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Non-Conventional Feeding Resources and Their Use as Feed for Cattle and Buffaloes

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Abstract

Non-conventional feed resources (NCFRs) are emerging as an effective solution to address the growing demand for livestock feed and the rising cost of conventional feed ingredients. These resources include a wide range of agricultural residues, industrial by-products, and urban wastes that are often underutilized. Their use not only reduces feeding costs but also supports sustainable livestock production through efficient waste utilization. NCFRs such as oilseed cakes, fruit and vegetable wastes, molasses, and bagasse provide valuable nutrients like energy, protein, and minerals. However, many of these feeds contain anti-nutritional factors such as tannins, trypsin inhibitors, and toxic compounds, which require proper processing and controlled inclusion levels. Several examples like guar meal, niger seed cake, subabul seeds, and tamarind seed powder demonstrate their potential in livestock diets when used judiciously. Incorporating NCFRs helps in reducing dependence on conventional feeds and promotes the use of locally available resources. Overall, NCFRs play a crucial role in improving economic efficiency and environmental sustainability in livestock farming.

Introduction

Livestock production is expanding rapidly to meet the growing needs of an increasing population. With the increasing demand for milk, meat, and other livestock products, the pressure on conventional feed resources is steadily rising. At the same time, the availability and cost of traditional feeds like grains and oilseed cakes are becoming major challenges for farmers (Agrawal and Singh, 2000). In this context, non-conventional feed resources (NCFRs) offer a practical and economical alternative. These include various agricultural by-products, industrial residues, and food wastes that are often underutilized or discarded. NCFRs not only help in reducing feeding costs but also contribute to efficient waste management and environmental sustainability. Many of these resources possess good nutritive value, providing

energy, protein, and essential nutrients to animals (Bakshi and Wadhwa, 2004). However, their proper processing and balanced inclusion in rations are important due to the presence of certain anti-nutritional factors. By promoting the use of locally available materials, NCFRs can significantly enhance livestock productivity and support sustainable farming systems.

Types of Non-Conventional Feed Resources

Non-conventional feed resources can be broadly classified into three major categories: agricultural by-products, industrial by-products, and urban or food wastes. Agricultural by-products include crop residues such as straw, husks, and stalks obtained from crops like rice, wheat, maize, and sorghum, which are widely available but generally low in protein and high in fibre. This category also includes fruit and vegetable wastes like peels, seeds, and pulp from processing industries, which are rich in vitamins and minerals, as well as oilseed cakes derived from soybean, cottonseed, and sunflower, known for their high protein content and use as valuable feed supplements.

Industrial by-products are another important group, consisting of materials such as brewer's spent grain, which is rich in protein and fibre, molasses from the sugar industry that serves as an excellent energy source due to its high sugar content, and bagasse, the fibrous residue of sugarcane that is mainly used as a roughage source despite its low protein content.

Urban and food wastes also offer significant potential as livestock feed, including kitchen wastes like leftover food and vegetable peels from households and restaurants, as well as unsold or expired fruits and vegetables from grocery stores. Although these materials are nutrient-rich, they require proper handling and processing to ensure safety and prevent spoilage before being used in animal feeding (Singh and Oostin, 1992).

Various Examples of Non-Conventional Feed

1) Pipal Leaves

Pipal leaves have low palatability and limited nutritive value for livestock. When fed alone, they can only meet the maintenance needs of animals and are not suitable for higher production. On average, pipal leaves contain about 5.47% digestible crude protein (DCP) and 39.22% total digestible nutrients (TDN). Therefore, they should be used along with other better-quality feeds to ensure proper nutrition of animals.

2) Ambadi Cake

Ambadi cake is a valuable livestock feed ingredient that is available in large quantities, especially in the western Maharashtra and Marathwada regions of India. It is a good source of both energy and protein, containing about 60% total digestible nutrients (TDN) and 23.4%

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crude protein (CP). One of its advantages is that it does not contain any harmful or toxic factors and is quite palatable to animals. Due to these qualities, ambadi cake can be safely included in the diet, and it can be incorporated up to 20% in the concentrate mixture of crossbred calves.

