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**Sneh D Patel**
Department of Animal Nutrition, College of Veterinary Science & Animal Husbandry, Kamdhenu University, Junagadh, Gujarat, India

**Bharat A Pata**
Department of Livestock Production Management, College of Veterinary Science & Animal Husbandry, Kamdhenu University, Junagadh, Gujarat, India

**Gaurang P Mathukiya**
Department of Animal Nutrition, College of Veterinary Science & Animal Husbandry, Kamdhenu University, Anand, Gujarat, India

**Corresponding Author:**
**Sneh D Patel**
Department of Animal Nutrition, College of Veterinary Science & Animal Husbandry, Kamdhenu University, Junagadh, Gujarat, India

# Recent advances in feeding practices in cattle and buffalo: A review

**Sneh D Patel, Bharat A Pata and Gaurang P Mathukiya**

**Abstract**
The efficiency of dairy animals needs to be improved because there is more pressure on the limited resources today, which makes advancements in feeding management an essential tool. The two innovative feed additive methods created by NDDB are Urea Molasses Mineral Block (UMMB) and by-pass protein feed technology. In addition, the NDDB's feed formulation software is very appreciated and is increasingly being used in both urban and rural regions of India. To improve the nutritional value of local agricultural residues, treatment is a potential solution. Additionally, Bovine Somatotrophin, Metabolic and Fermentation Modifiers, and Corn Steep Liquor (CSL) are all making their positions in this prospect important.

**Keywords:** UMMB, NDDB, feeding management, nutrient

## Introduction
Currently, the farmer group is not the only one involved in feeding management. It now extends beyond scholarly circles as well. It is a well-known truth that nearly 70% of the ongoing costs associated with starting a dairy enterprise are related to feeding. The aim of feeding management is evolving along with the passing of time. Other important and worrying variables are being added to the reserve of feeding management goals while maintaining the first goal of an unnecessary feeding expense. The first crucial factor at the moment is the plan for reducing methane ($CH_4$) pollution. Livestock enteric fermentation accounts for 16% of all $CH_4$ emissions worldwide (natural and artificial). Therefore, it is a difficult task for those involved in this industry to marginally reduce emissions by interfering with all branches of feeding management (Henry and Eckard, 2009) [3]. Secondly, the availability of feed and fodder is steadily decreasing to a point of extreme stress, making it crucial to progress feed and fodder utilisation. India currently has a net shortage of 64% of concentrate feeds, 21.9% of dry crop residues and 61.1% of green fodder. Thirdly, the aim is to create a steady stream of revenue for the dairy industry in order to make it sustainable. It will be feasible once one is able to reduce all potential expenses to a level that is both affordable and sustainable while still making a profit from their property. Therefore, all of the feeding formulations and ideas that have lately received attention will be clarified in this paper.

**Table 1:** Recommended feeding quantity

| | Dry Cow | Cow yielding 5 litter/day | Cow yielding 10 litter/day | Dry buffalo | Buffalo yielding 10 litter/day | Buffalo yielding 10 litter/day |
|---|---|---|---|---|---|---|
| Dry fodder (kg) | 7 | 7 | 7 | 6 | 6 | 7 |
| Green fodder (kg) | 10 | 10 | 10 | 10 | 10 | 15 |
| Compound Cattle feed (kg) | 1 | 3 | 3 | 1 | 5 | 7 |

## Bypass protein supplement
The digestive system of dairy livestock has four compartments. The majority of the meal components are degraded in the first and most important organ, the rumen. The rumen breaks down between 60 and 70 percent of the dietary protein meals given to animals to ammonia. A significant amount of this ammonia is eliminated through urine as urea. As a result, much of the protein in costly cakes and meals is encountering. Degradation in the rumen can be avoided if dietary protein meals receive the proper care. Bypass protein technology is the name given to this method or therapy for preventing dietary protein from being broken down in the rumen.

The additional protein made available for milk production as a result of these protected meals' improved small intestine digestion. This aids the animal in producing more milk of the highest grade. These protein meals are processed appropriately to lower their rumen degradability from 60-70% to 25-30% in a specifically designed airtight facility. Depending on the amount of milk production, treated protein meal may be given to animals directly as top feed at a rate of one kilogram per animal per day or may be included in cattle feed at a rate of 25 percent and fed at a rate of 4-5 kilograms per animal per day.

**UMMB (Urea Molasses Mineral Block)**

Numerous beneficial microbes can be found in ruminants' rumens, which aid in the digestion of fibrous feed components. When there is a lack of green feed, UMMB promotes rumen microbial growth, which enhances the absorption of dry feed. The "cold process" that NDDB has created for producing UMMB licks (three kg blocks) is being made available to dairy cooperatives, for-profit businesses and other agencies.

**Table 2:** Composition of UMMB

| Components | Parts per 100 kg mixture |
|---|---|
| Molasses | 36 |
| Rice bran | 38 |
| Urea | 10 |
| Cement | 8 |
| Salt | 1.9 |
| Dicalcium phosphate | 2.0 |
| Trace minerals | 0.1 |
| Water | 4 |

**RBP (Ration Balancing Programme)**

This creative plan was created by NDDB to balance the ratio of animals picked up by user-friendly software that can be used by local resource people (LRPs) who have been identified as being knowledgeable and committed to the area.

**Benefits of RBP**

1. Increase in milk production with more fat and solids-not-fat.
2. Improved reproduction efficiency.
3. Reduction in inter-calving period, thereby increase in productive life of animals.
4. Reduction in methane emission.
5. Farmers feeding balanced ration in different regions of the country have experienced an increase in their net daily income in the range of Rs 15 to 25 per animal.

