

G.C. Patanayak

PLANNED DIET

FOR



did

KITABISTAN

Plans for feeding India's 400 millions have been put forward by economists and politicians. In this book Dr. Patanayak has presented the science of dietetics in the Indian socio-economic background. With familiar food materials of India, he has worked out different diet schedules suitable for different economic strata of the Indian society. The nutritive value of different Indian food-stuffs and the best method of their use have been elaborately discussed in a non-technical language.

The diet of the expectant mother and of infant has also been analysed by the author, thus the interest of the future citizens has also been safeguarded.

PLANNED DIET FOR INDIA

By

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CHAPTER I

THE BACKGROUND

These are the days of scarcity and famine. Practically every place in India feels the effects of food shortage. Local accentuation of these prevalent conditions has led to the untimely death of millions. Malnutrition and the attendant diseases and epidemics are leaving the tragic trails of human misery. The War is blamed and is held to be responsible for the prevailing food shortage. All sorts of accusations and counter-accusations are heard everywhere. The country is naturally horrified when light is thrown on the dumping in municipal dumping grounds of a few thousand tons of rotting food-stuffs or when a similar quantity is rendered unfit for human consumption. But few introspect to find the colossal wastage of food-stuff in our day-to-day life. It occurs in every home, in every hamlet, in the small and big granaries, godowns and store-houses of individual householders. Further the unnecessary wastage of valuable food elements involved in the processes of preparing and dressing of food-stuffs in our daily life is simply incalculable. War or no war this colossal waste of our National Wealth has been occurring from time immemorial with few or no protests.

People prominent in the public eye have tried to analyse the cause of this tragic situation of food shortage, and suggested solutions and brought out plans. National and international aspects of the question have been discussed, the political and economic background of the food problem has been given prominence both here and abroad.

With this background in view an attempt has been made in the following pages to discuss the problem of our National Diet from the view-point of the Science of Nutrition, and present a rational solution of the many problems of the national nutrition.

A HISTORICAL RETROSPECT

Near about 240,000 years ago man appeared on the face of the earth. In those dim dawn ages of the earth's history, we can only speculate on the human society and the human food. The cerebral hemispheres of the human brain had begun developing comparatively rapidly and man had started to progress in the road of civilisation. Through ages man had been gathering experiences and learning from them through a continuous series of trials and errors. In spite of the obvious distinctive traits which made the primitive man distinct from the rest of the creation, he was still nurtured in Nature's cradle. This had been going on till the recorded history of civilised human life began near about 25,000 years ago. Throughout this unrecorded period of human progress, man must have derived his food from the animal and vegetable worlds as

found in nature. Being physically the weakest of most of the animals then flourishing, the primitive man is presumed to have been more hunted than being hunter himself. Increase of population and comparative shortage of available food in nature and above all the more primitive instinct of self-preservation and herd instinct and the presence of formidable competitors in the field, must have all played their role in compelling man to think of the morrow and start storing his food. The chance sprouting of the stored seeds must have led to agriculture. In his fight with the then competitors, he became a hunter and flesh-eater. The self-same faculty of storing for future led to animal husbandry and pastoral life. Discovery of fire and mastery over it antedates cooking. Chance firing of food stores and finding of half-burnt animals in the forest fires led to first stage of cooking. Chance emersion of food-stuff in hot springs for the purpose of cleaning led to the same end. These are but the rudimentary beginnings of the age of cooking as it is now understood. But the art of cooking as an independent and definite process began as late as 12,000 years ago when cooking utensils came to be used.

The various processes of food production, horticulture, agriculture, hunting, fishing, animal husbandry had been developing slowly with many ups and downs through ages. Depending on exigencies of the situations and fancies of individuals and groups, the multifarious processings of food during its passage from nature to the mouth

are of simultaneous development. But the culinary art represents a period of plenty and leisure.

Development of racial and tribal characteristics led to regional dietetic differences. The racial and tribal dietetic peculiarities evolved from utilitarian though empirical principles. Later on these were ritualised and codified; certain taboos developed in relation to certain foods. Different social and religious values were attached to different food-stuffs. The Sanatan Dharma of ancient India classifies foods into three classes: Satwika, Rajasika and Tamasika according as they tend to encourage the spiritualism, materialism and satanism. Islam rejects particular food-stuffs as absolutely heinous.

