DOI : 10.5958/2277-8934.2022.00050.9 Vol 29 No 3, p 355-358

EFFECT OF PHYTOCHEMICAL-RICH PELLETED COMPLETE FEED ON HAEMATO-BIOCHEMICAL PARAMETERS IN CAMEL CALVES

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ABSTRACT

To study the effect of phytochemical-rich pelleted complete feed on haemato-biochemical parameters of camel calves, 98 days feeding trial was conducted on 15 camel divided into 3 equal groups *viz.*, T_1 , T_2 and T_3. The experimental feed was iso-nitrogenous prepared with concentrate to roughage ratio 60:40. Treatments were: (T_1) a basal diet (control) consisted of roughage (groundnut straw and guar straw) and concentrate mixture, (T_2) the basal diet supplemented with *Prosopis cineraria* (20% of roughage moiety), (T_3) the basal diet supplemented with *Ziziphus nummularia* (20% of roughage moiety). There was no significant difference in the mean haemato-biochemical parameters *viz*., haemoglobin, packed cell volume, blood glucose, total serum protein, urea, AST and ALT. Results indicate that *P. cineraria* and *Z. nummularia* leaves supplementation of diets of Indian dromedary camel calves at 20% level in roughage moiety of pelleted complete feed does not affect physiological health status of camel calves.

Key words: Camel, haemato-biochemical, pelleted complete feed, phytochemical

The phytochemicals contained in plants are a part of the herbivore diets and these bioactive compounds have rumen modifying capabilities (Wallace *et al,* 2002). The phytochemicals or plant secondary metabolites act as natural feed additives to improve the efficiency of rumen fermentation such as enhancing protein utilisation efficiency, decreasing methane production, reducing nutritional stress such as bloat, and improving animal health and productivity (Singh and Sahoo, 2004; Patra *et al,* 2006; Benchaar *et al,* 2007). Camel has a unique ability to convert the scanty plant resources of the desert into milk, meat and fibre. Its unique physiological system aids this animal to fill important niche in desert ecosystem (Ahmad *et al,* 2010). The conventional sources of fodder seem inadequate and diminishing gradually and thus, it is imperative to identify other non-food plant resources and unconventional forages to assist the animal feed industry and improve livestock productivity (Sahoo and Sawal, 2021). The multipurpose tree leaves and shrubs have been proclaimed as a solution to feeding of ruminants in the tropical areas, especially as supplementary feeds to low-quality forages containing low levels of crude protein and fermentable energy (Singh and Sahoo, 2004; Patra and Saxena, 2009; Sharma and Sahoo, 2017). The objective was to evaluate the effects of tanniferous *P. cineraria* and saponiferous *Z. nummularia* supplementation in pelleted complete feeds of Indian dromedary camel calves on haemato-biochemical parameters.

Materials and Methods

Dietary treatments and feeding plan

The present experiment was conducted at ICAR-National Research Centre on Camel, Bikaner, Rajasthan, India. Fifteen Indian dromedary camel calves (5-6 months old; initial body weight 143±2.7 kg) were randomly assigned to one of three dietary treatments in a 98 days completely randomised design experiment. The experimental feed was iso-nitrogenous prepared with concentrate to roughage ratio 60:40. Three treatments given were: T1- a basal diet (control) consisted of roughage (groundnut straw and guar straw) and concentrate mixture, T2- the basal diet supplemented with *Prosopis cineraria* (20% of roughage moiety), T3- the basal diet supplemented with *Ziziphus nummularia* (20% of roughage moiety). Animals were housed in individual semi open pens.

All diets were mixed mechanically and pressed to form pelleted complete diets. Diets were offered individually twice daily (10:00 and 16:00 h), while feed residues, if any, were removed and weighed

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once daily before morning feeding. Fresh water was available *ad lib*.

Haemato-biochemical assay

Blood samples were collected at fortnightly intervals for assessing the haemato-biochemical status of camel calves.

Haemoglobin and packed cell volume (PCV) were determined using Sahli-Hellige haemoglobinometer and microhematocrit method, respectively, while mean corpuscular haemoglobin concentration (MCHC) was calculated as the ratio between the two and expressed as percentage. Serum was separated from another blood sample to estimate the biochemistry parameters, *viz.* blood glucose, serum urea, total protein, alanine aminotransferase (ALT) and aspartate aminotransferase (AST) by Biotron BTR-830 photometer using standard kit supplied by AGD Biomedicals (P) Ltd., India.

