Feeding and Management strategies of Dairy Animals during scarcity.

Dr. Sanjay Kumar,
Assistant Professor
Department of Animal Nutrition, BVC Patna

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Introduction

- Droughts, scarcity and natural calamities, unfortunately, are part of India's rural scene, and their frequency and severity in the future are likely to be increased.

- However, livestock causalities are immense, making livestock farming, vulnerable in event of continuous scarcity, droughts and natural calamities- either directly through the improper supply of feed and water, or indirectly by reduced income both during and after adverse situations.

- India is short of feed resources.

- **The area under fodder production has decreased to 4.4%, the crop residues available has increased (500MT), and compound livestock feed production has also increased (8MT), of which CLEMA produces only about 3MT.**
- **But still as mentioned above, we are not able to meet the requirement.**
- **A gigantic gap (shortage of concentrates 47%, green fodders 24.7%, and dry roughages 40.4%) exits between the demand and supply of animal feed resources in the country.**
- **Gujarat producing about 52.62 MT fodders and pastures resources around 4.5% of the national averages.**
- **To meet the availability and requirement feeding and management strategies of dairy animals during scarcity period is the demand of the time.**

AVAILABILITY AND REQUIREMENT OF FEEDS & FODDERS

Availability (MT)		
Dry Fodder	**486.80**	**387.86**
Green Fodder	**573.50**	**573.50**
Concentrate	**32.54**	**41.98**
Requirement(MT)		
Dry Fodder	**555.14**	**650.70**
Green Fodder	**710.48**	**761.53**
Concentrate	**32.90**	**79.40**
Deficit (%)		
Dry Fodder	**12.4**	**40.4**
Green Fodder	**19.3**	**24.7**
Concentrate	**1.1**	**47.1**
	FAO (1996)	***Ranjhan (1997)***

Strategy for probable monsoon scenarios in animal science

Table 1. The normal and other four probable monsoon scenarios and strategy of live stock management

Scenario	Strategy Program
Normal Monsoon	1. Ensuring feed and fodder availability 2. Ensuring drinking water 3. Livestock health management 4. Action plan to ensure strategy against sudden break of monsoon 5. Action plan against extended monsoon
Delayed monsoon Three weeks late	6. Ensuring quality feed & fodder availability during delayed monsoon arrival 7. Strategy of livestock management due to water scarcity, starvation, sickness & death
Timely onset Sudden break	8. Strategy of feeding green fodder due to timely onset of monsoon 9. Strategy as under program 6 & 7

Early with drought	**10. As under 6,7,8 & 9**
Extended monsoon	**11. Strategy of feeding green fodder of high moisture content & spoilage due to mould development** **12. Strategy of animal protein & mineral feeding** **13. Strategy of antiparasite, epidemics & other metabolic disease management** **14. Strategy of conservation of excess fodder mass produced**

The detailed solutions on the 14 strategies suggested above are given below.

- **Feeding Technologies to be used during Drought Situation**
- **Livestock management practices**
- ***Preventive Measures against Epidemics and Diseases***
- **Water Management**
- **Unconventional Feed Resources**

Strategy of meeting feed shortages

- **Two feeding strategies, one relates with lack of fodder availability and the other with lack of feed quality.**
- **Three programmes need to be followed.**
- **Feeding strategy for maintenance of animals to ensure its survival**
- **Feeding strategy to maintain minimum level of production and growth**
- **Feeding strategy to maintain desired production by purchasing supplements from outside.**

❖**Critical body weight for survival will be upto 20% of body weight loss in case of cattle, while in case of desert animals (sheep and camel) it may be upto 30 to 40%.**

❖ **In case of milch and other producing animals, the only solution lies with supplementation because productivity loss cannot be recouped by any other means.**

- **Storage in fodder banks**
- **Urea treatment of straws**
- **Complete feed formulations**
- **Use of dry and fallen tree leaves**

Feeding Technologies to be used during Drought Situation

Use of Sugarcane Bagasse as Animal Feed

- **Sugarcane bagasse is commonly used as fuel in sugar factories. But it can be used as livestock feed during scarcity.**
- **It is not palatable as such but mixed ration containing 50% sugarcane bagasse, 17% groundnut cake, 4% wheat bran, 25% molasses, 1% urea, 1% salt and 2% mineral mixture is quite palatable to animals after adaptation and animals can be maintained on it.**
- **Growing animals can be raised on complete feed containing 30% sugarcane bagasse, 20% Prosopis juliflora pods, 7% mango seed kernel, 12% babul seed chuni, 8.5%maize gluten, 12% corn steep liquor, 8% molasses, 0.5% urea, 1% salt and 1% mineral mixture.**
- **Digestibility of sugarcane bagasse can be increased by steam treatment.**