In more modern times with the increase of population and diminution of the means of food production, the human mind now attempts to take a realistic and rational view of the situation. From the Malthusian pessimism of the past century we have now progressed a long way to the modern era of planned economy. A planned production, an equitable distribution and a rational consumption appeal now to all progressive thinkers to be the only solution of most of the tragedies of our present civilisation.

Prior to the advent of the modern mechanical civilisation, food used to be processed and cooked by what we call crude processes. Grains other than paddy used to be crushed and ground by human hands with stone grinders. Paddy having a strong pericarp required husking by wooden hand pound-

ers or pedal pounders. But when mass production, mass storage and distribution came to rule the modern world of economics, the modern machines were used in these processes in relation to food as well. The nineteenth-century doctrine of *laissez faire* put profit motif of the few in the forefront of food production, distribution and consumption to the detriment of utilitarian principles. Thus we find in the U. S. A., the most advanced *laissez faire* country in the world, food is produced in one place, exported thousands of miles to be milled and to be re-exported to the original place for consumption.

False social values were put on the cleanness of processed food and whiteness was taken to be the index of the purity of food-stuffs. The foodgrains were milled white and then ground. The highly milled flour, the 'maida' and highly polished milled white rice came to be regarded as the best food for the aristocrats and fashionable people. But in this mad craze for cleaning and whitening, certain essential food elements were lost and new diseases like beri-beri developed.

A proper diet was always considered *sine qua non* of a sound health. All systems of medical treatment have prescribed diets suitable for different conditions and different diseases. We moderns look bewildered at the prescription of such rational diet schemes even in those ancient days. But the essentials of these ancient dietetic prescriptions had been lost in the maze of medical ignorance and superstition. The modern science of dietetics

began really in the nineties of the last century. Analysis of food-stuffs, evaluation of the different food elements, discovery of vitamins and animal and human experiments have all rationalised our dietetic ideas and have put Dietetics on a scientific basis. Every civilised country in the world now is carrying on dietetic investigations and researches and bringing out suitable dietetic schemes suitable to their national requirements.

In India under the aegis of the Indian Research Fund Association valuable research is being conducted by a band of devoted workers under the leadership of Dr. Aykroyd, the research worker of international repute. Different Universities of India are also carrying on original research of their own.

In the post-war reconstruction, Diet Planning forms an important part. The Hot Springs International Conference on Diet Planning to which Dr. Aykroyd was deputed by Government of India have prepared ground for the future international Diet Planning in the post-war reconstruction.

The tragedy of 1943 Bengal Famine stirred the whole world and focussed world attention on the tragic nutritional position of India as a whole. This led to the appointment of the Woodhead Commission with Dr. Aykroyd as one of the members. They have brought out two valuable reports and given outlines of future food planning on a scientific basis. Deriving inspiration from the Russian and American Economic Planning and

from the unpublished labour of the Indian National Planning Committee, a number of Indian plans have been produced and canvassed.

Food planning forms an important item of a National and International Economic Planning. A few such Food Plans have been produced mostly from the economic and political points of view. The present work is not so much of a National Diet Planning but a preliminary presentation of the basic knowledge about food and dietetics. The reader will be in a better position to get an intelligent grasp of any food planning if the basic facts are presented to him in a simple way divested of the technicalities. A plea is made for rationalisation of our dietetic conceptions in the light of modern scientific developments, and suggestions are given to adopt certain measures for the improvement of our National Diet.

ROLE OF FOOD IN LIFE'S ECONOMY .

Man's life is full of work. In fact work is the index of the very existence of life. Death is the end of all work. Work again is a form of energy. All the multifarious work that we are accustomed to do in our everyday life is dependent on the transformation of energy. While lying flat in bed or even when asleep there is no cessation of work. The ceaseless work of the heart, lungs, brain, liver, kidneys continues without any remission.

Further the usual temperature of the atmosphere is less than the body temperature. As a

result the body is losing heat constantly. The heat, however, has to be kept up in the normal condition. Heat, again, is another form of energy. For the maintenance of the body heat, therefore, energy is necessary.

