

# EFFECT OF FEEDING DIFFERENT LEVELS OF GUAR MEAL ON HEALTH AND CARCASS CHARACTERISTICS OF LOCAL GOAT KIDS

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## ABSTRACT

A feeding trial was conducted to evaluate the effect of guar meal, an unconventional protein source on health and carcass characteristics of local kids. 3 months old kids divided into three equal groups (control, T<sub>1</sub> and T<sub>2</sub>) randomly were fed concentrate mixture containing ground nut cake (control) while in T<sub>1</sub> and T<sub>2</sub>, ground nut cake was replaced with guar meal at 50 and 100 %, respectively. Significantly (P<0.05) higher dressing percentage was recorded on slaughter basis in group T<sub>1</sub>. The results showed that dietary treatments had no effect on whole cuts and non-edible portion. There was significantly (P<0.05) higher edible portion in group T<sub>1</sub> compared to other groups. No significant difference was observed in yield of visceral organs among the groups. Bone: muscle ratio was higher (P<0.05) in group T<sub>1</sub>. Histopathology revealed cellular swelling and peripheral leucocytic infiltration in liver of T<sub>2</sub> group kids. Present study revealed that ground nut cake can be replaced with guar meal, an unconventional feed at 50% level in kids ration without any adverse effect.

**Key words:** Carcass characters, Guar meal, Histopathology, Unconventional feed.

Conventional feeds including cereals, oil cakes and meals are provided to livestock of all categories traditionally, but there is a huge gap between the requirement and availability of feeds and fodders, Which is the reason behind low productivity inspite of large population of livestock in our country. Therefore, the use of conventional feeds in animal's diet need to be explored. Guar meal is one such protein rich non-conventional feed resource (NCFR) containing 40-50% protein<sup>5</sup>. It is a by-product of guar gum industry obtained after the mechanical separation of endosperm from both hulls and germs

of guar seed<sup>12</sup>. Major constraint in use of NCFR in livestock feeding is the presence of antinutritional factors. Guar meal also contains antinutritional factors like trypsin inhibitor, saponins, polyphenols and  $\beta$ -galactomannan gum residue<sup>9</sup> but processing of guar meal by diluted acid extraction, autoclaving or aqueous alcohol extraction has been found to improve the nutritive value<sup>14</sup>. Studies on the utility of processed guar meal as goat feed are limited. Hence, the present study was planned to determine the effect of different levels of guar meal on health and carcass characteristics of kids.

## MATERIALS AND METHODS

Eighteen kids (3 months old) with an average body weight of  $9.46 \pm 0.15$  divided into 3 groups (6 in each treatment) in a completely randomized design (CRD). All the kids were dewormed, vaccinated and reared under similar conditions throughout the experimental period of 120 days. A known quantity

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of feed was offered once a day at 8.00 am and clean water was made available.

The animals of control group were offered a basal diet, group T<sub>1</sub> and group T<sub>2</sub> were offered ration replacing ground nut cake @ 50 and 100 % with guar meal, respectively and hybrid napier var. (APBN1) was offered *ad lib.* as roughage to all the groups. The ingredient composition of experimental diets fed to different groups has given in Table 1.

After 120 days of feeding, three animals from each group were slaughtered by 'Halal' method after overnight starving. The live weights before slaughter were recorded. Stripping, legging, dressing and evisceration were performed by adopting the standard procedures<sup>8</sup>. The weight of hot carcasses, edible (liver, heart, testes, diaphragm, kidneys and spleen) and non-edible organs (blood, lungs, trachea, stomach and intestines) were recorded. The carcasses were then divided into 5 cuts - leg, loin, rack, shoulder and neck and fore shank and brisket as suggested by the National Livestock and Meat Board of United States of America<sup>4</sup>. To study histopathology, the tissue samples of liver, kidney and heart were collected and fixed in 10% neutral buffer formalin (NBF) soon after necropsy. The samples were processed, sectioned (5µm) and stained with hematoxylin and eosin for histopathological examination.<sup>10</sup>

Guar meal and the three experimental rations were analyzed for proximate composition<sup>1</sup> and fibre fraction<sup>16</sup>. Statistical analysis of the data was carried out according to the standard procedures<sup>13</sup>. Least-square Analysis of variance was used to test the significance of various treatments and the difference between treatments means was tested for significance by Duncan's new multiple range and F Test<sup>6</sup>.