Sugarcane Bagasse

Sugarcane tops

- Cane tops contain less N than the concentration that is required for optimum fermentation in the rumen. .
- Studies on urea supplementation of cane tops revealed that the digestibility of OM can be increased.
- It contains 5.3% crude protein, 2.3% DCP and 49% TDN. It is being fed to animals in South Gujarat.

Straws and Gotars

- Straws and Gotars are the byproducts of cereal and legume crops, respectively.
- They are used for feeding animals but in many parts they are not fed to the animals and burnt in the field rather they should be stored for feeding during scarcity.
- Urea treatment (4%) of straws improves its palatability, digestibility and nutritive value
- Straws like rice, wheat, jowar, bajra, maize, etc. and gotarslike Groundnut, Mung, Gram, Tur, Urad, Cow pea, etc. can be used.

Cher leaves and fruits (Avicennia officinalis):

- ✓Cher grows near the sea shore in stagnated sea water. During scarcity, cher leaves are available which can be used for feeding animals. Ripen cher fruits floating on water can also be used for animal feeding. It is the experience of livestock owners that cher leaves and fruits increase the milk fat content.

Tree leaves and vegetable leaves :

- ❖Green fodder is not available during scarcity. But tree leaves are easily available.
- ❖Leaves of neem, mango, banyan, pipal, babul, subabul, mahuva, etc. can be used as green fodder.
- ❖Tree leaves are good source of protein, calcium, Vitamin A. They contain about 6 to 20% crude protein, and 0.5% to 2.5% calcium.
- ❖Complete feed prepared using 50kg tree leaves, 5kg groundnut cake, 25kg vilayati babul pods (Prosopis julifora pods), 15kg molasses, 1kg urea and 2 kg mineral mixture is palatable to animals and it can form a good maintenance ration.
- ❖The livestock owners of north Gujarat are traditionally using castor leaves for feeding their animals. The vegetable leaves and creepers like cabbage, cauliflower, potato can also be used as animal feed during scarcity.

Cactus :

- Cactus is primarily found in deserts hence it is easily available during scarcity also.
- As such it is not used for feeding animals but during scarcity it can be used. It contains 3.3% crude protein, 3.8% crude fat and 56% carbohydrates.
- It also provides water to animals. The thorns should be removed/burnt before feeding cactus. 8 to 10kg cactus can be fed daily to an adult along with other roughages.

Agave (Ketki) :

- Agave also grows in desert and semi desert areas and hence during scarcity also it is available.
- It is not being fed to animals routinely but during scarcity, it can be used. It contains 4.5% crude protein, 3.3% crude fat and 48% carbohydrates.
- Animals can be maintained on it along with other concentrates during scarcity.

Paper waste :

- ❖ **Paper waste contains about 70% cellulose and hence it helps satisfying the hunger of animals. Ground paper waste (6kg) supplemented with molasses (4kg), salt (50g), and mineral mixture (50g) per day is sufficient to maintain an adult animal.**
- ➢ **Complete feed containing 30% ground paper waste and other concentrates can be effectively used to maintain the animals during scarcity.**

Saw dust :

- ❖ **During scarcity when nothing is available, saw dust can also be fed to animals. Complete feed containing 30% saw dust, 32% maize bran, 31% molasses, 4% urea, 2% salt and 1% mineral mixture can be used as maintenance ration during scarcity.**

Urea Ammoniation of straws :

❖Urea is readily available and is relatively safe chemical that is easy to store and also easy to dissolve in water.

❖Urea-treated straw saves on concentrate feeding, increases milk yield by 1-2 litres/animals a day, offers better economic returns to the farmers and may help reducing land area required for green fodder production.