Statistical analysis

The data on various haemato-biochemical profile were analysed using analysis of variance (ANOVA) by applying the general linear model (GLM) with two principal variables treatments and periods of observation (SPSS, 2011; version 20.0). The mean values were compared by employing Tukey's multiple comparison and significance was declared at $P < 0.05$.

Results and Discussion

The nutrient composition of tree leaves in the pelleted feeds differed with respect to polyphenolic composition and was due to addition of phytochemical rich tree leaves at 20% replacement to conventional groundnut straw and guar straw mixture that was offered to the control group. This deviation was due to higher tannin content in *Khejri** (*P. cineraria*) leaves and higher saponin content in *Pala leaves*** (*Z. nummularia*) (Pal *et al,* 2015; Singh *et al,* 2005).

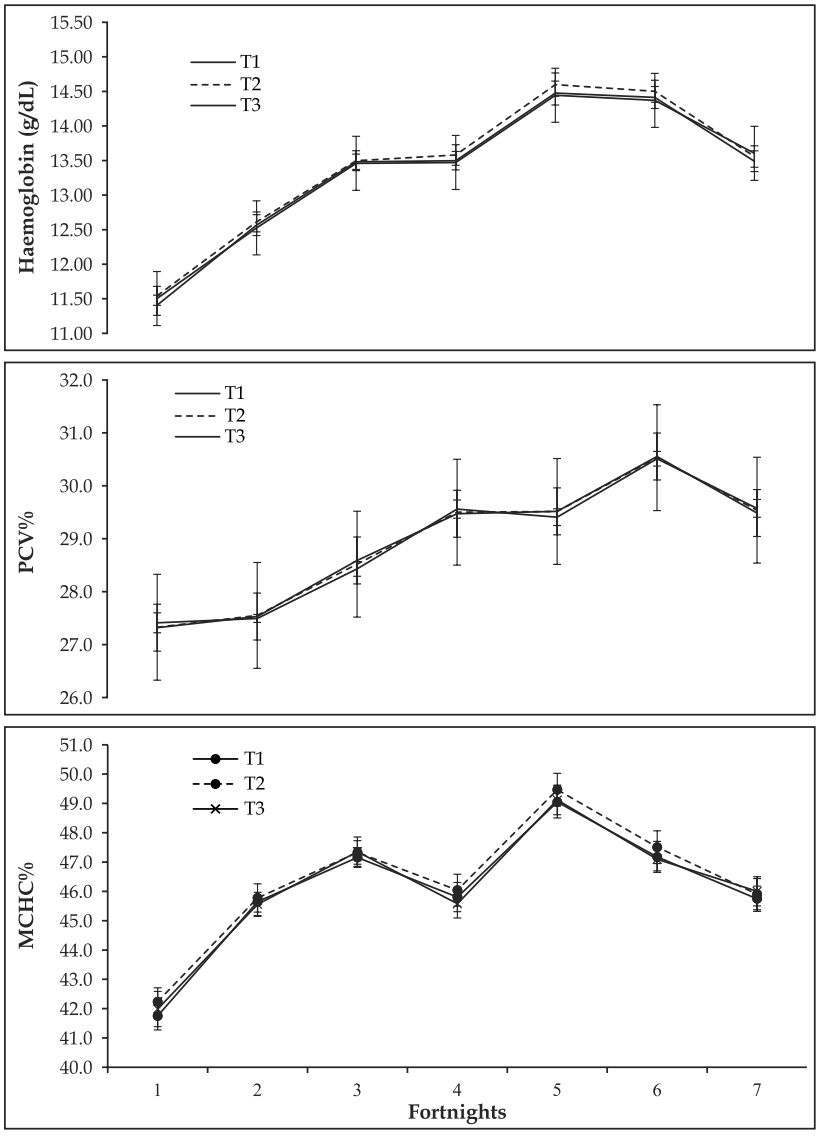

Fig 1. Haemoglobin, PCV and MCHC concentration of camel calves in different groups during the pre-weaning periods.

Haematological parameters

There was no significant effect of phytochemical-rich dietary variation on the haematological parameters *viz.*, haemoglobin ($P=0.536$), PCV ($P=0.983$), MCHC ($P=0.615$) between the groups, but periodic alteration ($P<0.001$) with non-significant treatment × period interaction was seen (Fig 1). Invariably, all the three parameters were highest during the 5th fortnight and lowest during the first fortnight. It was revealed that the observed values in all the 3 dietary groups were well within the normal range and were in line with other reports (Dey *et al,* 2015; Pathak *et al,* 2016; Sireesha *et al,* 2021). The present haematological observations in preweaning camel calves may be useful as reference values for camel calf health and metabolic profile in correlating to nutritional status or

* and ** Vernacular names.

different disease conditions.