**TMR (Total Mixed Ration)**

Total Mixed Ration or TMR, is a method of feeding cows that incorporates all forages, grains, protein feeds, minerals, vitamins and feed additives into a single feed blend that has been formulated to a specific nutrient concentration.

**Treatment of crop residue**

To increase the utilisation of agricultural residues in buffalo diets, numerous physical (particle size reduction), biological (pre-feeding fermentation, addition of fibrolytic enzymes) and chemical treatments have been investigated (Khan *et al.*, 2008). Ammoniated stalks have been found to contain less neutral detergent fibre (NDF), acid detergent fibre (ADF) and acid detergent lignin (Sarwar *et al.*, 1994) [7].

**CSL (Corn Steep Liquor)**

CSL, which is made from wet maize milling, is a concentrated, thick combination of myo-inositol phosphates, organic compounds, amino acids and additional peptides (Nisa *et al.*, 2004) [8]. However, CSL has low pH and high lactic acid concentration prevent it from being fed directly to ruminants.

**Metabolic and fermentation modifiers**

In general, compounds that are given, injected or inserted into animals are referred to as metabolic modifiers. These compounds are used to enhance nutrient utilization, feed efficiency, rate of gain, milk yield and its composition. Products called fermentation modifiers are added to feed to control rumen fermentation and improve forage utilisation. Conjugated linoleic acid, chromium, carnitine, magnesium, niacin, manganese, selenium betaine, vitamin A, D and E are a few metabolic and fermentation modifiers that have been widely used in dairy food. Other fermentation modifiers include methane inhibitors, proteolysis and deamination inhibitors, defaunation agents, microbial enzymes, buffer agents, ionophores and yeast cultures.

**Utilization of un-conventional feed sources**

Unconventional feed (UCF), non-conventional feed (NCF), and non-conventional feed resources (NCFR) are all terms that can vary from country to country, region to region and occasionally even within the same country. According to their abundance from agro-industrial products, unconventional feeds can be divided into four categories: (a) sources of animal protein; (b) source of vegetable protein; (c) sources of energy; and (d) miscellaneous feeds. To increase the nutritional yield per unit area, different non-conventional feeds must be evaluated for their potential use as regular livestock feed. Utilizing agro-industrial by-products also helps to solve the issue of disposing of industrial refuse. For the best animal efficiency, less concentrate must be consumed when non-traditional feeds are used.

1. **Cereal and gram by-products:** Rice bran, Rice husk, Wheat bran, Maize husk.
2. **Sugar Industry by-product:** Baggage, Molasses.
3. **Fruit and vegetable factory by-products:** Mango seed kernel, Tomato pomace, Citrus waste, citrus peel, Apple pomace.

**YEFECAP (Yeast fermented cassava chip protein)**

With yeast (*Saccharomyces cereviceae*), cassava chip and other cassava root products can be effectively fermented to produce a finished good with a high CP and a relatively high amino acid profile (Poungchompu *et al.*, 2009) [6]. When YEFECAP is added to concentrates to substitute soybean meal for lactating dairy cows, the milk yield improves. Based on the digestibility and cattle production metrics, Adhianto *et al.* (2018) [1] found that fermented palm oil waste-based feed with 13% cassava leaves and organic minerals addition produced the greatest results.

**Importance of feeding frequency (FF) on feeding management**

Understanding the fundamental processes of dry matter intake may be made easier by tracking circadian (i.e., almost 24-h)

patterns of feed consumption. More recently, group-fed lactating cows' average eating time per cow increased when FF was increased from once to twice or from twice to four times daily (DeVries *et al.*, 2005) [2]. Over the course of the 24-hour span, the cows that were fed more frequently consumed their food more evenly. Additionally, the more regular feeding resulted in less feed sorting. This could enhance fibre digestion, which has been slowed by more frequent consuming food. When a combination of grain and protein meal was given at 07:00 h and then forage was given at 10:00 h, compared to when forage was given first, a propensity for increased DMI was seen (Nocek, 1992) [5].

**Exogenous enzymes as feed additive for dairy animals**

Crop residue are intended to be used more effectively through the use of exogenous enzymes (fibrolytic). The majority of these enzymes are cellulases, hemicellulases or fungi-derived enzymes. These enzymes are available as liquid, granular or powder versions. When used as a spray on the forages prior to consumption, they demonstrate effectiveness for the intended use. The enzymes combine with the diet to increase the rumen's hydrolytic capacity, which in turn causes the microbial population to multiply, which is crucial for development. Now that organic livestock husbandry is becoming more widely used, feeding management is opening up new possibilities. 80% of the total feed for the animals is obtained from organic standard sources under this husbandry.

**Conclusion**

Dairy animals need more nutrition for production and reproduction. For next productive and powerful progeny require advanced feeding practices like RBP (Ration Balancing Programme), TMR (Total Mixed Ration), CSL (Corn Steep Liquor), feed additives like different enzymes. In the rumens of ruminants, there are many helpful microorganisms that help with the digestion of fibrous feed components. In the absence of green feed, UMMB encourages rumen microbial development, improving the absorption of dry feed. Defaunation agents, microbial enzymes, buffer agents, ionophores, methane inhibitors, proteolysis and deamination inhibitors, yeast cultures, and other substances are fermentation modifiers. Several unconventional feeds must be assessed for their potential to be used as normal livestock feed in order to maximise the nutritional yield per unit area. By-products from the agro-industrial sector can be used to address the problem of how to dispose of industrial waste. The rumen's hydrolytic capacity is increased by the enzymes and feed, which in turn allows the microbial population to grow, which is essential for development.

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