

NUTRITIONAL EVALUATION OF GUAR MEAL BY *in vitro* DIGESTIBILITY

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Abstract: A study has been carried out to find out the chemical composition and *in vitro* fermentation characteristic of Guar meal. Six guar meal samples were collected from different parts (feed mills) of Namakkal district. The samples were ground to pass through a 2-mm screen and then analysed for chemical analysis and *in vitro* dry matter digestibility. In the present study the Crude protein, Crude fibre, Ether extract, Total ash, Sand and silica content of guar meal are 48.07, 7.1, 5.21, 5.87 and 1.05% respectively. The calcium, phosphorous, magnesium and potassium content of guar meal were 1.14 %, 3.0%, 2.5% and 0.91% respectively. Similarly the trace mineral like zinc, copper and manganese are 35 ppm, 21 ppm and 15 ppm respectively. The traces of aflatoxinB1 (0.5 ppb) also noticed in the guar meal samples. *In vitro* DM digestibility of guar meal at 24 and 48 hrs was 35 and 47 % respectively. The total VFA production at 24 and 48 h of incubation was 43.7 and 44.5 mmoles respectively. Hence, the present study showed that guar meal had relatively high protein content and *in vitro* DMD and thus have the potential to be good alternate feed source for livestock in spite of its high mannan content.

Keywords: Guar meal, Digestibility, Nutritional value, Protein source.

Introduction

Under current scenario, the price hike of raw feed ingredients of prompted animal nutritionist to formulate the economic and efficient feed rations by maximum use of agro-industrial by products that minimizes the feed cost. Other hand, Indian poultry sector has been growing at around 8-10% annually over the last decades and at more than 15% in last four years. Guar meal is such an agro-industrial by product, now widely used as an alternate protein sources for livestock especially for poultry.

Guar meal is considered as cheapest vegetable protein source for ruminants and poultry. Addition of guar meal in the feed ration is an economic strategy that reduces the feed cost. Guar meals are suitable for ruminants but its usage is limited in monogastrics because of perceived growth retarding characters. ME content of guar meal is about 2022-2074 Kcal/kg and having TDN about 65%. Guar meal is palatable to cattle. Since its inclusion at only 5%

level was refused to its odour and taste at the initial phase by cows, although it accustomed, cows can accept rations containing as high as 15% guar meal. Hence present research had been initiated to study the chemical composition of guar meal and its in vitro dry matter degradability potential.

Materials and Methods

Three guar meal feed samples were collected from different parts (feed mills) of Namakkal district. The samples were ground to pass through a 2-mm screen and then analysed for chemical analysis and in *vitro* dry matter digestibility. Dry matter (DM) was determined by drying the samples at 105 °C overnight and ash by igniting the samples in a muffle furnace at 525 °C for 8 h. Content of nitrogen (N) was measured by the Kjeldahl method (AOAC 1990). The CP was calculated as N X 6.25 and other proximate analysis was done as per the AOAC (1990).

Dry samples (0.5g) were subjected to a 24 and 48 h digestion period with McDougall's buffer/rumen fluid mixture in sealed plastics bottles followed by 24 and 48 h digestion with pepsin in weak acid (Tilley and Terry 1963). All incubations were carried out in triplicate. Three blank tubes (without sample) were used in each run.

$$\text{IVDMD (\%)} = [(\text{initial DM input} - (\text{Residue} - \text{Blank}) / \text{initial DM input}) * 100]$$

Results and Discussion

The chemical composition of guar meal was presented the Table 1. In the present study, The CP content of guar meal was as similar with the value reported by Vatandousti et al (2010) where Singh et al (2008) reported that the CP contents of guar meal reported between 38-43 %. Guar meal was a good source of rumen undegradable protein (Singh et al, 2008). Similarly, Lund *et al.* (2008) reported that the crude fibre content of guar meal was about 3.3%.

Table 1: Chemical composition of guar meal (on DMB)

| Nutrients | Percent (DMB) |
|------------------|---------------|
| Crude Protein | 48.07% |
| Crude Fibre | 7.1% |
| Ether Extract | 5.21% |
| Free Fatty Acids | 0.093% |
| Sand and silica | 1.05% |
| Total ash | 5.87% |

The mineral profile of guar meal was presented the Table 2 and indicated that guar meal contain high level of both phosphorus and magnesium (Lund et al, 2008). .

Table 2: Mineral profile of guar meal

| Sl.No | Minerals | Value |
|-------|-----------------|-------|
| 1. | Calcium (%) | 1.14 |
| 2. | Phosphorus (%) | 3.0 |
| 3. | Magnesium (%) | 2.5 |
| 4. | Potassium (%) | 0.91 |
| 5. | Sodium (%) | 0.17 |
| 6 | Chloride (%) | 0.14 |
| 7 | Zinc (ppm) | 35 |
| 8 | Copper (ppm) | 21 |
| 9 | Manganese (ppm) | 15 |

In vitro dry matter digestibility (IVDMD) studies

The dry matter degradability and rumen fermentation characteristics were listed in Table 4. The Dry matter degradability of 48h was consistent with Lund *et.al* (2008). At 24 hours, the rumen ammonia and microbial production was lowered than 48 hours. This indicates that the strong correlation between rumen ammonia concentration and microbial protein synthesis.

Table 4: IVDMD and fermentation characteristics of guar meal

| Parameter | 24 hours % | 48 hours % |
|---------------------------|------------|------------|
| IVDMD (%) | 35.0 | 47.0 |
| Rumen ammonia (%) | 4.82 | 5.46 |
| Total VFA (mmoles) | 43.75 | 44.5 |
| Microbial protein (mg/dl) | 233.3 | 266.5 |

Conclusion

From the study, it can be concluded that guar meal had relatively high protein content and *in vitro* DMD and thus have the potential to be good alternate feed source for ruminant animals during the critical periods.

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