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Evaluation of Growth Performance for Growing Maghraby Camel Fed on Un-conventional Feed

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ABSTRACT

The present study was carried out at EL-Nubaria Experimental Station at Abd El-Monam Ryad Village of El-Bustan Province, to estimate the daily gain of growing camels fed different rations. Twelve growing male Maghraby camels (253.6 ± 1.8 Kg body weight & about 24 months old) were used in 98 days growth trial. The camels were randomly divided into 2 equal groups (6 in each) of similar weight and age, which were allotted into 2 dietary treatments. The first group was offered complete rations (control group) at 3% (on dry matter basis) of camel body weight. The second group was offered ration containing black cumin seed-cake (35%), molasses (18%), mixed of different straws (45%) at 3% of camel body weight. The growth trial was followed by digestion and nitrogen balance trial on 3 camels of each group. At the end of the experiment, three animals of each group were slaughter. The results indicated that camels fed on experimental ration were superior in average weight gain compared to the control ration (930 g vs. 886 g, resp.). The DM intake did not differ significantly among the two groups (8.97 kg vs. 8.95/animal/daily, resp.) for control and experimental diet, respectively. The treated group recorded higher values of DM, OM, EE and CF digestibility and the nutritive values as TDN and DCP but the results were not differ significantly. Nitrogen balance was higher for treated group (cumin diet) than the control group (33.87 vs 28.22 gm/animal/day). It is concluded that growing male Maghraby camels fed on the diet containing black cumin seed-cake performed better than those offered the control ration. Moreover, feeding camel on black cumin ration is more better economic, which lower feed cost/unit gain or as a net income than feeding control ration.

Key Word: Camels; Black cumin seed cake; Growth; Digestibility; Nitrogen balance

INTRODUCTION

Black cumin (*Nigella sativa*) is a spicy plant, belonging to the family Ranunculaceac. Extracted oil (37% of the seed content) is being used in some medical treatments such asthma, respiratory depression and cough (Karawya *et al*., 1994).

Nigella sativa (NSC) one of some un-traditional of feed proteins, which contain high protein content being 30% or more (Khalifah, 1995; Zeweil, 1996; El-Ayek, 1999). The NSC could be used as flexible ingredient to formulate balance rations, because of its relatively high CP and energy contents, which improves feed intake, digestibility coefficient and nutritive values (Zaki *et al*., 1998; Abd El-Ghani, 2003).

Nigella sativa improved the function of immunological body system and improved cellular immumity (El-Kadi & Kandi, 1986). *Nigella sativa* cake could be used safety and economically in rumimant feeding (Ibrahim *et al*., 2003).

In recent years, there has been increased interest in the camel as an important source of milk, meat hides and wool in many African and Asian countries (Gihad, 1995).

In Arabian and arid areas, camel meat production should be encouraged (Knoess, 1977; Wilson, 1984). In some Arab countries camel meat replaces beef and mutton (Shalash, 1988).

Camels have fascinated mankind both of their appearance and their ability to survive in a harsh arid environment and tolerance to many stresses, e.g. heat, shortage of feed, scarcity of water and/or water with high salinity. Camels digest dry matter, as well as all the nutrients, especially crude fiber better than other ruminants. This high fiber and dry matter digestibility might be attributed to the unique movement of the fore stomach and longer retention time of the large particles in the fore-stomach of the camel (Gihad, 1995).

Therefore, the objective of this study was to evaluate the performance of growing camel when fed a ration containing *Nigella sativa* (black cumin seed cake) plus leguminous straws in comparable study with conventional feeds.

MATERIALS AND METHODS

This experiment was carried out at El-Bostan area of Nubaria and belonging to Animal Production Department, National Research Centre, Cairo, Egypt.

Animals used. Twelve growing male Maghraby camels of average 253.6 ± 1.8 kg body weight and about 24 months old were divided into 2 equal groups of similar weight and age. The first group (control) was offered a complete ration

at 3% (on dry matter basis) of camel body weight. The second group was offered a ration containing black cumin seed-cake (35%), molasses (18%), mixed of different leguminous straws (45%) at 3% of camel body weight (on DM basis). Camels were individually housed in separate semi-opened pens through out the trial.

Feed ingredients of the experimental diets were mechanically well mixed and pressed to form complete diets (Factories of Atmida Company, Meet-Ghamr, Dakhalya Governorate).

Formulation of the experimental diets are shown in (Table I). Experimental diets were offered twice daily at 8.00 a.m. and 2.00 p.m. Fresh water was freely available all time. Daily feed intake was recorded. All camels were weighed biweekly before morning feeding. At the end of the growth trial (98 days), 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 faeces and urine separately from each camel.

Carcass characteristics of growing camels were carried out on three animals of each group at the finishing growing trial. All animals were fasted for 24 h before slaughter and the weight of slaughter animals were determined. Slaughter animals were left to bleed for 15 min, d-necked, skinned and eviscerated. The stomach and intestinal tracts were carefully removed and weighed full and empty. All the internal organs were removed and weight was recorded. Visual lean meat, bone and fat were separated and their weighed.

