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Review Article

Exploring the Power of Non-Conventional Feed Resources in Animal Nutrition

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Abstract

The use of non-conventional feed resources in animal nutrition has gained significant attention due to the growing demand for sustainable and cost-effective alternatives. Non-conventional feed resources include agro-industrial by-products, food processing wastes, and unconventional forages. The advantages, challenges, and prospects of non-traditional feed sources for animal nutrition are examined in this article. Advantages of non-conventional feed resources include economic sustainability, environmental sustainability, nutritional value, value addition, and waste utilization. Challenges and considerations include nutritional composition variability, process optimization, nutritional factors, and quality control. Promising examples include insect-based protein, microalgae, and non-conventional crop silage. The utilization of non-conventional feed resources should always be based on scientific research and expert guidance.

Keywords: Feed Resources, Animal Nutrition

Introduction

Animal nutrition plays a crucial role in ensuring the health, growth, and productivity of livestock. Traditionally, animal feed has been sourced from conventional resources such as grains, forages, and oilseeds. However, with the growing demand for sustainable and cost-effective alternatives, the utilization of non-conventional feed resources has gained significant attention. Non-conventional feed resources encompass a wide range of unconventional ingredients, including agro-industrial by-products, food processing wastes, and unconventional forages. Several known examples include palm leaf meals, palm press fibre, cassava foliage, Brewer's grains, sugar cane bagasse, rubber seed meal and some aquatic plants [2]. Small farmers who form the backbone of traditional agriculture in tropical regions have neither the resources nor they know how the quantity of residues make any individual impact [3].

In this article, we delve into the use of non-conventional feed resources in animal nutrition, exploring their benefits, challenges, and potential for revolutionizing the livestock industry.

What are non-conventional feed resources?

These are the feed resources that haven't been traditionally used in animal feeding or are not commonly used in rations produced commercially for livestock feeding.

NCFR (non-conventional feed resources) include a variety of feeds from perennial crops, tree leaves, animal feeds, and feeds of industrial origin. The term NCFR is frequently used to describe new sources of feedstuffs like oil mill effluent, palm press fibre, microbial protein, feed material from agro-industrial byproducts, etc.

Poor-quality cellulosic roughages from farm or crop residues such as straw, stover, stable, and vines, as well as from other agro-industrial byproducts and slaughterhouse byproducts, and those from the processing of sugar, cereal grains, citrus fruits, and vegetables for human consumption, also come under the NCFR.

Non-conventional feed resources are useful to maintain non-productive animals in cases of a scarcity of fodder. Non-conven-

tional feed resources are not fit for a long time regularly, and they vary by region.

Limitations with conventional feeds

The maximum portion of available grains is used for human consumption, and therefore animals have to depend on the grain byproducts, e.g., rice bran, wheat bran, pulse bran, crop residues, or straws of Ragi, wheat, paddy, barley, jowar, bajra, etc.

Natural pastures contribute 80-90% of livestock feed whose quality is seasonably variable and is the main source of feed in arid and semi-arid Pasture regions, and these lands are steadily shrinking by conversion to arable lands.

Crop residues contribute up to 50% of the feed supply in a mixed farming system. Adequate feeding of animals and safeguarding their food security shall largely depend on better utilization of feed resources that are not competing with human food. This is a major problem in most developing countries, so it is very important in developing countries like India to provide nutritious food with non-conventional foods.

Advantages of non-conventional food sources

- **Economic sustainability:** The use of non-traditional feed resources provides cost-effective alternatives to conventional feed ingredients. By using agricultural by-products and waste from the food industry, which are often readily available and less expensive, farmers can reduce their dependence on expensive conventional feed while maintaining adequate nutrition for their livestock.
- **Environmental sustainability:** Using non-traditional feed resources contributes to environmental sustainability by reducing waste and minimizing carbon footprints. Farmers can promote a circular economy and reduce the environmental impact of conventional feed production by diverting food waste and agricultural by-products to landfills.
- **Nutritional value:** They are excellent source of nutrients which keep intestinal microflora active for digesting cellulosic biomasses. However, some of them are low in nutritive quality and contain high concentrations of aversive factors which reduce the nutrient utilization and causes discontinuation of various metabolic processes. Value addition and Waste Utilization: Incorporating non-conventional feed resources allows for the effective utilization of agricultural and food processing by-products that would otherwise go to waste. By converting these resources into animal feed, farmers can derive additional value from their produce, leading to enhanced resource efficiency. Reject bananas have also been used as a fermentation substrate for the Production of single cell protein [4].

Challenges and considerations

- **Nutritional Composition Variability:** Non-conventional feed resources may present challenges in terms of their variable composition, both in terms of nutrient content and antinutritional factors. They are excellent source of nutrients which keep intestinal microflora active for digesting cellulosic biomasses. However, some of them are low in nutritive quality and contain high concentrations of aversive factors which reduce the nutrient utilization and causes discontinuation of various metabolic processes. (5) Careful formulation and consistent analysis are essential to ensuring a balanced and safe diet for animals.
- **Process Optimization:** Process methods may be required to improve the digestibility and palatability of unusual feed resources. Treatments such as drying, grinding, and storage can improve the use of these resources, but adequate research and development are needed to optimize processing methods.
- **Nutritional factors:** Some non-conventional nutritional resources may contain anti-nutritive factors such as toxins, enzyme inhibitors, or antimetabolites. Understanding and addressing these factors through appropriate management or preventative measures is critical to animal health and performance.
- **Quality Control:** Establishing quality control practices is important to ensure consistent nutritional values and safety standards for non-conventional food sources. Regular testing, monitoring, and certification processes are required to maintain quality nutritional ingredients. Promising examples:

Many non-conventional raw materials have shown great potential as animal feeds. Some notable examples include

- **Insect-based protein:** Adding insects such as black soldier fly larvae or mealworms to animal diets as a protein source shows promising results in terms of nutrient utilization and sustainability. Use of Black Soldier Fly (Hermetia illucens) in organic waste composting is a novel and an environment friendly approach which holds enormous potential and therefore, is strongly captivating people's attention worldwide [1].
- **Microalgae:** Microalgae provide abundant essential fatty acids, antioxidants, and pigments that can improve the nutritional value of animal feed, especially for aquaculture species.

- **Non-conventional crop silage:** The use of non-conventional crops such as maize, sugarcane tops, or different grass varieties in silage can provide cost-effective forage options all year round.

Conclusion

The use of unconventional feed resources in animal nutrition is an innovative and sustainable approach to optimizing animal health, growth, and productivity. While challenges exist, advancements in research, technology, and processing techniques are continually overcoming these obstacles. By embracing the potential of non-conventional feed resources, we can create a more resilient and environmentally friendly livestock industry while also addressing economic constraints and enhancing animal welfare. Let's continue exploring these untapped resources and unlocking the benefits they hold for the future of animal nutrition. Note: The utilization of non-conventional feed resources should always be based on scientific research and expert guidance, as specific considerations may vary according to livestock species and regional factors.

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