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FEEDS AND FEEDING OF DAIRY ANIMALS IN GOA

भाकृअनुप
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Rationale

In Goa, the dairy farmers mostly keep cows (indigenous and crossbred) along with few buffaloes for milk production. However, the genetic potential of the dairy animals is exploited fully, when they are fed with well balanced ration. Further, as feed cost is around 75% of the total cost of production, the success of the dairy farming depends not only on the quality of the ration, but also on the economy of the ration. Therefore, knowledge on the nutrient requirements, feeds and feeding practices of the dairy animals is highly essential.

Nutrients Requirement

Besides water, five nutrients namely carbohydrate, protein, fat, minerals and vitamins are required by the dairy animals in proper amount and proportions for optimum production. Animals get these nutrients from their feed ingredients for their maintenance, production and reproduction purposes. All types of nutrients are present in all feed ingredients, but in varying proportions. However, the predominant source of these nutrients has been discussed below.

Water

Water helps in absorption of food material from the digestive system and in elimination of the waste products from the body after digestion. As water is a major component of milk, it helps in milk production. The animals must be provided *ad-libitum* (free choice) clean drinking water throughout the day for optimum production. Animals get water mainly as drinking water in addition to the amount available through green fodder.

Carbohydrate

The main function of carbohydrate is to provide energy. Carbohydrate can be broadly divided into two types i.e. structural (fibrous) carbohydrate and soluble carbohydrate (sugar and starch). The main sources of fibrous carbohydrate are green fodder; while the predominant sources of soluble carbohydrate are cereal grains (maize, rice kani, sorghum etc) and their byproducts (rice polish, de-oiled rice polish, wheat bran etc). Both types of carbohydrates are well utilized by the dairy animals.

Protein

The main functions of protein are to synthesize tissue protein or milk protein. However, if the diet contains excess protein than the required amount, it is used by the body to get energy, which is not economical. Based on source, protein can be broadly divided into two types i.e. vegetable protein or animal protein. The major sources of vegetable protein are leguminous fodder (cow pea, guara etc), oil seed cakes (soybean meal, groundnut cake, cotton seed cake etc) and some agro industrial by-products (rice polish, de-oiled rice polish, wheat bran etc). Although the quality of animal protein is better than vegetable protein, it is generally not encouraged to feed animal protein to the dairy animals because of the chances of occurring "made cow disease". As a single protein source is not rich in all the essential amino acids, to get a balance of amino acids for proper protein synthesis, it is always encouraged to feed protein from two or more sources.

Fat

It provides 2.25 times more energy than the carbohydrate and protein. Besides, it provides essential fatty acids (fatty acids, which are not synthesized in body but are required by body), makes the diet more palatable and reduces dustiness of the diet. The main sources of fat in the diet are oil seeds (cotton seed, full fat soybean etc), expeller type oil cakes (groundnut cake, cottonseed cake etc) and supplements like by-pass fat (rumen protected fat).

Minerals

There are about 17 minerals, which are well defined for dairy animals. The minerals are broadly divided into two groups i.e. seven macro minerals (calcium, phosphorus, sodium, potassium, magnesium, chlorine and sulphur) and ten micro minerals (iron, copper, zinc, manganese, cobalt, iodine, molybdenum, selenium, chromium and fluorine). The minerals help in proper utilization of other nutrients (carbohydrate, protein and fat), keep animals healthy, increase milk production and reduce infertility. Although, each mineral has its own importance; calcium and phosphorus are required in highest amount in the diet of lactating animals.

Vitamins

About 15 vitamins are required by the dairy animals. Like minerals, vitamins also help in proper utilization of other nutrients (carbohydrate, protein and fat), keep the animals healthy, increase milk production and reduce infertility. The dairy animals have the ability to synthesize vitamin B complex, vitamin C, vitamin K and vitamin D in their own body, however for the synthesis of vitamin D exposure to sun light is needed. Thus, only vitamin A and vitamin E are dietary essential for the dairy animals. Green fodders are predominant sources of these vitamins (A and E). Therefore, vitamin mixture must be supplemented with the ration, when green fodder is either not available or available in limited quantities.

