STRATEGIES FOR FORAGE RESEARCH AND TRANSFER IN INDIA

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ABSTRACT
The debate on how to meet the yawning gap of forage and feed (both in terms of quantity and quality) in India has continued since the last decade. This paper is an effort to discuss the feed and forage deficit, harnessing of unexploited resources (arable and non-arable) and the strategies of forage research and extension support for the development of forage and feed sector.

KEYWORDS
Forage, feed, strategies, arable, nonarable

INTRODUCTION
India with a livestock population of over 500 million is faced with a grim situation of forage and feed deficit to the tune of 20-30% green fodder, 30-35% crop residues and 47% concentrate. In terms of nutrients, the deficit equals 58% DCP and 31% TDN (Singh and Majumdar, 1992). The country is engaged in preparing the Ninth Five Year Plan as well as other long term perspective plans. The feed shortages are to be made up through initiation of need based research technology development as well as extension strategies. Livestock products exports are increasing by 13% per year (World Bank, 1995). With improved domestic production and marketing efficiency and a world market reshaped by GATT, the Indian livestock sector could become an even more competitive participant in the world market. All this largely depends, however, on improvement and sufficiency in the production of feeds and forages.

The question arises as to how we can meet the feed gap? What are the resources which could be depended on (priority-wise) for production? What is the yield potential that can be achieved through research and the constraints which exist and require the researcher's attention. Similarly, why are forage extension activities not being adopted by the clientele. All these have been conceptualised in this paper and the strategies for forage research and extension in India have been suggested.

RESULTS AND DISCUSSION
The forage is available mostly from cultivated fodder (7 m ha), crop residues (180.11 m ha), forests (6.08 m ha), permanent pastures and grazing lands (11.8 m ha), fallows and current fallows (24.30 m ha), wastelands (15.23 m ha) and tree groves 3.45 m ha (World Bank, 1995). The components of total available feed are 26% green fodder, 31% grasses from forest and grazing lands, 40% crop residues and stovers and 3% concentrates (World Bank, 1995).

Some of the major constraints to forage production are:-

1. Marginal and small farmers: In this country, 31% of land holdings rest with these groups (Datwala, 1983). These farmers are almost deficient in green nutritive fodder as they cannot part with even a small portion of their land for fodder cultivation. The technologies developed by IGFRI and elsewhere for fodder based mixed cropping, sequential catch cropping and fodder cultivation on field boundaries etc. fit very will in the system without disturbing their existing all-needs fulfilling production systems.

2. Cultivated fodder production: There is almost no option for increasing the area under cultivation due to our different food habits and priorities. However, the experimental results indicate increasing of the present yield level by 20% with the adoption of improved varieties and crop management (Menhi Lal et. al., 1995).

3. Management of the common property resources: Most of the natural grazing areas are common property resources (CPR's) like village grazing lands, social forestry and wastelands. CPR's are resources over which groups of people have co-equal use rights. CPR's are now subject to a serious problem of erosion and land degradation. Such lands are estimated at about 130-150 m ha. CPR's area has also declined by 30-50% between 1950-51 to 1982-85 (Jodha, 1991).

Since the past two decades the Govt. of India initiated integrated area development programmes through National Wasteland Development Board (Ministry of Rural Development) and National Afforestation & Eco-development Board (Ministry of Environment and Forestry) on Watershed basis with provision of financial assistance. Social forestry, silvopasture and grasslands were the major components. However, the problem of people's participation, the protection of improved areas and equal benefit sharing were usually faced.

4. Periods of Non-availability of green forage: This problem of varied periods is prevalent in temperate as well as subtropical and tropical ecosystems. As a result of natural climatic conditions the production slows down or ceases. In order to overcome such effects the conserved fodder, the enriched crop residues, sometimes growing of a fodder catch crop, use of top feed and grazing on shrubs (mixed vegetation pasture) have been found useful (Heady and Dennis, 1994).

5. Mixed herd grazing: The grazing in natural pastures by mixed herd grazing leads to better utilization of biomass and reduction of weeds (Heady and Dennis, 1994).

6. Quality seeds: Awareness of the use of quality seeds of improved varieties is lacking. The present seed replacement rate of 2 to 3% is very poor. There is a short supply of at least 40-50 thousand tonnes of certified seeds of fodder crops and 20-25 thousand tonnes of pasture seed (Singh and Hazra, 1995). The seed production networking is not effectively functioning as there is no correlation between the timely indenting and lifting of the seed.

7. Enrichment of low grade crop residues: Since a large contribution towards feed supply in the country comes from the crop residues and stovers, there is a paramount need to improve its intake and quality.

Taking into consideration the anticipated situation of forage production and utilization in the next 20-25 years, the following thrust areas for forage research have been identified:

1. Forage Plant Genetic Resources: The sub-continent is known for its rich endowment of biodiversity. The collection, evaluation, documentation, conservation
and use are to receive priority.

2. Forage Crop Improvement: Improvement of crop and pasture species particularly for stress (biotic and abiotic) situations is to be given a specific thrust.

3. Use of organic inputs: Greater emphasis in increased use of farm byproducts and wastes, vermiculture, bio-fertilizers etc. in different forage production systems needs to be given to make them sustainable and relieve soil exploitation from chemical

4. Reclamation and revegetation of problematic soils: Problematic lands like acid, saline, sodic soils, water-logged and marshy lands, mined and industrial wastelands need to be targeted for improvement in order to utilize them for forage production.

5. Reclamation of degraded rangelands: Identification of efficient species, establishment techniques, grass-legumes interface studies for compatibility, persistency and production, mixed herd and mixed sward grazing approach, mitigation of lean period influences, surplus forage conservation and utilization need to be given focused attention.

6. Watershed Management: Approach for the development of soil suited crop use systems including forage trees and crops on the principles of soil-water conservation and harvesting, distributed production and income generation, rural employment etc. needs to be adopted.

7. Intensive forage production: For the high input intensive situations emphasis needs to be given to the use of efficient cultivars and their improved production technology for a high cost:benefit ratio and rural employment.

8. Forage seed technology and production: There is a need to identify the efficient sites for seed production . Emphasis also to be given to work on seed standards, seed quality and effective seed collection and processing machineries as well as to establish effective systems for timely seed indenting and lifting, seed production networking and marketing.

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