تجربة نمو استمرت لمدة ١٢٦ يوم لدراسة تأثير الإحلال الجزئى للتمور الجافة المستبعدة بديلا عن الذرة والشعير فى العلائق التجريبية وكانت نسبة الإحلال الكلية فى العلائق هى صفر % (عليقة المقارنة)، ١٣% (عليقة ٢)، ٢٦% (عليقة ٣)، ٣٩% (عليقة ٤) وذلك يعادل صفر %، ٢٥%، ٥٠% و ٧٥ % على التوالى من كل من الذرة والشعير. عقب انتهاء تجربة النمو تم إجراء تجربة هضم وميزان أزوت باستخدام ثلاث جمال من كل مجموعة اختيرت عشوائيا.

دلت النتائج على أن معدل النمو اليومى، معدل النمو النسبى والمادة الجافة المأكولة كانت متقاربة فى المجاميع المغذاة على العلائق ١، ٢ و ٣ حيث كانت أعلى معنويا عن المجموعة المغذاة على العليقة ٤. لوحظ نفس الاتجاه بالنسبة لمعاملات هضم كل من المادة الجافة، المادة العضوية، الدهن والمستخلص الخالى من الأزوت. انخفضت معنويا معاملات هضم جدر الخلية بزيادة نسبة التمور فى العلائق. تقاربت القيمة الغذائية كمجموع المركبات الغذائية المهضومة فى العلائق ١، ٢ ، ٣ حيث كانت أعلى معنويا عن العليقة ٤.بينما أنخفضت القيمة الغذائية كبروتين مهضوم بزيادة محتوى العلائق من التمور. كان الأزوت المأكول متقارب في العلائق ١، ٢ ، ٣ وأعلى معنويا عن العليقة ٤. لم يختلف أزوت البول للعليقة ٢ عن عليقة المقارنة بينما حدث انخفاض معنوى بارتفاع مستوى التمور بالعلائق من ١٣% إلى ٣٩% (عليقة ٣ ، ٤). تشابه ميزان الأزوت كنسبة مئوية من الأزوت المأكول للمجاميع المغذاة على العلائق ١، ٢ و ٣ حيث كان أعلى معنويا من المجموعة المغذاة على العليقة ٤.

كان معدل التحويل الغذائي على أساس كجم مادة جافة أو كجم مركبات غذائية مهضومة لكل كجم نمو أفضل في المجموعة ٢ عن باقي المجاميع ولكن الفروق بين العلائق لم تكن معنوية بينما تحسن معدل التحويل الغذائى على أساس البروتين المهضوم مع زيادة نسبة التمور بالعلائق حيث كانت العليقة ٤ هى الأفضل بالمقارنة مع عليقة المقارنة.

تغذية الجمال على علائق تحتوى على التمور أدى إلى انخفاض معنوى فى تكاليف التغذية لإنتاج كيلو جرام زيادة فى وزن الجسم وكذلك تحسنت الكفاءة الاقتصادية بارتفاع مستوى التمور فى العلائق.

من هذه النتائج يمكن استخلاص أن إحلال التمور المستبعدة حتى نسبة ٢٦ % من العليقة الكلية وبما يعادل إحلال ٥٠% من كل من الذرة والشعير فى علائق الجمال النامية أدى إلى الحصول على معدل أداء أعلى أو مشابه مع تحسين فى الكفاءة الاقتصادية عن الجمال المغذاة على عليقة المقارنة المحتوية على الذرة والشعير بينما أدى معدل الإحلال بنسبة ٣٩% (٧٥% من كل من الذرة والشعير) إلى انخفاض معدل أداء الجمال. انخفاض سعر التمور المستبعدة يعزز إمكانية استخدامها كمصدر للطاقة بديل عن الذرة والشعير فى علائق الجمال النامية.