



## Growth Performance, Behaviour and Faecal Consistency of Kids Fed on Guar Meal

Razia Sultana Janampet<sup>1\*</sup>, Kishan Kumar Malavath<sup>2</sup>, Rajanna Neeradi<sup>1</sup>, Satyanarayana Chedurupalli<sup>3</sup> and Raghunandan Thirunahari<sup>4</sup>

<sup>1</sup>Department of Livestock Production Management, College of Veterinary Science, Rajendranagar, Telangana, INDIA

<sup>2</sup>Department of Instructional Livestock Farm Complex, College of Veterinary Science, Korutla Telangana, INDIA

<sup>3</sup>Department of Veterinary and Animal Husbandry Extension Education, College of Veterinary Science, Rajendranagar, Telangana, INDIA

<sup>4</sup>Department of Instructional Livestock Farm Complex, College of Veterinary Science, Rajendranagar, Telangana, INDIA

\*Corresponding author: RS Janampet; Email: drrazia0204@gmail.com

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### ABSTRACT

The present study was carried out to evaluate the effect of Guar meal, an unconventional feed on growth performance, behavioural traits, faecal consistency in kids (3 months old) with an average body weight of  $9.46 \pm 0.15$  Kg divided into three equal groups (D1, D2 and D3) following completely randomized design. Experimental diets were formulated by replacing ground nut cake (GNC) from the control (D1) group, with guar meal at 50 (D2) and 100% (D3) level in the concentrate mixture. Dietary replacement of GNC with unconventional protein source (GM) either at 50 or 100% had no negative influence on dry matter intake and feed conversion ratio. ADG was significantly ( $P < 0.01$ ) higher in D2 group but comparable to that of D1 group. No significant difference was observed in behavioural aspects in kids fed on three different rations. The percentage of time spent on eating was recorded highest in all the groups. Faecal consistency score was significantly ( $P < 0.05$ ) higher in kids fed D3 ration compared to those fed D1 and D2. Guar meal based diets were found to be more economic than conventional type.

**Keywords:** Chemical composition, cost economics, growth performance, Guar meal

Meeting livestock nutritional requirements by providing balanced ration is very important to increase the growth rate of animals. Feed accounts for 60-70 % of the cost for animal production. In developing countries like India due to erratic monsoons and expansion of human activities into the natural environment manifested by urbanization, industrialization and so on, there is a scarcity of feed and fodder. To overcome the shortage of animal feeds it is necessary to incorporate non conventional feed resources in feed formulation. Guar meal is one such unconventional feed. The major constraint in using Guar meal for feeding livestock is the presence of anti-nutritional factors like Trypsin inhibitor, Saponins, Polyphenols and  $\beta$ -galactomannan gum residue (Hassan *et al.*, 2013) but processing by diluted acid extraction, autoclaving or aqueous alcohol extraction has been found to improve the nutritive value (Tasneem and Subramanian,

1990) of Guar meal making it useful in animal feeding. While introducing such unconventional feeds feeding behaviour of livestock has to be studied as the feeding behavior can also effect the cost of raising animals. Duration of feeding, feed intake, feeding frequency, and activity level are the important aspects of behavior (Rauw *et al.*, 2006) and decreasing negative behavior helps in improving productivity of animals. Faecal scoring is a helpful tool to diagnose presence of disease, adaptability to newer feeds and nutritional status (Bovera *et al.*, 2007). Ruminant nutritionists are trying to relate faecal consistency with changes in the ration due to inclusion of unconventional diets as feeding different levels and type of feed fibre, causes changes in manure (Stallings, 1993). The present study was planned to determine the effect of different levels of Guar meal on nutrient intake, growth performance, feeding behavior, faecal consistency and



economics as the studies on the utility of processed guar meal as goat feed are limited.

**MATERIALS AND METHODS**

Present study was carried out according to the norms of Institutional Animal ethics committee of the university.

**Experimental animals and diet formulation**

Eighteen kids (3 months old) with an average body weight of 9.46 ± 0.15 Kg were used for the study. The kids were kept in quarantine for 21 days and then allotted to 3 groups (6 in each treatment) in a Completely Randomized Design (CRD). Three types of experimental rations (Table 1) were prepared and the animals of control group (D1) were offered a basal diet containing GNC whereas group D2 and D3 were offered diet replacing conventional protein source (GNC) @ 50 and 100 per cent with GM, respectively and hybrid napier (APBN1) was offered *ad libitum* for a period of 120 days.