❖The process is very simple and involves spraying of urea solution uniformly over the straw and storing it for a specific time period. The process of urea ammoniation of straw is as follows:

❖For processing one tone straws

Straw, Kg	1,000
Urea, kg	40
Space requirement	180 x 150 x 150 cm

Silage technology for drought situation

- **The process is very simple and involves spraying of urea solution uniformly over the straw and storing it for a specific time period.**

- **The basic principle of silage making is to convert the sugars in the ensiled fodder into lactic acid; this reduces the pH of the silage to about 0.4 or lower depending on the type of process.**

- **To attain this, the early establishment and maintenance of oxygen free, i.e. anaerobic, micro-environment is essential.**

- **Crops and plant material rich in soluble sugars such as maize, sorghum, oats, sugarcane tops, hybrid Napier grass and other grasses are highly suitable for ensiling.**

- **The dry matter concentration of the forage at the time of ensiling should be around 15-30%, but higher is possible.**

- **Chaffing of the material for ensiling increases it compactness, thus eliminating the air space to the maximum extent.**

- **Green to semi-green forage, which may use the oxygen present for respiration, results in high quality silage.**

- **The silo should be air tight for filling.**

- **Fermentation starts within hours after closing the silo, and accelerates over the next 2 to 3 days.**

- **It terminates about three weeks. Organic acids, primarily lactic and acetic acid, ethanol and gases such as CO_2, CH_4, NO_2 and NH_3 are produced during the fermentation process.**

- **Due to the production of acid, the pH of the biomass is reduced to a level below 4, resulting in the termination of all biological activities, after which the material remains conserved under anaerobic conditions.**

Silage from different forages:

- **Maize, oats and sorghum are important fodder crops that are rich in carbohydrates.**
- **During periods of abundant green fodder availability, they can be chopped and ensiled to produce silage for feeding during scarcity periods.**
- **Sorghum and oats should be harvested at flowering stage when 50% ears have emerged, while maize should be harvested at its milk stage.**

Silage from cultivated and forest grass:

- **During the monsoon season, cultivated as well as forest grass grow luxuriantly, and there is abundant availability of green fodder.**
- **These grasses can be harvested at their pre-flowering or flowering stage when growth has leveled off while their feeding value is still high.**

Silage from water hyacinth:

- **Water hyacinth is an aquatic weed, abundantly growing in Eastern India. In its fresh form it is not liked by ruminants.**

- **Its leaves are rich in protein but the plant contains 90-94% water. In order to prepare silage from water hyacinth, it is necessary to reduce the water concentration to about 70%.**

- **As the leaves dry faster than the petiole and the stems, they drop down during the drying process, and the nutritive value is reduced.**

Complete Feed for drought area

- **Complete feed is a system of feeding concentrates and roughages together in blended form and except water all dietary essentials are supplied through it.**

- **Complete feed system is advantageous against conventional system of feeding by reduced labour cost, maintenance of uniform roughage: concentrate ratio, uniform feed intake, favouring uniform supply of nutrients and maintenance of rumen environment.**

- **This system of feeding is well suited to our country as it helps utilizing locally available crop residues, agro-industrial by products and non-conventional feeds.**

- **Minimizing feed cost and labour cost and maximizing production is the need of time and can be achieved by complete feed system.**

- **This system is economical and efficient as it allows inclusions of low cost Agro industrial byproducts and low quality crop residues with their efficient utilization.**

- **Complete feed supplies ready made, balanced, low cost ration for ruminants for the benefit of landless labourers and small farmers.**

Block (CBF's) Technology

- **The CFBs were found to be very nutritious, easily digestible and handy to transport.**

- **The blocks were made of proportionate mixture of wheat bran, rice, bran, mustard, groundnut cakes, one percent urea, molasses, minerals and salt. The blocks have dimension of 0.5 cubic feet containing about 13% proteins and 50 to 55% TDN.**

- **The nutritive value is 33% higher than common feed. The CFBs can be used in famine and flood situations due to easy transport. The machine costs about 8.5 lakhs.**

Complete feed block

Complete feed block

UMMB

Ingredients	Parts/100 kg Mixture
Molasses	36.0
Rice bran	38.0
Urea	10.0
Cement	8.0
Salt	1.9
Dicalcium phosphate	2.0
Trace minerals	0.1
Water	4.0
Total	100.0

UMMB

Complete feed for growing animals:

- **Complete feed containing 30.0% ground wheat straw, 20.0% *Prosopis juliflora* pods, 6.5% rice polish, 5.0% wheat bran, 26.0% ground nut cake, 0.5% urea, 10.0% molasses, 1.0% salt and 2.0% mineral mixture can be used as ration of growing crossbred calves without any adverse effect on growth and health of animals. It provides 11.0% DCP and 56.0% TDN.**

