

THE COCONUT PALM AS A SOURCE OF FOOD

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ONLY one-half of the total production of coconuts in Ceylon is exported, the balance represents domestic consumption. Coconuts are used freely as a refreshing drink and as an ingredient of curries, savoury dishes, puddings, confectionery, ices, biscuits, cakes, and bread. Coconut oil is used as a cooking oil, hair oil, lamp oil and as an essential ingredient in soap-making. The residue "poonac" is fed to poultry and dairy cattle, and is used as a fertiliser also. Palms may be tapped to obtain sweet toddy which can either be evaporated to yield coconut jaggery (sugar) or fermented to produce vinegar, or fermented and distilled to produce arrack (alcohol). When this is done, the crop of nuts is lost.

It was estimated by the Ceylon Coconut Commission that the overall domestic consumption in 1948 was equivalent to 140 nuts per head per annum. Its report stated that, out of a total estimated production of 2,001,622,165 nuts, no less than 998,600,850 nuts were consumed in Ceylon.

It has been recently announced that the population of Ceylon is increasing at the nett rate of 230,000 people annually, which means that 30,000,000 more nuts will be required each year to satisfy local requirements. So, if the export trade of Ceylon in coconut products is to be maintained, at least 1,000,000 coconut seedlings will have to be planted each year to balance this heavy increase in population, otherwise the export trade in coconut products will decline, as it did in India.

Coconuts in Human and Animal Nutrition

The constituents of the food of animals and humans fall into six groups: proteins, carbohydrates, fats, minerals, vitamins and water.

Proteins.—This term is used for a large group of complex nitrogenous organic substances which are present in the protoplasm of vegetables and animal cells. Animals and man depend on the proteins in their diet to build up and restore active tissues in the heart, liver, kidneys, nerves, muscle, skin, hair and nail.

Proteins from various sources vary considerably in chemical composition and certain proteins, even if consumed in large quantities, are not capable of supporting an animal in health; in general, a mixed diet is better than a single source of protein. The protein in the edible white kernel of the coconut (mostly globulin) and amounting to 4.3 per cent., is fairly satisfactory as a food and will produce normal growth even when used as the only source of protein, provided the diet is complete in other respects.

According to Baptist,* the following figures for the essential amino acids of coconut globulin are representative of the protein of the whole kernel of the coconut. The figures given are amino acid nitrogen, expressed as a percentage of the total nitrogen :—

Amino Acid	%	Amino Acid	%
Lysine	4.8	Leucine	4.4
Threonine	2.7	Valine	4.1
Methionine	1.1	Phenylalanine ..	2.5
Cystine	1.0	Arginine	31.0
Tryptophan	0.8	Histidine	2.4
Isoleucine	2.9		

Carbohydrates.—Sugars and starches, otherwise known as carbohydrates, are complex organic substances consisting of carbon, hydrogen and oxygen in various combinations. They are mainly used as a source of energy and help the body to perform work. At least 7 per cent. of sugar is present in the fresh undried kernel of the coconut; the bulk of the carbohydrate in the tissue is in the form of cellulose and much of this is digestible. Sweet toddy, *i.e.*, coconut sap contains about 16 per cent. of sugars, and fermented toddy about 6 per cent. of alcohol. Kurumba water contains usually less than 3 per cent. of mixed sugars.

Oils and Fats.—An oil is a liquid fat; thus coconut oil is a transparent liquid in Ceylon and a waxy white solid in England. All fats consist essentially of mixtures of glycerides of various complex fatty acids and like the carbohydrates, are also made up of carbon, hydrogen and oxygen. Similarly they are sources of energy and have high calorific or fuel value. The fat reserves which can be accumulated in the human body act as reserves of fuel.

The coconut's most important contribution to animal and human nutrition is coconut oil which constitutes 35 per cent. of the fresh wet meat of the kernel. Coconut oil is the most easily digestible of all fats, even including butter, and it is the most concentrated and sustaining of all food materials, furnishing 9,500 calories of energy per gram as compared with about 4,000 calories provided by the proteins and carbohydrates.

Coconut oil is one of the world's strategic raw materials, because it is a storageable staple food, with more calories per ton than any other food.

Minerals.—When plants and animals are burnt, a mineral ash is left. Minerals occur in various quantities in different foods and they are essential to life. If an animal is fed solely on synthetic foods, deficient in minerals, it will die in a few weeks. Minerals function in the body in definite organic and inorganic combinations, and the usefulness of minerals in foods requires the correct combination, just as the coconut palm itself requires a correctly-balanced mixture of mineral plant foods for healthy growth and high productivity.

The principal mineral constituents of coconut meat are potash, phosphorus and magnesium. Calcium which is essential to human nutrition is lacking.

