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FEEDLOT PERFORMANCE AND CARCASS TRAITS OF GROWING ONE-HUMPED CAMELS FED ON NON-CONVENTIONAL RATIONS.

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ABSTRACT

Fifteen growing male one-humped camels (average body weight 250 kg) were used to study the effect of some non-conventional feedstuffs on their performance and carcass traits. Fresh range plants, *i.e.*, *Atriplex nummularia* (AN) and/ or *Acacia saligna* (AS) and ensiled rice straw (ERS) were used as roughages. Both ground date stones and olive cakes were introduced as concentrate components in the formula of traditional concentrate mixture at the rates of 20 and 10 %, respectively. Camels were divided into five equal groups (3 camels each). The first control group were fed traditional concentrate mixture (TCM) and berseem hay (BH). The second group was fed adjusted concentrate mixture (ACM) and AN, the third group was fed ACM and AS, the fourth group was fed ACM and both AN and AS, while the fifth group was fed ACM and ERS. Average dry matter intake from TCM by control group was significantly higher ($p<0.05$) than the amount consumed from ACM by the other four groups. Daily dry matter intake from roughages differed significantly ($p<0.05$) among the different groups. Average daily gain in camel body weight were 0.828, 0.525 0.719, 0.680 and 0.589, kg/head for the five groups, respectively. Slaughter and empty body weights, hot and chilled carcass weights did not differ significantly among the different camel groups. Results showed that feeding male camels on non-conventional rations of AN, AS, AN-AS and ERS, reduced the feeding costs required to produce one kg body weight gain compared to using the conventional ration. Among the non-conventional rations, *Acacia saligna* was the most efficient in reducing feeding cost.

It was concluded that the use of ACM and edible parts of the halophytic plants in feeding growing camels is economically efficient for meat production under arid and semi-arid conditions.

Keywords: Camel, Growth, carcass traits, n0n-conventional rations.

INTRODUCTION

Camels are physiologically and anatomically well adapted to survive in harsh environmental conditions. The dromedary is an economic feeder, which can uniquely exist in the desert as a producer of meat, milk and other by-products from natural feeding resources that are unusable by any other species. Favorable potentiality of dromedary could be shown through: 1) The extended productive life of almost 25 years revealing 12 calves with 12 lactation seasons of 12 months each. 2) High milk yield of up to 4500 kg or more per season. 3) Carcass weight reaches around 400 kg, dressing percentage ranging from 52 to 77% and lean meat around 66% (Sooud, *et al.*, 1988 and Shawket, 1999a). Camels represent an important source of

income in terms of meat and milk production in arid and semi-arid regions and it is expected to continue this role during 21st century (Gahlot, 1998).

The future prosperity of feed resources in the countries located in the arid and semi-arid regions rely on the economic feasible use of marginal and long-neglected resources such as halophytic plants. Halophytes are promising to have the potentiality of being good animal feed resources (El-Shaer and Ismail, 2002). Feeding halophytes particularly to camels is feasible solution to minimize the problem of feed shortage in arid and semi-arid regions in Egypt, where desert represents 96% of its total area. Halophytes include several fodder and salt tolerant grasses and legumes of high productivity, rapid tender and suitable nutritive value (El-Shaer, 1995). The saltbush *Atriplex nummularia* gives great biomass yield, contains high crude protein and low crude fiber (El-Hyatemy *et al.*, 1987), and tolerates high salinity (Le Houerou, 1992). Also, *Acacia saligna* is ever-green legume shrub that extensively grows in arid and semi-arid zones, it contains high crude protein, high fiber content but has condensed tannins, which decreases the availability of protein (Devendra, 1990 and Ramirez and Lara, 1998).

Because of the limited information and data concerning camels as meat-producing animals in Egypt, this study was carried out to evaluate the utilization of fresh *Atriplex nummularia*, *Acacia saligna,* ground date stones and olive cake as non-conventional feedstuffs in fattening of young male camels, and their influence on growth performance and carcass yield.

MATERIALS AND METHODS

Animals and Management

This study was carried out at Maryout Research Station, 35 km. South of Alexandria, Desert Research Center, Ministry of Agriculture and Land Reclamation, Egypt. Fifteen growing male one-humped camels (*Camelus dromedarius)* aged 10 – 12 months with an average body weight ± S.E. (250.23 ± 3.27kg) were used in this study. Some non-conventional feeds, which are available in the local area, were used instead of conventional feeds for feeding growing camels. The study lasted for 240 days. Camels were divided into five groups equal in number (3 camels each) and similar in average body weight. They were individually housed in closed pens throughout the experimental period. Camels of different groups were randomly assigned to the five experimental rations.

