

**USE OF CONVENTIONAL AND UNCONVENTIONAL FEEDS AND FODDERS
FEEDING OF ANIMALS DURING SCARCITY**

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India is an agricultural-based country with 70 percent of its population living in villages. Their livelihood is dependent mainly on agriculture and animal husbandry. India has a vast livestock population of over 512 million, (**livestock census 2012**) and poultry (729) millions, yet the production of milk per animal and other livestock products is the very lowest in the world. India is highly deficient in various livestock products, though we have about one-fourth of the total cattle population of the world. Scarcity of feeds and fodder resources is a big problem limiting animal production. Among all, flood and drought is the major devastating natural calamity leading to a massive loss of vegetation. On average, about 50-60 percent of the cropped area in wave affected area remain submerged, and it takes at least a minimum of 30 days to bring the field for cultivation purposes. Increase in livestock and human population and decrease in land under cultivation has resulted in acute shortage of feeds and fodder for livestock which further increases due to natural calamities like droughts due to uneven monsoon and flood whose intensity is increasing nowadays, these the worst to suffer are the livestock. In these situations, the use of the feed and fodders not commonly used gives some relief. The need for using these unconventional feed and fodders in livestock ration is increasing day by day due to the shortage of animal feeds. The primary source of such feeds is agricultural and forest by-products. Such feeds are not used either because of the traditional benefits of livestock owners or due to less palatability and presence of toxic factors in them. It also happens that specific un-conventional feeds are being traditionally fed to animals in a particular region, but the same may be neglected in other areas. Recent studies indicated that quite a large number of agricultural by-products and industrial waste materials could be used to fulfilling the scarcity of feeds and fodders.

Different kinds of damages caused by floods can be categorized as follows

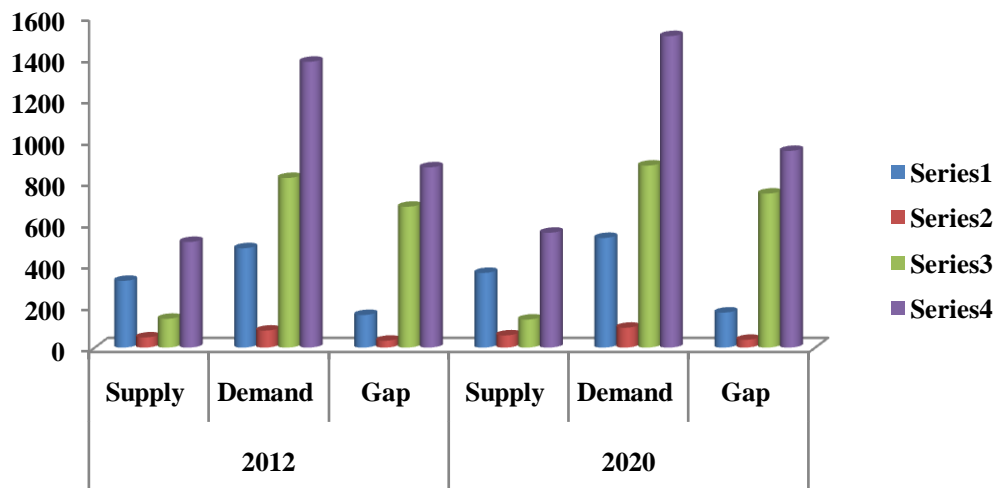
- Loss of standing crops due to flood water.
- Damage of stored dry roughage due to not proper storage facility.

- Dry roughage stored in open space by aggressive currents of floodwater.
- Damage of stored grains and brans by water soaking followed by fungal growth resulting in loss of nutrients and production of harmful/toxic metabolites.
- Pollution of water with dung, urine, debris, and other wastes.

On the other hand, drought causes a different type of loss where there is no or limited growth of plants. In such condition, there is an acute shortage of feeds and fodder in flood-affected areas. Feeding strategies during scarcity depend on the specific conditions prevailing in any particular area. In general, the farmer has to make decisions based on economics, knowledge of nutrition, the availability of feed resources and his calculated guess on the length of the drought.