Vitamins.—Vitamins are complex organic compounds which are present in certain foods in only minute or trace amounts but they are absolutely essential to animals, including man, for the normal growth and maintenance of life. When they are not present in sufficient amounts in a diet, the result is stunted growth, ill-health, and various skin diseases or in extreme cases, serious illness leading to nervous paralysis, blindness and even death.

* Proceedings, Ceylon Association for the Advancement of Science, 1952.

They are needed only in minute amounts for the vital processes of all living matter. They do not furnish energy and are not used to build up the body; they are simply catalysts or assisters which are necessary for the transformation of foods from one form into another, and for the regulation of the metabolism or chemical changes, occurring in the body.

The vitamins are identified by a system of letters,—vitamin A, B, C, D, E and so on. In recent years, some of these have been further sub-divided into related complexes and some have been isolated in pure form as carotene (A), thiamine (B₁), riboflavin (B₂), ascorbic acid (C), ergosterol (D) and tocopherol (E).

On the whole, coconut is not a good source of vitamins. Fat-soluble vitamins A and E, but not D, have been reported in coconut meat but not in adequate quantities. Vitamin C seems to be absent from the kernel, but is present in the water of young nuts and in fresh toddy; vitamin B can be produced by toddy yeasts.

Coconut Foods

Analysis of Typical or Average Samples of Coconut Foods

	Fresh Kernel	No. 1 Copra	Coconut Flour	Poonac	Coconut Milk	Kurumba Water
Moisture	48.0%	6.8%	5.7%	9.8%	52%	93%
Oil	35.5	63.7	7.2	8.1	27	2
Protein	4.3	7.6	20.4	21.0	4	1
Crude Fibre	2.1	3.8	9.2	10.5	1	—
Ash	1.1	2.0	5.4	5.5	—	1
Carbohydrates	9.0	16.1	52.1	45.1	16	5

Fresh Kernel.—This is a good source of protein, fat and carbohydrate. In its fresh state it contains a considerable amount of moisture and so freshly scraped coconut meat does not keep well as it is quickly attacked by bacteria and moulds.

Copra.—Since fresh coconuts meat so easily goes bad, it is dried in kilns to about 6 per cent. of moisture and as a result of this, the oil content is nearly doubled. This is the familiar article of commerce from which coconut oil is extracted.

Poonac.—This is the residue left after the oil has been extracted from copra. Poonac is a valuable protein concentrate for poultry, pigs, dairy cows and horses. It can be fortified by the addition of a little red palm oil which is rich in carotene and will improve the health and general condition of the animals.

A balanced ration for milking cows based on coconut poonac would be Mill Poonac 4 parts by weight, Rice Bran 1 part, and Ulundu or crushed Gram 1 part, to be fed at the rate of 3 to 4 lbs. per day, depending on the milk yield of the animal. Mill poonac is to be preferred as chekku poonac contains too much oil.

Edible Copra.—This is copra manufactured in specially constructed kilns to ensure the complete purity of the product, which is directly consumed as food in parts of India. It is the poor man's substitute for desiccated coconut and can be used in curries and puddings, and for sweet and cake-making.

Desiccated Coconut.—Desiccated coconut is produced from the kernel from which the brown skin or parings have been removed; the product is sliced, granulated or powdered, the drying is more severe than in the case of copra, and the final product should contain less than 2 per cent. of moisture. It is packed in air-tight packages otherwise it would re-absorb moisture and go sour and rancid.

Coconut Flour.—This is the product obtained by grinding to powder the residue left after extracting pure white oil from desiccated coconut. Although it has not the essential dough-making properties characteristic of wheat flour and therefore cannot completely replace flour, it has been proved conclusively that coconut flour and poonac flour can be substituted in part for wheat flour in the preparation of bread, suet pastry, steamed puddings, cakes and biscuits.

Coconut Milk.—Coconut milk is an emulsion which is obtained by grating the meaty tissue, and pressing and kneading the meal with water. It must be freshly prepared as it rapidly goes sour and rancid on keeping. Coconut cream which is thicker and richer may be obtained by expressing the meal without using water, or by allowing coconut milk to stand and separate.

Coconut Honey.—This is obtained by adding coconut cream to molten cane sugar, which has been “inverted” with lime juice or dilute citric acid. Coconut honey may be stored in glass jars and eaten with cereals, rice, porridge or buttered toast.

Kurumba Water.—Green unripe coconuts otherwise known as “kurumbas” contain meat which is soft and jelly-like and can be removed from the shell with a spoon. The water obtained from such nuts is a very refreshing drink and the meat is delicious.

The two most important energy-producing foods in Ceylon are rice and coconuts. Rice is the staple carbohydrate but the Island is far from self-supporting in this commodity. Ceylon, however, does not need to import much fat, because the coconut palm provides the bulk of her requirements. The coconut palm is undoubtedly a valuable contributor to human and animal diet, and coconut oil is Ceylon's principal contribution to the food resources of the World.

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