Experimental Feeding

Camels of the first group (control) were fed traditional concentrate mixture (TCM), while the other four groups were fed adjusted concentrate mixture (ACM) by introducing both ground date stones and olive cake (20 and 10 %, respectively) as shown in Table (1). Both concentrate mixtures were offered to camels at level of 125 % of maintenance requirements (Farid *et al,* 1990). In addition to the concentrates, all camels were fed roughages of different sources *ad libitum*. The control group was offered berseem hay (BH), while three other groups were offered fresh *Atriplex nummularia* (AN), *Acacia saligna* (AS), A, *nummularia* along with *A. saligna* (AN-AS, each ration in different container and camels select by free choice), respectively.

Table (1): Feed ingredients of the five experimental rations (% on dry matter basis).

Feed ingredients	Control (BH+TCM)	Experimental Rations			
		AN + ACM	AS + ACM	AN-AS* + ACM	ERS + ACM
Concentrated mixture:					
Soy bean meal (SM)	15	20	20	20	20
Yellow corn (YC)	25	27	27	27	27
Barley grains (BG)	30	18	18	18	18
Olive cake (OC)	-	10	10	10	10
Ground date stones (GDS)	-	20	20	20	20
Wheat bran (WB)	25	-	-	-	-
Molasses	3	3	3	3	3
Lime stone	1	1	1	1	1
Common salt	1	1	1	1	1
Experimental roughages:					
Berseem hay (BH)	+	-	-	-	-
Atriplex nummularia (AN)	-	+	-	+	-
Acacia saligna (AS)	-	-	+	+	-
Ensiled rice straw (TRS)**	-	-	-	-	+

*** AN-AS, Atriplex *nummularia* and *Acacia saligna* were offered separately.**
**** ERS, Ensiled rice straw: with 2.5% urea (44.98% N) and 5% molasses.**
TCM, Traditional concentrate mixture, ACM, Adjusted concentrate mixture

Table (2): Chemical composition of feed ingredients and concentrate feed mixture of the experimental diets.

Feedstuffs	DM%	% on DM basis					
		OM	CP	CF	EE	NFE	Ash
Soybean meal	88.47	93.71	44.60	5.52	4.81	38.78	6.29
Yellow corn	86.29	98.72	6.53	2.35	7.41	82.43	1.28
Barley grain	82.81	97.38	8.79	5.28	2.78	80.53	2.62
Olive cake	89.09	97.09	7.36	34.40	6.46	48.87	2.91
Ground date stones	90.20	98.06	7.12	20.63	8.43	61.88	1.94
Wheat bran	88.83	94.84	13.28	10.47	4.44	66.65	5.16
Berseem hay	87.57	87.77	10.55	30.23	2.36	44.53	12.23
Atriplex nummularia	25.77	78.07	17.06	25.27	2.96	32.78	21.93
Acacia saligna	35.70	92.71	14.88	33.89	2.43	41.51	7.29
Ensiled rice strew	79.32	81.86	8.86	33.63	2.77	36.60	18.14
Chemical composition of concentrate mixture (CM):							
TCM**	89.86	92.30	12.59	4.44	4.00	71.27	7.70
ACM***	86.98	94.55	12.86	10.38	5.21	66.10	5.45

*** Ensiled rice straw with 2.5% urea (44.98% N) and 5% molasses.**
**** Traditional concentrated mixture: 15% soybean meal, 25% yellow corn, 30% barley grains, 25% wheat bran, 3% molasses, 1% lime stone, 1% common salt.**
*****Adjusted concentrate mixture: 20% soybean meal, 27% yellow corn, 18% barley grains, 10% olive cake, 20% ground date stones, 3% molasses, 1% lime stone, 1% common salt.**

The fifth group was offered ensiled rice straw (ERS). Rice straw was treated with 2.5 % urea and ensiled for 25 days. Molasses was added at the rate of 5 % to the silage before feeding. Fresh AN and AS were collected

daily by cutting green leaves and succulent stems and offering them to camels. Amounts of feeds offered and refused were daily recorded to estimate the actual voluntary feed intake of each camel. All camels were individually weighed at the beginning of the experiment then at biweekly intervals. Body weight changes and daily gains were calculated. The amount of allowed concentrates was adjusted according to the changes in camel body weight during the experiment. Animals were allowed fresh water once a day. At the end of growth experiment, nutrient digestibility trials were carried out to determine the digestibility coefficients for rations used in this study.