Energy is indestructible but in the body economy, so far as the body is concerned, energy is constantly being wasted. This waste of energy, has to be constantly replenished. Food is the source of energy and all our required energy has to be derived from food.

Again from the moment of conception, the process of building of and wasting of tissues has been going on side by side. Due to ceaseless work, the tissues are getting worn out and these have to be replaced. This is possible only by food. Again for laying of new tissues and for general growth, new food substances are also required.

CHAPTER II

FOOD CONSTITUENTS

Broadly speaking there are two kinds of foods, namely, (1) energy-giving food, (2) body-building food. But food constituents are classified into several chemical groups, namely :

1. Carbohydrates....starches and sugars.
2. Fats and Oils.
3. Proteins.
4. Mineral Salts.
5. Water.
6. Vitamins.

The human body on analysis is found to contain these above-mentioned chemical food constituents. Protein is the basis of body construction as a whole. Mineral salts are found mostly in bones. In working parts of the body, namely, the muscles we find the carbohydrates in comparative preponderance. Fat is found everywhere but it is specially accumulated under the skin and inside the abdomen. Water and vitamins are present in every tissue. Now we will pass on to a rather detailed consideration of these constituents.

CARBOHYDRATES

This is the most important energy-giving food of the body. It is found abundantly in rice, wheat, pulses, yam, potato, beans, sweet potato, orange, grape, and ripe fruits. It is also found in the juice of sugarcane, date palm juice and palm juice. It is present in milk as lactose. Honey contains mostly of sugar. There is no dearth of this food ingredient in our diet, rather there is an excess of it. Because of its predominance, the other food constituents are used much less. As a result we suffer from many diseases like anorexia, tympanitis, diabetes, and accumulation of excess of fat in tissues.

FATS AND OILS

From the animal world we get our supply of fats from milk, butter, ghee, fat of animal bodies, from the vegetable world, we get oils from the oil seeds like mustard, gingelly, linseed, ground-nuts, cashew nuts, cocoanuts, mahua fruits and soya bean. The vitamin content of the vegetable oils is poorer than those of the animal fats. But the red palm oil of Burma, Malaya and East Africa is rich in vitamin A. The diet of our country is lacking in animal fats. Thus we do not get sufficient vitamin A. As a result, our power of resistance to diseases is very small indeed.

PROTEINS

Protein is the basis of the whole body economy. This is the basis of construction of all cells—the

unit of life. Construction, reconstruction and demands to meet the wear and tear of the tissues are met from the proteins of the food. No life is possible without proteins. Besides these, energy is also obtained from proteins. The energy derived from proteins is distinct from those of other sources. It is not only energy-giving but also stimulating to the life process. The youthful enthusiasm, the dynamic personality, the driving urge of manhood are not possible without proteins. Unfortunately, however, there is the general deficiency of the proteins in our national diet.

Animal proteins are obtained from milk casein, egg, fish, meat; vegetable proteins are derived from rice, wheat, millets, barley, oats, ragi but comparatively in much less quantity. Rice is very poor in proteins and again much of it is lost during milling and husking because proteins are found only in the embryo and under the pericarp of the grains. Not only the proteins but many mineral salts and vitamin B are also lost in this way. Parboiled rice is comparatively better as it retains these food elements in spite of husking and milling. In pulses and nuts, protein is present in fairly large amount. In leafy vegetables also we get some proteins. If these are taken in large quantities the required amount of protein may be obtained in this way.

Vegetable protein is inferior to animal proteins. A strong manhood and a strong womanhood cannot be built with vegetable proteins alone. For national regeneration and for reconstruc-

tion of an improved national life, inclusion of animal protein in the daily diet is absolutely necessary. Milk and milk proteins are the best forms of animal proteins. Next in importance are egg, fish, liver and meat. Unfortunately for our poor country the cost of animal proteins is very much higher than that of vegetable proteins. If, however, we can procure 50% of our protein requirements from the animal source there will definitely be a big improvement of our existing diet.

