

Influence of Mahua Seed Cake on Serum Profile in Crossbred Calves

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Abstract

A study was conducted to assess the effect of feeding compressed complete feed block (CCFB) containing 5% deoiled mahua seed cake (DMSC) on the serum biochemical profile in the crossbred (CB) calves. Twelve growing crossbred male calves (6-10 months old), were selected and divided into two groups (six in each) by using paired random design. The control group (T₁) was fed CCFB alone while treatment group (T₂) was fed with CCFB containing 5% DMSC. Both the diets were iso-nitrogenous and were formulated to meet the requirement of 600 g/d average daily gain. The study was continued for 120 days. Blood was collected to harvest the serum and serum metabolites were analysed using standard protocol. The mean values for Hb (mg/ dl), serum glucose (mg/dl), total protein (g/dl), albumin (g/dl), globulin (g/dl), A: G ratio, ALT, AST (IU/L) and serum urea-N (mg/dl) of all the experimental CB calves were found to be statistically similar with that of the control group. It is concluded that the inclusion of DMSC at 5% in CCFB has no any adverse effect on the serum biochemical profile in the CB calves in long term feeding.

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Introduction

The shortage of protein and energy feeds and economic considerations have attracted the attention of veterinary nutritionists to use unconventional feed resources in the feeding of livestock. Mahua (*Bassia latifolia*) is a deciduous, large evergreen tree of dry forests containing 20% CP and 50-55% TDN. The use of mahua seed cake is limited due to its extremely bitter taste and some anti-nutritional factors such as saponins and tannins. Saponins are found in various plants in different forms,

resulting in their different activities. Many saponins have a general action on lipid membranes and cause lysis of red blood cells *in vitro* and *in vivo* by intravenous administration. Saponins and tannins at minimal level in diet have positive influence on the rumen fermentation. The blood consisting of blood cells and plasma fulfils the transport, regulatory, protective and homeostatic functions (Nasyrova *et al.*, 2006). Determination of the haematological profiles reflects the physiolo-

gical responsiveness of the animals to its internal and external environment (Esonu *et al.*, 2001). Haematology and serum biochemistry assay of livestock suggest the physiological disposition of the animals to their nutrition (Madubuike and Ekenyem, 2006). Serum biochemistry is important indicator of health and disease in animals and has become vital in the diagnosis, treatment or prognosis of many diseases (Eze *et al.*, 2010). Keeping above in view, the present study was conducted to assess the effect of feeding CCFB containing 5% DMSC on serum biochemistry in crossbred calves in order to know the effect of feeding DMSC on serum profile.

Materials and Methods

Twelve growing crossbred male calves (6-10 months old), were selected and divided into two groups of six in each by using paired random design. The control group (T₁) was fed CCFB while treatment group (T₂) was fed CCFB containing 5% DMSC. Chemical composition of the diet fed to the animals is given in Table 1. Both the diets were made iso-nitrogenous and were formulated to meet the requirement of 600 g/d growth as per NRC (2001). All the animals were dewormed and vaccinated before the onset of the experiment. The study was continued for 120 days. Blood was collected at the end of experimental trial by jugular venipuncture and serum was collected and then stored at -20°C until further analysis. Serum was analysed after thawing for various biochemical and enzymatic profiles by standard protocol using commercial diagnostic kit (Span Diagnostics Ltd. Surat, India). The experimental data generated were analyzed using the SPSS (SPSS Inc., Chicago, Illinois, USA) computer package.

Results and Discussion

The average haemoglobin (Hb) concentration at the end of metabolism trial was 12.87 and 12.17 in control and treatment groups, respectively (Table 2). Saponins are having the haemolytic properties and they may lower the Hb level in the body of the animal but, levels of CB calves (Kaneko, 1989). Present results indicate that feeding of DMSC at 5% level in

CCFB have no adverse effect on Hb in CB calves even during long term feeding.

Hb observed in the present study was within the normal physiological range (Hb 9-15 g/dl) for Serum glucose concentration (mg/dl) was 59.12 and 54.82 in control and treatment groups, respectively, which was statistically (P<0.05) similar in both the groups. These values are within the normal (50-80 mg/dl) physiological range for cattle (Kaneko, 1989). An increased or decreased level of serum glucose level is an indicator of optimum nutrition to the animals. However, in present study, analogous glucose level indicates normal physiological condition of all the experimental animals throughout the experimental period.

Table 1: Chemical composition of concentrate mixtures offered to crossbred calves

Attributes (%)	Groups [#]	
	T ₁	T ₂
Organic matter	91.51	91.68
Crude protein	13.12	12.93
Ether extract	1.31	1.56
Neutral detergent fibres	52.49	53.16
Acid detergent fibres	33.28	33.82
Hemicelluloses	19.21	17.34
Total carbohydrates	7.05	77.31
Calcium	0.99	0.97
Phosphorus	0.72	0.7
Total Ash	8.49	8.32

[#] Group T₁ and T₂ contain compressed complete feed block (CCFB) with and without 5% deoiled mahua seed cake (DMSC), respectively.