Slaughter and Carcass Yield

At the end of the experiment, all animals were slaughtered after fasting for 24 hrs. Live fasting body weight was recorded before slaughtering. After bleeding, animals were skinned, eviscerated and dressed. The weight of hot carcass, weight of all internal organs and external offals were recorded immediately for each camel. Weight of contents of the digestive tract was obtained and subtracted from the slaughter weight to determine empty body weight for each camel.

Analytical procedures

Chemical analysis of feeds (fresh *Atriplex nummularia* (AN); fresh *Acacia saligna* (AS); Berseem hay (BH); ensiled rice straw (ERS); soybean meal (SM); yellow corn (YC); barley grains (BG); wheat bran (WB); olive cake (OC) and ground date stones (GDS) were carried out according to the Association of Official Analytical Chemists (A.O.A.C.1980).

Economic Efficiency

Economic efficiency was expressed as the ratio between the price of total live weight gain and the price of feeds consumed. Feedstuffs were estimated on the basis of the following prices in Egyptian pounds (LE) per ton in the year 2002: TCM 850 LE; ACM 750 LE; berseem hay 560 LE; fresh Atriplex 25 LE; fresh Acacia 25 LE and ensiled rice straw 120 LE. The price of one kg of live body weight on selling was 7 LE.

Statistical Analysis

Data of the present experiment were statistically analyzed by one-way analysis of variance according to SAS (1988).
Procedure General Linear Model (GLM) using the following model:

$$Yij = \mu + Ri + Eij$$

Where:

Yij = The observation on the ij^{th} traits,
μ = General mean,
Ri = effect due to the i^{th} rations i=1-5,
Eij = Random error.

Duncan's Multiple Range Test was used to compare the differences among the five treatments.

RESULTS AND DISCUSSION

1- Performance of Camels

a- Feed consumption

Results of feed intake from different rations are illustrated in Table (3).

Table (3): Growth performance, feed intake and feed conversion of growing male camels fed on different types of roughages.(Mean ± SE).

Item	Type of roughage*				
	BH	AN	AS	AN-AS	ERS
No. of animals	3	3	3	3	3
Exp. Period (days)	240	240	240	240	240
Initial Body wt (kg)	252.0^{a}	249.7^{a}	250.5^{a}	250.0^{a}	249.0^{a}
Final Body wt (kg)	450.6^{a}	375.7^{b}	423.1^{ab}	413.2^{ab}	390.4^{b}
Total gain (kg)	198.6^{a}	126.0^{c}	172.6^{abc}	163.2^{b}	141.4^{bc}
Daily gain (g)	828.0^{a}	525.0^{c}	719.0^{ab}	680.0^{b}	589.0^{bc}
Daily feed intake (kg DM/head)					
Concentrate mixture	4.585^{a}	3.072^{b}	3.161^{b}	3.157^{b}	3.485^{b}
Roughages	2.817^{c}	3.544^{b}	3.399^{bc}	4.839^{a}	1.720^{d}
Daily total feed intake:					
Kg DM /head	7.402^{ab}	6.616^{b}	6.500^{b}	7.996^{a}	5.205^{c}
g/kg$^{0.75}$	91.01^{b}	88.95^{b}	82.72^{b}	103.46^{a}	69.05^{c}
Kg TDN /head**	5.808^{a}	4.488^{b}	4.639^{b}	6.328^{a}	4.141^{b}
g/kg$^{0.75}$	71.44^{b}	60.39^{c}	59.04^{c}	81.97^{a}	54.92^{c}
Kg DCP /head**	0.720^{b}	0.745^{b}	0.651^{b}	1.008^{a}	0.517^{c}
g/kg$^{0.75}$	8.86^{bc}	10.02^{b}	8.29^{c}	13.05^{a}	6.86^{d}
Feed conversion (kg /kg gain):					
DM	8.93^{b}	12.76^{a}	9.08^{b}	11.83^{a}	8.91^{b}
	±0.48	±0.89	±0.41	±0.74	±0.63
TDN	7.01^{bc}	8.60^{ab}	6.49^{c}	9.38^{a}	7.08^{bc}
	±0.43	±0.56	±0.33	±0.67	±0.52
DCP	0.8687^{b}	1.439^{a}	0.911^{b}	1.493^{a}	0.885^{b}
	±50.67	±116.85	±53.77	±100.50	±61.33