MINERAL SALTS

In all fresh foods there is some amount of salt present, but due to the complicated process of cooking, much of it or whole of it is lost. The salts are neither energy-giving nor tissue-building. But then they are very essential substances in the life processes. The mineral salts get constantly excreted in urine, stool, and sweat. These losses must be replaced. That is why we feel the necessity of taking some salt every day. When we are put up to very hard physical work or when we are suffering from fever, a lot of sodium chloride, common salt gets excreted in the sweat which may be visible or may be invisible. The easiest and most pleasant way of taking common salt in such conditions is to drink a tumbler of warm lemon sarbat mixed with half a tea spoonful of common salt. The drink is not only pleasant but stimulating and invigorating.

Besides common salt (sodium chloride), we require for our life processes salts of calcium,

phosphorus and iron. But these salts we mostly derive from the foods that we generally take. Calcium and phosphorus salts are found in milk and milk products, leafy vegetables, amaranthus leaves, drumstick leaves. Rice is very poor in calcium salts. Ragi is, however, very rich in these salts. The rice-eating population should, therefore, supplement their diet by ragi to meet their calcium deficiency. In washing of rice before cooking and rejecting gruel after cooking we lose most of phosphorus salts in the rice. Calcium and phosphorus salts are essential for the growth of the bones of growing children, for the growth of embryo in the mother's womb and the manufacture of the milk of the nursing mother. In their absence the bone becomes soft and malnutrition results.

Haemoglobin, the red pigment of the red corpuscles of blood is mostly constituted of iron. By this pigment the oxygen of the atmosphere is drawn into the system and sent to all working tissues. Oxygen converts the potential energy of the food-stuff into kinetic energy of work and heat.

Iron is found in abundance in cereals, pulses and meat and the body easily utilises this iron from these foods. There is some iron in vegetables but the human body is unable to utilise it. In malaria, and certain other diseases the red blood corpuscles are broken down and iron gets lost. As a result there is deficiency of iron in the body and man suffers from anaemia. During pregnancy a large quantity of iron is necessary. In these circumstan-

ces foods rich in iron and tonics containing iron are very much required.

WATER

Water is neither constructive nor energy-giving. Water, therefore, cannot be strictly classified as a food. But it is very essential in our daily life and life processes. If the human body is analysed water is found to be the most predominant constituent of the tissues. Its total quantity far exceeds the sum total of all other elements of the body. The nutrition of every cell is dependent upon water. Water again is the vehicle of all essential requirements of the body. Water, however, remains in the body mixed with other substances. Unless mixed with salts, water is not well utilised by the body. That is why, salt solutions are injected into the system when there is a sudden loss of water from the body as in cholera and diarrhœa.

Water again is required to act as a vehicle of the waste products of the body to be carried to the excretory apparatus. Water thus greatly helps the elimination of the waste products and poisonous substances that are formed in the body as a result of the various complicated life processes.

All food-stuffs contain varying amounts of water but cucumbers and water melons contain a large amount of water. The water requirements may be met by eating these fruits. By cooking in water the water content of the food increases. In spite of it water has to be taken separately to meet the normal demands of the body.

VITAMINS

The vitamins are chemical substances and are present in various food-stuffs in very small quantities. These neither yield energy nor do they enter into the construction of the tissues but in their absence all the foods become useless. The tissues are unable to utilise the foods in their absence. They play the most important role in the life processes. The vitamins are, therefore, classified as a class of food-stuff.

Many vitamins are in use in the living world. But for man, six essential vitamins have so far been found. With the advance of human knowledge, more and more new vitamins are being discovered. Many more vitamins may be found in future, but now 6 different vitamins have been well established and these six will be described now.

VITAMIN A

It is found both in the animal and vegetable kingdoms. Animals derive the supply of vitamin A from all green leaves and ripe fruits. Spinach leaves, all amaranthus leaves, cabbage leaves, drumstick leaves, agasti leaves, poyi leaves, ripe mango, ripe papaya, ripe tomato, ripe oranges are all very rich in vitamin A. The lower animals get their supply of vitamin A from the green leaves and stems of plant and creepers and store them in their body in the reserves of fat and in their liver particularly. Man gets his supply of vitamin A from the animal fat and animal oil which are rich

in vitamin A. The well-known and universally used cod liver oil obtained from the liver of cod fish is very rich in this vitamin. Cod liver oil was very popular in medical practice but cod fish is the inhabitant of the coastal seas of the North Atlantic. Cod liver oil, therefore, is not available now in India due to war conditions. Fortunately, however, Indian research scholars have been able to discover a far better substitute of cod liver oil in shark fish liver oil which is very much richer in vitamin A and D content. Sharks are abundantly found and caught in the Indian seas. Shark fish liver oil is being manufactured and sold now by the Governments of Madras and Travancore and elsewhere. Halibut liver oil is still richer in vitamin A but it is not easily available now.