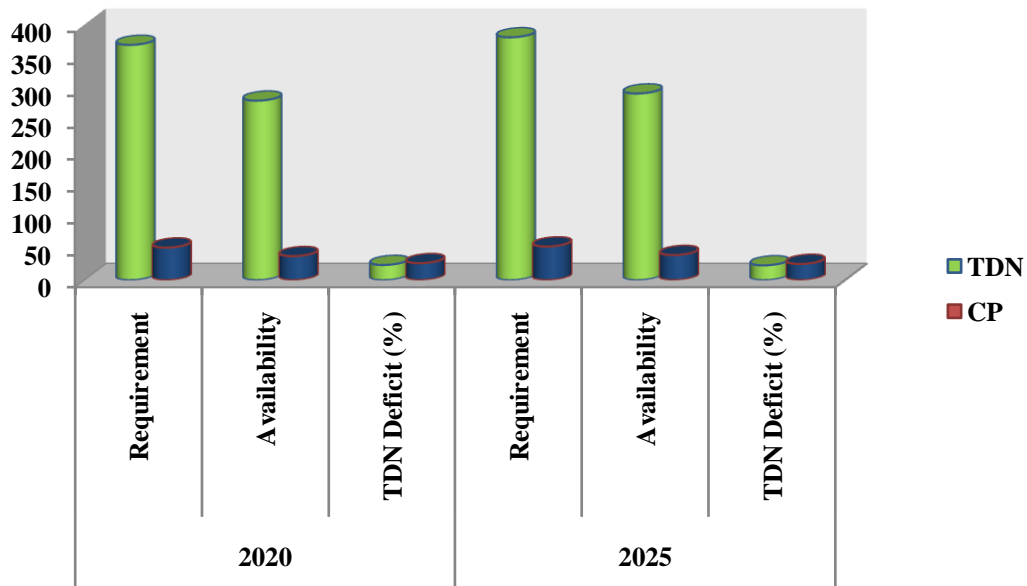
Table 1. Projected demand and supply of feed (million tonnes)

S. No.	Resource	2012			2020		
		Supply	Demand	Gap	Supply	Demand	Gap
1.	Dry fodder	322.6	480.2	157.4	360.9	530.0	169.1
2.	Concentrate	48.9	82.0	33.1	58.8	96.0	37.2
3.	Green fodder	139.1	820.0	680.9	135.4	880.0	744.6
4.	Total	510.6	1382.0	871.4	555.1	1506.0	950.9



Requirement & availability (MT) of TDN & CP UP TO 2025

S. No.		2020			2025		
		Requirement	Availability	Deficit (%)	Requirement	Availability	Deficit (%)
1.	TDN	368.63	281.24	23.73	380.5	292.46	23.14
2.	CP	51.05	37.6	26.53	52.69	39.31	25.38



Widening of the gap between demand and supply of concentrates and green forage (especially legumes) would also imply the widening of protein and energy deficit in (Table1).

Meeting the requirement for different feed resources in the coming year is no doubt a Herculean task, but with concentrated efforts and right approach and strategies, it may not be challenging to achieve the target.

Unconventional feeds are described under the following categories:

- Protein sources
- Energy sources
- Miscellaneous alternative feeds.

Feeding technologies to be used during feed scarcity

- Complete feed blocks
- Urea molasses mineral block licks
- Urea treatment of straws
- Use of dry and fallen tree leaves
- Use of conventional and unconventional feeds

Quality/characteristics of NCFR

- They are the end products of production and consumption that have not been used, recycled, or salvaged.
- They are mainly organic and can be in a solid, slurry, or liquid form.

- Their economic value is often less than the cost of their collection and transformation for use, and consequently, they are discharged as wastes.
- The feed crops which generate valuable NCFR are excellent sources of fermentable carbohydrates, e.g. cassava and sweet potato, and this is an advantage to ruminants because of their ability to utilize inorganic nitrogen.
- Fruit wastes such as banana rejects and pineapple pulp, by comparison, have sugars which are energetically very beneficial.
- Some of the feeds have harmful effects on animals, and not enough is known about the nature of the active principles and ways of alleviating the effects.
- They have considerable potential as feed materials, and for some, their value can be increased if there were economically justifiable technological means for converting them into some usable products.
- More information is required on chemical composition, nutritive value, toxic factors, and value in the feeding system.