*** BH, Berseem hay; AN, *Atriplex nummularia*; AS, *Acacia saligna*; AN-AS, AN and AS were offered separately; ERS, Ensiled rice straw with 2.5% urea (44.98% N) and 5% molasses. ** These values were calculated from digestion experiments.**
a, b, c, d: Means followed by different superscripts within each row are significantly different (p≤0.05).

Dry matter intake (g/d/kg $w^{0.75}$) from TCM of the control group was significantly higher (p≤0.05) than those of other groups, which were fed ACM.

Regardless of control group, no significant differences were noticed among the four groups in their daily intake of ACM while daily roughage intakes (g/d/kg $w^{0.75}$) was significantly (p≤0.05) different. The highest value was 62.68 for camels fed AN-AS choice followed by AN group (47.63), AS group (42.50) and ERS group (22.84). The respective value of control group was 34.62-g/d/kg $w^{0.75}$. There was dissimilar trend in dry matter intake (g/d/kg $w^{0.75}$) from the roughages (BH, AN, AS, AN-AS choice and ERS).

Camel group that was fed fresh AN-AS free choice had significantly ($p \leq 0.05$) higher DMI than the other groups. This may be due to the higher palatability of AS when offered with AN compared to the intake from single fresh halophyte. The selectivity intake increased when animals had a free choice to consume more than one kind of halophytic plants (Shawket, 1999b). Generally, growing camels of groups fed on fresh halophytic plants (AN, AS and AN-AS free choice) had significantly ($p \leq 0.05$) higher DMI (g/d/kg $w^{0.75}$) than those fed on BH or ERS, indicating that these halophytic plants were very palatable for camels.

When daily DMI was expressed as an average percentage body weight, the values were 2.10, 2.12, 1.93, 2.43 and 1.64 % for rations containing BH, AN, AS, AN-AS choice and ERS, respectively. These values were higher than those obtained by Kamoun, (1991) and Shawket, (1999a). The former found that, camels consumed an average of 1.5% DM of live body weight. Also, Yacout and El-Badawi (2001) reported that camels had limited feeding capacity, being satisfactory from 1.72 to 1.80% DM of body weight for their appetite, regardless of the feed quality.

The daily DMI roughage percentages from total dry matter intake were 38.06, 53.57, 51.38, 60.75 and 33.08 % for BH, AN, AS, AN-AS choice and ERS experimental camel groups, respectively. The poor intake from ERS might be due to increasing the CP level of ACM formula (Yacout and El-Badawi, 2001), Although ERS ration has higher nutritive value (%), yet its DMI was significantly the lowest ($p \leq 0.05$), which may reduce daily gain of camels in this group. Daily nutrients intake (g/d/kg $w^{0.75}$) expressed as DM, TDN and DCP revealed that the maximum intake ($p \leq 0.05$) was recorded for animals fed fresh AN-AS free choice followed by the control group (BH), fresh AN, fresh AS and ERS.

b- Daily Gain in Live Body Weight

The average of initial and final body weights and average daily gain (ADG, g/head/day) for the different experimental groups are presented in Table (3). The ADG of camels ranged from 525 g for animals fed AN ration to 828 g for animals fed control ration containing BH. However, significant differences ($p < 0.05$) were observed in daily gain among camel groups fed different rations containing BH, AN, AS, AN-AS and ERS. Regardless of control group fed BH, the camel group fed AS ration showed the highest ADG (719 g/d) followed by AN-AS group (680 g/d), ERS (589 g/d) and AN (525 g/d) groups. These results indicated that ADG was significantly ($p \leq 0.05$) affected by the type of both roughages and concentrate components. In this respect, Etman (1997) found that ADG was 412 g for camels fed berseem hay and concentrate, while it was 386 g/d for camels fed wheat straw and concentrate. . Faye et al. (1992) indicated that ADG for camels was 550 g/d for concentrate and 570 g/d for concentrate supplemented with mineral.

Rai *et al.* (1992) reported that ADG of dromedary camels of Bikaner breed (1-3 year old) fed 20% and 40% dried leaves of Subabool and dried moth chara were 330.6 and 258.3 g/d, respectively.

