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Original paper

Un-conventional Feeds – Need for a Conventional Approach

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Introduction

India is home to 17.5% of the world's population and 20% of the world's cattle population despite covering only 2.3% of the planet's territory. In India, the annual growth rate of the animal population is 0.66%, and the country's human population is growing at an enormous rate of 1.6%. Just 4% of the land that may be cultivated for agriculture is used for the production of farm feed in order to meet all the demands due to the severe competition between the expanding human and animal populations for food and fodder, respectively. The nation today faces a net scarcity of 44% of concentrate feed ingredients, 10.5% of dry crop leftovers, and 35.6% of green fodder, which adds to the ongoing shrinkage of farmed area with rising urbanization. The traditional feed contains crop leftovers or straw from grains like jowar, bajra, ragi, wheat, barley, etc., either whole or ground up. Crop wastes or straw from grains like jowar, bajra, ragi, wheat, and barley make up the traditional feed. These materials may be digested on their own or in conjunction with fresh fodder. There aren't many options for expanding the area used for fodder crops. Due to this mismatch, animals' production is impacted indirectly by the supply and demand for feed. Non-traditional or alternative feed sources are crucial to close this supply-demand mismatch. "Non-conventional feed resources" refer to any feeds that are either not typically used in commercially produced livestock rations or have not historically been employed in animal feeding (NCFR). A variety of perennial crops and feed of both plant and animal origins are frequently found in NCFR.In response to the rise of antibiotic resistance, it is time to take action. Studies that were the first of their kind to present their findings found strong

evidence of antimicrobial residue in bovine milk as well as resistant bacteria in bovine (Patel et al., 2019; Patel et al., 2020). According to a number of studies, young piglets are becoming infected with germs that are resistant to antibiotics at an increasingly young age (Tumlam et al., 2022). It has been observed that phytogenic chemicals and herbal plants can greatly ameliorate fatty liver disease (Parmar et al., 2022)[b] and have anti-viral activity (Ghoke et al., 2018). In addition, Parmar et al. (2022)[a] have provided substantial proof that naturally available unconventional top crops can be used as feed for livestock because they have a significant source of nutrients. This demonstrates that the utilization of herbal plants, unconventional feeds is useful for the husbandry of livestock, poultry, and swine.

Resources for Unconventional Feeds are required

Due to direct rivalry with food products needed for human consumption, such as major grains, which are also a mainstay for humans, conventional types of feed are severely in short supply. With dwindling cultivable lands and a rise in human population, it is imperative for nutritionists and livestock producers to protect the feed security of cattle. This can only be done by effectively utilizing unconventional feeds that aren't in direct competition with human feeds and taking maximum nutrients from them by effective digestion of fibrous nutrients (Patel K. P. *et al*., 2020). The cost of feeding an animal might be decreased by including the NCFR in its daily diet, which would also improve nutritional security and self-sufficiency from locally sourced foods (Amata, 2014).

Types of Alternative Feeds

1) Energy-dense ingredients, such as Vilayatibubul pods, apple waste, cocca pods, coconut pits, kusum cake, mango seed kernels, rain tree pods, tarmarid seed powder, etc.
2) Sources of protein that are high in quality include ambadi cake, corn gluten meal, corn steep liquor, dhaincha seeds, guar meals, isabolgola and lali, rubber seed cake, subabul seeds, sun hemp seeds, and insect meals.
3) Other sources, such as sugarcane tops, banana root bulbs, citrus byproducts, jackfruit waste, palm create tree, panewar seeds, potato waste, tea waste, azola, tomato waste, etc.

Quality and Features of Alternative Feed Resources

These are leftovers from the production process or the supply chain that are not recycled or utilised. Further the nutritive values are locked in the form of fibrous strong bonds which makes them difficult to digest by the normal mechanism and microflora. Use of Certain specific feed additives, fibrolytic enzymes and nutraceuticals along with un-conventional feeds can help to yield put maximum potential present in these unconventional feeds (Patel *et al*., 2018; Patel K. P. *et al*., 2020)
They ought to be top-notch sources of nutrient molecules that can be fermented and meet the dietary requirements of animals. Such feed resources must be commercially feasible

(affordable) to be used as feed raw materials. It is important to have access to accurate information and data about the nutritional makeup of such feed and fodders. Many feeds contain anti-nutritional elements that have a negative impact on animals' health and may change how feed is processed and stored. More has to be learned about the way these compounds function and how to lessen their negative impacts. With careful consideration to maximize their digestibility, major feeds of agricultural origin are bulky and have significant quantities of fiber that are ideal to include in ruminants' diets. Potential has been identified as feed materials that can be enhanced by additional processingPatel (K. P. *et al*., 2020) and inclusion in regular diets.