**Table 1:** Ingredient composition (g/Kg) of feed ration

| Ingredient         | D1   | D2   | D3   |
|--------------------|------|------|------|
| 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    |
| Total              | 100* | 100* | 100* |

\*APBN1 is supplemented *ad lib* to all groups

Vitablend is added @ 30g/100 kg ration

**Experimental procedure and chemical analyses**

All the kids were dewormed and vaccinated and housed in clean and well ventilated pens. The kids were weighed initially before the start of the experiment and thereafter at fortnightly intervals during the feeding trial. Feed was weighed and offered to the animals once a day at 8.00 am and the feed refusals of each animal were weighed and

recorded daily to determine feed intake, feed conversion ratio and cost of live weight gain. Clean water was made available throughout the experiment. Behavioural recording was done by direct visual observation of kids using a stop watch for a period of five days each for four hours from 8.00 am-12.00 Noon after refreshing of daily feed. The recorded activities were eating, ruminating, drinking, standing and resting, as per the procedures of Fraser and Broom (1990). Faecal consistency of the kids was also recorded for five days by collecting the faecal samples immediately 48 hours after starting the animals to feed on the experimental rations. Faecal samples were collected in the morning and evening hours to observe the changes in faeces due to feeding of experimental rations. Faecal samples were scored using the method given by Greeffe and Karlson (1997). Guar meal and the three experimental rations were analysed for chemical composition and fiber fractions as per AOAC (2005) and Van soest (1991) methods respectively.

**Economic analyses**

The feed cost (FC) was calculated based on the price of ingredients used and then employed to calculate the feed cost per kg body weight gain.

**Statistical analyses**

Statistical analysis of the data was carried out according to the procedures suggested by Snedecor and Cochran (1994). 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 (Duncan, 1955).

**RESULTS AND DISCUSSION**

**Chemical composition of Guar meal, APBN1 and the experimental rations**

The chemical composition of Guar meal, APBN1 and the experimental rations with different levels of Guar meal fed to growing kids is presented in Table 2. The per cent of CP in toasted Guar meal was 49.52 on dry matter basis. CP value determined in toasted Guar meal in the present study was comparable with the findings reported by Nidhina and Muthukumar (2015).

**Table 2:** Chemical composition experimental diets (% DM basis)

| Nutrient                  | Guar meal | APBN1 | D1    | D2    | D3    |
|---------------------------|-----------|-------|-------|-------|-------|
| Proximate composition     |           |       |       |       |       |
| Dry matter                | 93.56     | 25.40 | 91.13 | 91.00 | 91.08 |
| Organic matter            | 94.66     | 87.22 | 90.31 | 92.53 | 93.02 |
| Crude protein             | 49.52     | 8.75  | 17.02 | 17.05 | 17    |
| Ether extract             | 3.59      | 1.52  | 2.22  | 2.48  | 3.14  |
| Crude fibre               | 4.46      | 36.00 | 9.36  | 9.82  | 10.12 |
| Total ash                 | 5.35      | 12.78 | 9.69  | 7.47  | 6.98  |
| Nitrogen free extract     | 37.09     | 40.95 | 61.61 | 63.18 | 62.76 |
| Van Soest fibre fractions |           |       |       |       |       |
| Neutral detergent fiber   | 44.05     | 57.54 | 54.42 | 57.21 | 61.59 |
| Acid detergent fiber      | 22.59     | 52.91 | 15.6  | 14.11 | 13.57 |

### Dry matter intake and feed conversion ratio

There was no significant difference in dry matter intake (Kg/d) (Table 3) among the kids fed experimental rations. Results clearly indicated that unconventional feed was equally palatable to that of the conventional protein source. The Insignificant difference in DMI might be due to usage of toasted Guar meal as processing removes beany odour and residual gum making it more palatable and another factor may be the addition of molasses which improves the palatability of feed and fodder. Similar findings were reported by Sharif *et al.* (2014). The results disagreed with the findings of Makki (1998) and Salehpour and Qazvinian (2012) who reported decreasing DMI with increasing Guar meal percentage. The ADG of kids fed on ration D2 was significantly ( $P<0.05$ ) higher than D3, but there was no significant difference in ADG between D1 and D2 rations. Similar findings were reported by Goswami *et al.* (2012) in calves fed concentrate replacing ground nut cake at 50 and 75 per cent level. Difference in FCR was statistically insignificant among three groups. Results were in line with those of Sharma *et al.* (2012) and Sharif *et al.* (2014) who reported no significant difference in FCR of Control group and the test groups containing Guar meal. Goswami *et al.* (2012) reported that replacing ground nut cake with Guar meal at 50 per cent has improved FCR in calves while at 75 per cent replacement there was a decrease in FCR.