3) Subabul Seeds

Subabul seeds are a good source of energy and protein, containing about 65% total digestible nutrients (TDN) and 29% crude protein (CP). However, they contain a toxic compound called mimosine, which can negatively affect the growth, reproduction, and overall health of animals if fed in excess. Therefore, careful use is important. Subabul as green fodder should not exceed 33% of the total ration, while the seeds can be safely included up to 10% for lactating animals and up to 30% for growing animals in the concentrate mixture.

4) Bamboo Leaves

Bamboo leaves are available in good quantity, with about 90–150 tonnes of leaves obtained annually from one hectare of bamboo forest. They are a good source of protein, especially in the tender stage, and are readily eaten by animals. Due to their nutritive value and palatability when young, bamboo leaves can be used as a part of the animal ration along with other feed resources.

5) Mango Seed Kernal

Mango seed kernels are available in large quantities in India, with about 1 million tonnes produced annually. They are mainly a source of energy, containing around 55% total digestible nutrients (TDN), but are low in protein with only about 6% crude protein (CP). However, they contain a high level of tannins (5–6%), which can negatively affect the growth and health of animals if used in excess. Despite this, mango seed kernels are fairly palatable and can be safely included up to 10% in the concentrate mixture of milch cattle.

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6) Vilayati Babul Pods

Vilayati babul is widely available in India, with about 1 million tonnes produced annually and around 0.2 million tonnes of pods available for animal feeding. Babul pods are a good source of energy, containing about 65% total digestible nutrients (TDN) and around 12% crude protein (CP). They contain a low level of tannins (0.74–1.5%), which does not cause any harmful effects on animals, and no other toxic substances are reported. The pods are quite useful in feeding and can be included up to 20% in the concentrate mixture of crossbred calves, 30% for lactating cows, and up to 45% in the ration of adult bullocks.

7) Seaweed Meal

Seaweeds are available in India in significant quantities, estimated at about 0.6 million tonnes annually. Their nutritive value varies widely, with crude protein (CP) content ranging from 9% to 19.93%, and a high total ash content of about 23% to 44.62%, indicating rich mineral content. Dried seaweeds can be used as a feed ingredient in livestock diets and can be safely included up to 20% in the ration of growing calves and up to 15% in the ration of milch animals.

8) Babul Pods, Seeds and Babul Seeds Chuni

Babul pods and seeds are widely available in India, with about 6 lakh tonnes of pods and 60,000 tonnes of seeds produced annually. Babul pods contain around 12% crude protein (CP) and 55% total digestible nutrients (TDN), along with a good balance of rumen degradable protein (RDP) and bypass protein (RUP). However, babul seeds and their by-products contain tannins (about 3–5%), which can reduce protein digestibility when used in excess. Despite this, they can be effectively used in animal feeding. Babul seeds and pod chuni can be included up to 15% in the concentrate mixture of lactating cows, while babul seed chuni can be used up to 30% for growing calves, 45% for adult bullocks, and 15% for lactating cows.

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9) Sugarcane Bagasse

Bagasse, a by-product of the sugar industry, has nutritive value that varies depending on the place of production and type (fine or coarse). It contains about 3.5% crude protein (CP) and around 35% total digestible nutrients (TDN), with moderate levels of fiber and carbohydrates. However, its use in animal feeding is limited due to low digestibility, high lignin content (above 20%), and very low nitrogen content. Because of these limitations, bagasse and bagasse pith is mainly used as fillers in compound feed and as carriers for molasses or molasses-urea mixtures rather than as a primary feed ingredient.

10) Sugarcane Top

Sugarcane tops have limited nutritive value, containing about 3% crude protein (CP) and 45% total digestible nutrients (TDN). They also contain oxalates, which can act as a deleterious factor when fed in large amounts. However, sugarcane tops can still be used as a roughage source when fed along with concentrate feeds. They can be effectively preserved as silage, either alone or with the addition of 0.5% urea, which improves their feeding value. The resulting silage is well accepted by crossbred cattle and has a slightly higher nutritive value, containing about 47.8% TDN.

Conclusions

Non-conventional feed resources offer a practical and cost-effective solution to the growing scarcity and high cost of conventional livestock feeds. Their utilization not only reduces feeding expenses but also helps in efficient recycling of agricultural and industrial wastes. Many of these resources provide valuable nutrients and can support animal productivity when used in balanced rations. However, proper processing and controlled inclusion are essential to avoid the effects of anti-nutritional factors. Overall, the adoption of NCFRs can play a significant role in promoting sustainable and profitable livestock farming systems.

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