Shawket (1999a) found that growing male camels fed rations containing fresh saltbush (*Atriplex halimus*) with ground barley grains equal to

100% of their maintenance requirements for energy, had an ADG of 732.2 g/d. This rate of growth was higher than that of experimental camels group fed *Acacia nummularia* in the present study (525 g/d). The difference could be attributed to the type of halophyte and concentrate. Barley grains had higher content of energy (NFE= 77.8%) than that of ACM in the present study (NFE= 66.10%). In addition, halophytes are known to be deficient in energy (Wilson, 1977 and Hassan *et al.*, 1979).

Yacout and El-Badawi (2001) concluded that camel calves of average body weight 358.2 kg, which were fed 2% of their body weight concentrate mixture (14% CP) and chopped rice straw *ad libitum* had 810 g/d ADG. This value was higher than that in the present study for ERS camel group (589 g/d). Higher intake from traditional concentrate mixture (TCM = 2% of body weight) than that in the experimental ERS group (ACM = 125% of their maintenance requirements for energy), might explain the difference in daily gain between the two studies. The present study showed that, DMI from ERS ration group was significantly ($p \leq 0.05$) the lowest, hence resulted in reduced daily gain (Table 3) compared to the other two successive rations (AN-AS and AS). The ensiled rice straw was perhaps unpalatable for camels. Also, It seems that ensiling process for the rice straw may not compensate the low level of concentrates in ERS group.

c- Efficiency of Feed Conversion and Economic Evaluation

Efficiency of feed conversion of the tested rations is presented in Table (3). There were no significant differences ($p \leq 0.05$) among groups fed rations containing BH, AS and ERS that were superior in DM, TDN and DCP conversions. The corresponding values were 8.93, 9.08 and 8.91 kg DM/ kg gain, 7.01, 6.49 and 7.08 kg TDN/ kg gain and 0.869, 0.911 and 0.885 Kg DCP/ kg gain. The other two groups AN and AN-AS were significantly less efficient in feed conversions with values 12.76 and 11.83 kg DM/ kg gain, 8.60 and 9.38 kg TDN/ kg gain and 1.439 and 1.493 kg DCP/ kg gain, respectively. Regardless of the BH control group, feed conversion of AS and ERS groups were superior to the other two halophytic groups AN and AN-AS, respectively. These results are in agreement with those found by Yacout and El-Badawi (2001) for rice straw with concentrate mixture (CP = 14%) and Hafez and Hassan (2001) for *Acacia saligna* with barley grains.

The present values of DMI conversion into weight gain were almost within the range reported by Kamoun *et al.* (1989), being between 6.3 and 11.9 kg in camels (at one year old) fed on hay *ad libitum* plus concentrate (80% wheat bran). But, on the other hand, the present values of DMI conversion were more efficient than those obtained by Etman (1997) who reported 13.52 and 14.57 kg DM/kg gain, respectively, for the camels fed berseem hay with concentrate and camels fed wheat straw with concentrate.

With respect to TDN conversion (Table 3), camels fed on AS ration recorded the best value (6.49 kg TDN/kg gain), which was not significantly differed from BH group (7.01 kg TDN/kg gain) or ERS (7.08 kg TDN/kg gain) group. The values of TDN conversion obtained in the present study were higher than that obtained by Shawket (1999a) when camels were fed on *Atriplex halimus* plus barley grains alone or with olive cake.

Data of economic evaluation of feeding growing male camels on the experimental rations are summarized in Table (4). In comparison between control ration and experimental rations, it was noticed that, experimental rations were cheaper than the control ration. The cost of feeding camels to produce one kilogram of weight gain was 7.45, 5.28, 3.94, 4.25 and 5.52 Egyptian pound (LE) for rations BH, AN, AS, AN-AS and ERS, respectively. These results cleared that feeding male camels on rations AN, AS, AN-AS and ERS, reduced the cost of feeding by 29.13, 47.11, 42.95 and 25.91%, respectively compared to control ration (BH). Moreover, the ration AS showed comparable value of ADG, that obtained from control ration (BH) and it seemed to be the least in feed cost to produce one kg weight gain (3.93 LE), showing the highest economical efficiency (177.7%) as shown in Table (4).

Table (4): Economic evaluation of weight gain using the experimental rations fed to growing male camels.