Problems with Using Unusual Feeds as Regular Feeds

Several obstacles prevent the use of unconventional feeds as a regular feed component in animals' staple diets, including:

- Such feeds are produced in extremely small quantities and are dispersed widely.
- Due to low volumes and inadequate infrastructure, further processing of non-conventional feeds is difficult and limited
- Low levels of incorporation in meals and limited final use of products.
- Certain unusual feeds require multi-stage preparation and particular storage conditions
- Irregular availability with regard to the hours, places, and seasons.
- Uncertainty regarding these products' commercial viability

Methods to increase the use of unconventional feeds.

To address these issues and enhance the nutritional qualities and inclusion levels of these unconventional feeds, a wide variety of procedures and treatment methods are being developed.

Soaking - By soaking cereal straws and certain seeds in water overnight, you can minimize the quantity of tannins and lignin they contain and improve their digestibility and flavour.

The nutritional balance of low quality feed resources may be improved by supplementation—top dressing appropriately with the limiting nutrients.

Chemical treatment: Under anaerobic conditions, chemicals like sodium hydroxide (NaOH), ammonia gas, and urea make the fibrous connections in cereal fodder more brittle and result in a higher energy production when digested by animals.

Sr. NO	Unconventional feed	Nutritive Value	Inclusion Rate	Anti-nutritional factor	Treatment	Palatabilty
PROTEIN RICH						
1	Ambadi Cake	60% TDN, 23.4% CP	20% in Concentrate Mixture	NA		Fairly Palatable
2	Corn Gluten Meal	80% TDN, 58% CP	NA	NA		NA
3	Guar Meal	75-80% TDN, 50-55% CP	5-15%	Anti-trypsin, Guar Gum	Toasting	Less Palatalbe
4	Isabgol gola	30-40% CP	50% in concentrate	NA		Palatable
5	Niger seed cake	50% TDN, 34% CP	up to 57% in Conentrate	NA		Fairly Palatable
6	Rubber seed cake	55% TDN, 35% CP	25-35% in concentrate	Hydrocynic acid	Soaking + add iran salts	Fairly Palatable
7	Shubabul seeds	65% TDN, 29% CP	10-30% in conentrate	Minosine		Fairly Palatable
ENERGY RICH						
1	Balbul pods	65% TDN, 12% CP	20-40% in concentrate	Tannin	Soaking	Highly Palatable
2	Apple waste	60% TDN, 12% CP	30% in concentrate			Highly Palatable
3	Topica stach waste	60% TDN, 8-12% CP	30% in concentrate	Hydrocynic acid		Fairly Palatable
4	Cocoa pods	63.5% TDN, 6.3% CP		theobromine		Fairly Palatable
5	Mango seed kernel	55% TDN, 6% CP	10% in concentrate	Tannin	Soaking	Palatable
6	Tamarind seed powder	64% TDN, 12% CP	NA	Tannin	Soaking	Less Palatalbe
MISCELLANEOUS						
1	Azolla	20-25% CP	Fresh azola in 1:1 ration with concentrate			Palatable
2	Banana root bulb	50% TDN, 12% CP	20-25 kg as such basis/ day			Fairly Palatable
3	Panewar seeds	55% TDN, 16% CP	15% in concentrate	crysophenic acid		Less Palatalbe
4	Sugarcane baggase	35% TDN, 3.5% CP	As filler in Concentrate diet	High lignin levels	NaOh/ Urea Treatment	Fairly Palatable
5	Tea waste	58% TDN, 18% CP	10-15% in concentrate	Tannic acid		Less Palatalbe
6	Tomota waste	55% TDN, 15% CP	16% on concentrates			Fairly Palatable

Conclusion

The Indian subcontinent's low levels of animal output are mostly caused by a severe scarcity of feedstuffs, poor supply, and inadequate nutrition. The nutritional needs of animals and their ability to obtain them differ significantly. It is ideal for enough feed supplies to build up. In the Indian subcontinent, crop waste such as straws, molasses, and other agro-industrial wastes are widely dispersed. Yet, a variety of factors, such as their low nutritional value and challenges in handling and using them for extended periods of time, may be part of the reason for their limited utilization. Feed supplies must be enhanced by planting more fodder, promoting agroforestry, improving the nutritional value of crop remnants, and using other non-conventional feed sources. Crop wastes, agro-industrial leftovers, and browsing foliage will become more important sources of feed as both human and animal populations increase. A special focus should be placed on the efficient integration of multipurpose fodder shrubs and trees as a fodder bank while feeding sheep and goats under harsh conditions.

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