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Cattle Nutrition in War Time

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The prices of cattle feed have increased enormously and the supply of suitable feed to the cattle in sufficient quantities has become a major problem for cattle owners. The prices of cattle have also risen considerably, that people could not afford to allow their cattle to run down in condition and get inefficient and to substitute them by fresh purchases. It is however felt that by suitably adjusting the feeding programmes, the feeding of cattle could be done in a fairly satisfactory manner, and with this hope the following suggestions are offered.

Pastures In many districts grass can be successfully grown for grazing. If the rainfall is adequate and its distribution favourable, the growth of grass will be satisfactory. The grass growth over and above the immediate requirements can be usefully converted into hay.

Grey loamy soil, popularly called Sambal mannu is considered to be best suited for raising pastures, since it is rich in lime. Next in the order of preference come the red loamy and sandy soils (4). If the soil is deficient in lime or phosphoric acid, it could be corrected by the application of suitable manures; if not, it will be reflected in the pasturage. Cattle grazing in such pastures will be unthrifty and easily contract deficiency diseases caused either by a deficient or imbalanced intake of minerals, notably calcium and phosphorus. Grass does not stand waterlogging and pastures should therefore be laid in well drained lands. It would be an advantage if the pasture is secure against winds. Controlled grazing gives satisfactory results.

Composition of grass It is well known that (i) the dried young grass is as valuable as concentrates for sheep and cattle and (ii) the silage from young leafy herbage can even replace concentrates in the ration of the dairy herd (1). These statements are borne out by the chemical composition of the grass determined at various stages of growth. In the early stages of growth the plant cell walls are thin and tender, being composed of simple forms of cellulose. This is easily digested and has a nutritive value for ruminants comparable with that of starch. Further, the nutrients in the cell, namely, proteins, carbohydrates, and fats are released and are throughly digested by the cattle. Hence the proportion of nutrients digested is rather high in young grass. Young grass is rich in protein, which gets reduced as the grass matures. Further, lignification sets in and the cell walls get thickened and tough, due to the conversion of the cellulose into complex forms like ligno-cellulose. Ligno-cellulose cannot be digested by cattle and hence the meagre nutrients in the cells do not become easily available for the nutrition of cattle. That is the reason for straw, a typical

example of a highly lignified material, having a low nutritive value. The advice that can therefore be given to livestock owners is that, ignoring the bulk, the hay crop should be cut before it matures and lignification sets in. Such a hay, rich as it is, will have a concentrate-saving value.

Raising leguminous crops for fodder A discreet farmer should bear in mind the requirements of his farm animals, when he plans his cropping. In view of the non-availability of some concentrates and the prohibitively high prices practically of all the conentrates, he should include protein-rich fodders in his cropping. There are a number of crops that will yield protein-rich herbage, chief among them being the leguminous plants. These possess the unique capacity to assimilate atmospheric nitrogen and fix it in their tissues. The legumes selected must be capable of making luxuriant growth, without being fastidious about its requirements of soil and climatic conditions, *i. e.*, only those that are best suited for the different localities must be chosen.

Lucerne (*Medicago sativa* L.) and sweet potato (*Ipomea batatas* Poir) can advantageously be substituted for concentrates (8). Two and a half pounds of lucerne hay can replace one pound of groundnut cake as a source of protein. But it should not entirely replace the groundnut cake in the ration, based on this calculation. Das Gupta has noted that there is no variation in milk yield, when an ideal grain and cake mixture is replaced to an extent of 75 per cent by green berseem (2). Green leguminous feeds in large quantities are likely to set up tympany and they may be largely fed as hay preferably. Almost all the leguminous hays can be safely fed to cattle. In Circars, *ryots* raise a hay crop of sunhemp (*Crotalaria juncea* L.) in summer, in wet lands making use of the moisture in the soil. A practice akin to this may be possible in other localities as well. Sweet potato is a familiar tuber crop, conspicuous for its vigorous growth. The succulent young vines contain 2·58 per cent protein, equivalent to 19 per cent on a dry basis (8). It is estimated that 20 lb. of green vines a day would supply as much protein as one pound of groundnut cake or 3 lb. of cotton seed. The vines cannot entirely replace the concentrates in the routine ration of cattle, as they exercise a laxative action. Cultivation of sweet potato for fodder will solve the fodder difficulty particularly during summer, when fodder is scarce. This is a practice adopted at the Agricultural College Dairy at Coimbatore.

