

EFFECT OF ENERGY SUPPLEMENT FED MOTH STRAW BASED DIETS ON NUTRIENT INTAKE AND UTILISATION IN DRAUGHT CAMELS

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ABSTRACT

An experiment was conducted on 9 draught camels (8-10 years old of 574±11.9 kg BW) to study the effect of energy supplementation fed moth straw based diets on nutrient intake and utilisation in draught camels. The randomly selected camels divided into 3 equal groups were offered *ad lib* moth straw supplemented with either low energy (65%TDN) in concentrate (T₁); medium energy (70%TDN) in concentrates (T₂) or high energy (75%TDN) concentrate (T₃). The mean DMI was higher (P<0.05) in T₃ as compared to T₂ and T₁ but a non-significant difference was observed between T₂ and T₁. The water, DCP and TDN intake was significantly (P<0.05) higher in T₃ and T₂ as compared to T₁. There was a significant difference between T₁, T₂ and T₃ for DCPI and TDNI. The digestibility of DM, CP and TDN was improved (P<0.05) in animals fed on high energy concentrate mixture but there was nonsignificant difference between the treatment for digestibility of OM, CF and NFE. There was a significant (P<0.05) improvement in DCP and TDN content in T₃ as compared to T₁. The DE and ME contents did not differ significantly among the treatment groups. The ADG was higher (P<0.05) in camels fed on high energy concentrate mixture as compared to others. Likewise, draught (kgf) and power output (hp) was higher (P<0.05) in T₃ as compared to other treatment groups. It was concluded that *ad lib* feeding of moth straw supplemented with high energy concentrate mixture resulted in improved nutrients utilisation and draught performance by the camels without any apparent ill effect on the health.

Key words: Camel, draught, energy level, intake, moth straw, nutrient utilisation

The camel has unique ability to utilise low quality feed resources which other species of animals are unable to consume. Kohnke and Cluer (1992) reported a preliminary survey on nutrition of racing camels and emphasised attention on specific research on the energy, protein, mineral and vitamin requirements for practical feeding of camels. Moth straw (*Phaseolus acontifolius* Jacq.) is one of the kharif pulse crop grown in Rajasthan. However, very few reports are available indicating effect of feeding moth straw with different levels of energy in draught camels. Therefore, the present investigation was planned to assess effect of energy supplementation fed moth straw based diets on nutrient intake and utilisation in draught camels.

Materials and Methods

Nine draught camels (8 to 10 years of age and 574±11.9 kg BW) were randomly selected and fed on 3 dietary treatments. The animals were offered

ad lib moth straw supplemented with either low energy (65% TDN) in concentrate mixture (T₁); medium energy (70%TDN) concentrates (T₂) or high energy (75%TDN) in concentrate mixture (T₃). The concentrate mixture was fed as per requirement of draught camels (ICAR, 1985).

The animals were housed in a well ventilated shed having sandy floor, asbestos roofing and provision for manger for individual feeding. All animals were offered fresh water once at 4 pm daily and refusal of water, if any, was also recorded to know the actual voluntary water consumption. The quantity of water received by the animals through feed and fodder were also calculated to know the water intake by the camel. The moth straw (*Phaseolus acontifolius* Jacq.) was fed to each animal as a sole diet between 5 to 6 pm. The daily allowance of concentrate mixture was offered to all camels @ 2.7 kg DM/camel. All other management practices were kept the same for the entire group. After a preliminary feeding of 84 days,

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a six day digestibility trial was conducted on all the draught camel. The refusal of straw, if any, was also recorded to know the actual intake of feed and total faecal output in 24 hr. was collected by harnessing faecal bags to individual animals. The representative samples of feeding and faeces were pooled and analysed for proximate principals (AOAC, 1995).

A two wheeled camel cart was used as a loading device for applying the load cells (Dynamometer of 500 kg Ecl, UK) between the body cart and the beam for measuring the draught. The cart was pulled on a sandy track to cover a distance of 25.5 km with 18 per cent pay load in 4 to 5 hr. The camels were allowed to pull payload including the weight of the cart and the driver in such a way that experimental camels could exert an average draught of 18% of their body weight. The data obtained was analysed by using simple ANOVA (Snedecor and Cochran, 1967).

Results and Discussion

The chemical composition of moth straw and concentrate fed to draught camels have been depicted in Table 1. The mean CP content in moth was 10.10 per cent (Nagpal and Jabbar, 2005) and concentrate was 15.13, 14.87 and 15.01 per cent, respectively in T₁, T₂ and T₃ groups.