Use of conventional and unconventional feeds. The different kinds of traditional and unconventional feedstuffs for the preparation of rations of different categories for feeding of flood-affected animals been listed below

Minor by-product feeds from various sources

Crop residue

Paddy straw constitutes the good sourceroughage of livestock in different north-eastern states of India. It is usually stored on wooden or bamboo platform raised over the ground. This is required to minimize spoilage in the dense rainfall areas.

Sugarcane crop residue

Sugarcane is cultivated in some part of India. After harvesting the sugarcane tops available as a waste can be used for the feeding of livestock. Some quantity of cane tops is converted into hay at some places, while the vast amount of it goes waste, which can be preserved by ensiling. Sugarcane trash mostly used as fuel for the preparation of jaggery may also be used to supply part of the roughage requirement after chaffing and enriching with more palatable and nutritious feeds.

Bagasse is available in sugar factories and crushers after extraction of juice. A small quantity is also available with a farmer during the process of jaggery preparation. Parity large proportion of bagasse is used as a source of energy in the form of fuel for boilers.

Aquatic plants

Several types of aquatic plants are available in the river, pond and other water logging areas may be used for the feeding of farm animals. Besides supplying protein and energy, they are rich sources of carotenes. So far, the common aquatic plants tested for the food of farm animals are water hyacinth, aquatic spinach, stalks and leaves of lotus plant (*Neumbiull* sp.), water chestnut (*Trapanatans*), hydrilla, pistia, aquatic weeds.

Industrial by-products feed by cattle

Lemongrass

Lemongrass grows widely in large areas in many parts of the country. After the extraction of oil which is used for the preparation of vitamin A and also in the pharmaceutical and cosmetics industry, large quantities of spent lemongrass are available and can be fed to animals. It has been found to contain 1.03% DCP and 53.5% TDN.

Tapioca

The bitter variety of tapioca is, generally, used for commercial production of starch from its tuberous roots. The fibrous waste, left after the extraction of carbohydrate known as tapioca spent pulp as tapioca starch waste, has been fed to cattle and found to contain 72% TDN.

Sugar beet

Sugar beet pulp, a by-product of the sugar beet industry has been fed to Murrah buffaloes and found to contain 3.42% and 59.23. TDN and dry matter basis.

Rice husk

Rice husk is available in large quantities from the rice milling industry; it has high silica and lignin contents.

Mulberry

The leftover of mulberry leaves and stalks after feeding to silkworms have been feed to cattle and found to contain 7.80% DCP and 48.0% TDN.

Guar

Guar meal is available as a by-product after the extraction of gum from guar seeds. When fed as a sole concentrate, it resulted in chronic diarrhea in growing calves. Guar meal as a good protein supplement to crossbred calves could achieve a high body weight gain @ of 655 g/day as compared to only 640 g/day in calves fed GNC.

Other unconventional feed resources

Azolla

Azolla is an aquatic fern mostly utilized as Bio-fertilizer for wetland paddy and ponds. It belongs to the family of azollaceae. It contains almost all the essential Amino acids, many probiotics, Biopolymers, and B carotene. The higher crude protein content (above 23 % on dry matter basis) and presence of essential amino acids (high lysine content) vitamins like A & B and minerals like calcium, phosphorous, potassium and magnesium made Azolla useful feed supplement for livestock, poultry, and fish.

Food and vegetable waste

In most states, losses in fruits and vegetables are to the tune of 30%, thereby resulting in the production of vast quantities of FVW. Only 4 percent of fruits and vegetables produced in the country are processed, as compared to western countries.

Straw and Stover

It is significant food crops, like wheat, rice, maize, and pulses, are in abundance. Most of these are burnt, causing environmental pollution/ global warming. Technology to harvest and pack the straw as blades and densified complete feed block for use as basal roughages, with or without urea treatment should be developed.