The proximate analysis of feeds, faeces and total nitrogen in urine were determined according to A.O.A.C. methods (1996).

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

Table I. Formulating of the experimental rations

Control ration		**Nigella sativa ration**	
Ingredient	%	Ingredient	%
Corn	20	*Nigella sativa* meal	35
Wheat bran	20	Bean straw	15
Soybean meal	15	Pea straw	15
Groundnut hay	40	Chick pea straw	15
Molasses	3	Molasses	18
Limestone	1.5	Limestone	1.5
Salt	0.5	Salt	0.5

Table II. Chemical composition of the experimental rations (on DM basis)

Composition %	**Control ration**	**Nigella sativa ration**
DM	86.59	88.28
OM	91.41	90.76
CP	15.70	15.20
CF	16. 45	18.62
EE	4.46	4.86
Ash	8.59	9.24
NFE	54.79	52.08

Table III. Nutrient digestibility and nutritive values of camel fed the experimental rations

Parameters	**Control ration**	**Nigella sativa ration**	**SD±**
	Nutrient digestibility (%)		
DM	70.63	72.22	1.734
OM	72.04	74.35	1.472
CP	69.31	71.25	1.650
CF	60.73[b]	65.25[a]	3.071
EE	62.83	64.41	1.593
NFE	78.03	78.37	1.975
	Nutritive values (%)		
TDN	69.99	70.76	1.85
DCP	11.41	11.65	0.385

a.b. Means of different letters in the same raw are significantly different at ($P< 0.05$)

RESULTS AND DISCUSSION

The chemical composition of the experimental rations, were presented in (Table II). These results indicate that the two experimental rations were nearly isocaloric and isonitrogenous. However, crude fiber content of the second ration (*Nigella sativa*) was slightly higher compared with control ration, being 18.62% and 16.65%, respectively. This increase is due to the higher content of straws in the second ration.

Nutrients digestibility coefficients and nutritive values of control and *nigella sativa* rations are presented in (Table III). The *nigella sativa* ration had slightly higher values of DM, OM, CP, EE and NEF digestibility coefficients compared with the control ration but the differences were not significant. It is of interest be notice that, CF digestibility of *Nigella sativa* ration was higher significant compared with the control ration. The high crude fiber and dry matter digestibility might be attributed to the unique movement of the fore-stomach and the longer retention time of the large particles in the fore-stomach of the camel (Engelhardt *et al*., 1988).

The TDN and DCP values of the *Nigella sativa* diet were higher than the control ration, being (70.76 & 69.99%) and (11.65 & 11.41%), respectively. However the differences were not significant. These results are agreement with that obtained by Abd El-Ghani (2003), who reported that in growing lambs, the digestion coefficient and nutritive value were higher in ration containing *Nigella sativa* (black cumin seed meal) compared with the control ration.

The growth performance of the experimental camels is shown in (Table IV). Initial body weight was similar for the two camel groups, but at the end of the experiment, camels fed *nigella sativa* diets showed higher daily gain compared with the control ration (950 & 886 g, respectively), but the differences were not significant.

The dry matter intake for all camels in the two groups seemed to be similar. These results indicate that the mixed of *Nigella sativa* and molasses to leguminous straws make this diet to be more palatable for growing camel and improve the camel performance.

Feed conversion (kg DMI/kg gain) was better in *Nigella sativa* meal ration compared with the control ration this may be a reflection of the high daily gain for the nigella sativa ration than the control ration. These results are in agreement with Awadalla (1997), Gaber *et al*. (1998), El Khnawy *et al*., (1999) and Abd El-Ghani (2003), who reported that fed animal ration containing cumin seed meal improved the feed conversion and performance of ruminants.

Total water intake, which is the sum of drinking water and water in feed (mL/day) are presented in (Table IV). Camels fed *nigella sativa* ration consumed higher total water than those fed the control ration. The main pathway of water excreted by camels was throwing the faeces. This result agreed with that obtained by Maloiy (1972) and Mohamed (1996), who found that through the high power of filtration and then concentration of the filtrate by the re-absorption of water the kidneys reduce the urine volume. The insensible water loss expressed as mL/day showed that camels in *Nigella sativa* ration recorded a lower ($P < 0.05$) value than camels in the control ration.

Nitrogen utilization by camels offered the different rations are presented in (Table V). Data indicated that daily nitrogen intake by camels offered control and experimental rations were similar as a reflection of DM intake. Nitrogen excretion was relatively smaller in *Nigella sativa* ration than the control ration resulting in increased absorbed nitrogen for the same group over the control. Nitrogen balance of camels fed *Nigella sativa* plus molasses and straw diet was higher than that of camel offered the control diet. This result is agree with the findings of Awadalla and Gehad (2003), who found that nitrogen balance was improved by feeding sheep ration containing black cumin seed (*Nigella sativa*).