## RESULTS AND DISCUSSION

Results showing the chemical composition of experimental rations with different levels of Guar meal is presented in Table 1. Chemical composition of guar meal and Napier hybrid has been given in Table 2. The per cent of crude protein in toasted Guar meal was 49.52 on dry matter basis which

was comparatively higher than other conventional protein sources commonly used in preparation of concentrate mixture. The details of carcass characteristics are presented in Table 3. The pre-slaughter weight, empty body weight and carcass weight were similar in three groups. The results were in agreement with the findings of a researcher<sup>7</sup>, who reported insignificant differences among experimental animals fed variable protein sources. Another researcher also reported similar findings in beef cattle fed guar based feed and oil seed cakes<sup>15</sup>. The similarity in carcass yield could be attributed to isocaloric and isonitrogenous feeds. There was no significant difference in dressing percentage on empty body weight basis among kids fed three experimental rations. Significantly (P<0.05) higher dressing percentage was recorded in group T<sub>1</sub> on slaughter basis. Contrary to the present findings a researcher<sup>15</sup> reported insignificant difference in dressing percentage in beef cattle.

Feeding of different levels of guar meal did not significantly influence the per cent wholesale cuts of the kids in different groups (Table 4). Similar results were reported by a worker<sup>15</sup> in beef cattle. There was significantly (P<0.05) higher edible portion in kids fed T<sub>1</sub> ration compared to animals on other two rations. But there was no significant difference in non-edible portion and in the ratio of edible and non-edible portion in different groups. No significant difference was observed in yield of visceral organs (Table 5) among animals fed three different rations. Similar findings were reported by<sup>15</sup> except for the lower values of kidney percentage in beef cattle fed guar based diets. There was a significant (P<0.05) difference in bone percentage in whole carcass among three experimental groups. Goats fed on T<sub>1</sub> ration with 50 % replacement of ground nut cake with guar meal showed lesser percentage of bone compared to other groups. Numerically higher values for meat were found in Guar based groups compared to control group. Fat percentage was significantly higher in kids fed control diet compared to Guar meal based rations. Bone: muscle ratio was significantly (P<0.05) higher in kids slaughtered from T<sub>1</sub> group. Numerically higher Bone: Muscle ratio was found in guar based diets compared to

Control ration indicating higher building of muscle in animals through usage of Guar meal compared to conventional feeds which could be a favourable point for goat farmers in economic terms or profitability.

No adverse effects were observed on liver (Fig. 1) kidney and heart of group T<sub>1</sub>. But the liver collected from goats fed T<sub>2</sub> ration revealed peripheral leucocytic infiltration (Fig. 2) and cellular swelling

(Fig. 3), which might be due to the stress in the digestive functioning, as liver secretes bile salts but it might not be directly attributed to toxic principle since the processed Guar meal was used in the ration. No adverse effects on organs (liver, kidney and heart) were observed when Guar meal was fed at 10 % in a complete diet in chicks<sup>2,3</sup> but abnormalities were reported in internal organs<sup>11</sup> on feeding chicks with 20 percent and higher levels of guar meal.

**Table 1. Physical and chemical composition of experimental diets**

Ingredient	Control	T <sub>1</sub>	T <sub>2</sub>
Maize	33	32	34
Deoiled rice bran	21	19	18
Wheat bran	18	19	17
Ground nut cake	18	9	-
Guar meal(toasted)	-	9	18
Molasses	7	9	10
Mineral mixture	2	2	2
Salt	1	1	1
<b>Proximate composition</b>			
Dry matter	91.13	91.00	91.08
Organic matter	90.31	92.53	93.02
Crude protein	17.02	17.05	17.00
Ether extract	2.22	2.48	3.14
Crude fiber	9.36	9.82	10.12
Total ash	9.69	7.47	6.98
Nitrogen free extract	61.61	63.18	62.76
<b>Cell Wall constituents</b>			
Neutral detergent fiber	54.42	57.21	61.59
Acid detergent fiber	15.6	14.11	13.57

**Table 2. Chemical composition of Napier hybrid and guar meal (% DM basis)**

Chemical composition	Napier hybrid	Guar meal
<b>Proximate composition</b>		
Dry matter	25.4	93.56
Organic matter	87.22	94.66
Crude protein	8.75	49.52
Ether extract	1.52	3.59
Crude fiber	36	4.46
Total ash	12.78	5.35
Nitrogen free extract	40.95	37.09
<b>Cell Wall constituents</b>		
Neutral detergent fiber	57.54	44.05
Acid detergent fiber	52.91	22.59

**Table 3. Effect of feeding different levels of guar meal on carcass characteristics**

Parameter	Group		
	Control	T <sub>1</sub>	T <sub>2</sub>
Pre slaughter wt. (kg)	14.87 ±0.42	14.70±0.29	14.50±0.23
Empty body wt. (kg)	10.89±0.36	10.84±0.23	10.46±0.28
Hot carcass wt. (kg)	6.31±0.16	6.52±0.18	6.08±0.14
<b>Dressing %</b>			
On slaughter wt.	42.37±0.10 <sup>b</sup>	44.32±0.34 <sup>a</sup>	41.92±0.38 <sup>b</sup>
On empty body wt.	58.03±0.46	60.13±0.44	58.13±0.21