- **Complete feed with 30.0% wheat straw, 18.0% ground nut cake(deoiled), 20.5% rice polish, 19.0% wheat bran, be used as ration of growing calves supporting the growth rate of 435 g/day. It provides 12.0% DCP and 56.0% TDN.**

- **Complete feed with 30.0% sugarcane bagasse, 8.5% maize gluten, 20.0% Prosopis juliflora pods, 12.0% corn steep liquor, chuni, 7.0% mango seed kernel, 12.0% corn steep liquor, 0.5% urea, 8.0% molasses, 1.0% salt and 1.0% mineral mixture supports the growth rate of 497 g/day of growing calves. It provides 12.0% DCP and 58.5%% TDN. It is 44% economical in terms of feed cost per kg gain than conventional system of feeding.**

Complete Feed for Milch Animals

- **Complete feed with 30% wheat straw, 20% Prosopis juliflora pods , 6.5% rice bran , 5% wheat bran, 26% dioiled groundnut cake, 0.5% urea, 1% salt, 2% mineral mixture and 10% molasses can be used as ration and milk fat %.**

- **Complete feed or total mixed ration with 45% wheat straw, 25% deoiled groundnut cake, 14% Prosopis juliflora pods, 3.5% babul seed chuni, 10% malasses, 1% salt, 1% mineral mixture and 0.5% urea can be used as ration of lactating cows without any adverse effect on production performance of cows. Total mixed ration is 8.66% economical than complete feed in terms of feed cost per kg milk yield.**

- **Complete feed based on 45% wheat straw and non-conventional feeds (Prosopis juliflora pods 14% and babul seed chuni 3.5%) with 25% deoiled groundnut cake, 10% malasses, 0.5% urea, 1% salt and 1% mineral mixture can form an efficient and economic ration for lactating cows without any adverse effects on the milk yield and composition. It decreases the feed cost per kg milk yield by 36.58% over conventional systems of feeding.**

Creation of Feed & Fodder Bank

- **It is an important over delayed proposal to be implemented to meet the contingency needs of livestock during Drought & Floods.**

- **Feed Bank from Ingredients Not Fit for Human Consumption: All State & ICAR labs should test the feed ingredients, which become unfit for human consumption in FCI silos & stores. These tests are aflotoxin contents, pesticides & drug residues. Once they are declared suitable for use in ruminants or non-ruminants, they may be spared for livestock use & stored in feed banks. Such feeds will be useful for all class of livestock including birds.**

- **Fodder Banks: Grasses: Grasses from periphery of forest area wastelands & farmlands may be harvested & stored as hay in briquettes & high density stacks.**

- **Fodder Bank: Crop Residues: The major cereals like rice & wheat straws are more important for this purpose. Next are coarse cereals, legumes, haulms left after removing grains from the crops. These may be stored in these banks.**

❖**Fodder Bank: In Temperate & Alpine Areas:**

❖ **This practice is already followed in Ladakh, Himachal & Hill Hills of Uttranchal.**

❖ **Govt.should provide support to farmers for making stacks briquettes & bailing & storage by Mechanized, Bailing Machines, developed at IARI, GFRI, CIFE, BAIF & ANGRAU.**

Fodder Bank

Fodder Bank

Livestock managemental practices

- The important management practices, which are to be adopted during drought condition, are given below.
- Animals should not be kept in direct sunlight they should be tied under a tree or in a shed.
- They should be allowed to graze only in early morning or late evening.
- Food must also be supplied during early morning and in late evening, as animal's water requirement will decrease.
- There should be no over crowding of animal in shed and animals should be provided proper ventilation.

- If the roof of the animal shed is of iron sheet it should also be covered with thatch or asbestos sheet so that animal may be protected with environmental temperature.

- Upper layer of Kachha floor should be replaced with new sand in every six month so that load of organism can be reduced.

- Pakka floor should be properly cleaned and as be need disinfectant may also be used.

- Wild animals like fox, dogs and jackals are mainly responsible for spreading infection diseases like rabies, anthrax, FMD, H.S. etc therefore control of these animals is important.

Preventive measures against epidemics and diseases

There are certain diseases, which are more common during drought period so these diseases need more attention so as to prevent its outbreak.

To control and prevent these diseases, following measures are to be adopted.