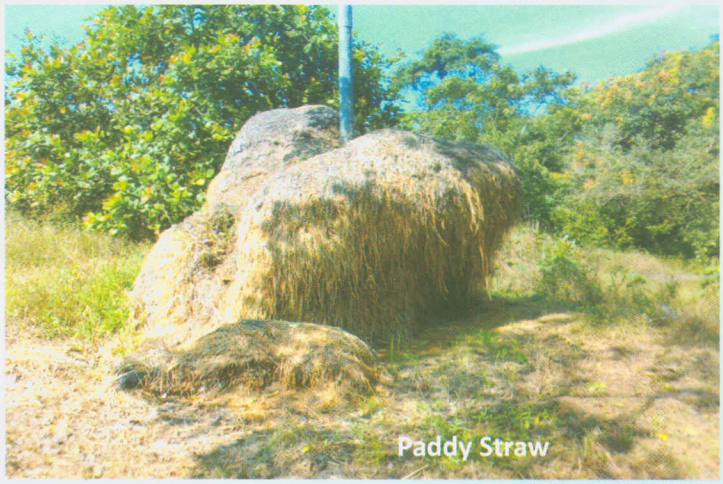
Feeds of Dairy Animals

The balanced ration of dairy animals has mainly two components i.e. roughage and concentrate mixture. The

roughage part includes both dry roughages and green roughages (fodder).

Dry Roughages

The dry roughages include crop residues like straws and stovers. The available dry roughages in Goa are paddy straw,


Paddy Straw

dried karad grass, maize stovers and jowar straw (*kadaba kutti*). The maize stovers and kadaba kutti are mostly being imported from the neighbouring state Karnataka. The crop residues are very poor in nutritive value and mainly provide bulk to the animal.

Green Roughages

The green roughages include cultivated fodder crops, road side un-cultivated grasses and tree leaves. The cultivated


Fodder Maize

fodder are mainly of two types i.e. legumes and non legumes. In Goa, the legume fodders cultivated are mainly cowpea and guara; while the major non-legume fodder crops available are maize, hybrid napier, para grass, jowar etc. The legume fodders are rich in crude protein (15-18%) content; while the non-legume fodders are rich in carbohydrate, but less in crude protein (8-10%). Generally, the nutritive values of the grasses are lower than the cultivated fodder. The fodder trees include *Leucaena leucocephala, Sesbania, Glyricedia* etc with high crude protein content (20-25%).

Concentrate Mixture

It is a mixture of different concentrate feed ingredients like cereal grains (maize, rice kani, wheat, sorghum etc), cereal


Mash Form
Pellet Form

grain byproducts (rice polish, de-oiled rice polish, wheat bran etc), oil cakes (soybean meal, groundnut cake, cotton seed cake etc), oil seeds (soybean, cotton seed etc), mineral mixture and common salt in different ratios as per the requirement.

Feeding of Dairy Animals

The ration of the dairy animals can be divided into two parts i.e. maintenance ration and production ration. The maintenance ration takes care of the body needs of animals where as the production ration includes growth of animal, growth of foetus during pregnancy and formation of milk. The maintenance and production requirements are added together before formulation of daily ration of the animal. Dairy animals are roughage eaters and can not be maintained for long period by feeding only concentrate mixture, which is also not economical. As the dry roughages are very poor in nutritive value and generally provide bulk to the animals, most of the nutrient requirements are met from green fodder and concentrate mixture. In Goa, limited green fodders are cultivated or available for feeding of the dairy animals because of one or other reasons like small land holding size of the farmer and labour problem. Further; the road side grasses and karad grass are available only during the monsoon season. However, in Goa fodders can be grown in the wider interspaces of the cashew or coconut plantations with intercrop approach for proper utilization of the land. The concentrate mixture can be fed both in mash and pellet form. The pellet form of concentrates reduces the wastage during feeding of the animals. If the concentrate mixtures are purchased from the local market, it must be tested for its quality. However, the feed ingredients can be purchased from the local market and the concentrate mixture can be prepared by the dairy farmer himself. The maize grain must be ground to about 1.0-1.5 mm particle size

for proper utilization by the animals; otherwise, most of them are excreted in the faeces undigested. The Bureau of Indian Standard (BIS) recommends two types of concentrate mixture or cattle feed (Type I and Type II) for dairy animals.

BIS Specification of cattle feed

Nutrients (%)	Type-I	Type-II
Moisture (Max)	11	11
Crude Protein (Min)	22	20
Ether Extract (Min)	3.0	2.5
Crude Fiber (Max)	07	12
Acid Insoluble Ash (Max)	3.0	4.0
Salt as NaCl (Max)	2.0	2.0
Calcium (Min)	0.5	0.5
Available Phosphorus	0.5	0.5
Vit A (IU/kg)	5000	5000

Feeding of Type-I (22% crude protein) concentrate mixture is recommended with non-leguminous fodder; while feeding of Type-II (20% crude protein) concentrate mixture is recommended with leguminous fodder. As in Goa, the fodders available are mostly non-leguminous; feeding of Type-I (22% CP) concentrate mixture is recommended.

