

## EFFECT OF PARTIAL REPLACEMENT OF GROUNDNUT CAKE WITH GUAR MEAL ON BLOOD BIOCHEMICAL PROFILE IN SHEEP FED DENSIFIED CROP RESIDUE BASED COMPLETE FEED BLOCKS

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**Abstract**– A 120 day trial was conducted to evaluate the effect of replacement of 50% Groundnut cake (GNC) nitrogen with guar meal (GM) on the blood biochemical profile in the ram lambs fed maize and sorghum stover based complete feed blocks. Twenty-four growing ram lambs of 3-4 months age were randomly selected and allocated into 4 groups consisting of 6 animals in each group. The Maize and sorghum stover based complete diets (50 roughage: 50 concentrate) with and without inclusion of GM was prepared and densified into block form and fed to ram lambs. The four dietary treatments were: M1: Maize stover based complete feed blocks (MSCFB) with GNC (34.8% CP) as protein supplement; M 2: MSCFB with guar meal (52 % CP) replacing 50 % GNC nitrogen of M1; S1: sorghum stover based complete feed blocks (SSCFB) with GNC as protein supplement and S2: SSCFB with guar meal replacing 50 % of GNC nitrogen of S2. Blood was drawn at the end of the trial for serum collection and serum metabolites were analyzed according to standard procedures. There was no significant ( $P>0.05$ ) effect on the concentration of all serum biochemical constituents among the different experimental groups of lambs and all serum biochemical constituents had mean values that were within the normal range. According to the findings of this investigation, replacing 50% GNC nitrogen with GM had no detrimental effect on blood biochemical parameters in lambs.

### INTRODUCTION

The persistent scarcity of conventional feed ingredients for ruminants in most developing nations has necessitated the search for alternative protein supplements. Groundnut cake (GNC) is a conventional protein supplement which is being extensively used in the ruminant rations throughout India but the steady increase in the market price due to limited production or seasonal availability has become a major constraint. Guar meal (GM) which is majorly cultivated in the Northwestern states (Rajasthan, Haryana and Gujarat) can be used to combat these setbacks. Guar (*Cyamopsis tetragonoloba*) is a draught resistant annual legume having 40-50% protein, and fibre with high

digestibility (Janampet *et al.*, 2016). Guar seeds mainly contain 3 parts, viz: Endosperm, germ and hull. GM is obtained after mechanical separation of the endosperm from the rest having an approximate ratio of 1:3 (germ: hull) which can be used as a feed for livestock. However, use of GM in livestock diets is limited as it contains some potent anti-nutritional compounds like saponins, trypsin inhibitors, residual gum and haemagglutinins (Mohit Antil and Sandeep Chhikara, 2019). Consumption of these anti-nutritional factors beyond threshold levels allows them to produce bitterness, reduce the availability of nutrients, reduce palatability and cause toxicity in animals. Prolonged feeding of unconventional feeds consisting high levels of anti-nutritional factors adversely affects the health,

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growth rate and immunity of animals (Mako *et al.*, 2021). Therefore, the physiological and health parameters of feed consumption from non-conventional sources must be verified.

Blood metabolic profile serve as a good indicator for assessing the effects of feeding diets and supplementations on normal physiological parameters. There are many factors that affect the biochemical and hematological indices of blood, one of which is nutrition. Dietary content (Kurtoglu *et al.*, 2005). Keeping above points in view, the present study was designed to assess the effect of feeding densified crop residue based complete feed blocks containing GM on blood biochemical profile in sheep.

## MATERIALS AND METHODS

### Animals, housing management, experimental feeds and feeding

Twenty-four growing Nellore ram lambs with initial body weight of  $15.26 \pm 0.36$  kg (3-4 months age) were distributed into four groups in a completely randomized design with six replicates per treatment, and housed in well-ventilated individual pens with provision of feeding and watering. All ram lambs were dewormed at regular intervals alternatively with albendazole and Niclosamide throughout the experimental period. Before start of the experiment, vaccination was done against foot and mouth disease and enterotoxaemia. Rams were fed four experimental rations formulated as the following: M1: Maize stover based complete feed blocks (MSCFB) with GNC (34.8% CP) as protein supplement; M2: MSCFB with guar meal (52 % CP) replacing 50 % GNC nitrogen of M1; S1: sorghum stover based complete feed blocks (SSCFB) with GNC as protein supplement and S2: SSCFB with guar meal replacing 50 % of GNC nitrogen of S2. Four iso-nitrogenous crop residue based complete diets were formulated with roughage to concentrate ratio of 50:50 to meet the requirement of 100 g/d growth as per ICAR (2013). The complete feed blocks were prepared with semi-automatic, hydraulic operated block making machine. The lambs were fed the respective diets at the rate of 4.5% of their body weight for experimental duration of 120 days. The respective diets were offered twice a day i.e., at 9.30 A.M and 3.30 P.M in equal proportion throughout the experimental period. The quantity of diets to be offered daily was adjusted fortnightly as per body weights recorded at the end

of every fortnight. The ingredient composition and chemical composition of the experimental diets were shown in Table 1 and Table 2, respectively.

