



## Effect of Feeding Compressed Complete Feed Block Containing Guar Meal on Blood Biochemical Profile of Crossbred Calves

Shyam Lal Sharma<sup>1</sup>, Putan Singh<sup>2</sup>, Ashok Kumar Patil<sup>3\*</sup> and Jitendra Sharma<sup>4</sup>

<sup>1, 2</sup>Division of Animal Nutrition, Indian Veterinary Research Institute, Izatnagar, (U.P.), INDIA

<sup>3</sup>Department of Animal Nutrition, N.D.V.S.U., Jabalpur, (M.P.), INDIA.

<sup>4</sup>Department of Livestock Products Technology, N.D.V.S.U., Jabalpur, (M.P.), INDIA.

\*Corresponding author: AK Patil; Email: ashokdrpatil@gmail.com

Received: 11 June, 2015

Accepted: 30 July, 2015

### ABSTRACT

A study was conducted to assess the effect of feeding compressed complete feed block (CCFB) containing 5% guar meal on the blood 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% guar meal. Both the diets were iso-nitrogenous and were formulated to meet the requirement of 600 g/d average daily gain. The study was conducted for 120 days. Blood was collected to harvest the serum and serum metabolites were analyzed 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, SGOT, SGPT (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 guar meal at 5% in CCFB has no any adverse effect on the blood biochemical profile in the CB calves in long term feeding.

**Keywords:** Compressed complete feed block, guar meal, crossbred calves, saponin.

The rapid world-wide expansion of livestock and human population strongly indicates that a crisis will be precipitated in the livestock feed industries in the near future. 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. Guar meal is a relatively inexpensive high protein meal produced as a by-product of guar gum manufacture. It is a potential source of protein and has been used to feed livestock and poultry. Data of Mathur and Mathur (1989) showed that guar meal is comparable to soybean meal in terms of nutritional content. For instance, the minimum crude protein percentage of guar meal is rated at 50% compared to 48% of soy bean meal. Its crude fibre is at 6.8% maximum, while that of soybean meal is at 3%; it has a minimum crude fat content of 5% versus 1% of soybean meal, and has a higher protein solubility of 89% than soybean meal

with 78%. Guar also contains 13% crude saponin on DM basis (Curl *et al.*, 1986).

The use of guar meal is limited because it contains some anti-nutritional factors such as saponins, residual gums and trypsin inhibitors. 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 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 physiological 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 points in view, the present study was conducted to assess the effect of feeding CCFB containing 5% guar meal on blood biochemical profile of crossbred calves.

## MATERIALS AND METHODS

The protocol for this experiment was approved and calves were cared according to the guidelines of the Institutional Animal Care and Use Committee of Indian Veterinary Research Institute, Izatnagar, Bareilly, (UP), India.

### Animals and experimental design

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% guar meal. Physical and 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 experiment was conducted for 120 days. Blood was collected at the end of experimental trial by jugular vein puncture 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. The experimental data generated were analyzed using the SPSS (SPSS Inc., Chicago, Illinois, USA) computer package.

## RESULTS AND DISCUSSION

Blood haemoglobin (Hb) is an indicator of erythrocytic normal level and general well beings of animals. The average Hb concentration at the end of metabolism trial was  $12.87 \pm 0.59$  and  $12.69 \pm 0.35$  in control and treatment groups, respectively (Table 2). Saponins are having the haemolytic properties (Hassan *et al.*, 2007) and they may lower the Hb level in the body of the animal but, levels of Hb observed in the present study were within the normal physiological range (Hb, 9-15 g/ dl) in CB calves

(Radostits *et al.*, 2003) and did not differ significantly ( $P > 0.05$ ) among different dietary treatments. Present results indicate that feeding of guar meal at 5% level in CCFB have no adverse effect on target Hb in CB calves for 120 days. Similar to our study, Ojha (2010) have also observed that supplementation of 10% guar meal in concentrate mixture did not have any change in Hb values in crossbred calves of control and treatment groups.

**Table 1.** Physical and chemical composition of CCFB offered to crossbred calves.

Physical composition (g) of 5 kg CCFB			
S.N.	Particulars	Groups #	
		T <sub>1</sub>	T <sub>2</sub>
1	Wheat straw	2500	2500
2	Crushed maize	750	675
3	Wheat bran	875	875
4	Soybean meal	800	625
5	Guar meal	-	250
6	Min. Mixture	50	50
7	Common salt	25	25
Chemical composition (% DM basis)			
1	Organic matter	91.51	91.39
2	Crude protein	13.12	13.12
3	Ether extract	1.31	1.79
4	Neutral detergent fibres	52.49	50.88
5	Hemicelluloses	19.21	17.8
6	Total carbohydrates	77.05	76.44
7	Calcium	0.98	0.96
8	Phosphorus	0.72	0.71

