RATIONAL FEEDING OF CATTLE

BY T. MURARI, B. Sc., (Oxon), F, L. S., F. R. S. A.,

Deputy Director of Agriculture, Livestock.

Hindus and Buddhists generally venerate animal life and usually show an aversion to hurt dumb animals. In India, especially the cow is a very sacred animal and the veneration in which it is held, evidently had its origin in man's appreciation of its great usefulness, in supplying milk, milk products, and cattle for the farm and the home, not to speak of the dung and urine, which besides serving as manure, figure prominently in the domestic and religious life of the Hindu. It is amazing therefore, to find, when one journeys through the country, emaciated specimens of cows, which are the result of insufficient feed and improper attention, quite out of keeping with sacredness associated with the cow.

This negligent attitude is reflected even in cities like Madras where the professional milkman maintains the cow through her lactation period and later sells her to the butcher. The humane method of killing animals with the special type of gun called the "humane killer" is not practised. It is usual to see miserable-looking calves with the milkman. The calves generally die, due to lack of nutrition and the milkman has the dead animal stuffed with straw and put before the dam so as to induce her to yield milk. That there should be no public opinion to stop this kind of practice in this country is more surprising.

The ryot who mainly depends on cattle for his crop-husbandry does not usually conserve fodder in the same way as the farmer does in the Western Countries. He generally takes particular care of the bullocks but not of the cow. He feeds them when he has plenty and at other times, lets them find their requirements as best as they can by grazing in dried-up fields and roadsides. Nevertheless the ryot expects the cows to work and produce calves.

Again, both in villages and in small towns, people who are not ryots maintain cows to supply home requirements. This practice may be back-yard dairying. The cows in these cases are generally managed by servants who may be ignorant of the best methods of feeding, and very often the animals do not get a balanced ration although they are expected to give large quantities of milk.

All animals need sufficient food for keeping their bodies in working order. The ration which gives sufficient energy for just keeping the animals in good health without further demand for any useful work is known as "the maintenance ration". It is in addition to this,

that food must be given, for producing milk or for turning out work. This portion of the food is known as the "production ration". These terms, maintenance and production are mainly used for purposes of working out rations in a sensible way, but it must be remembered that in the animal stomach no such distinction occurs. Any food that is in excess of the requirements of the body in normal working order, would either be stored as fat or converted into work, or milk. The type of food given will no doubt vary from district to district, but it should fulfill these fundamental requirements.

The ration should contain what are known as proteins or albuminoids. These are of complex chemical composition and contain 16 per cent of nitrogen, a certain amount of sulphur and sometimes phosphorus, in addition to carbon, hydrogen and oxygen. It has been discovered that there are particular types of aminoacids like cystine and tryptophane, required for particular function of the body growth, milk production etc. It is yet too early to state exactly the minimum requirements of the various types of farm stock. The white of an egg and the caseinogen in milk, glutin in wheat are examples of proteins. Cattle foods such as groundnut, coconut, gingelly and other cakes, and tender green grass, rich in proteins, are called concentrates. Proteins are essential for muscle building. When they are not sufficient the young animals cease to grow, while older ones become emaciated and several disorders make themselves apparent. When proteins are given in excess, digestion and kidney functions are disturbed and unpleasant smelling fæces and gases are produced.

Foods should also contain what are known as carbohydrates. These are composed of carbon, hydrogen and oxygen with hydrogen and oxygen in the same ratio as in water. All starches, and sugar, may be classed as carbohydrates. Grass and straws contain large quantities of carbohydrates. Rice, maize, potatoes, sweet-potatoes, tapioca, and yams also contain large percentage of carbohydrates. These are necessary for producing sufficient heat for doing work or putting on fat. Carbohydrates are also required by the ruminants in particular to satisfy their craving for bulk. If the animals feed mainly on bulky fodder like straw, the abdominal muscles get distended and "Pot bellies" become evident. In extreme cases the energy used in mastication is more than the energy in the food; and the result is enfeeblement and death.

Foods also contain fats which are similar to carbohydrates but are poorer in oxygen. They are found in large quantities in foods like groundnut, gingelly, rape and linseed seeds and coconut cakes. The heat producing value of fat is two and a half times that of carbohydrates. The fat is generally used up in work and when in excess will be deposited in the body as depot fat. When stored as fat it is used up

for work in times of stress. At one time it was thought that carbohydrates could replace fats of equal heat value but it is now being recognised that a certain minimum of fat is required for the well-being of the body.

Substances called Vitamins, the chemical composition of most of which is not yet thoroughly understood, are essential for growth, maintenance of good health and for reproduction. These vitamins have been recognised by their specific effect on the body complex and they have been called vitamins A, B, C, D and E. Vitamin A, was first observed to be in loose association with animal fat and to be essential for the growth of the young. This vitamin has been recently isolated and is known to be clearly related to a group of vegetable pigment known as the carotenes. Green vegetables and green herbage grazed by cattle will no doubt supply this vitamin adequately. It is noted that vitamin B is necessary for the proper function of the nervous system. Vitamin B complex is divided into B_1, and B_2. Vitamin C is well known as a preventive of scurvy, a common complaint when fresh foodstuffs are not available for considerably long periods. This vitamin has been chemically separated and it is now called ascorbic acid. Vitamin D is known in connection with rickets. This vitamin is essential for proper assimilation of calcium, and belongs to a class of substance known as sterols. If this is not present in the food of the growing animal, it could be produced by the body itself by irradiation. At Hosur it was found that the pure white ram lambs could not survive more than six months and were not fit for breeding. By the administration of small quantities of cod-liver oil it was possible to make them grow satisfactorily and to use them for breeding. Vitamin E is also known as anti-sterility vitamin. Absence of vitamin E will lead to a failure in reproductive powers. The chemical action of this has not yet been determined. If mixed feeding with sufficient green herbage is possible, there should be no vitamin deficiency in the rations.