Table 2. Conventional feed as concentrate

S. No.	Ingredients	Parts mixture in concentrate
1.	Mango seed kernel	22-24
2.	Kapok	20-25
3.	Cassia tora seeds	25-30
4.	Babul	20-23
5.	Akra	20-25
6.	Mahua cake	10-25
7.	Sal seed meal	20-22
8.	Oak	9-16
9.	Vegetable and fruit processing waste	25-30
10.	Seaweeds and fishmeal	25-28

Tree leaves as fodder

Considering the highest shortages of nutritious conventional feeds, efforts made to utilize various tree leaves as livestock feed resources during the past several decades, as shown below.

Table 3. Major By-Product Feeds from Tree and Crops

S. No	Hindi name of the tree leaves	Botanical name	DCP (%)	TDN (%)
1.	Bargad	<i>Fiscus bengalesis</i>	2.00	44.80
2.	Pipal	<i>Fiscus religiosa</i>	7.90	40.38
3.	Gular	<i>Fiscus glomerata</i>	6.70	53.82
4.	Shisam	<i>Delbergiasisso</i>	9.06	52.46
5.	Gauj	<i>Milletiaauriculata</i>	15.56	44.87
6.	Bambo	<i>Dendracalamusstrlctus</i>	9.33	48.84
7.	Mulbery	<i>Mors indica</i>	10.70	59.57
8.	Ardu	<i>Ailanthus excelsaRoxb</i>	13.06	63.03
9.	Subabul	<i>Lucalenalucocephala</i>	12.64	51.70
Other unconventional Roughages resources				
1.	Jute	<i>Corchorus olitorius</i>	13.93	60.59
2.	Sunhemp	<i>Crotlariyajuncea</i>	12.60	64.02
3.	Chakunda	<i>Cassia toralinn</i>	4.17	55.30
4.	Water hyacinth	<i>Eichhorniacrassipes</i>	5.64	40.25
5.	Jhanji	<i>Scripusauriculantus</i>	9.28	43.80
6.	Banana leaves	<i>Musa paradiosica</i>	8.02	61.00
Agriculture by products Other unconventional Roughages resources				
1.	Ground nut haulms	<i>Arachis hypogaea Linn</i>	5.39	50.7
2..	Soybean bhoosa	-	1.95	45.0
3.	Moong straw	<i>Phaseolus aureus Roxb</i>	3.95	49.2
4.	Urad straw	<i>Phaseolus mungo</i>	3.90	49.2
5.	Rice bean straw	<i>Phaseolus calcartus</i>	6.91	31.2
6.	Horse gram	<i>Dolichosbiflorus Linn</i>	3.00	49.2
7.	Arharbhoosa	<i>Cajanus indicus</i>	3.85	49.4
8.	Cowpea hull	<i>Vigna catjung</i>	3.29	59.0
Unconventional feeds as concentrate resources				
1.	Jamun seeds	-	5.36	45.5
2.	Mango seed kernel	-	6.00	72.0
3.	Coconut pitch (coir waste)	-	-	62.7
4.	Tea waste	-	9.50	44.0
5	Pea hull	-	-	-
6.	Salseed meal	-	1.68	43.0
7.	Tapica starch waste	-	1.89	60.0
8.	Spent annatto seed	-	7.50	67.5

9.	Guar meal	-	23.8	66.0
10.	Mahua cake	-	7.56	60.2
11.	Mahua flower	-	3.96	74.0
12.	Kidney bean chuni	-	16.35	66.9
13.	Rubber seed cake	-	18.60	54.2
14.	Tamarind seeds	-	5.36	61.0

Conclusion

The main reason for the reduced animal production is the less supply and poor quality of feeds due to a severe shortage of feedstuffs. A significant gap exists between the supply and demand of nutrients for feeding of livestock; the nonconventional feeds could partly fulfill this gap. Farmers are not aware of the nutritive value of some feed sources and the way for their adequate level of feeding in livestock. The involvement of local extension workers/agencies in technology development for the efficient use of NCFR.

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