



University of Kentucky  
UKnowledge

---

International Grassland Congress Proceedings

XXIV International Grassland Congress /  
XI International Rangeland Congress

---

## Indian Forage Scenario – Region Wise Availability and Deficit

A. K. Roy

*Indian Grassland and Fodder Research Institute, India*

Rajiv K. Agrawal

*Indian Grassland and Fodder Research Institute, India*

N. R. Bhardwaj

*Indian Grassland and Fodder Research Institute, India*

Asim Kumar Misra

*Indian Grassland and Fodder Research Institute, India*

S. K. Mahanta

*Indian Grassland and Fodder Research Institute, India*

Follow this and additional works at: <https://uknowledge.uky.edu/igc>



Part of the [Plant Sciences Commons](#), and the [Soil Science Commons](#)

This document is available at <https://uknowledge.uky.edu/igc/24/1/26>

**This collection is currently under construction.**

**The XXIV International Grassland Congress / XI International Rangeland Congress (Sustainable Use of Grassland and Rangeland Resources for Improved Livelihoods) takes place virtually from October 25 through October 29, 2021.**

Proceedings edited by the National Organizing Committee of 2021 IGC/IRC Congress

Published by the Kenya Agricultural and Livestock Research Organization

---

This Event is brought to you for free and open access by the Plant and Soil Sciences at UKnowledge. It has been accepted for inclusion in International Grassland Congress Proceedings by an authorized administrator of UKnowledge. For more information, please contact [UKnowledge@lsv.uky.edu](mailto:UKnowledge@lsv.uky.edu).

## **Indian Forage Scenario – Region wise availability and deficit**

Roy, A.K\*.; Agrawal, R.K.; Bhardwaj, N.R.; Misra, A.K. and Mahanta, S.K.

ICAR- Indian Grassland and Fodder Research Institute, Jhansi- 284003

\*Corresponding Author email: [royak333@rediffmail.com](mailto:royak333@rediffmail.com) ; [royak3333@gmail.com](mailto:royak3333@gmail.com)

**Keywords:** Fodder deficit; cultivated fodder; rangeland; fodder conservation; grassland

### **Abstract**

In India, rapid urbanisation, changing food habit and higher purchasing power have increased the demand for animal based food products. Proper feeding strategies using green nutritious fodder is key to increase livestock production and productivity in economical and sustainable way. Three major sources of fodder are crop residues, cultivated fodder from arable land (irrigated and rainfed) and fodder from common property resources like forests, permanent pastures, grazing lands, cultivated wasteland, fallow lands etc.

Based on the livestock census, we estimated the green and dry fodder availability *vis-a-vis* demand and emerging deficit/surplus situation. The state wise livestock population for Cattle, Buffaloes, Goat, Sheep, Yak and Mithun were taken into account and the requirement for green, dry forage and animal feed concentrate was worked out considering factors like age, milking or non-milking state, gender, working nature, feeding practices etc. The availability of green forages was estimated based on cultivated area under forage, cropping intensity, productivity etc., green fodder from fallow land, wasteland, forest fringe areas, social forestry, pasture land. For dry fodder, availability of crop residue for fodder was calculated based on the major utilizable cereals, pulses and oilseed crops, harvest index, production, and utilization pattern. Availability of dry forages from forest, wasteland, fallow land and cultivated field after harvest available for grazing were considered. On all India basis, there is an overall deficit of nearly 11 % in green fodder availability and 23 % in dry fodder availability.

To meet the deficit scenario various strategies are proposed which include a national programme in mission mode for accelerating production; grassland and grazing policy; rejuvenation of degraded pastures; targeted research and extension programme; entrepreneurship in commercial venture of fodder production and utilization.

### **Introduction**

India with only 2.29% of land area of the world, is supporting more than 17% of world human population and 10.5% of livestock (more than 530 million heads), thereby creating a tough competition for land, water and other resources (Roy et al 2019b).