Serum ALT activity is present in both as cytoplasmic and mitochondrial enzyme which is released by even mild degenerative changes that occur in acute and occasionally in chronic liver diseases but remarkably higher values have been recorded in muscle damage (Pensent, 1983). Increased ALT activity has been reported by feeding solvent extracted mahua cake in sheep (Singh, 1987) and deoiled salseed meal in lambs (Garg *et al.*, 1984).

Table 2: Serum biochemical profile of different groups of crossbred calves fed CCFB containing DMSC

Parameters	Groups [#]		SEM	P-value
	T1	T2		
Hb (mg/dl)	12.87±.591	12.17+0.55	0.40	NS
Glucose (mg/dl)	59.12±2.38	54.82±4.55	3.07	NS
Total Protein (g/dl)	7.44±.242	7.61+0.34	0.20	NS
Albumin (g/dl)	5.01±.280	5.35+0.45	0.24	NS
Globulin (g/dl)	2.44±.184	2.16+0.19	0.11	NS
A/G ratio (g/dl)	2.05±.07	2.25+0.22	0.11	NS
ALT (IU/ L)	18.70±.765	18.44+0.65	0.48	NS
AST (IU/ L)	82.33±7.37	87.03±3.75	4.40	NS
Serum urea (mg/dl)	25.18±2.63	22.50+3.38	2.08	NS

NS: Non significant (P<0.05)

[#]Animals in Group T₁ and T₂ were fed on compressed complete feed block (CCFB) with and without 5% deoiled mahua seed cake (DMSC), respectively.

The activity of ALT and AST is an indicator of damage to liver and muscles (Silanikove *et al.*, 1996). However, activities of both ALT and AST in present study were within the normal physiological range reported for calves (Kaneko, 1989) and did not differ significantly (P<0.05) among dietary treatments. The mean values (IU/L) of ALT were 18.70 and 18.44 and for AST were 82.33 and 87.03 in control and treatment groups, respectively. Activity of both ALT and AST were found to be comparable among different dietary treatments in present experiment. Present findings are corroborated with Arif (2010) who reported that the feeding of either deoiled mahua seed cake (10%) of the concentrate mixture or addition of 2 or 4% harad (*Terminalia chebula*) have not exerted any adverse effect on blood biochemical parameter (ALT, AST and LDH) of buffaloes. Similarly Singh *et al.* (2011) found that plasma enzymes AST and ALT were not significantly altered due to supplementation of CT and saponins. Findings of present experiment are an indication that saponins level present in concentrate mixtures are within the safe level.

In the present study, serum total protein, albumin, globulin and A:G ratio

remained within normal range and did not differ significantly (P<0.05) among different dietary treatments. The serum protein concentration at the end of metabolism trial was 7.44 and 7.61 in control and treatment groups, respectively and was statistically (P<0.05) similar. This indicates that experimental feeds having 5% saponins had no deleterious effect on serum proteins. It is in accordance with the finding of Anbarasua and Dutta (2004). They reported that serum protein (albumin and globulin) concentration did not differ significantly due to the replacement of 50% dietary protein by leaf meal mixture containing saponins. Similarly Ojha (2010) reported that feeding of 10% guar meal (saponin) in crossbred calves did not result in any significant difference in concentration of serum protein in comparison to control. Contrary to these findings Hu *et al.* (2006) reported that concentrations of total protein and albumin in the goats receiving 3 g of TS/day were higher than those receiving 0 and 6 g of TS/day.

The mean values of serum urea (mg/dl) were 25.18 and 22.50 in control and treatment groups, respectively and was statistically (P<0.05) similar in both the groups

at the end of feeding trial. Present findings are in accordance with the finding of Wu *et al.* (1994) who have reported that serum urea level did not differ significantly when fed saponin from yucca extract. Similarly Nasri *et al.* (2011) found that there was no effect of *Quillaja saponaria* on plasma urea. However, lambs receiving *Quillaja saponaria* exhibited lower ($P<0.05$) concentration of plasma glucose than control lambs. Contrary to our finding feeding of *Yucca* saponin reduce blood urea in poultry (Preston and Leng, 1987) and elevated blood urea in sheep (Ryan *et al.*, 2001) and stimulatory effect in cows (Wilson *et al.*, 1998).

Conclusion

From the results of the present findings, it is concluded that feeding of complete compressed feed block containing deoiled mahua seed cake at 5% level induced no adverse effect on serum biochemical profile in CB calves during long term feeding.

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