Body weight and draught performance

The camels in all the treatments maintained their body weight and showed marginal increase in

Table 1. Ingredient proportion and chemical composition of feedstuffs.

Attributes	Concentrate mixture			Moth straw
	T ₁	T ₂	T ₃	
Ingredient proportion %				
Groundnut cake	6	15	8	
Barley	10	49	45	
Wheat bran	20	-	30	
Deoiled rice polish	52	33	-	
Guar churi	9	-	-	
Moth churi	-	-	14	
Mineral mixture	3	3	3	
Chemical composition % DM basis				
DM	90.23	89.80	90.10	87.2
OM	88.68	87.80	89.77	88.77
CP	15.13	14.87	15.01	10.10
CF	11.23	12.90	12.51	35.62
EE	2.36	2.85	2.20	1.20
NFE	59.96	57.18	60.05	40.85
TA	11.32	12.20	10.23	11.23

average daily gain (ADG) which was of the order of 125.55, 209.11 and 314.33 g, respectively in T₁, T₂ and T₃ (Table 2). The difference between the treatments for ADG was significantly (P<0.05) in T₃ followed by T₂ and T₁ which confirms the findings of Chaudhary *et al* (2003) who reported the average daily gain (g/d) between 77.08 to 387.25. Like wise, Al-Mutairi (1991) and Saini *et al* (2007) reported higher body weight gain in camels fed on 2% urea treated as compared to untreated average daily gain (g/d) of 227.3 in camels on feeding dry moth fodder.

The optimum load carrying capacity of Indian camels is about 2.8 kg/kg body weight (Rai and Khanna, 1990). Therefore, the camels were made to pull cart at pay load of 2.8 kg/body weight on two wheeled cart and covered 25.5 km in 4 to 5 hours. The average draught (kgf) was 100.30, 102.60 and 113.50, respectively in T₁, T₂ and T₃ (Table 2) which was significantly (P<0.05) higher in T₃ as compared to T₂ and T₁. The value of power developed (hp) was significantly (P<0.05) higher in T₃ followed by T₂ and T₁ with their respective values of 0.96,

Table 2. Body weight and nutrient utilisation in draught camels fed on moth straws supplemented with different levels of energy.

Attributes	Treatments			S.E.
	T ₁	T ₂	T ₃	
Body weight (B/W)				
Initial BW, kg	575.66	574.00	574.33	11.96
Final BW, kg	586.96	592.82	602.62	12.10
Total BW gain, kg	11.30 ^c	18.82 ^b	28.29 ^a	0.58
ADG, g/d	125.55 ^c	209.11 ^b	314.33 ^a	5.77
Draught, kgf	100.30 ^b	102.60 ^b	113.50 ^a	4.27
Power developed, hp	0.96 ^c	1.11 ^b	1.32 ^a	0.06
Nutrient digestibility %				
DM	63.51 ^c	67.23 ^b	72.89 ^a	0.41
OM	65.87	67.39	68.64	0.77
CP	63.32 ^c	69.02 ^b	73.13 ^a	0.71
CF	66.18	63.62	65.71	3.31
EE	66.09	65.92	67.56	0.61
NFE	69.25 ^b	72.31 ^{ab}	74.15 ^a	3.70
Nutritive value %				
CP	11.49	11.31	11.28	0.15
DCP	7.28 ^b	7.81 ^{ab}	8.25 ^a	0.14
TDN	60.74 ^b	61.74 ^b	63.88 ^a	63.88
DE, M cal/kg	2.67	2.74	2.82	0.06
ME, M cal/kg	2.16	2.20	2.27	0.05

Figure with different superscripts in a row differs significantly, P<0.05

1.11 and T₁, T₂ and 1.32 in T₁, T₂ and T₃ groups. The results for draught performance in camels were within the range as reported by Rai and Khanna (1994) who reported the similar trend as compared to the present investigation. However, the camels are capable for exerting equivalent to 1 hp of energy during ploughing covering 1 hectare in 11.25 hr. and slightly during oil milling (Khanna and Rai, 1989).