The livestock productivity in India is lower as compared to the developed countries like USA, Israel, and Europe etc. Non-availability of adequate feed resources is one of the main limiting factors contributing to low productivity. Various attempts have been made in estimating green and dry fodder demand and supply at the national level. But these studies have assumed that the gap between availability and nutritional requirement is the gap between actual consumption and requirement. However, these assumptions need to be reconsidered with better logical assumptions and analyzing the available supportive data.

The livestock productivity in terms of milk yield per lactation is low in comparison of that of countries like USA, UK, Israel etc. ~~The productivity of livestock is low in Indian condition,~~ the major reasons are deficiency of feed and fodder, health, breed and improper management. Around 80% of the livestock are with marginal, small and medium holdings farmers under rainfed situation, whereas, small ruminants are mostly reared under nomadic (30%) and sedentary (70%) systems. There are nearly thirty pastoral communities in India located particularly in northern and western part of the country (Roy and Singh, 2013).

In the present study, the state wise green and dry fodder availability was estimated using both primary and secondary data *vis-a-vis* demand from various categories of ruminants and emerging deficit/surplus scenario. The factors like agro-climatic zone, land use pattern, rainfall pattern, major crops and availability of crop residue etc. were taken into consideration. Data from various publications have been taken to estimate the dry forage or crop residue availability (Agricultural Research databook 2018).

### **Livestock population and distribution**

For this study, the state wise livestock population as per Livestock Census 2012 was considered. The population of six ruminants Cattle, Buffaloes, Goat, Sheep, Yak and Mithun were converted into ACU (Adult Cattle Unit – 350 kg body weight) for ease of calculation and estimation. The weight of different categories of animals based on age, sex, species etc. were considered as per standard norms. It resulted in the total ACU to be approximately 232 million for around 500 million numbers of livestock.

Out of a total cattle population, 151 million were indigenous and nearly 40 million were exotic. In Punjab and Haryana, which are leader in milk production, exotic cattle outnumber indigenous. In other small states, exotic cattle are more because of peri-urban dairies. Overall country scenario indicated that exotic cattle are 20.8% of total cattle population. Most of the indigenous cattle are of nondescript type and are generally low milk yielder. For buffaloes, Uttar Pradesh accounted for more than 25% population followed by Rajasthan, Andhra Pradesh+Telangana, and Gujarat. In Hills and NEH buffalo population is much less. Sheep was found to predominant in undivided Andhra Pradesh, Karnataka, Tamil Nadu, Rajasthan, J &K and Gujarat *etc.* Goat was recorded mainly in Rajasthan, UP, Bihar, WB *etc.* Small ruminants were very less in Punjab and Haryana. Mithun was reported from Arunachal Pradesh and Himachal Pradesh. Similarly Yak was reported from Western Hills and NEH regions only.

### **Estimates of Green and dry fodder requirement**

Total dry matter requirement of livestock was estimated and converted into green, dry and concentrate requirement based on the various factors like exotic/indigenous breed, age, milking or non-milking state, gender, working nature, feeding practices, and etc.

The total dry matter requirement assumed was 1.8% to 2.8% of body weight for cattle and buffaloes, 3.0 to 3.5% for sheep and goat, 1.8% for Yak and Mithun. The feeding ration was estimated to be combination of green fodder, dry matter and concentrates in varying proportion ranging from 40 to 80% for crop residue, 10 to 30% for green fodder and 10 to 30% for concentrates.

For these six categories of ruminants i.e., cattle, buffaloes, goat, sheep, yak and mithun, the estimate for total green fodder, dry fodder and concentrate requirements were 827.19, 426.11, 85.78 million tonnes, respectively.

### **Estimates of green and dry fodder availability**

#### **~~Green fodder availability estimation~~**

The estimate of green fodder availability from arable land was done using data on cultivated area under forage, cropping intensity, productivity, penetration of technologies, rainfed and irrigated conditions, etc. Availability of green fodder from non-arable land like fallow land, wasteland, forest fringe areas, social forestry and pasture land was also estimated depending on soil, rainfall pattern, state of grassland etc. The total green fodder availability was worked out to be 734.2 million tonnes from various sources such as grazing land, pastures, forests, top feed etc. of which forage from cultivated land was 88.0%.

