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Production of urea-molasses-mineral blocks in a process developed by Dairyboard of India

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SUMMARY

In most developing countries, ruminant animals usually survive on crop residues and natural herbage, which do not provide adequate nutrients for improving productivity. Low quality crop residues are deficient in fermentable nitrogen, carbohydrates and minerals. Urea-molasses-mineral block (UMMB) is a strategic feed supplement for ruminants which provides a constant source of fermentable nitrogen throughout the day to promote growth of rumen microbes. Supplementation with UMMB licks significantly increase feed intake, milk yield and growth rate and as such is a cost-effective approach to maximise the utilisation of locally-available feed resources for improved productivity. National Dairy Development Board (NDDB) of India developed a modified 'cold process' of manufacturing UMMB and has also designed a plant with automatic pressing device for manufacturing block licks. In addition, a dispenser has also been designed for feeding the block lick, to prevent its biting and over-ingestion by the animal. UMMB manufacturing technology is being provided to dairy cooperatives, private organizations and international agencies for commercial production of block licks.

Keywords: *milk production, ruminant, supplementation, urea molasses mineral block*

INTRODUCTION

The productivity of dairy animals in developing countries is greatly constrained by the lack of green fodder and good quality feed, due mainly to low availability and high cost. Crop residues and dry grasses are the major source of forages for feeding livestock in these countries. These crop residues are low in nitrogen and high in fibre and lignin; characteristics that restrict intake and digestibility in animals. Animal nutritionists, all over the world, have proved that the nutritive value of these crop residues can be enhanced if supplemented with deficient nutrients (Makkar, 2002; Singh and Singh, 2003). UMMB through licking provides fermentable nitrogen, energy and minerals intermittently, necessary for optimum microbial growth. Microbial protein can contribute 30–40 percent of crude protein requirement of an animal. As ruminants can produce microbial protein from non-protein nitrogen, UMMB supplementation in the ration is quite beneficial, especially when fed crop-residue-based diets. The use of UMMB for supplementing crop-residue-based diets for livestock

has the potential to increase livestock production and net daily income (Misra, Reddy and Balakrishna, 2006). UMMBs can be fed throughout the year but are more-beneficially utilised during the dry season or when the animals are grazing low-quality fodder. Considering the benefits of UMMB supplementation of crop-residue-based diets, as demonstrated by several scientific studies, Dairyboard of India initiated efforts to standardise the formulation, production process and equipment for the commercial production of block licks.

EXPERIENCES OF APPLYING UMMB TECHNOLOGY IN THE FIELD

The 'hot process'

National Dairy Development Board (NDDB) first introduced UMMB to farmers in 1983, by manufacturing block licks using a *'hot process'*. Blocks were produced by steam-heating the molasses and then mixing it with other ingredients in a double-jacketed insulated vessel. Although farmers started using these blocks there were inherent problems in their manufacture, transport, storage and feeding (Garg, Mehta and Singh, 1998). It was difficult to handle the hot material manually at 130 °C and the blocks, being highly hygroscopic, would start melting and de-shaping on storage.

The 'cold process'

In view of problems faced in manufacturing the block licks by the *'hot process'*, efforts were made to produce blocks by the *'cold process'* using lime as a gelling agent. It was possible to produce reasonably-hard blocks using lime, however these blocks had very low palatability due to their bitter taste, resulting in poor acceptance at the field level.

The 'cold process' developed by Dairyboard of India

Efforts were made to improve the block lick formulation, to ensure that the blocks were hard enough and also palatable to the animals. To achieve this, lime and magnesium oxide were used in combination, and a buffering agent was added towards the end of the process to reduce the pH which considerably improved palatability of the blocks. In addition to modifying the formulation and the production process, Dairyboard also designed a plant for manufacturing the blocks and a dispenser for feeding blocks (Photos 1 and 2).

APPLICATION STATUS OF THE UMMB TECHNOLOGY

Supplementation with UMMB increased digestibility of low-quality basal diets leading to improvement in milk production (Garg, Sanyal and Bhanderi, 2007; Misra and Reddy, 2004). Use of UMMB supplementation proved economically beneficial. Taking into account the milk production alone, average cost: benefit ratio of feeding UMMB prepared by the 'cold process' was 1:3. Although the benefits of using UMMB are well documented by researchers in developed and developing countries, use of UMMB licks amongst milk producers need to be popularized through extensive extension efforts.

CONSTRAINTS OBSERVED DURING THE IMPLEMENTATION OF THE TECHNOLOGY

Imprints of the 'hot process'. Various problems were encountered in production, storage and feeding when UMMBs produced by the *'hot process'* were first introduced, adversely

photo 1
UMMB plant with pneumatically controlled rotary pressing device for UMMB feeding to animals

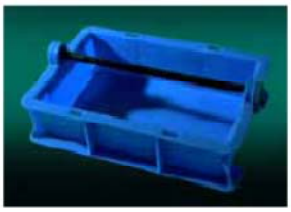

photo 2
A plastic trough for UMMB feeding to animals

affecting the large-scale acceptance of the UMMB technology by farmers. Even with all the improvements through the *'cold process'*, it was very difficult to remove the imprints of the 'hot process' from the minds of people.

Feeding and management practices. Feeding and management practices vary from region to region in India. In some regions, animals are let loose (untethered) into the field in the morning and are returned home only in the evening. The tethering place of animals is different in the morning and evening. Milk producers do not move the UMMB dispenser when they move animals from one tethering place to another. At certain tethering places, there is no manger to offer feed to animals. Under such situations, animals do not have regular and free access to UMMB. As a result, the benefits from UMMB feeding are not clearly noticeable to milk producers.

Cost and availability of molasses. Being highly palatable and a rich source of calcium, sulphur and B complex vitamins, molasses is an important and economic source of nutrients in the UMMB. In view of large variations in sugarcane production, the cost and availability of molasses fluctuates. The price of molasses varies from as low as Rs 4 000 per tonne to as high as Rupees 15 000 per tonne (1 US$ = ca Rupees 45). Due to the high cost of molasses and problems of availability, agencies are sometimes discouraged from taking up production of UMMB on a regular basis.

Lack of extension education. As well as taking-up the production of good-quality UMMB by various agencies, delivering proper extension-education to milk producers concerning the advantages of regular use of UMMB is considered equally important. Milk producers need to be explained the do's and don'ts of using UMMB so that they are able to derive proper benefits. Some agencies tried to introduce UMMB in their areas of operation without educating milk producers about the benefits and importance of regular use of the licks. These agencies had to discontinue as there was no regular demand for UMMBs after some time.

LESSONS LEARNT AND FUTURE OF THE UMMB TECHNOLOGY

In view of the above-mentioned constraints, we advise the following to agencies that are willing to popularize the UMMB technology in their areas of operation.

- The UMMB technology is only suitable for areas where dry fodder is the predominant source of roughage for animals.
- Ensure the availability of a manger for feeding UMMB and also ensure its free access for at least 10–12 hours in a day.
- Popularise the use of a specially-designed dispenser for feeding UMMB which prevents the animal biting and over-ingesting the feed block.
- Educate the milk producers about the safe use of UMMB and the benefits accrued from its regular use.
- Ensure regular availability of molasses at a reasonable price.

Some of the agencies are now producing and supplying UMMB on a regular basis, using the equipment, formulations and production process developed by Dairyboard of India. On average, about 300 000 blocks, each weighing 3 kg, are used in India annually.

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