Red palm oil also is rich in vitamin A but poorer than cod liver oil and shark liver oil. But it contains more vitamins than butter and ghee. Vegetarians can, without any objection, take this vegetable oil fairly rich in vitamin A. It is sold by Messrs. Beard Shell & Co., of Madras.

We come to know the effects of a particular vitamin by observing the conditions which result from complete or partial want of that vitamin in the diet. In the absence of vitamin A the eye suffers most. The lustre of the cornea and conjunctiva is lost, ulceration of the cornea occurs leading to the loss of the eye. Keratomalacia or softening of the eye-ball and night blindness are other common conditions which result from the want of vitamin A. Further the intestines are unable to absorb food

materials and a general malnutrition occurs. Skin becomes rough and the condition of phenoderma (Padmakantaka) develops. Intake of vitaminous food in judicious quantities and administration of pure vitamin A clears up these deficiency diseases quickly.

VITAMIN B COMPLEX

There are several distinct vitamins classed under Vitamin B Complex.

Vitamin B₁ (Thiamin, aneurin):—It is abundantly present in cereal grains. Parboiled rice contains more vitamin B₁ than raw rice. Rice polishings from raw rice are very rich in vitamin B₁ and also in protein and mineral salts. Whole wheat flour is better than white flour. Home-ground flour from whole wheat grains is certainly much better. Ragi flour is similarly rich in vitamin B₁ because it is generally home ground from whole ragi grains. Barley, millets, maize, oats, bamboo rice also contain fairly good amounts of vitamin B₁. Pulses and nuts also contain vitamin B₁. Yeast cells also are rich in this vitamin B₁. Toddy which contains a lot of yeast cells if taken moderately may supply the want of vitamin B₁ to the poorer section of the population.

In the absence of the vitamin B₁ man suffers from beri-beri. Here the heart gets very weak and the patient gets ascitis and the legs and feet get swollen. There is the apprehension of the heart suddenly failing. Neuritis and neuralgia also develop.

RIBOFLAVIN

It is found in cereals and pulses. In ordinary vegetables it is not present. But in leafy vegetables, in yeast cells, in milk, curd, animal fat, meat, liver, eggs, riboflavin is found in fairly large quantities. In its absence the condition of Ariboflavinosis develops. This is characterised by the angles of the mouth getting ulcerated, tongue inflamed and the scrotum scaly and itching. If at least one Powa of milk (4 Chhataks = 200 ml) or two eggs are taken daily this condition gets cured because sufficient Riboflavin is obtained by this way. Administration of Riboflavin in sufficient dose immediately clears up the condition.

Nicotinic Acid: Is a chemical substance found in association with vitamin B Complex and is intimately concerned in the healthy function of the human body.

Vitamin C: (Ascorbic acid). This vitamin is found in nature in all fresh fruits and vegetables which are very rich in this vitamin. Unfortunately this vitamin is very easily destroyed by heat. Prolonged storage, purification, exposure to atmosphere and cooking destroy the vitamin C almost completely. It is not found in pulse grains but when they germinate, vitamin C appears in them in large quantities. In the absence of any other way of getting a supply of vitamin C, the same may be obtained by taking a quantity of germinating green gram (moong) or germinating Bengal grain (Boont) every day. Diseases due to the deficiency of

vitamin C are very soon cured by this way. Vitamin C is present in very large quantity in the "amla" fruit which has been in use in India for ages and which has been highly praised in the Ayurveda. This fruit forms the ingredient of many Ayurvedic medicines. This is probably due to its high vitamin C content. The speciality of "amla" fruit is that it retains vitamin C even when it is long stored and pickled. This is probably due to the high initial content of vitamin C.