# Group T1 and T2 contain compressed complete feed block (CCFB) with and without 5% guar meal, respectively.

The glucose level is an indicator of the normal physiological condition and well being of animals. Serum glucose concentration (mg/dl) was  $59.12 \pm 2.38$  and  $56.23 \pm 5.47$  in control and treatment groups, respectively and within the (50 to 80 mg/ dl) normal physiological range for cattle (Kaneko, 1989) and did not differ significantly ( $P > 0.05$ ). Similarly, Paliwal *et al.*, (1989) reported the glucose concentration ranged from 53 to 57 mg/dl in the blood of growing buffalo calves fed on guar meal. Ojha (2010) also reported similar glucose content in blood

if CB calves fed on diets containing 10% guar meal in concentrate mixture. Conversely Tiwari *et al.*, (1994) observed increased glucose concentration in blood when they provided 30% and 40% ME energy requirements through crushed and boiled guar meal. An increased or decreased level of serum glucose level is an indicator of stress to the animals. However, in present study, analogous glucose level (Table 2) indicates normal physiological condition of all the experimental animals throughout the experimental period. This might be due to only 5% inclusion of guar meal and if guar meal is present in more amounts it has highly digestible NFE which generally favour propionate type of fermentation in rumen.

**Table 2.** Dry matter intake and Blood biochemical parameters in different groups of crossbred calves

Attributes	T <sub>1</sub>	T <sub>2</sub>	SEM	Sig
<b>Dry matter intake (DMI)</b>				
Intake (kg)	5.12 ± 0.49	5.31 ± 0.39	0.30	NS
Digested (kg)	3.53 ± 0.39	3.51 ± 0.27	0.22	NS
Digestibility (%)	63.63 ± 1.18	64.96 ± 0.81	0.76	NS
Blood biochemical parameters				
Hb	12.87 ± 0.59	12.69 ± 0.35	0.33	NS
Glucose	59.12 ± 2.38	56.23 ± 5.47	2.88	NS
Total protein	7.44 ± 0.24	7.63 ± 0.24	0.16	NS
Albumin	5.01 ± 0.28	5.20 ± 0.27	0.18	NS
Globulin	2.44 ± 0.18	2.48 ± 0.20	0.13	NS
A/G ratio	2.05 ± 0.07	2.14 ± 0.20	0.10	NS
SGOT	18.70 ± 0.77	18.58 ± 1.06	0.63	NS
SGPT	82.33 ± 7.37	89.02 ± 3.85	4.09	NS
Serum urea	25.18 ± 2.63	21.73 ± 2.75	1.91	NS

NS: Non significant (P>0.05)

Increased SGPT activity has been reported by feeding unconventional feeds (solvent extracted mahua cake) in sheep (Singh, 1987) and deoiled salseed meal in lambs (Garg *et al.*, 1984). The activity of SGOT and SGPT is an indicator of damage to liver and muscles (Silanikove *et al.*, 1996; Casteel, 1999). However, activities of both SGOT and SGPT 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 of SGOT (82.33±7.37 and 89.02 ± 3.85) and SGPT (18.70 ± 0.77 and 18.58 ± 1.06) IU/ L were comparable between two groups (T1 and T2). This finding are in agreement with Ojha (2010) who reported that inclusion of 10% guar meal in concentrate mixture did not alter SGOT and SGPT values in crossbred calves. Similarly, Paliwal *et al.*, (1989) also did not get any change in SGPT (IU/L) values (30.0 to 35.4) in growing buffalo calves fed on formaldehyde protected guar meal. Thus, findings of present experiment are an indication that saponins level present in CCFB are within the safe level.

In the present study, serum total protein, albumin, globulin and albumin : globulin (A:G) 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 ± 0.24 and 7.63 ± 0.24 in control and treatment groups respectively and was statistically (P>0.05) similar. This indicates that experimental feeds having saponins within normal range had no deleterious effect on serum protein. This is in agreement with the findings of Paliwal *et al.*, (1989) who reported serum protein (g/dl) ranged from 6.75 to 7.97, serum albumin ranged from 3.23 to 3.41 g/dl and serum globulin varied from 3.59 to 4.67 g/dl in growing buffalo calves fed different type of guar seed/meal. Further it is in accordance with the finding of Anbarasua *et al.*, (2004) who reported that serum protein (albumin, globulin) level did not differ significantly due to the replacement of 50% dietary protein by saponins containing leaf meal mixture. Moreover Ojha (2010) reported that feeding of 10% guar meal in concentrate mixture in crossbred calves did not produce any significant difference in concentration of serum proteins in comparison to control group.

The mean values of serum urea (mg/dl) were 25.18 ± 2.63 and 21.73 ± 2.75 in control and treatment groups, respectively and was statistically (P<0.05) similar in both the groups. This corroborates well with the findings



of Paliwal *et al.*, (1989) who fed growing buffalo calves fed on formaldehyde protected guar meal. Similarly, Wu *et al.*, (1994) also reported that serum urea level did not differ significantly when fed saponin from yucca extract. Contrary to this, Gudev *et al.*, (2005) reported lower serum urea level in lambs when saponins at a level of 2g per day were given to the lambs. In agreement with this finding feeding of *Yucca* saponin reduce blood urea in poultry (Preston and Leng, 1987).

## CONCLUSION

From the results of the present findings, it is concluded that feeding of compressed complete feed block containing guar meal at 5% level has no any adverse effect on serum biochemical profile in CB calves during long term feeding.

