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# NUTRIENT UTILISATION AND SERUM BIOCHEMICAL PROFILE OF ADULT DROMEDARY CAMELS FED OAT STRAW AND GROUNDNUT HAULMS

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## ABSTRACT

The study was conducted to explore the feasibility of incorporation of oat straw in the diet of camels. Five adult male camels (726.00 kg B.Wt., 8-10 years) were fed sole roughage diet of dry chaffed oat (*Avena sativa*) straw in phase I to estimate its nutritional worth followed by feeding of oat straw and groundnut (*Arachis hypogea*) haulms in 1:1 ratio in second phase II to study the impact on nutrient digestibility and intake. In phase III, the camels were switched to sole roughage ration of groundnut haulms. Average DM intake kg/d or DMI kg/ 100 kg body weight was minimum (3.83 or 0.54 ) in camels fed sole oat straw ration which improved ($P<0.05$) on supplementation in second phase (6.80 or 0.98 ) and was maximum in third phase (8.70 or 1.20 ) in camels given only groundnut haulms. The digestibility of DM, OM, CP was similar in phase II and III but significantly ($P<0.01$) higher than in phase I. Because of supplementation effect of better nutritional valued groundnut haulms, the intake of DM, DCP and ME increased significantly ($P<0.01$) from phase I to phase III. Similar serum glucose, total protein in 3 phases but higher serum urea level ($P<0.01$) was observed in phase I followed by phase II and lower in phase III. The results indicated poor nutritional value of oat straw and the need of its pre-treatment to increase its digestibility for incorporation in the animal diet.

**Key words:** Groundnut haulms, male camels, nutritional value, oat straw, serum biochemicals

Under feeding and malnutrition are among the main reasons for the low productivity of our livestock, besides the low genetic potential of domestic livestock. The analysis of availability, *vis-à-vis* the requirement of feed and fodders show that there is a gap of 10, 35 & 33% between demand and supply of dry fodder, concentrates and green fodder, respectively (Ramachandra *et al*, 2007). The crop residues are available mainly from wheat, paddy, bajra, jowar, oat, ragi, sugarcane trash, etc. Since these form the staple diet of livestock, these need to be utilised efficiently and judiciously either through combination or pre-treatment or in feed blocks/ pellets to bridge the requirements of our animals. A large percentage of Indian livestock depend on cereal straws for their rations. Like other cereal straws, oat straw is also a poor quality roughage having low protein, energy and mineral contents and is not normally fed to camels. Oat straw (*Avena sativa*) is a low density, bulky roughage. Inclusion of 30-40% in the feed block ration resulted in the formation of easily disintegrable feed blocks. Hence, idea of oat straw based feed block was dropped. Its utilisation alone and in combination and with groundnut haulms was tried in camels.

## Materials and Methods

Using 5 adult healthy dromedary male camels (726.00 ± 30.09 kg B.Wt., 8-10 years), the nutritional evaluation of 3 diets, viz., oat straw as sole feed (phase I), mixed diet of oat straw and ground nut haulms in 50:50 ratio (phase II) and ground nut (GN) haulms as sole feed (phase III) was done for 3 experimental feeding periods, each of 4 weeks duration. Each experimental period was followed by a digestion trial of 5 days' collection period to know the nutrient utilisation and assessment of nutritive value of diets. Out of the 5 adult camels, 2 camels refused to eat oat straw in phase I, because of its physical texture, toughness and had to be excluded from the experiment. In phase II, again 2 camels consumed ground haulms but refused oat straw, thus 2 camels had to be excluded from the experiment. Groundnut haulms was soft, palatable and all the 5 camels

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readily ate it to fulfill their dry matter requirements in phase III. Body weight of camels was recorded in the morning before feeding. Daily feed offered and refusal of individual animal was recorded. Blood was drawn from the jugular vein of the camels in the morning before feeding. The chemical composition of pooled samples was determined as per AOAC (1995) methods and serum glucose, total protein and urea were estimated with the help of Ark Diagnostics Pvt. Ltd. kits from Banglore. The data were subjected to statistical analysis as per Snedecor and Cochran (1968).