Item	Type of rations				
	BH + TCM	AN + ACM	AS + ACM	AN-AS + ACM	ERS + ACM
Price of daily feed consumed L.E.:**					
Concentrate mixture	4.29	2.62	2.69	2.69	2.97
Roughages	1.88	0.15	0.14	0.10	0.28
Daily feed cost, L.E	6.17	2.77	2.83	2.89	3.25
Average daily gain, kg	0.828	0.525	0.719	0.680	0.589
Price of daily weight gain, LE	5.80	3.68	5.03	4.76	4.12
Feed cost/ kg gain, L.E.	7.45	5.28	3.94	4.25	5.52
Improvement, %***	-	29.13	47.11	42.95	25.91
Economical efficiency, %****	94.0	132.9	177.7	164.7	126.8

*** BH, Berseem hay; AN, *Atriplex nummularia*; AS, *Acacia saligna*; AN and AS were offered separately; ERS, Ensiled rice straw with 2.5% urea (44.98% N) and 5% molasses.**
**** Calculated based on the prevailing price in 2002. TCM 850, ACM 750, BH 560, AN 25, AS 25 and ERS 120 LE/Ton. The price of one kg of live body weight on selling was 7 LE.**
***** [(Feed cost per kg gain of control – feed cost per kg gain of treatment)/ feed cost per kg gain of control] x 100, **** (Price of daily gain / price of daily feed consumed) x 100.**

2. Carcass Yield

a- Dressing Percentage

Data of slaughter weight, empty body weight, hot carcass weight, chilled carcass weight and dressing percentage are presented in Table (5). Dressing percentage based on slaughter and empty body weight ranged from 59.71–64.77% and 68.06–70.61%, respectively. The values of dressing percentage either based on the slaughter or empty body weight were superior to those reported in the literature, which ranged from 48.2– 56.8% and 60.1–63.6%, respectively (Dahl and Hajort, 1977; Morton, 1984; Wilson, 1984; Babiker and Yousif 1990; Wardeh, 1989 and El-Gaseim and El-Hag, 1992).

The group of camels fed AN-AS had significantly ($p \leq 0.05$) higher hot and chilled dressing percentage than those of the other tested groups either based on slaughter or empty body weight. It was noticed that even the lowest dressing percentage values of camel groups fed on AN were slightly higher than those values obtained by Shawket (1999a) on yearling male camels fed on *Atriplex halimus* being 59.02 and 66.10 %, as based on slaughter and

empty body weight, respectively. The present results clearly indicated that dressing percentages of growing male camels were superior to those reported by Bendary et al. (1992) and El-Gasim and El-Hag (1992) on camel calves fed concentrate mixture with hay or rice straw which had dressing percentage ranged from 51.10 – 52.66 and 61.00 – 62.71% either based on slaughter or empty body weight, respectively.

Table (5): Slaughter wt, empty body wt, hot carcass wt, chilled carcass wt and dressing percentage of camels fed on different types of rations.

Item	Type of rations*					±SE
	BH + TCM	AN + ACM	AS + ACM	AN-AS + ACM	ERS + ACM	
Slaughter wt, kg	445.5	385.0	433.0	390.0	386.7	11.2
Empty body wt (kg)	384.8	337.8	381.5	357.7	347.1	9.2
Hot carcass wt** (kg)	268.3	229.9	264.6	252.5	239.1	6.9
Chilled carcass wt (kg)	261.9	219.9	254.5	243.9	225.9	6.9
Hot dressing (%)						
(1)	60.22^{bc}	59.71^{c}	61.12^{bc}	64.77^{a}	61.89^{b}	0.5
(2)	69.72^{ab}	68.06^{b}	69.37^{ab}	70.61^{a}	68.86^{ab}	0.3
Cold dressing (%)						
(1)	58.70^{b}	57.15^{b}	58.79^{b}	62.53^{a}	58.41^{b}	0.5
(2)	68.02^{a}	65.16^{b}	66.72^{ab}	68.17^{a}	64.99^{b}	0.5

*** BH, Berseem hay; AN, *Atriplex nummularia*; AS, *Acacia saligna*; AN and AS were offered separately; ERS, Ensiled rice straw with 2.5% urea (44.98% N) and 5% molasses.**

**** Hot carcass weight (including hindquarters, forequarters, neck and hump fat)**

(1) Based on slaughter weight. (2) Based on empty body weight. a, b, c: Means followed by different superscripts within each row are significantly different (p≤0.05).

b- Organs and offals

The weights of external offals and internal organs for camel carcass as a percent of empty body weight are shown in Table (6). Results showed marked differences among the experimental treatments for all offals except the percentage of head and tail. Percentage of head did not differ among groups except that between AN and AN-AS groups. Percentage of total external organs showed the same trend to that of head percentage. Shawket (1999a) reported that, feeding the yearling male camels on *Atriplex halimus* either supplemented with barley alone or barley with olive cake did not affect all offals.