Carcass characteristics and weights of edible and non-edible offal's of slaughtered camels are presented in (Table VI & VII). The dressing percentages of hot carcass were not different among the two groups, the same trend was observed with visual lean bone, meat and total fat percentages of hot carcass. The edible and non-edible offal's were not different significantly between the two groups.

Concerning the economic evaluation, data in (Table VIII) indicated that the daily feed cost (L.E) was significantly reduced in *Nigella sativa* ration (5.82 L.E) compared to the control group (7.62 L.E). The high economic efficiency was recorded for the camels fed *Nigella sativa* ration. The economic efficiency was improved by the ration containing *Nigella sativa* compared to the control. This is in full agreement with the results obtained by Abd El-Ghani (2003), who reports that black cumin seed meal had best economical efficiency when adding to growing lambs-ration and can be replaced from protein of concentrate mixture. Also, El-Ayek (1999) reported that black cumin seed meal could be used as a relatively good source of energy and protein supplement in the diets of ruminants since its protein characterized by low degradation rate in the rumen.

Table IV. Growth performance of camels fed the experimental rations for 98 days

Parameters	Control ration	Nigella sativa ration	SD±
No. of animals	6	6	
Initial body weight (kg)	254.4	250.8	15.213
Final body weight (kg)	343	343.8	20.597
Av. daily gain (kg)	0.886 [b]	0.950 [a]	0.097
Daily intake (kg)	8.97	8.95	0.809
Feed conversion (kg) DMI/kg gain	10.12	9.62	0.835
Water balance			
Drinking water (ml/day)	10880 [b]	11350[a]	103.163
Water in feed (ml/day)	980	950	87.532
Excreted water (ml/day)			
Faecal (ml/day)	5925[a]	5454[b]	63.471
Urinary (ml/day)	3123	3251	30.750
Insensible water loss (ml/day)	2812[b]	3595[a]	19.719

a.b. Means of different letters in the same raw are significantly different at ($P < 0.05$)

Table V. Nitrogen balance of camels fed the experimental ration

Parameters	Control ration	Nigella sativa ration	SD ±
Nitrogen intake (g/day)	225.33	217.66	8.531
Faecal (g/day)	81.21[a]	74.07[b]	3.057
Urinary (g/day)	115.90	109.72	7.528
Nitrogen retained (g/day)	28.22[b]	33.87[a]	5.291
Nitrogen retained / Nitrogen intake (%)	12.52	15.56	1.273
Nitrogen retained/Digestible nitrogen (%)	19.58	23.59	2.057

a.b. Means of different letters in the same raw are significantly different at ($P < 0.05$)

Table VI. Carcass characteristics of camels fed the experimental rations

Parameters	Control ration	Nigella sativa ration	SD ±
Fasting body weight (kg)	340.00	345.00	2.721
Empty body weight (kg)	306.00	308.80	2.586
Hot carcass weight (kg)	197.35	203.55	1.742
Dressing %			
fasting body weight	58.04	59.00	0.174
empty body weight	64.49	65.92	0.131
Visual lean meat (kg)	139.40	143.18	0.181
% of hot carcass	70.64	70.34	0.951
Separable fat			
Abdominal (kg)	4.75	5.00	0.079
Kidney (kg)	2.30	2.25	0.022
Hump (kg)	12.80	12.95	0.173
Total fat: (kg)	19.95	20.20	0.209
% of hot carcass	10.06	9.92	0.110
Bone: (kg)	28.65	29.15	0.319
% of hot carcass	4.52	14.32	0.127
Bone : meat ratio	1: 4.9	1: 5.0	0.025

In conclusion, supplementation of animal ration with *Nigella sativa* improved animal performance, because *Nigella sativa* can act as a free radical scavenger with other anti-oxidant vitamins and it can depress inflammatory responses (Al-Ghamdi, 2000), it can act as an antibacterial and antifungal (Rathee *et al*., 1982) and it can alleviates stress through its hypertensive effect (Zaoui *et al*., 2000).

Table VII. Weight of edible and non-edible offals of slaughtered treated camels

Parameters	Control ration	Nigella sativa ration	SD±
Edible offals			
Liver	5.14	5.39	0.011
Heart	1.15	1.28	0.005
De-fatted kidney	0.87	0.93	0.002
Spleen	0.59	0.62	0.001
Non edible offals			
Head	9.45	10.50	0.025
Legs	11.20	11.80	0.031
Lungs	2.10	2.45	0.008

Table VIII. Economic efficiency of feeding growing male Maghraby camels fed the experimental rations

Parameters		Control ration	Nigella sativa ration
No. of animals		6	6
Initial body weight	(kg)	254.40	250.8
Final body weight	(kg)	343.00	343.80
Total body weight gain	(kg)	88.6	93.0
Daily gain	(kg)	0.886	0.950
Total DM intake	(kg)	8.97	8.95
Total feed cost	(L.E)	7.62	5.82
Price of weight gain	(L.E)	8.86	9.30
Income	(L.E)	1.24	3.48
Relative economic efficiency		100	281
Feed cost / kg gain		8.60	6.13

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