In addition to the above, cattle food should contain sufficient minerals such as calcium, phosphorus, sodium chloride, iron, etc. They are absolutely necessary for bone formation in the young, production of milk and for maintenance of proper balance of health. Tuberculosis in the cases of heavy milkers is considered to be directly due to lack of sufficient calcium in the blood. Col. Matson has shown the beneficial effect of potassium iodide in cases of delayed shedding of calf hair. In general practice very often unthrifty animals have improved considerably after the inclusion of minerals in the ration. At Hosur, the Ongole calves weighed on the average 52 lb. while the average weight at Chinthaladevi in the Nellore district was 62 lb. but when 2 oz. of equal portions of lime and bone flour were given to pregnant animals for about 2 months prior to parturition, the average weight of calves increased to 61 lb. Of late, deficiency of iodine has

been found to affect growth and produce abnormalities. In order to obviate any mineral deficiencies proprietory articles in the form of mineral bricks are put on the market. Experiments conducted at Hosur show that an ounce of common bazaar salt per animal in addition to 1 to 2 ounces of lime and bone flour in equal quantities and rock salt lick for all stock are very economical from the ryot's point of view. The bazaar salt contains enough iodine to make up for any iodine deficiency in the cattle food.

In addition to minerals, water should be given *adlib* to all animals. As the muscles and blood contain a very high percentage of water it is essential that water should be consumed. It also helps in transporting food materials and washing down of waste products in the body economy.

So far the uses of foods have been described. Now the ryot should know how much food to give an animal. The European standards do not apply to Indian conditions. From Ramiah's nutrition experiments conducted at Coimbatore it is seen that the maintenance ration of adult Indian cattle in the Presidency is extremely low as compared with European. 200 grammes* of groundnut cake and 8 kilograms of paddy straw are sufficient for maintaining an adult bullock in good health. Figures for production are not yet available, but in the absence of such figures, it would be quite safe to give 3 lb. concentrated mixture for every 10 lb. of milk produced by the cow; for work-animals 2 to 4 lb. of concentrated mixture depending on work ought to be sufficient. Hay and water *adlib* should be given in order to satisfy the animal.

The following are some of the useful standards for feeding a bullock of about 1000 lb. liveweight, the production rations being added to the maintenance ration for bullock at work.

	Maintenance ration.	*Production ration.*
1.	14 to 18 lb. hay 7 to 10 lb. straw or grazing ½ lb. concentrate	2 to 3 lb. groundnut cake. 1 to 1½ lb. ricebran.
2.	25 to 40 lb. silage 10 to 14 lb. hay 7 lb. straw	1 to 2 lb. wheatbran 1 to 2 lb. horsegram ½ to 1 lb. chenna busa.
3.	20 lb. cholam fodder or hay ½ lb. concentrate	2 lb. bran (rice or wheat). 1 to 2 lb. cotton seed (crushed). 1 lb. soaked horsegram.
4.	10 to 15 lb. green fodder such as lucerne, lab-lab and 10 to 20 lb. of some grass or straw.	2 lb. gingelly cake. 2 lb. gingelly cake. 1 lb. ricebran. 1 lb. bhusa. 1 lb. wheatbran.

1 oz. bazaar salt, 1 to 2 oz. lime and bonemeal, rock salt lick and water *adlib.*

Palatability of foods and individuality of the animal should not be lost sight of in animal management.

* 1 lb. = 453·593 grammes.

One is likely to ask whether a ryot could afford to give a liberal ration to cattle. If he wishes to get the best out of his animal, it would be far better for him to keep a less number and look after them properly and sell out the surplus than keep an unnecessarily large number of mediocre animals and underfeed them. At present there are far too many useless cattle in the country. It is a greater sin to starve the animals than to kill those that the ryot cannot possibly feed satisfactorily, as he has to conserve fodder for his animals for the dry period when no proper grazing is available.

A PRELIMINARY NOTE ON THE EFFECT OF HAND DIBBLING ON SOME OF THE CHARACTERS IN COTTON

BY C. VIJAYARAGHAVAN, L. Ag.,
Superintendent, Dry Farming Station, Hagari
and
N. KESAVA IYENGAR, M. A.,
Assistant in Cotton, Agricultural Research Station, Hagari.

The common practice of sowing cotton in breeding plots is to dibble the seeds by hand. This system is preferred to drilling since the quantities of seed material handled are small and the number of units to be sown is very large. In the course of sowing trials conducted on the black soils of the Hagari Agricultural Research Station, differences have been noticed from the very beginning in the mulch of the plots dibbled by the hand and of those sown with a drill. Drill sown plots have an advantage over those sown by dibbling in that the seeds lie uniformly deep in the furrows formed by the drill. The furrows are covered immediately by working a blade harrow and the soil is compacted over the seed leaving a fine mulch on the top. The effect of this harrowing lasts for a long time. In the dibbled plots on the other hand it is not possible to lodge the seed at a uniform depth. Further as no harrow is passed, the top soil gets dry and hard, and starts cracking earlier leading to depletion of soil moisture sooner.

In order to test whether the two methods of sowing affect any of the characters of cotton, observations were made during the season 1934–35 on a pure strain of *herbaceum* (Hagari 1) grown at this station. The two treatments were replicated four times on plots of two cents each.

The characters studied were (1) position of the first fruiting branch, (2) yield of seed cotton per plot, (3) lint weight per seed, (4) weight per seed, (5) ginning percentage and (6) lint length. Samples for the examination of lint and seed weights were collected from 3 locked bolls of weekly pickings and seeds from all the positions of