**Table 1.** Ingredient composition of experimental diets used in the study

Ingredient	M1	M2	S1	S2
Maize stover	50.00	50.00	0.00	0.00
Sorghum stover	0.00	0.00	50.00	50.00
Maize grain	14.15	18.77	11.05	17.18
Groundnut cake	27.00	13.50	30.10	14.00
Deoiled rice bran	0.00	0.00	0.00	0.00
Guar meal	0.00	9.03	0.00	10.05
Urea	0.25	0.10	0.25	0.17
Molasses	8.00	8.00	8.00	8.00
Mineral mixture <sup>1</sup>	0.20	0.20	0.20	0.20
Salt	0.40	0.40	0.40	0.40
Total	100.00	100.00	100.00	100.00

<sup>1</sup>Mineral mixture contained (per kg) : Calcium 220 g, Phosphorus 100 g, Magnesium 40 g, Iron 6 g, Zinc 2.2 g, Copper 2 g, Iodine 200 mg, Cobalt 100 mg, Vitamin B1 1300 mg, Vitamin B6 130 mg, Vitamin B12 3000 mg, Vitamin A 750000 IU, Vitamin D3 150000 IU and Vitamin E 975 IU.

M1: Maize stover based complete feed blocks (MSCFB) with GNC as a protein supplement;

M2: MSCFB with guar meal replacing GNC nitrogen at 50 % level;

S1: Sorghum stover based complete feed blocks (SSCFB) with GNC as a protein supplement;

S2: SSCFB with guar meal replacing GNC nitrogen at 50 % level

### Collection of samples and analysis

Blood samples were collected at the end (120<sup>th</sup> day) of growth trial aseptically from the jugular vein of rams. The blood was drawn into vacutainers which were kept in slanting position at room temperature for separation of serum. Then the vacutainers were centrifuged at 3000 rpm for 5 min to separate the blood cells, if any. The clear serum samples were transferred to storage vials and kept in deep freezer (-20 °C) for further analysis. Serum was analysed after thawing for various biochemical and enzymatic profiles by standard protocol using commercial diagnostic kit. Feed samples were analyzed for proximate principles (AOAC, 1997) and cell wall constituents (Van Soest *et al.*, 1991).

The results obtained in study were subjected to analysis through software (Version 15.0; SPSS) by applying one-way ANOVA. The treatment means were ranked using Duncan's multiple range tests.

**Table 2.** Nutrient composition of maize and sorghum stover based complete Complete feed blocks (% DMB)

Constituent	M1	M2	S1	S2
Proximate constituents				
Dry matter	90.37	90.18	91.30	90.83
Organic matter	91.22	92.27	92.12	92.08
Crude protein	14.95	14.73	14.77	14.83
Ether extract	3.82	2.41	4.21	2.88
Crude fibre	22.16	22.19	21.21	20.99
Nitrogen free extract	50.29	52.95	51.93	53.38
Total ash	8.78	7.73	7.88	7.92
Cell wall constituents				
Neutral detergent fibre	50.08	49.60	49.12	50.25
Acid detergent fibre	31.17	30.27	31.29	30.17
Hemicellulose	18.91	19.33	17.83	20.08
Cellulose	21.12	20.44	21.66	21.82
Acid detergent lignin	5.43	5.13	4.39	4.13

Each value is an average of duplicate analysis

M1: Maize stover based complete feed blocks (MSCFB) with GNC as a protein supplement;

M2: MSCFB with guar meal replacing GNC nitrogen at 50 % level;

S1: Sorghum stover based complete feed blocks (SSCFB) with GNC as a protein supplement;

S2: SSCFB with guar meal replacing GNC nitrogen at 50 % level

## RESULTS AND DISCUSSION

The values of blood biochemical constituents in the present study (Table 3) were within the normal range in all the groups. There was no significant

( $P>0.05$ ) difference in serum glucose, total protein, albumin and globulin, total cholesterol, triglycerides, urea, BUN, ALT, AST, and ALP concentrations in lambs of various dietary groups. The results of the present study indicated that, the replacement of GNC nitrogen with guar meal did not show any adverse effect on blood biochemical constituents in lambs.