Deficiency of vitamin C causes a disease known as scurvy. Due to this disease the blood vessels become very brittle and easily bleed. Patches of bleeding are seen under the skin. The gums become spongy and bleed on slight pressure. Administration of vitamin C or foods rich in vitamin C very soon clears up this condition. Administration of vitamin C maintains the tone of liver function and is helpful in toxæmic diseases.

Vitamin D :—In the absence of this vitamin bones are not well formed. They become soft and deformed. Diseases like rickets and osteomalacia result from the deficiency of vitamin D. Calcium and phosphorus salts are the essential substances for building and growth of bones. In the absence of vitamin D these salts are not utilised by the tissues. Utilisation of calcium, phosphorus, vitamin D and ultra-violet light of the sunlight are interconnected. The internal secretion of the parathyroid glands is also connected with it. In absence of one of them the others become useless. Ultra-violet ray, alone, however, has a decided

influence on others. Rickety children, if regularly exposed to the morning and evening sunlight, rapidly gain in health. Ultra-violet rays have the power of forming vitamin D in the body. That is probably why certain religious performances with reference to the Sun God were devised to ensure the good health of the devotee. Synthetic vitamin D is manufactured by exposing ergosterol to ultra-violet rays.

Vitamin D is naturally present in large quantities in cod liver oil, shark liver oil and in all liver oils, milk, butter and ghee. Halibut liver oil is very rich in vitamin D.

This vitamin is present in a concentrated form in Adoxilin.

Vitamin E:—The absence of vitamin E leads to disturbances in the generative functions of the body. Imbedding of the ovum in the uterus becomes difficult. The prolonged absence of vitamin E leads to impotency and sterility both in males and females. Administration of vitamin E and foods containing vitamin E soon cures this disease. Among the ordinary food-stuffs it is found richly in meat, milk, germinating seeds and leafy vegetables. In certain religious performances among the women in India particularly among the sterile women, germinating moong (green gram) forms an important item. It is probably intended to supply vitamin E to the devotee. In medical practice wheat germ oil is prescribed for sterility for its high vitamin E content.

CHAPTER III

DIGESTION, ABSORPTION, ASSIMILATION AND EXCRETION

We take a number of food-stuffs in various forms and in various stages of preparation. Most of them are not fit to be used by the body as such. Certain changes occur in the foods after ingestion to make them suitable for utilisation by the tissues. In the mouth the food is cut up into small pieces and saliva converts some of the starch into sugars. Important stages of digestion or simplification of the food occur in the stomach. The muscular bag of the stomach contracts strongly on the food-stuffs and the food is churned in it and made into still smaller bits. The protein part of the food is mixed up with a juice, pepsin hydrochloric acid, secreted from the inner lining of the stomach wall. The complex protein molecules are simplified. The food gets liquified by the twin process of secretion and churning. Slowly and in small quantities food leaves the stomach and goes into the upper part of the small intestines, namely, the duodenum. Here food meets several secretions, namely, bile from the liver, pancreatic juice from the pancreas and certain juices from the inner lining small intestines. The progressive process of alternate contraction and re-

laxation in the succeeding segments of the intestines forces the liquified food lower and lower from segment to segment. The raised internal body temperature and the mechanical action of churning and the chemical action of the enzymes present in the secretions all help to convert complex food substances into simple chemical compounds. The carbohydrates are converted into simple sugar, fats into fatty acids and glycerine, proteins into amino acids. In these simple conditions, they are absorbed into blood stream. On getting into the blood stream further changes occur in different parts of the body, particularly in the liver and then alone the tissues utilise the simple food-stuffs for their purposes. The working tissues, namely, muscle fibres utilise the simple sugars, e.g., glucose for producing work and heat. Amino acids are utilised in laying out new tissues or meeting the wear and tear of the tissues. They are also utilised in supplying energy both potential and kinetic. Further they exert a specific dynamic action on the bodily activities as a whole. On absorption, the fatty acids and glycerine are re-synthesised into suitable fats and deposited in the fat reservoirs of the body as stores of potential energy to be drawn on in cases of emergency.

