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Molasses: A Sweet Solution for Better Ruminant Nutrition

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Abstract:

Rising feed costs and the seasonal shortage of good-quality fodder make it difficult for livestock farmers to maintain animal productivity, especially in tropical regions where cattle and buffaloes often depend on crop residues and mature grasses. Sugarcane molasses is a palatable, sugar-rich by-product that can provide rapidly fermentable energy and help deliver other nutrients uniformly in the ration. When carefully combined with a suitable nitrogen source such as urea, molasses-based liquid feed can support rumen microbes, improve the use of fibrous feeds and, under appropriate conditions, enhance growth and milk production. Its benefits, however, depend on the basal diet, inclusion level and safe formulation. This article explains the nutritional value, working principle, practical advantages and precautions associated with molasses-based liquid feeds.

Introduction:

Balanced nutrition is essential for animals to express their production potential. Yet in many tropical production systems, dry-season grasses and crop residues such as rice straw are low in protein and readily available energy. These limitations can depress feed intake, fiber digestion, growth and milk yield. Molasses, a by-product of sugar processing, offers a practical way to supply readily fermentable carbohydrates and improve the palatability and uniform distribution of supplements. A review by Yangngam et al. (2026) highlights molasses-based liquid feeds—often formulated with urea or other ingredients—as a strategy to improve nutrient use in ruminants consuming low-quality roughages.

What Makes Molasses Valuable in Animal Feeding?

Molasses is valued mainly for its high concentration of soluble sugars, especially sucrose, which rumen microorganisms can ferment quickly. This fermentation supplies energy for microbial activity and produces volatile fatty acids (VFAs), which are important energy sources for the animal. Molasses also contributes minerals, including sulfur, and can act as a carrier for urea, minerals, buffers and selected

agricultural co-products. Its sweet taste may encourage animals to consume less-palatable feed ingredients, while the liquid form can help reduce sorting and improve the even distribution of supplement ingredients.

How Molasses and Urea Work Together:

The main nutritional idea is energy–nitrogen synchronization. Rumen microbes need both fermentable energy and available nitrogen at the same time to grow efficiently and produce microbial protein. Molasses supplies rapidly fermentable carbohydrate; urea supplies non-protein nitrogen (NPN), which rumen microbes convert to ammonia and then use to build microbial protein when sufficient energy is available. Microbial protein subsequently passes to the small intestine, where it is digested and provides amino acids to the animal. If ammonia is released faster than microbes can use it, nitrogen-use efficiency falls and the risk of ammonia toxicity increases. Therefore, molasses–urea mixtures must be professionally formulated and introduced according to appropriate feeding guidance.

Potential Benefits for Livestock:

Improved intake and digestibility: In diets based on poor-quality roughages, moderate molasses-based supplementation can improve dry-matter intake and the digestion of fiber and other nutrients. The response is not guaranteed; it may be small when the basal ration already provides adequate energy and rumen-available nitrogen.

Better rumen fermentation: When energy and nitrogen are supplied in a suitable balance, rumen microbes can use nutrients more efficiently. Several studies summarized by Yangngam et al. (2026) reported changes in VFA production and rumen fermentation following molasses-based supplementation. Responses differed with ingredient combinations, animal type and feeding level.

Growth and body-weight performance: In a study summarized in the review, Holstein fattening bulls receiving a total mixed ration containing 1.4% molasses and 1.1% slow-release urea had average daily gain of 1.88 kg/day, compared with 1.66 kg/day in the control group. This is an example from a particular trial, not a universal expected response.

Milk production: Some studies have reported higher milk yield or improved milk components with liquid supplements containing molasses, fat, protein or buffers. Other studies found little or no change. The response depends on the complete diet and should not be attributed to molasses alone when it is supplied as part of a multi-ingredient supplement.

Common Ingredients Used in Molasses-Based Liquid Feed

Ingredient	Main role in the supplement
Molasses	Readily fermentable sugars; palatability and liquid carrier
Urea or another NPN source	Nitrogen for rumen microbial protein synthesis; requires careful control
Mineral mixture	Helps balance minerals according to the ration and animal

	requirement
Buffer (e.g., sodium bicarbonate)	May help moderate rumen pH changes in suitable diets
Agricultural co-products	Can contribute nutrients or fiber and help use locally available resources

Safe Use: Important Precautions

More is not always better. Excessive or rapidly consumed molasses can promote fast fermentation, increase acid production and lower rumen pH, potentially contributing to subacute ruminal acidosis. Urea is particularly safety-sensitive: excessive intake or poor mixing can cause rapid ammonia accumulation and serious toxicity. Never prepare or feed a molasses–urea mixture using an unverified recipe, and do not offer concentrated urea mixtures to animals without expert formulation and supervision. Use a properly balanced ration, ensure uniform mixing, provide adequate roughage and introduce any supplement gradually under veterinary or animal-nutrition guidance. Storage, transport, feed consistency and the skill of the person preparing the supplement also affect safe adoption.

When Is Molasses-Based Liquid Feed Most Useful?

The greatest opportunity is generally in ruminant systems where the basal diet is deficient in both fermentable energy and rumen-available nitrogen—for example, during periods when animals rely heavily on low-quality crop residues. Before adding a liquid supplement, assess forage quality, total ration composition, animal class, production stage, water availability and likely intake. Where the ration is already well balanced, additional molasses may offer limited production benefit and could disturb rumen fermentation if supplied excessively.

Limitations and Future Scope

Results across studies are variable, and the best inclusion level is not the same for every species, production system or basal diet. More research is needed to define species-specific feeding rates, optimize the timing of energy and nitrogen release, evaluate long-term health effects and assess economic and environmental outcomes. Slow-release urea, buffers and carefully selected co-products are being explored to improve nutrient synchronization and reduce metabolic risk. On-farm adoption also depends on reliable supply, storage facilities, training and access to professional ration formulation.

Conclusion:

Molasses is more than a sweet by-product: used appropriately, it can serve as a useful energy source and carrier in liquid supplements for cattle, buffaloes, sheep and goats. Its most important role is to provide rapidly fermentable carbohydrate that complements rumen-available nitrogen, helping microbes digest fibrous feeds and synthesize microbial protein. Improvements in intake, digestibility, growth or milk production are possible, particularly when animals consume poor-quality roughages, but they are not guaranteed. Safe formulation, controlled feeding and a balanced overall ration are essential—especially when urea is included.

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