## Results and Discussion

Proximate composition of oat straw in terms of crude protein (CP), ether extract (EE), crude fibre (CF), total ash (TA) and nitrogen free extract (NFE) contents was 4.93, 1.22, 39.93, 11.40 and 42.52%, respectively and in GN haulms the respective values were 8.75, 1.74, 28.60, 10.74 and 50.16% on dry matter basis. Chemical composition of oat straw and groundnut haulms indicated that GN haulms being leguminous was superior to oat straw. The results presented in Table 1 indicated that camels fed on oat straw alone had significantly (P<0.01) lower DM intake than mixed diet (phase II) or GN haulms (phase III). The% DMI of camels fed on mixed diets was less than camels fed on GN haulms alone (phase III) but differences were not significant. The digestibility of DM, OM, CP, EE and NFE except CF were significantly (P<0.01) lower in camels maintained on oat straw alone. The CF digestibility in camels reared on sole GN haulms was significantly (P<0.01) less than in phase I and phase II and the digestibility of all other proximate constituents was higher in phase II and phase III than in phase I. The differences between phase II and III were however non- significant for all other proximate constituents. The nutritional value of oat straw (phase I), mixed diet (phase II) and GN haulms (phase III) were 1.93, 4.37, 5.60% DCP and 48.07, 60.69, 62.38% TDN and 7.27, 9.14, 9.40 ME MJ/ kg, respectively indicating that feeding oat straw alone may not meet the nutrient requirement for maintenance. But feeding it with GN haulms as 50:50 diet (phase II) or feeding camels with GN haulms alone (phase III) can meet the requirement for maintenance. The intake of poor quality roughage as sole feed is restricted probably due to nutrient deficiency or longer digestion/retention time. Ondiek *et al* (2011) also observed increase in DM intake on supplementing rhodes grass with *Zizypus mucrona* in African goats and showed it due to improved rumen environment. Similar digestibility responses were also reported by Ondiek *et al* (2011) and Nyangaga (2001) and support our results. The nutritional value of rations in terms of CP, DCP, TDN% and ME MJ/ kg DM was lower in phase I and improved in phase II and III on supplementation of nutritional and palatable groundnut haulms. Similar findings were reported by Nagpal *et al* (2004), Ondiek *et al* (2011) and Veereswawa *et al* (1993) which lend support to the present observations. Higher voluntary dry matter intake, nutrient digestibility and intake were also ealier reported by Nagpal *et al* (2004 ) in camels on supplementation of ardu (*Ailanthus excelsa*) leaves to sewan (*Lasiurus sindicus*) grass. Because of supplementation effect of better nutritional valued groundnut haulms, the dry matter intake coupled with higher