By a slow process of internal combustion, the carbohydrates and fats are oxidised to provide energy requirements, the end products being simple carbon dioxide and water which are utilised or excreted, the former by respiration and the latter by respiration, perspiration and urination. The breakdown of tissue proteins and ingested proteins

results, however, in the production of more complex end products, namely, urea and uric acid. The latter is difficult of excretion and when in excess gets deposited near about joints causing gout.

CHAPTER IV

COOKING OF FOOD

Cooking is the speciality of the human civilisation. No other animal cooks its food. In the early days of the human civilisation man also did not cook his food. He was eating everything raw. Reference has already been made as to how and when cooking came into vogue. Civilisation progressed differently and at varying rate of progress in the different parts of the world. It is possible that some groups of men learnt cooking earlier than others. Even now there are primitive tribes who do not cook their food.

Amongst the civilised peoples, cooking is not absolutely universal. Some foods we still take raw and love to do so. There are now some people highly civilised and highly cultured who advocate going back to nature and they preach in season and out of season that mankind should leave the unnatural habit of cooking food. It is, however, not very easy to leave off a habit which is more than 12,000 years old. Nor is this reaction against cooking based on any scientific reasoning. It is not a fact that cooking destroys, deteriorates or adversely changes the utility of food. Rather cooking enhances the utility of food and increases the

palatability and digestibility of food. It must be understood clearly that it is the faulty way of cooking that undoubtedly destroys much of the intrinsic value of the food-stuffs. That is no reason why cooking itself should be condemned, because of its occasional abuse. We do not condemn scientific development in spite of their universal abuse.

There are certain definite purposes for cooking the food. Cooking improves the sight, smell and taste of food. It makes food easy of mastication and digestion. The food constituents get simplified by cooking. But certain complicated process of cooking and dressing of the food deteriorates the value of food. A simple food becomes difficult of digestion. If tastefulness be not made the only criterion of food cooking, if cooking is adopted for improving the intrinsic value of food, we will not suffer from many of our present ailments. Instead of the meaningless efforts to go back 12,000 years, if we rationalise our food and its cooking it would lead us on to a better world.

Cooking of cereals and pulses by the ordinary methods does not harm these food-stuffs. The food constituents remain preserved. By cooking, the cellulose covering of the starch grains get broken up and when eaten digestive juices easily digest the starch. The vitamins get lost only by prolonged application of heat, particularly vitamin C. Because of high initial content of vitamin C Amaranthus and other leafy vegetables retain enough vitamin C even when cooked. Vegetables cooked in ordinary way lose a lot of their nutritive value.

By washing the rice before cooking we lose a lot of mineral salts, proteins and vitamin B; cooking, however, does not harm these. If paddy is well kept, if husking is cleanly done and rice is cleanly preserved there is no necessity of washing rice and the loss of the nutritive elements can be avoided. Any way the rice may be winnowed but should not be washed on any account.

Quick frying does not harm most of the food-stuffs. Addition of cooking soda completely destroys the vitamin value of the food but if the food is cooked with tamarind or other acid fruits the essential food constituents including the vitamins are well retained.

Too much cooking of protein foods, particularly animal proteins, is bad. The food gets stiffened and indigestible.

Steam cooking is the best method of cooking. It does not produce any bad effects. None of the food constituents are lost. There are many indigenious methods of steam cooking. If these indigenious methods of steam cooking are universally adopted and improved, the quality of our diet will greatly improve.

In this connection the method of steam cooking of the Great Jagannath Temple is worthy of reference and if the devotees of the Lord Jagannath take a lesson out of the Lord's method of cooking they would do an immense service to themselves and necessarily please the Great Lord. The simple method of steam cooking so popularly adopted in Orissa and Madras to prepare some simple yet

delicious cakes is very scientific in conception and merits encouragement. If the principles of this method are extended to the cooking of other foods, there will be full retention of the nutritive elements of food-stuffs and at the same time the deliciousness of the food-stuffs will increase. A representative example of this indigenous method can with advantage be mentioned here. A quantity of black gram grains (urid) is crushed and soaked in water. By an ingenious process of washing, the black covering of the grains are removed completely. The whole thing is ground into a paste. By another very ingenious but simple process the pasty mass is aerated which results in the enormous increase in volume of the original mass. This process of aeration softens the cooked material. A quantity of water is kept in a pot. A piece of fine linen is bound to the rim of the pot. The required quantity of paste is placed on the linen. It is covered over completely by a well-fitting cover. The whole is placed over a fire. Steam generated from the water remains enclosed and steams and cooks the black gram paste. Various improvements over this process have been introduced. The Enduri of Orissa and the Idli of Madras are the products of this method.