An increased or decreased level of serum glucose level is an indicator of stress to the animals. However, in the present study, analogous glucose level indicated normal physiological condition of all the experimental ram lambs throughout the experimental period and the values (mg/dl) ranged from 60.16 to 64.17.

The mean values of serum glutamate oxaloacetate transaminase (SGOT) (U/L), serum glutamate pyruvate transaminase (SGPT) (U/L) ranged from 129.33 to 146.050 and 27.83 to 31.33, respectively. Guar meal contains saponin which have haemolytic and hypocholesterolaemic properties. The activity of SGOT and SGPT is an indicator of damage to liver and muscles (Silanikove *et al.*, 1996). Normal blood biochemical parameters and serum enzymes (SGOT and SGPT) in the present study indicated that no hemolytic effect of saponin occurred when guar meal containing feed blocks (M2 and S2) were fed to lambs and there was also no occurrence of liver or kidney dysfunction. Thus, findings of the present experiment are an indication that saponins level present in M2 and S2 feed blocks were within the safe level.

**Table 3.** Effect of partial replacement of groundnut cake with guar meal on Blood Biochemical Profile in sheep fed maize and sorghum stover based complete feed blocks

Constituent	M1	M2	S1	S2	SEM	P value
Glucose (mg/dl)	60.16	60.33	64.17	61.17	0.851	0.326
Total cholesterol (mg/dl)	64.50	64.75	63.0	62.50	1.278	0.917
Triglycerides (mg/dl)	36.50	36.75	38.00	36.50	0.906	0.935
Urea (mg/dl)	44.50	40.50	41.00	37.00	1.301	0.251
BUN (mg/dl)	19.00	21.00	19.00	20.00	0.801	0.807
Creatinine (mg/dl)	1.40	1.50	1.35	1.50	0.052	0.693
Serum glutamic pyruvic transaminase (U/L)	28.00	27.83	30.33	31.33	1.299	0.747
Serum glutamic-oxaloacetic transaminase (U/L)	146.50	129.33	128.83	143.00	5.951	0.649
Alkaline phosphatase (U/L)	182.83	176.33	163.66	181.83	5.751	0.652
Total protein (g/dl)	7.61	7.56	7.45	7.30	0.162	0.917
Albumin (g/dl)	2.81	2.80	2.85	2.78	0.047	0.969
Globulin (g/dl)	4.80	4.76	4.60	4.51	0.167	0.934

Each value is an average of six observations

M1: Maize stover based complete feed blocks (MSCFB) with GNC as a protein supplement;

M2: MSCFB with guar meal replacing GNC nitrogen at 50 % level;

S1: Sorghum stover based complete feed blocks (SSCFB) with GNC as a protein supplement;

S2: SSCFB with guar meal replacing GNC nitrogen at 50 % level

The total protein (g/dl), albumin (g/dl) and globulin (g/dl) values were ranged from 7.30 to 7.61, 2.78 to 2.85 and 4.51 to 4.80, respectively and the values were within normal range and did not differ ( $P>0.05$ ) significantly. This indicated that experimental feeds having guar meal had saponin content within normal range and hence no deleterious effect on serum protein was observed. These results are in agreement with Sharma *et al* (2015) who reported that the inclusion of guar meal at 5% in CFB had no adverse effect on glucose, total protein, albumin, globulin, urea, SGOT and SGPT in the crossbred calves in a long-term feeding trial. Similarly, Ojha *et al.* (2013) reported that, feeding of 10% guar meal in concentrate mixture in crossbred calves did not produce any significant ( $P>0.05$ ) difference in blood biochemical constituents in comparison to control group. Similarly, the blood glucose, blood protein and blood urea nitrogen remained unaltered with replacement of cotton seed cake with guar meal at 50 and 100% level in Sahiwal calves (Sharif *et al.*, 2014). No adverse effect was observed on blood glucose and blood urea nitrogen in Sahiwal cows on replacement of GNC with GM up to 75% level in concentrate mixture (Jongwe *et al.*, 2014). Grewal *et al* (1996) reported that the blood glucose, BUN, creatinine, AST, ALT and cholesterol levels were within the physiological limits when soybean meal was replaced with different guar products. Similar results were reported by Walaa *et al* (2016) with replacement of sunflower cake by guar meal and he observed that lipids profile (Cholesterol and triglycerides) was decreased with increasing GM level in the diet of buffaloes.

### CONCLUSION

The results of the present study indicated that conventionally used groundnut cake can be satisfactorily replaced by Guar meal up to 50% on nitrogen basis without any adverse effect on blood biochemical parameters.

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