Vaccination:

a) Polyvalant FMD Vaccine (OAC Asia 1): Ist dose to be given at the age of One month, 2nd dose at 4-6 month of age, later every 6 months. The dose rate in large animal is 1oml SC and in small animals 5ml SC.

b) HS oil adjuvant vaccine: 1st dose to be given at the age of 4-6 months followed by annual vaccination. The dose rate in large animal is 3-5ml IM and in small animals 2ml IM.

c) Anthrax spore vaccine: 1st dose to be given at the age of 6 months followed by annual vaccination The dose rate in large animal is 1ml SC and in small animals 0.5ml SC.

d) BQ polyvalent vaccine: 1st dose to be given at the age of 6 months followed by annual vaccination The dose rate in large animal is 5ml SC and in small animals 2-3 ml SC.

e) Enterotoxemia vaccine: Dose rate 5ml SC, two doses at 21 days interval every year.

Deworming:

To check the parasitic infestation regular deworming should be followed. This practice must be started the age of two weeks, followed after 21days and repeated 3-4 times a year at regular interval.

Coccidiostat:

All calves at 0-3 months should be given Coccidiostat for 3-5 successive days to control infection of new born. For this purpose sulfonamides are frequently used the first dose is 220 mg/kg body weight following by 110 mg/kg body weight for the next four days.

Insecticidal spray:

For control of ticks, flies, mosquitoes, lice etc. various insecticides like kilex, carbars, methrin, melathion, aldrin, etc. may be used for this purpose. These can be used at least 3-4 times a year and dose rate to be used as mentioned by the manufacturer. Livestock owners should take proper care during spray or application of these compound on animals because these are toxic substances so all precautions should be taken which have been suggested by the manufacturer.

Dry Cow therapy

At the end of lactation every teat should be injected with antibiotics so as to prevent mastitis during the next lactation but before application these teat should be completely empty.

Disinfection of animal sheds

This can be done with the compounds like lime powder, alum, 2% formalin, 4% NaoH, 1% KMno4 sodium bicarbonate , HgCl2 , Bleaching powder , Copper sulphate, phenol gases like HCN, formaldehyde etc.

Notification of Infectious Diseases

- When there is an outbreak of infections disease, information must be conveyed throughout the country via mass media like T.V., Radio and Newspapers.

- The movement to and fro of the animal should be restricted in that area.

- Detection of sub clinical cases of important infectious diseases like brucellosis, tuberculosis, johne's disease and mastitis and slaughter of positive cases will prevent the out break of these diseases. Field test like CMT, MBR, Tuberculin and johnin test etc. are helpful.

Non-Infectious Diseases :

- During the period of drought, it has been noticed that animals do not get proper nutrients, due to which there are many deficiency and metabolic diseases due to non availability of various factors/precursor for various metabolic pathways occurs.

Deficiency diseases:

- The common deficiency diseases caused by under nutrition are ketosis, Anaemia. Hypocalcaemia, Pica, Grass Tetany, Rickets, Osteomalacia, Goiter, Parakeratosis, Xerophthalmia, Night blindness. Diseases due to the deficiency of vitamin D (Rickets). Vit. E (Skin ailments, reproductive disorders).

Management of Heat Stroke :

- The condition may be sudden preceded by ataxia, weakness, hot skin, rapid pulse and high temperature. The rectal temperature reaches upto $107^{O}F$. Death occurs in most of the cases.

Ketosis

Milk Fever

Poisoning and Toxicity Control :

- **Further awareness among the local community must be created, so that they take proper care of their animals and prevent them from eating poisonous toxic material, which may further increase the stress factor.**

- **These poisonous materials include Braken fern, Lantana, camara, Rati, (*Abrus prectorus)*, Dhatura (Thorn apple), kner (Olendar) Cyanogenic plant like immature maize, sorghum Banchari, cereal affected with Egrot, India Pea, Nitrate and nitrite containing plant etc.**

- **As the exotic breed and cross bred are more susceptible to the drought condition than the indigenous breeds hence, livestock owners must be made aware to take proper care of these exotic breed and cross bred.**

Water management

- It is a most important commodity, whose availability is severely affected for the animals in drought condition. During summer large animal like buffalo/ cattle need 80-100 lts/day for drinking and same amount needed for cleaning and bathing etc.

- It is not available in required amount; for this precaution should be taken to avoid wastage of water. Further the salt intake of the animal should be restricted. The water should be mixed with ‘Gur’ as it quenches the thirst. The water should be provided to animals in small quantity and more frequently.