Tamarind Seed Tamarind seed is available everywhere at a nominal cost and could be used as a concentrated feed, though this is not widely practised. It is used for feeding cattle in the Krishnagiri Taluk (Salem District), in the North Arcot District and in parts of Tinnevelly District. There are many small scale factories, processing the seed for feed purposes at Krishnagiri. The seeds are roasted in small furnaces and the seeds are dehusked by pounding. The testa or outer integument of the seed contains an astringent mucilagenous material, which is likely to induce choking, and should therefore be removed. Roasted seeds contain 3·6% ash, 16·12% crude proteins.

6·32% fat and 61·47% carbohydrates. The roasted and dehusked seed could be soaked and used as a concentrated feed, which is relished by cattle very much, possibly because of its peculiar appetising flavour. To start with one-fourth the quantity of protein in the concentrates may be substituted by an equivalent in tamarind seed and later the tamarind seed could replace half the quantity of concentrates.

White Babool (*Acacia alba* Willd.) The white babool pods contain 14·86% of crude protein, 57·8% of carbohydrates, and 6·84% of ash. includ-1·61% of lime (CaO) and 0·44% of phosphoric acid (P_2O_5). The pods have a good feeding value and can be included in the dietary of cattle as a concentrate. This is a regular practice with the Pattayagar of Palayakottai, the famous Kangayam cattle breeder.

Seldom do cattle take to new feeds kindly. They should therefore be gradually introduced in the dietary of animals, in the place of the usual concentrates.

Tobacco Seed Cake This is not generally known to be a feed for cattle. The tobacco seed cake contains 30 to 35% of crude proteins and 16 to 17% of fat, and is free of nicotine. This could substitute the usual gingelly and groundnut cakes as cattle feed. Tobacco seed cake feeding trials conducted at the Agricultural Research Station, Guntur, indicate that the cake is without deleterious effects on the cattle fed with it (9).

Fish Meal There are several grades of fish meal and their nutritive value depends on the type of fish used, the method of drying and the care bestowed in the manufacture of the meal (3). It usually contains about 60% of protein and 20% of mineral matter, which is mainly made up of bones. The calcium in the bones is in an easily available form and the protein content is high. The fish meal is noted for its vitamin contents, chiefly A, D and G. It is not in common use as a livestock feed owing to the belief that the fishy flavour is imparted to the milk of cows and to the meat of the animal fed with it. No such experimental evidence is however forthcoming, but its inclusion in large amounts in the diet might taint the milk and meat. In consideration of the present high prices of concentrates, it is worthwhile including it in the feed of cattle, setting aside the unfounded prejudices against its use.

Molascake Molasses have been utilised in preparing cakes, called 'Molascakes' for feeding cattle, in the chemical laboratory of the Agricultural Research Institute at Coimbatore. Cane molasses contains 25—29% of moisture, 9·4% of ash and 61·9% of carbohydrates, chiefly as sugar (3). It is palatable and is very much relished by cattle, so much so that rancid groundnut cake mixed with it will be readily eaten by cattle. Molascakes are made by mixing thoroughly equal parts of finely ground groundnut cake and molasses and moulded into convenient shaped bricks. Mineral mixture and salt at one oz each per pound of molascake may also be incorporated; such a cake would contain 4·7% fat, 29·9% protein, 40% carbohydrates, 3·7% lime and 1·8% phosphoric acid.