Camel's liver represented 1.64, 1.82, 1.88, 1.74 and 1.60 % of the empty body weight with significant (p≤0.05) differences among the groups, BH, AN, AS, AN-AS and ERS respectively. The present results were in agreement with those obtained by Shehata (1999) who reported values of 1.82, 1.71 and 1.59 % for camels slaughtered at body weight of 300, 400 and 500 kg, respectively. The group of AN showed the highest kidneys percentage while ERS was the lowest one. Type of rations did not realize significant differences in other offals and total offals. Gaili and Osman (1977) reported that, dromedary camels had lighter heads, hides, alimentary tracts and reproductive organs but heavier feet, livers, heart and lungs & trachea as

compared with fattened Friesian calves. Bendary *et al.* (1992) reported that the fattened camel calves had lighter heads, lungs, spleens, reproductive organs, digestive tracts full and feet, but average weights values of hide, liver, heart and kidneys were equal in both animal species.

Table (6): Means percentage* of organs and offals of camels fed on different types of rations.

Item	Type of rations**					±SE
	BH + TCM	AN + ACM	AS + ACM	AN-AS + ACM	ERS + ACM	
External offals						
Head	3.21^{ab}	3.94^{a}	3.12^{ab}	3.0^{b}	3.13^{ab}	0.13
Pelt	9.07	8.88	7.84	7.93	8.23	0.22
Four feet	3.55	3.67	3.55	3.3	3.42	0.08
Tail	0.37^{a}	0.30^{b}	0.32^{ab}	0.29^{b}	0.28^{b}	0.01
Total non carcass components	16.20^{ab}	16.79^{a}	14.82^{ab}	14.52^{b}	15.06^{ab}	0.34
Internal organs						
Dig- tract full	19.19^{a}	17.95^{a}	17.48^{a}	11.82^{c}	14.52^{b}	0.78
Dig- tract empty	3.28	3.94	3.99	2.80	3.25	0.28
Dig- tract Contents	15.91	14.01	13.49	9.02	11.27	-
Blood	4.50	4.79	4.41	5.52	4.73	-
Lungs & trachea	1.37	1.30	1.37	1.16	1.52	0.06
Heart	0.43	0.53	0.52	0.54	0.47	0.02
Liver	1.64^{ab}	1.82^{ab}	1.88^{a}	1.74^{ab}	1.60^{b}	0.04
Spleen	0.12	0.13	0.12	0.13	0.13	0.00
Kidneys	0.30^{b}	0.39^{a}	0.31^{b}	0.36^{ab}	0.30^{b}	0.01
Testes	0.03	0.02	0.02	0.02	0.03	0.00
Total offals***	3.89	4.19	4.22	3.95	4.05	0.06

*** Based on empty body weight. ** BH, Berseem hay; AN, *Atriplex nummularia*; AS, *Acacia saligna*; AN and AS were offered separately; ERS, Ensiled rice straw with 2.5% urea (44.98% N) and 5% molasses. *** = Sum of Lungs & trachea, Heart, Liver, Spleen, Kidneys and Testes. a, b, c: Means followed by different superscripts within each row are significantly different (p≤0.05).**

CONCLUSION

On the basis of the nutritional and economical results of the present work, it could be concluded that the use ACM and green edible parts of halophytic plants especially *Acacia saligna* in feeding growing camels is economically efficient for meat production without any health troubles and no effects on meat yield.

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الإداء وصفات الذبيحة للذكور النامية للإبل وحيدة السنام المغذاة على أنواع مختلفة من العلائق غير التقليدية

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استخدم فى هذه الدراسة عدد ١٥ ذكر جمل نامى فى عمر ١٠ –١٢ شهر بمتوسط وزن ٢٥٠,٢٣ كجم بهدف دراسة تأثير التغذية على بعض العلائق غير التقليدية من النباتات الملحية (القطف الملحى، الأكاسيا) والتى تنتشر فى منطقة الساحل الشمالى الغربى كذلك قش الأرز المسيلج وإدخال بعض المخلفات مثل نوى البلح المجروش وتفل الزيتون على أداء وكفاءة النمو وخصائص اللحم لهذه الحيوانات .