<sup>a,b</sup> Means with different superscripts in a row differ significantly (P<0.05)

**Table 4. Effect of feeding different levels of guar meal on whole sale cuts, edible and non-edible portions (% carcass weight)**

Parameter	Group		
	Control	T1	T2
Breast +Fore shank	20.28±0.22	20.33±0.19	20.34±0.47
Neck and shoulder	24.97±0.15	25.26±0.33	25.17±0.12
Rack	10.62±0.24	10.22±0.12	10.70±0.06
Loin	11.22±0.30	11.96±0.08	11.42±0.19
Leg	32.61±0.16	32.52±0.14	32.27±0.18
Edible portion (% slaughter wt.)	59.89±0.18 <sup>b</sup>	61.24±0.27 <sup>a</sup>	58.79±0.46 <sup>b</sup>
Non edible portion (% slaughter wt.)	20.35±0.31	19.75±0.21	20.39±0.21
Ratio of edible: non edible portions	1: 2.94±0.04	1: 3.10±0.04	1: 2.89±0.05

<sup>a,b</sup> Means with different superscripts in a row differ significantly (P<0.05)

**Table 5. Effect of feeding different levels of guar meal with diet on yield of visceral organs**

Parameter	Group		
	Control	T <sub>1</sub>	T <sub>2</sub>
Pluck (%)	4.31±0.12	4.16±0.11	4.26±0.04
Liver (%)	2.48±0.07	2.40±0.04	2.44±0.09
Kidney (%)	0.39±0.01	0.39±0.01	0.40±0.01
Heart (%)	0.44±0.01	0.46±0.01	0.45±0.02
Testicles (%)	0.40±0.01	0.38±0.01	0.38±0.02
Gut empty (%)	7.29±0.17	7.25±0.11	7.61±0.17
Spleen (%)	0.14±0.00	0.14±0.00	0.15±0.01
Lungs with trachea (%)	1.38±0.06	1.30±0.06	1.36±0.04
Skin (kg)	1.26±0.05	1.21±0.02	1.15±0.01
Head (kg)	1.42±0.06	1.31±0.01	1.30±0.01
Blood (kg)	0.46±0.03	0.41±0.02	0.44±0.02
Meat	52.00±4.58	56.83±0.06	56.90±0.33
Bone	36.45±0.33 <sup>b</sup>	38.42±0.12 <sup>c</sup>	39.63±0.14 <sup>a</sup>
Fat	4.65±0.05 <sup>a</sup>	4.30±0.05 <sup>b</sup>	4.28±0.13 <sup>b</sup>
Bone-Meat ratio	1: 1.35±0.11 <sup>b</sup>	1: 1.63±0.01 <sup>a</sup>	1: 1.41±0.01 <sup>ab</sup>

<sup>a,b,c</sup> Means with different superscripts in a row differ significantly (P<0.05)