Blood-biochemistry

The blood biochemical constituents *viz.* glucose, urea, total proteins were found similar amongst the groups (Table 1).

Serum enzymes

The serum concentration metabolising enzymes, ALT and AST did not differ between the treatments, periods or treatment × period interaction in camel calves during the pre-weaning periods (Table 2).

In the present study, glucose, urea, total protein, AST and ALT levels in all the 3 dietary groups were found within the physiological range indicating that inclusion of phytochemical-rich pelleted feeds did not elicit any adverse effect on these parameters and agree with previous findings of Yadav and Bissa (1998) and Bogin (2000). Raghuvansi *et al* (2007a) also reported similar non-significant effect of inclusion of tree leaves in the diet of sheep on blood biochemical constituents

Table 1. Effect of phytochemical-rich pelleted feeds on blood biochemical parameters of camel calves during the pre-weaning periods.

Attributes	Fortnights							Pooled	SEM	Significance		
	1	2	3	4	5	6	7			Treatment	Period	Treatment × Period
Glucose (mg/dL)												
T1	127.4	127.8	128.1	126.2	125.0	128.8	127.2	127.2	0.48	0.128	0.882	0.900
T2	127.9	126.9	128.7	129.4	127.7	126.3	126.4	127.6	0.44			
T3	126.5	126.1	125.8	127.3	126.1	124.7	124.9	125.9	0.34			
SEM	0.41	0.49	0.88	0.94	0.78	1.19	0.67					
Plasma urea (mg/dL)												
T1	19.47	19.44	17.44	18.65	18.59	19.31	18.78	18.81	0.27	0.579	0.122	0.747
T2	19.76	18.34	17.33	19.56	19.24	16.85	16.59	18.24	0.50			
T3	19.11	19.91	18.35	18.90	18.55	16.62	18.25	18.53	0.38			
SEM	0.20	0.47	0.35	0.27	0.20	0.85	0.67					
Serum protein (g/dL)												
T1	4.27	4.31	4.39	4.30	4.36	4.29	4.32	4.32	0.022	0.203	0.340	0.210
T2	4.34	4.30	4.27	4.26	4.31	4.29	4.24	4.29	0.013			
T3	4.26	4.35	4.33	4.23	4.30	4.34	4.36	4.31	0.021			
SEM	0.004	0.030	0.028	0.031	0.026	0.033	0.005	0.034				

T1, pelleted feed with conventional roughages; T2, pelleted feed containing 20% *P. cineraria* leaves; T3, pelleted feed containing 20% *Z. nummularia* leaves.

Table 2. Effect of phytochemical-rich pelleted feeds on serum enzymatic profile indicative of the liver function of camel calves during the pre-weaning periods.

Attributes	Fortnights							Pooled	SEM	Significance		
	1	2	3	4	5	6	7			Treatment	Period	Treatment × Period
Aspartate transaminase activity (IU/L)												
T1	53.5	52.9	54.3	55.9	50.4	51.3	55.4	53.4	0.77	0.906	0.953	0.954
T2	53.9	53.1	53.3	52.2	52.6	52.6	56.5	53.5	0.55			
T3	51.4	54.7	51.4	56.3	52.0	50.9	51.2	53.2	0.79			
SEM	0.78	0.57	0.85	1.31	0.66	0.51	1.41					
Alanine transaminase activity (IU/L)												
T1	10.16	10.22	11.87	10.81	10.68	11.93	12.18	11.12	0.32	0.932	0.241	0.999
T2	10.12	11.31	10.51	11.20	11.72	11.34	12.47	11.24	0.29			
T3	10.86	10.56	11.61	11.16	10.69	10.54	12.05	11.07	0.22			
SEM	0.25	0.32	0.43	0.13	0.33	0.41	0.12					

T1, pelleted feed with conventional roughages; T2, pelleted feed containing 20% *P. cineraria* leaves; T3, pelleted feed containing 20% *Z. nummularia* leaves.

and found no health disorders during the period of study. Likewise, Raghuvansi *et al* (2007b) also found no effect of foliage supplementation on haemato-biochemical parameters of sheep.

In the present study, haemato-biochemical parameters that were assessed and monitored fortnightly as a measure of nutritional and health wellbeing of camel calves in response to feeding on phytochemical-rich diets did not alter.

Acknowledgement

The support provided by National Research Centre on Camel in carrying out this study is thankfully acknowledged.

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