- Adequate water conservation means should be adopted during the rainy season, so that rainwater is not wasted and utilized during the drought period.

❖**Water that has been utilized for external use for animal as well as human being should be recycled and treated before it reaches the main stream, so that it is again utilized and does not get wasted. This harvesting and recycling of water is already in practice in some areas and needs to be encouraged.**

❖**Earlier as was the practice in villages that huge ponds were created which in rainy season got filled with the rainwater. This stored water was utilized during the lean period and throughout the year. This practice should be encouraged again at village level.**

❖**As drought and floods are a regular phenomenon in our country hence there is a need to have a mission mode project for water conservation, so that suitable means can be adopted for conservation and scientific utilization of water in drought hit areas.**

Water Requirement

- This depends upon environmental temperature and physiological needs of animals.

- A cattle above 27 deg centigrade atmospheric temperature requires 5.5 litres of water per day. A pregnant cattle requires 9 litres of water per day. A milch cow needs 0.87 litres of water per litre of milk produced in addition to its requirement of 5.5.

- In case of sheep water requirement is 3 kg per day, 5 kg per day is needed for pregnant sheep & milk.

- A pig requires 2.1 litres of water per day, lactating sow requires 3.1 litres of water per day.

- For other animals water requirement can be assessed on the basis of above principles.

❖**Use of sea water**

❖**Efforts should be put in to develop cheap method of desalination of seawater, so that it can be used for irrigation etc. In the drought hit region there should be a close coordination between the veterinarians, Veterinary scientists with the livestock owners of the area so that immediate remedial measures can be provided to them and the precious livestock of the poor landless farmer can be saved.**

❖**Unconventional Feed Resources**

❖**Non conventional feeds are helpful to reduce the deficit of animal feeds as well as to make livestock production more economical and profitable. some feasibly used unconventional feed sources could be:**

Unconventional feed resources in India

Feed	TDN %	DCP %	Tannin %	% of inclusion in concentrates	Availability in India(Ton)	References
Damaged Apple waste	65-70	2	--	30		
Vilayati Babul pods	74	7	0.76-1.5	30	2,00,000	Talpada,1979
Tapioca Starch Waste	64	2	--	25	40,000	
Mango seed kernal	70	6	6-8.3	10	20,000	Kehar and Chanda, 1945
Babul pods	66-72	10	18	30	60,000mt	Barman and Rai,2006, Kehar and Sastry, 1948
Panewar seed	66	15.9	1	15	30,000mt	
Tamarind seed	64	1.5	2.96	--	8,70,000	

Spent Anatto seeds	**67**	**8**	**1**	**20**	**30,000mt**	
Rubber seed-cake	**66**	**18**	**--**	**25**	**1,50,000**	**Amrithkumar and Sampath, 1979**
Sal seed meal	**57.8**	**0.1**	**8-10**	**20**	**70,000**	
Mahua seed cake	**49.8**	**9.3**	**--**	**20**	**3,00,000**	
Tea waste	**43.3**	**9.7**	**1.9**	**20**	**15,000mt**	