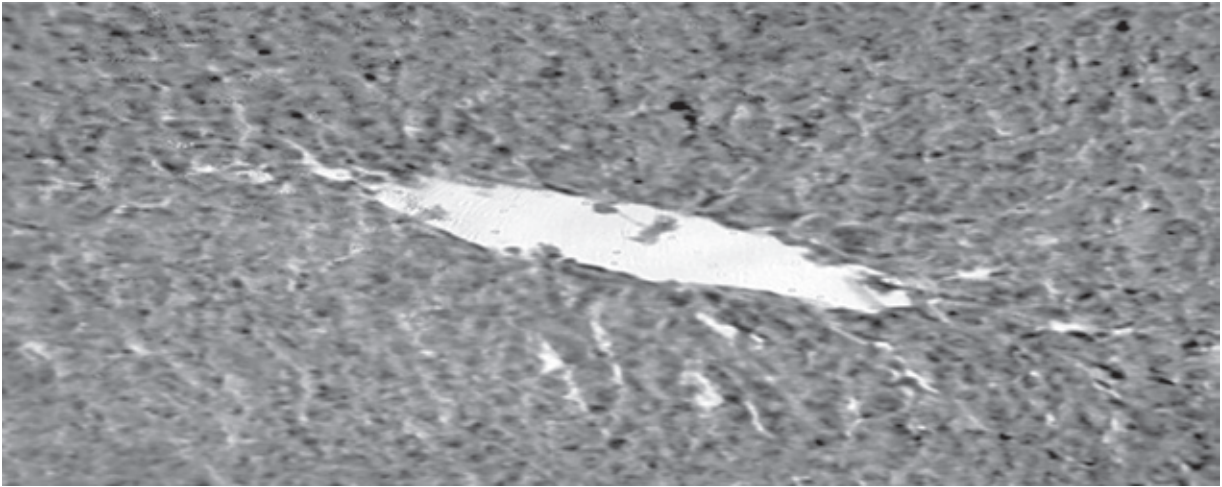


Fig. 1. Microphotograph of normal liver. HE x 200

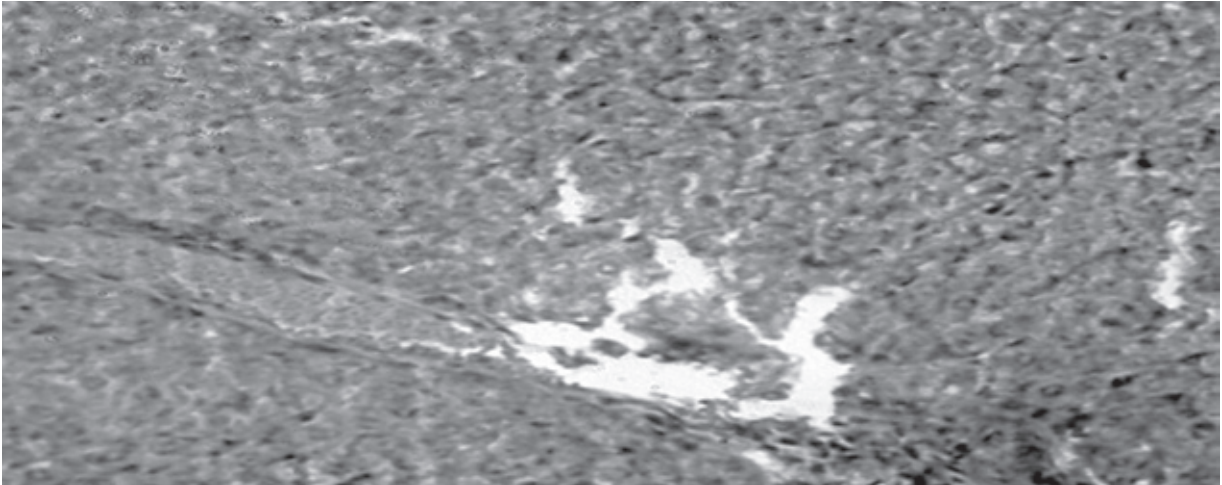


Fig. 2. Microphotograph of liver from goat fed with T<sub>2</sub> ration showing perivascular leucocytic infiltration. HE x 200

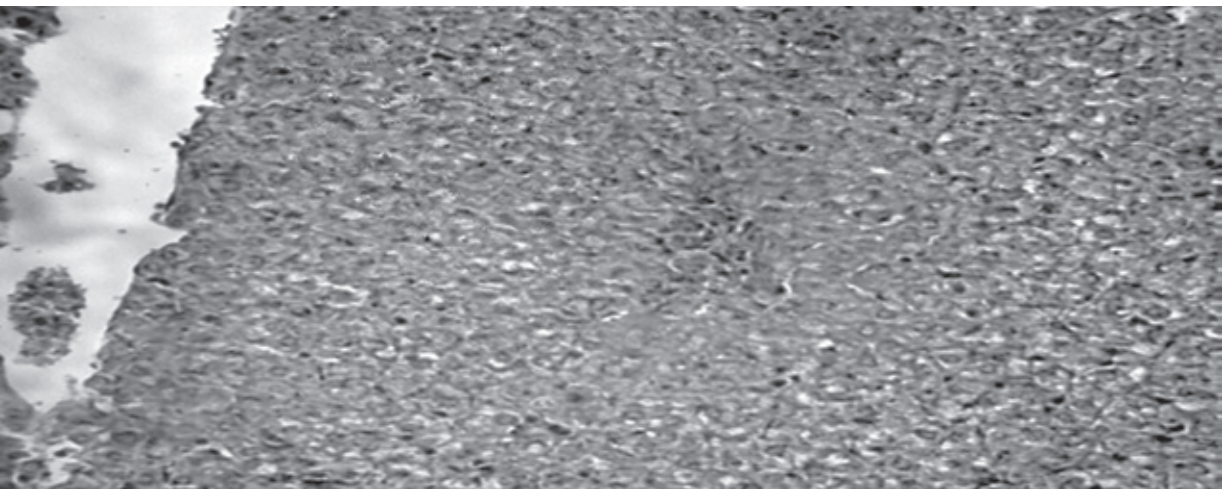


Fig. 3. Microphotograph of liver from goat fed with T<sub>2</sub> ration showing cellular swelling. HE x 200

## CONCLUSION

Hence, replacement of 50% ground nut cake with guar meal improved carcass characteristics without any adverse effects on health of experimental kids.

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