## ACKNOWLEDGEMENT

Authors wish to thank to the Head of Animal Nutrition Division and the Director, IVRI, Izatnagar for providing requisite facilities to conduct this study.

## REFERENCES

- Anbarasua, C. and Dutta, N. 2004. Response of goats to partial replacement of dietary protein by a leaf meal mixture containing *Leucaena leucocephala*, *Morus alba* and *Tectona grandis*. *Small Rum. Res.*, **51**: 47-56.
- Curl, C.L., Price, R.K., & Fenwick, G.R. 1986. Isolation and structural elucidation of a triterpenoid saponin from guar (*Cyamopsis tetragonoloba*). *Phytochem.*, **25**: 2675-2676.
- Esonu, B.O., Enealom, O.O., Udedibie, A.B.I., Herbert, U., Ekpor, C.F., Okoli, I.C. and Iheukwumere, F. C. 2001. Performance and blood chemistry of weaner pigs fed raw mucuna (velvef bean) meal. *Trop. Anim. Pro. Invest.* **4**: 49-55.
- Eze, J.I., Onunkwo, J.I., Shoyinka, S.V.O., Chah, F.K., Ngene, A.A., Okolinta, N., Nwanta, J. A. and Onyenwe, I.W. 2010. Profiles of pigs raised under intensive management system in southeastern Nigeria. *Niger. Vet. J.*, **31**(2): 115-123.
- Garg, A.K., Agrawal, D.K. and Nath, K. 1984. Effect of sal (*Shorea robusta*) seed meal tannins on serum enzymes, nutrient utilization and growth in growing lamb. *Agri. Wastes.*, **11**: 307-317.
- Gudev, G., Popova- Ralcheva, S., Moneva, P., Kozelov, L. and Iliev, F. 2005. Effect of *Yucca Schidigera* on some biochemical parameter in lambs. *Biotechnol. Anim. Husb.*, **21** (5-6): 59-64.
- Hassan, S.M., Gutierrez, O., Haq, A.U., Byrd, J.A., Bailey, C. A. and Cartwright, A.L. 2007. Saponin-rich extracts from quillaja, yucca, soybean, and guar differ in antimicrobial and hemolytic activities. *Poult. Sci.*, **86**: 121.
- Kaneko, J.J. 1989. Clinical biochemistry of domestic animals, 4th ed. Academic Press, Inc, California, USA.
- Madubuike, F.N. and Ekenyem, B.U. 2006. Haematology and Serum Biochemistry characteristics of broiler chicks fed varying dietary levels of Ipomoea asarifolia Leaf Meal. *Int. J. Poult. Sci.*, **5**: 09-12.
- Mathur, O. P. and Mathur, C.S. 1989. Feeding of protected protein and urea supplementation for enhanced growth and feed utilization in Magra lambs. *Indian J. Anim. Nutr.*, **6**(3): 274-278.
- National Research Council. 2001. Nutrient requirements of Dairy cattle. National Academy Press, Washington, D.C., USA.
- Nasyrova, D.I., Sapronova, A., Nigmatullina, R.R. and Ugrumov, M.V. 2006. Changes in blood plasma volume in rats during ontogenesis. *Russ. J. Dev. Biol.*, **27**: 1062-3604.
- Ojha, B. 2010. Performance of crossbred calves fed on diets supplemented with deoiled mahua seed cake and guar meal as functional feed. M.V.Sc. Thesis submitted to Indian Veterinary Research Institute, Izatnagar, India.
- Paliwal, V.K., Mandal, A.B., Yadav, K.R., Singh, N. and Krishna, G. 1989. Effect of industrially discarded guar seed (*Cyamopsis tetragonoloba*) vis-a-vis protected guar meal on rumen metabolic profile and blood biochemical constituents in growing buffalo calves. *Indian Vet. J.*, **66**:149-153
- Preston, T.R. and Leng, R.A. 1987. Matching ruminant production system with available resources in tropics and subtropics, Penambul Books Ltd: Armidale NSW, Australia.
- Radostits, O.M., Gay, C.C., Blood, D.C. and Hinchcliff, K.W. 2003. In : Veterinary Medicine - A text book of the diseases of cattle, sheep, pig, goats and horses 9<sup>th</sup> edn. Book Power, China.
- Silanikove, N., Gilboa, N., Nitsan, Z. and Perevolotsky, A. 1996. Effect of daily supplementation of polyethylene glycol on intake and digestion of tannin containing leaves (*Quercus calliprinos*, *Pistacia lenticus* and *Ceratonia siliqua*) by goats. *J. Agri. Food Chem.*, **44**: 199-205.
- Tiwari, S.P., Krishna, G. and Kumar, N. 1994. Effect of feeding guar seed (*Cyamopsis tetragonoloba*) on certain blood biochemical constituents in male buffalo calves. *Indian J. Dairy Sci.*, **47**:702-703
- Wu, Z., Sadik, M., Slemans, F.T., Simas, J. M., Pessarali, M. and Huber, J.T. 1994. Influence of yucca extract on ruminal metabolism in cows. *J. Anim. Sci.*, **72**: 1038-1042.