Unconventional feeds in Gujarat

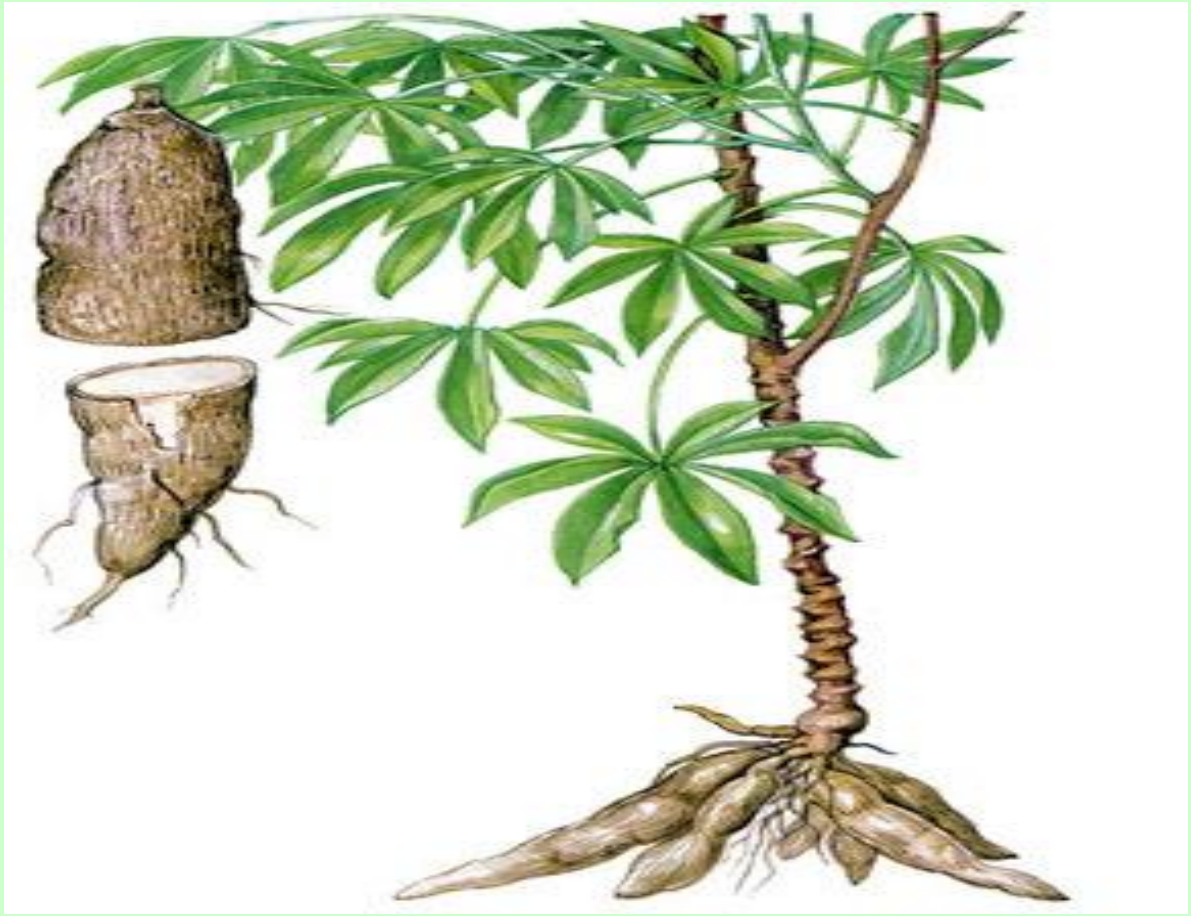
Name	DCP%	TDN%	Availability (ton)	Fed up to (%)	Toxic factor
Mango seed kernel	3.50	70.00	20000	10-15	Tannin
Mahua cake	9.30	49.80	10000	20	Mowrin
Mahua flower	2.10	68.00	500	20	Mowrin
Babul chunni	14.00	59.00	25000	30	Tannin
Babul pod	6.00	57.00	100000	15	Tannin
Kumadia seed(cassia tora linn)	14.00	67.00	2000	10	
Vilayti babul	7.00	75.00	200000	20-30	Crysofenic acid

Corn steep liquor	**39.00**	**75.00**	**5000**	**10-15**	
Subabul seed	**20.00**	**68.00**	**100000**	**15**	**Mimosin**
Isabgul gola	**18.00**	**70.00**	**1000**	**50**	
Isabgul lali	**18.00**	**70.00**	**2000**	**25**	
Molasses	**0.00**	**60.00**	**5000**	**10**	

Babul Pods

Acacia nilotica

Salseed Meal



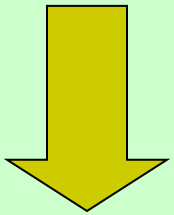
Cassava

Kumadia seed (cassia tora linn)


Karanja Cake


Apex
NEEM PALLETS
Powered by DIYTrade.com

NEW FEED RESORUCES



1. VEGETABLES AND FRUITS WASTE
2. FOREST (BY) PRODUCTS
3. SEA WEEDS

VEGETABLES & FRUITS WASTE

Vegetable Wastes

1. Cabbage
2. Cauliflower
3. Carrot
4. Pea Pods
5. Pumkins
6. Ash Gourd

Fruit Wastes

1. Apple Pomace
2. Citrus peels
3. Banana peels
4. Mango peels
5. Pineapple
6. Coconut pith

AVAILABILITY

Fruits waste : 618.80 thousand tonnes
Vegetable waste : 1102.33 thousand tonnes

GAP (%)

DCP : 46.2 **TDN: 44.2**

Jain et al., 1996


THANK YOU