**Table 1.** Nutrient utilisation of adult camels given 3 roughage rations.

| Particulars | Phase 1 | Phase 2 | Phase 3 |
|---|---|---|---|
| Body wt. Kg | 721.00 ± 28.16 | 757.00 ± 45.83 | 740.80 ± 53.57 |
| DMI kg/d | 3.83 ± 0.28 | 6.80 ± 0.4 | 8.70 ± 0.12 |
| DMI** kg/ 100 kg B.Wt. | 0.54 a ± 0.06 | 0.98 b ± 0.09 | 1.20 b ± 0.09 |
| **Digestibility%** | | | |
| DM** | 57.28 a ± 1.33 | 67.76b ± 0.87 | 65.08 b ± 1.15 |
| OM** | 59.10 a ± 0.77 | 69.53 b ± 1.27 | 68.49 b ± 0.88 |
| CP** | 39.13 a ± 1.02 | 62.00 b ± 2.70 | 63.98 b ± 1.76 |
| EE | 47.39 ± 1.29 | 55.00 ± 2.83 | 57.73 ± 4.51 |
| CF** | 65.04 b± 0.35 | 65.89 b ± 0.61 | 56.26 a ± 1.49 |
| NFE** | 52.05 a ± 1.54 | 68.55 b ± 1.53 | 76.62 c ± 0.91 |
| **Nutritive value** | | | |
| CP% | 4.93 | 7.06 | 8.75 |
| DCP% | 1.93 | 4.37 | 5.60 |
| TDN% | 48.07 | 60.69 | 62.38 |
| ME MJ /kg | 7.24 | 9.14 | 9.40 |
| **Plane of Nutrition** | | | |
| CPI g/d | 188.67 ± 14.08 | 479.67 ± 19.63 | 761.40 ± 10.66 |
| DCPI g/d | 73.67 ± 4.33 | 298.00 ± 24.02 | 487.40 ± 17.62 |
| TDNI kg/d | 1.84 ± 0.14 | 4.13 ± 0.29 | 5.43 ± 0.14 |
| MEI MJ/d | 27.70 ± 2.05 | 62.27 ± 4.42 | 81.79 ± 2.06 |
| DMI ** g/kg W 0.75 | 27.67 a ± 2.77 | 50.22 b ± 3.57 | 62.15 c ± 3.54 |
| DCPI** g/kg W 0.75 | 0.53 a ± 0.05 | 2.19 b ± 0.14 | 3.48 c ± 0.23 |
| TDNI** g/kg W 0.75 | 13.30 a ± 1.34 | 30.55 b ± 2.66 | 38.81 c ± 2.43 |
| MEI** MJ / kg W 0.75 | 0.20 a ± 0.02 | 0.46 b ± 0.04 | 0.58 c ± 0.04 |

Values bearing different superscripts in a row differ significantly ( ** =P<0.01)

nutrient digestibility the nutrient intake of CP, DCP, TDN and ME increased from phase I to phase III. Mokhtar *et al* (1989) observed that adult camels lose their body weights on dry matter intake falling below 1.0 kg/100 kg body weight. The dry matter intake was nearly 1.0 kg/100 kg body weight in phase II and higher in phase III, thus, the oat straw as roughage diet alone was not enough to satisfy the maintenance requirements of the camels and camels fed oat straw should be supplemented with minimum equal quantity of groundnut haulms. Comparison of present data with ICAR (1985) feeding standards show that ICAR recommendations of 16.50 kg DM @ 2.2 kg/ 100 kg body weight, 650 g DCP and 7.5 kg TDN for maintenance of adult camel weighing 750 kg are much higher than those observed in the present experiment.

Analysis of serum biochemical profile revealed non-significant difference for serum glucose, total protein and urea among 3 phases (Table 2). Non-significant higher serum values of urea were also observed in camels on dry chaffed sewan grass than on ardu leaves supplementation (Nagpal *et al,* 2004). Again higher serum urea levels were observed in grazing camels in sewan pasture than stall-fed moth (*Phaseolus aconitifolius*) chara roughage ration (Nagpal *et al,* 1998). It was observed by Emmanuel *et al* (1976) that on decreasing dietary protein from 13.6 to 6.1%, the fraction of urea entry rate that was degraded rather than excreted in urine increased from 47 to 86% which shows camels superiority over other livestock under desert conditions.

**Table 2.** Serum biochemical values of camels given 3 roughage rations.

| Parameters | Phase 1 | Phase 2 | Phase 3 |
|---|---|---|---|
| Glucose (mg/dl) | 80.12 ± 1.26 | 87.22 ± 2.16 | 80.72 ± 2.73 |
| Total protein (g/dl) | 6.27 ± 0.27 | 6.31 ± 0.20 | 6.81 ± 0.32 |
| Urea (mg/dl) | 22.14 ± 1.46 | 18.94 ± 3.12 | 17.25 ± 1.19 |

The results indicated that oat straw alone was not palatable enough provide enough nutrients for maintenance of adult camels, it should be fed in combination with groundnut haulms. Groundnut haulms alone was palatable enough support adult camels.

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