Examples of Concentrate Mixtures (Type I)

Feed Ingredients	Parts by Weight (kg)		
	Example - 1	Example - 2	Example - 3
Maize grain (ground)	35	35	35
Soybean meal	15	22	---
Groundnut cake	15	---	24
Cotton seed cake	---	23	24
Rice polish	32	17	14
Mineral mixture	02	02	02
Common salt	01	01	01

In Goa, the dairy animals are of around 300-500 kg body weight with daily milk production of approximately five liters per animal. However, there are few numbers of dairy animals with daily milk production up to 15 litres in cows and eight liters in buffaloes. The maintenance requirement of a dairy animal is dependant upon the body weight of the animal, while the requirement for milk production varies as per the quantity of milk production and fat content of the milk. The feeding schedule of low (cow up to seven liters/ day and buffalo up to five liters per day) and medium (cow up to 15 liters/ day and buffalo up to eight liters per day) yielding dairy animals can be made with the following guidelines.

(i) Do not feed exclusively succulent green leguminous fodder to the dairy animals, as it may cause digestive problems. The succulent green leguminous fodder should be mixed with dry roughages (chopped straws or stovers) in 10:1 ratio on fresh basis or with the non-leguminous fodder in 1:1 ratio on fresh basis. However, the non-leguminous green fodder can be fed exclusively to the dairy animals. About 20-25 kg good quality green fodder is sufficient for the daily maintenance requirement of about 350-500 kg body weight dairy animal.

(ii) About 25-30 kg good quality green fodder will take care of the daily production requirement of a dairy animal (cows producing up to seven liters milk with 4% fat content and buffaloes producing up to five liters milk with 7% fat content per day)

(iii) In addition to the concentrate mixture and green fodder, provide dry roughages (paddy straw, jowar straw, dried karad grass etc) *ad lib* (free of choice) to fulfill the bulk of the animal.

(iv) That means daily feeding of about 45-55 kg good quality green fodder along with *ad lib* (free choice) straw will take care of the bulk, maintenance (300-500 kg body weight) and production (cows producing up to seven liters milk with 4% fat content and buffaloes producing up to five liters milk with 7% fat content per day) requirement of a dairy animal.

(v) When green fodder is not available sufficiently, then we have to depend upon the concentrate mixture (mash or pellet) for the nutrient requirement of the dairy animal. The more you depend up on the concentrate mixture, the higher will be the cost of production.

(vi) As a Thumb rule, according to the availability of the green fodder, replace 10 kg good quality green fodder by one kg concentrate mixture (20-22% crude protein).

(vii) That means daily feeding of 4.5-5.5 kg concentrate mixture along with *ad lib.* (free choice) straw will take care of the bulk, maintenance (300-500 kg body weight) and production requirement of a dairy animal (cows producing up to seven liters milk with 4% fat content and buffaloes producing up to five liters milk with 7% fat content per day).

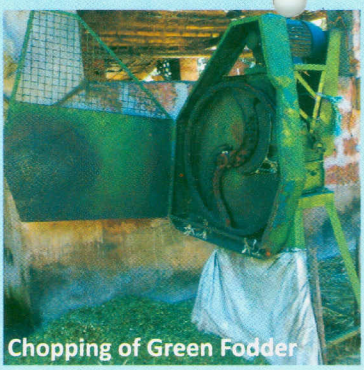
(viii) If the dairy animal i.e. cows producing less or more than seven kg milk and buffaloes producing less or more than five kg milk per day, than, respectively reduce or increase the amount of concentrate mixture @ 400g for every one kg of cow milk and 500 g for every one kg of buffalo milk.

(ix) If the dairy animal is pregnant, then besides the maintenance and production requirement, one kg concentrate mixture as pregnancy allowance should be offered extra only in the last three months of the pregnancy.

Important Tips on Feeding of Dairy Animals

(i) The green fodder must be chopped before feeding to the dairy cows for better utilization.

(ii) If possible, soak the concentrate mixture in water for 6-8 hours and then feed to the animals.


Chopping of Green Fodder

(iii) The required concentrate mixture, green fodder and straw may be offered either separately or mixing together as total mixed ration (TMR).

(iv) The total ration to be offered daily should be divided and offered twice (morning and afternoon) for better utilization.


Water Soaking of concentrate

(v) Do not feed calcium rich feed ingredients or mineral mixture to the dairy cows 15 days before parturition, as high calcium intake during this period increases the chances of milk fever.

(vi) Provide clean fresh water free of choice to the dairy cows. For easy accessibility, a cemented water tank should be constructed near to the cow shed and the tank should be painted with lime at frequent intervals to make the water clean.

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