Nutrient digestibility and nutritive value

The digestibility of DM, CP and NFE was significantly higher (P<0.05) in T₃ as compared to T₂ and T₁ but a non-significant difference was observed between the treatment groups for OM, CF and EE digestibility (Table 2) and these results corroborate the earlier findings of Farid *et al* (1984) and Nagpal *et al* (1993). The CP, DCP and TDN contents were reported as 11.49, 11.31, and 11.28; 7.28, 7.81 and 8.25 and 60.75, 61.74 and 63.88 percent, respectively for T₁, T₂, and T₃. The nutritive value of diets was improved (P<0.05) in high energy concentrate group as compared to other but the difference between T₁ and T₂ was non-significant. The DE and ME contents were reported as 2.67 and 2.16; 2.72 and 2.20 and 2.82 and 2.27, respectively in T₁, T₂ and T₃. Similarly, Chaudhary *et al* (2003) reported the values of DE and ME (M cal/kg) as 2.65 and 2.14 in control and 3.27 and 2.64 in concentrate supplemented group. However, the DE and ME values were comparable between the groups.

Nutrient and water intake

The mean DM intake was higher (P<0.05) in T₃ as compared to T₁ and T₂ (Table 3). The DMI as per cent body weight basis was statistically comparable confirming the earlier report of Nagpal and Jabbar (2005). There was a significant difference between T₁, T₂ and T₃ for DCPI and TDNI. The DCP and TDN intake was higher (P<0.05) in T₃ followed by T₂, T₁, respectively which confirms the observations recorded earlier by Nagpal *et al* (2000). Wilson (1989) reported the daily maintenance requirements for 500 kg adult camel as 300 g DCP and 54.0 MJ ME. Rai *et al* (1994) reported that the DMI, DCPI, TDNI (kg/d) and MEI (MJ/d) for 635 kg camels was 1.351, 0.607, 5.036 and 75.8, respectively. The nutrients intake was higher than those recommended by Wilson (1989) but Mokhtar *et al* (1989) observed that 0.91 per cent DMI was not sufficient and the animals lost their body weights. Khanna and Rai (1989) reported that the requirement of Bikaneri camel on *ad lib* feeding during pulling a load of 1.8 to 2 tonnes for 4 hr/day

Table 3. Nutrient and water intake in draught camels fed on moth straw supplemented with different levels of energy.

Attributes	Treatments			S.E.
	T ₁	T ₂	T ₃	
Nutrient intake				
DMI, kg/d	10.01 ^b	10.45 ^b	11.24 ^a	0.27
DMI, %BW	1.74	1.81	1.95	0.05
DMI, g/kg ^{w0.75}	85.36 ^b	89.08 ^b	95.64 ^a	1.17
DCPI, g/d	728.73 ^c	816.15 ^b	927.30 ^a	14.58
DCPI, % BW	1.27 ^c	1.42 ^b	1.61 ^a	0.05
DCPI, g/kg ^{w0.75}	6.20 ^c	6.97 ^b	7.90 ^a	0.22
TDNI, kg/d	6.06 ^b	6.45 ^b	7.18 ^a	0.13
TDNI, % BW	1.05 ^b	1.13 ^{ab}	1.25 ^a	0.64
TDNI, g/kg ^{w0.75}	51.61 ^b	55.13 ^{ab}	61.22 ^a	2.77
Water intake (i/d)				
VWI	32.10 ^b	36.13 ^a	37.47 ^a	0.97
WI through feedstuffs	1.00	1.04	1.12	0.02
TWI	33.10 ^b	37.17 ^a	38.59 ^a	0.58
VWI/kg DMI	9.63 ^{bc}	10.38 ^a	10.00 ^{ac}	0.06
TWI/kg DMI	9.93	10.68	10.30	0.10

Figure with different superscripts in a row differs significantly, P<0.05

is between 1.8 to 2.0% of body weight which confirms the present investigation.

The mean daily voluntary water intake (VWI/d) in T₁, T₂ and T₃ was 32.10, 36.13 and 37.47 litres, respectively. The total water intake (TWI/d) of draught camels was 33.10, 37.17 and 38.59 litres, respectively in T₁, T₂ and T₃ which was higher (P<0.05) in T₂ and T₃ groups as compared to T₁ group. The water intake was significantly (P<0.05) influenced by the treatments (Nagpal and Rai, 1993 and Chaudhary *et al*, 2003). Mathur and Mathur (1979) reported lesser water intake on feeding urea treated misa bhusa to Bikaneri male camels.

Thus, it was concluded that *ad lib* feeding of moth straw supplemented with high energy concentrate mixture (75% TDN) resulted in improved daily weight gain, feed intake and digestibility of nutrients in draught camels. Thus, moth straw supplemented with high energy concentrate mixture (75% TDN) may be recommended for feeding of draught camel for better nutrient utilisation and power output with enhanced work performance of the camels.

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