قسمت حيوانات التجربة إلى ٥ مجموعات ، حيث. غذى كل حيوان بمفردة على عليقة مركزة بمعدل ١٢٥ % من احتياجاتة الحافظة من الطاقة بينما قدمت العليقة المالئة للشبع. غذيت المجموعة الأولى على علف مركز تقليدي مع دريس برسيم بينما المجموعات الأربعة الأخرى فقد غذيت على عليقة مركزة معدلة (مكونة من نوى بلح مجروش، تفل زيتون، شعير مجروش، ذرة صفراء و كسب فول صويا) بينما اختلفت فى نوعية العلف المالئ حيث غذيت المجموعة الثانية على أوراق وسيقان غضه من نبات القطف الملحى ، المجموعة الثالثة على الأجزاء الغضة من نبات الأكاسيا ، المجموعة الرابعة على كل من القطف الملحى والأكاسيا أما المجموعة الخامسة فغذيت على قش الأرز المعامل باليوريا (٢,٥ %) والمولاس (٥ %).

وقد تم تسجيل نتائج كميات الأعلاف المستهلكة يوميا لكل حيوان كما اجريت تجربة الهضم وفى نهاية تجربة النمو التى استمرت لمدة ٢٤٠ يوم تم ذبح جميع الحيوانات لتقدير اصفات الذبيحة لهذه الجمال النامية. وأوضحت نتائج الدراسة أن محتوى القطف من البروتين الخام والرماد (على أساس المادة الجافة) أعلى مقارنة بالأعلاف الخشنة الأخرى واقل فى الكربوهيدرات الذائبة. بينما كان القطف والأكاسيا الأعلى فى نسبة الرطوبة مقارنة بالأعلاف الأخرى . كان محتوى العلف المركز الغير تقليدي من الألياف الخام أعلى بمقدار الضعف تقريبا عن العلف المركز التقليدي أو الكونترول (١٠,٣٨ مقابل ٤,٤٤ % على التوالي).

حققت المجموعة المغذاة على القطف مع الأكاسيا أعلى استهلاك من المادة الجافة ، العناصر الغذائية المهضومة والبروتين المهضوم على أساس وزن الجسم التمثيلي بينما كانت مجموعة قش الأرز هي الأقل استهلاكا.

ولم يلاحظ اختلافا معنويا فى معدل النمو بين مجموعتي الكونترول والأكاسيا (٠,٧١٩ كجم) أو بين الأكاسيا ومخلوط القطف مع الأكاسيا (٠,٦٨٠ كجم) وكذلك بين مجموعتي القطف وقش الأرز (٠,٥٨٩ كجم).

حققت المجموعات الثلاثة الكونترول ، الأكاسيا وقش الأرز افضل معدلات للتحويل الغذائي لكل من المادة الجافة والطاقة والبروتين المهضوم.

أثرت المعاملات الغذائية معنويا فى نسبة التصافي على أساس الوزن عند الذبح وتراوحت بين ٥٩,٧١ إلى ٦٤,٧٧% لمجموعتي القطف ومخلوط القطف مع الأكاسيا على التوالي

أوضحت النتائج أن التغذية على علائق القطف ، الأكاسيا ، القطف مع الأكاسيا وقش الأرز اقل تكلفة عن عليقة الكونترول بنسبة ٢٩,١٣ % ، ٤٧,١١ % ، ٤٢,٩٥ % ، ٢٥,٩١ % على التوالي. كما انه لا يوجد اختلافا معنويا فى معدل النمو بين مجموعتي الأكاسيا والكونترول مما يجعل الأكاسيا ذات التكلفة الأقل لإنتاج كيلوجرام نمو (٣,٩٤ جنية مصري) هي الأفضل اقتصاديا.

وعلى ذلك فانه يمكن التوصية باستخدام النباتات الصحراوية خاصة الأكاسيا مع بعض مخلفات التصنيع الغذائي فى تغذية الإبل النامية بغرض خفض تكاليف إنتاج لحوم الإبل .