#### **~~Dry fodder availability estimation~~**

Availability of crop residue for fodder was calculated utilizing the data available for the major cereals, pulses and oilseed crops, their harvest index, production, and utilization pattern for each state. Availability of dry forages utilizable for grazing from forest, wasteland, fallow land and cultivated

field after harvest were considered. Assumptions for different level of production were made depending on the productivity estimate based on rainfall, soil type and grassland status. (Agricultural Research data Book. 2018; Roy et al 2019b.) **Demand – supply gap scenario**

On all India basis, an overall deficit of 11.24% in green fodder availability was estimated. Total green fodder availability was estimated to be 734.2 mt against requirement of 827.19 mt. Similarly for dry fodder availability was estimated to be 326.4mt against requirement of 426.1 mt., thereby making an overall deficit of 23.4%. For concentrate, our study indicated requirement of 85.78 million tonnes at national level, however, the estimated annual availability of total concentrate feed is only 61 million tonnes (Anonymous, 2018) which makes a deficit of approximately 24.78 million tonnes or 28.9% of the demand.

### **Future strategies**

The future strategies should focus on precise estimation feeding for enhancing and economical productivity of livestock to make the industry economically and ecologically sustainable and viable. Suitable region based feeding model should be developed for different categories of livestock based on age, gender, status. This should consider profitability as well as productivity / health. A national programme in mission mode for accelerating production and effective utilization should be implemented for enhancing the nutritious fodder availability round the year. Our grasslands demand rejuvenation and conservation for better output and there should be a proper strategy for this. In India overgrazing, demand for fodder, mining, industrial activities are the main factors responsible for the loss of grassland, although scientific management and rejuvenation of grasslands can lead to enhanced biodiversity and sustainability of the ecosystem as well as higher productivity (Malaviya and Roy, 2021). The strategies to develop suitable varieties and improvement of forage grasses and legumes have been discussed in details in several reviews (Roy et al., 2016, 2019a). Proper planning and execution are required for developing improved varieties and technologies for different agro-ecological conditions. Development of entrepreneurship in various fodder based products/ post harvest technologies should be given priority. Post harvest technologies like densified dry bales (for transportation of crop residue from surplus to deficit states) and hay/ silage making for commercial dairies should be promoted. As of now, the fodder production in India is not a commercial enterprise, but increasing demand of fodder opens a new avenue for entrepreneurship in the area in production, processing and marketing of fodder and products for specialized livestock production.

### **Acknowledgements**

Authors are thankful to ICAR-IGFRI for support

### **References**

- Agricultural Research data Book. 2018. ICAR-IASRI, New Delhi. <http://www.iasri.res.in>
- Anonymous. 2018. Demand and supply projections towards 2033: Crops, livestock, fisheries and agricultural inputs. *The Working Group Report (February, 2018)*. NitiAyog, New Delhi.
- Malaviya, D.R. and Roy, A.K. 2021. Let's green the grasslands. State of India's environment. A Down to Earth Annual Publications. pp 290-297.
- Roy, A.K. and Singh, J.P. 2013. Grasslands in India: Problems and perspectives for sustaining livestock and rural livelihoods. *Tropical Grasslands – Forrajes Tropicales* 1: 240–243
- Roy, A.K., Malaviya, D.R. and Kaushal, P. 2016. Genetic improvement of fodder legumes especially dual purpose pulses *Indian J Genet* 76 (4): 608-625
- Roy, A.K., Malaviya, D.R. and Kaushal, P. 2019a. Genetic improvement of dominant tropical India range grasses *Range Mgmt & Agroforestry* 40 (1): 1-25.
- Roy, A. K., Agrawal, R. K., Bhardwaj, N. R., Mishra, A. K. and Mahanta, S. K. 2019b. [Revisiting National Forage Demand and Availability Scenario](#). In: *Indian Fodder Scenario: Redefining State Wise Status* (eds. A. K. Roy, R. K. Agrawal, N. R. Bhardwaj). ICAR- AICRP on Forage Crops and Utilization, Jhansi, India, pp. 1-21.