Mineral matter in feed However adequate the ration may be from the point of view of meeting the energy and protein requirements of cattle, it is advisable to include mineral mixture and common salt, in the feed, at the rate of one oz. per animal per day. The heavy milkers may be given two ozs. of mineral mixture advantageously. The mineral mixture is made up of equal parts of burnt shell lime and steamed bone meal, ground to a fine powder and can be purchased from Messrs Stanes & Co., Coimbatore, and other firms. Common salt tones up the system and the mineral mixture makes up the deficiency of lime and phosphorus in the feed. Mineral mixture has a smell which may not be liked by animals and it has therefore to be mixed with the concentrated feed. In areas where the soil is deficient in minerals like Malabar, Kurnool, North Salem and possibly Tanjore also, the quantities recommended normally may safely be doubled to make good pasture deficiencies (6). The mineral mixture should preferably be fed continuously. It is cheap and its inclusion in the feed, along with common salt, would not cost more than a pie or two per day per animal.

Important points to be remembered while purchasing concentrated feed for cattle The cheapest concentrate must be purchased, consistent with quality. While adjudging the value of a concentrate special consideration must be paid to its protein content, since it is the most valuable nutrient present in it. The kind of concentrate to be purchased depends upon the type of animal, the availability of the material in the market and its cost. For instance, for feeding working bullocks cotton seed or oil cake, whichever is locally available for a reasonable price, can be used, preferably in combination with cereals and legumes. It is not economical to feed young calves with cotton seed. In any locality the availability of the concentrates depends upon the types of crops grown. It will be observed that cotton seed is invariably fed to all classes of cattle in the cotton growing areas and that gingelly and groundnut cakes are likewise preferred in places where these crops are largely cultivated (7).

The concentrates should not be stale or rancid. A ready method of testing the freshness or otherwise of a concentrate like cotton seed or oil cake is to chew a small quantity for noting the degree of rancidity.

It is customary to include in the ration for cattle rice bran and wheat bran, and these may be adulterated with sand and husk. The freshness of the bran is easily detected, but not necessarily the admixture of husk and sand. When a sample of bran is put in a glass of water, sand will settle down quickly at the bottom of the glass and husk will float on the surface and the quantities settling down fast and floating will respectively measure the quantities of sand and husk in the feed. The ingestion of large quantities of inert matter upsets the digestive system of animals.

Cereals, pulses, cotton seed and cakes should also be tested for damage by insects, as to that extent their value is lowered.

Summary The present high prices of feeding stuffs and fodders and their non-availability preclude the inclusion of the ingredients, to which the

animals were accustomed previously. Some suggestions have been given for the maintenance of pasture, inclusion of legumes in the cropping, inclusion of materials like tamarind seed, babul pods, tobacco seed cake, fish meal and molasses in the dietary of cattle and the addition of mineral mixture and salt in the feed. It has been pointed out that grasses and leguminous crops intended for feeding milch animals and growing stock should be cut before they mature fully. Some important points about the purchase of concentrated feeds are also mentioned.

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Abstract

Nature and uses of sea weeds. By R. E. Delf, *Nature, 152, No. 3849, 149 (1943)* Generally speaking, sea weeds are utilised in three principal ways :—In connection with agriculture, as food or medicine, and for industrial purposes. In agriculture sea weeds are used as fodder or manure. They may be fed fresh. In Scotland Pelvetia is boiled with oat meal and then fed to calves. Dried sea weed ground to meal or stored in layers with hay between is used in some districts. Laminaria saccharina was fed to horses with varying success in France during the war of 1914–18. In New Zealand, sea weed (Macrocystis, Hormosira) is found to benefit cattle grazing on poor pasture land. In America, sea weed meal has improved health and fertility in cattle and in chickens when fed as a small proportion of the daily diet. The use of algae as manure in maritime situations is widely practised. Driftweed is largely collected but harvesting is also practised where the coast is suitable. The manurial value is probably due to the organic constituents as well as for mineral salts. There is little nitrogenous value in most sea weeds except in Ulva and Porphyra.

Sea weeds are greatly valued in the East-Japan, Coasts of China and Malay and also in the North and North-west coasts of Europe. Pink laver is produced commercially in Japan. In Great Britain, Carrageen moss is the most widely utilised sea weed. It is usually considered that their mineral content is of value, especially the iodides; their gelatinous substances are probably not digested by man but may be useful in providing bulk without irritation.

The manufacture of potash and other substances from *kelp* (brown algae) fell into disuse when cheaper mineral deposits were discovered. In the present