**Table 3:** Feed conversion efficiency of kids fed on experimental rations

| Parameter                        | D1                      | D2                      | D3                      |
|----------------------------------|-------------------------|-------------------------|-------------------------|
| Daily dry matter intake (kg/day) | 0.54±0.22               | 0.58±0.02               | 0.53±0.02               |
| Average daily gain (g)           | 45.28±0.56 <sup>a</sup> | 47.22±1.15 <sup>a</sup> | 42.22±0.88 <sup>b</sup> |
| Feed conversion ratio (FCR)      | 12.31±0.43              | 12.36±0.42              | 12.41±0.59              |

<sup>a, b</sup> means with different superscripts row wise differ significantly ( $P<0.05$ )

### Cost economics

The cost of feed per Kg body weight gain recorded in the present study was 136.05, 128.36 and 133.20, respectively for D1, D2 and D3 rations. Cost of feed per Kg weight gain was approximately 5.7 per cent lower for D2 ration than the Control ration (D1). Even D3 ration with 100 percent replacement of ground nut cake with Guar meal was also found to be economic than D1. Similar findings were reported by Sharif *et al.* (2014). Mahdhavi *et al.* (2010) also pointed out that replacing protein sources with Guar meal resulted in better economic efficiency.

### Feeding behavior

No significant difference was observed in kids in their behavioral traits (Table 4) like eating, drinking, ruminating, standing and sleeping. The percentage of time spent on eating was recorded highest during the observation period of four hours and eating activity was maximum when fresh feed was offered. The percentage of time spent for ruminating was less than the time spent for eating in the present study. Insignificant difference in time spent in eating among kids belonging to three groups and more percentage of time spent in eating indicates that Guar meal based rations were equally palatable which indicates that processed Guar meal is acceptable by animals and further the addition of molasses might have helped improving palatability. Similar findings were reported by Keskin *et al.* (2005) but Nasrullah *et al.* (2013) reported higher time for ruminating in goats compared to eating activity. Present study revealed lesser percent of time spent standing by the animals during the period of observation which is contrary to the findings of Keskin *et al.* (2005) and Nasrullah *et al.*

**Table 4:** Behavioural traits and faecal consistency score of kids fed on experimental rations

| Behavioural trait        | D1                     |                 | D2                     |                 | D3                     |                 |
|--------------------------|------------------------|-----------------|------------------------|-----------------|------------------------|-----------------|
|                          | Time spent (min)       | % of total time | Time spent (min)       | % of total time | Time spent (min)       | % of total time |
| Eating                   | 114.00±1.87            | 47.50±0.78      | 111.00±1.87            | 46.25±0.78      | 108.00±4.06            | 45.00±1.69      |
| Drinking water           | 5.20±0.37              | 2.00±0.16       | 5.20±0.37              | 2.17±0.16       | 5.00±0.45              | 2.08±0.19       |
| ruminating               | 50.00±4.47             | 20.83±0.78      | 46.00±1.87             | 19.17±0.93      | 50.00±2.24             | 20.83±0.72      |
| Standing                 | 22.00±2.00             | 9.17±0.83       | 26.00±1.87             | 10.83±0.78      | 26.00±2.45             | 10.83±1.02      |
| sleeping                 | 51.20±2.92             | 21.58±0.48      | 51.80±1.16             | 21.58±1.75      | 51.00±4.2              | 21.39±0.68      |
| Faecal consistency score | 1.37±0.06 <sup>b</sup> |                 | 1.40±0.14 <sup>b</sup> |                 | 2.37±0.35 <sup>a</sup> |                 |

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

(2013). Findings for other behavioural traits like sleeping and drinking were similar to those reported by Keskin *et al.* (2005).

### Faecal consistency score

Faecal consistency score (FCS) was significantly (P<0.05) higher in kids fed D3 ration (Table 4) compared to those fed D1 and D2. Burnett, (1966) and Lee *et al.* (2003a) reported that residual gum in Guar meal increases intestinal viscosity in chickens. A significant increase in viscosity decreases the digestibility of lipid. (Smits *et al.*, 1997) and causes pasty faeces and depresses the growth and feed efficiency (Vohra and Kratzer, 1964a). Faecal pellets of kids fed on D1 and D2 ration were hard whereas those of kids fed D3 ration were soft. This might be due to higher substitution percentage of GNC with GM. Much work has not been done on Faecal consistency in small ruminants fed on unconventional feeds hence further investigation is needed to conclude the effect of GM on change in faecal consistency.

### CONCLUSION

Results of the present study indicated that replacement of 50 per cent GNC with GM improved the growth performance without any adverse effects on experimental kids. It proved to be economical than ground nut cake based conventional ration. Hence replacement of GNC with guar meal @ 50% is suggested for profitable growth rate.

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