CHAPTER V

FOOD REQUIREMENTS

Food is necessary for tissue building, meeting the demands of wear and tear, for supplying energy and for maintaining the body temperature. But question arises how much of food is required. This is a very difficult question to answer. Hunger may be considered as the index of food requirement. But the feeling of hunger is not dependable in actual practice. The human body is very capable to adapt itself to various conditions. Long, continued abstinence or partial starvation dulls appetite and hunger and in spite of colossal deficiency in the required quantity of diet, man carries on seemingly all right. But there is a definite deterioration of his mental and physical faculties. Some other more accurate method must be found which will be scientifically dependable. The quantity of food required for man varies widely in varying circumstances. It varies according to age, sex, race, occupation, climate and country.

All the three principal food constituents, namely, proteins, fats and carbohydrates are capable of yielding heat, a form of energy. In the field of scientific work, it has been found convenient to measure the intrinsic food value of the foods and

food constituents in terms of heat units. For finer measurements of heat in Physics a small calorie is used as a heat unit. A calorie is defined as the amount of heat necessary to raise the temperature of one gramme of water from 4° to 5° C., i.e., through 1° centigrade. For ordinary purposes of heat measurement, a large Calorie (spelt with a capital C) is used in Physiology which is 1,000 times larger than the physical small calorie. The large Calorie is, therefore, that amount of heat which is necessary to raise the temperature of 1,000 grammes of water (one litre of water) through one degree centigrade.

It is found that one gramme of protein and one gramme of carbohydrate on being burnt yields 4 large Calories of heat. Similarly, one gramme of fat yields 9 large Calories of heat.

A Food Commission of the League of Nations after a lot of investigations have recommended standard diets for different peoples in terms of Calories of heat which the foods are capable of yielding. For temperate climates, for an average man doing no specially hard work, they say that 2,400 Calories of heat are necessary per diem. For doing light work another 75 Calories extra will be necessary. For agricultural village labourers of India, 2,500 to 2,600 Calories will be necessary per diem. But labourers performing very hard manual work and the active and energetic players and athletes will require 2,800 to 3,000 Calories of heat per diem. The pregnant woman requires 2,400 Calories, the nursing mother 3,000 Calories per diem.

Converted into weight of food constituents the requirements of our countrymen according to the League of Nations standard would be as follows:

	<i>Proteins or Carbohy- drates</i>	<i>Fat</i>
Rural agricultural workers	625-650 grms. or 56-59 tolas	266-277 grms. or 24-25 tolas
Hard manual workers & nursing mothers	750 grms. or 68 to- las	333 grms. or 30 to- las.

In this connection one thing is to be kept in mind. All the food-stuffs that we take is not digested or absorbed. Therefore, they are not fully converted into heat Calories. So we have to take something more than above-mentioned quantities to compensate for the loss due to improper digestion and absorption.

The foregoing shows the optimum and standard food requirements of our country according to the League of Nations standard. But the analysis of the prevailing diet regimen of our countrymen reveals a colossal deficiency in all respects. No wonder our countrymen are universally weak, inactive and inefficient in comparison with other peoples of the world.

CHAPTER VI

DIETETIC BALANCE

Food is required for providing energy to the body for different forms of work in different circumstances, for providing materials of tissue construction and reconstruction and finally for keeping up the general health of the body. There are many kinds of food in use in the human society. The food that meets all the above mentioned requirements is called the "ideal food". The "ideal food" should contain all the proximate principles of diet in proper proportion. It should be in a digestible form, it should be well absorbed. After absorption it should leave sufficient heavy material to stimulate the large intestine to expel the food remnants and along with it help the excretion of certain waste products of the body. The food should contain principles which will increase the resistance of the body against diseases. The food should be easily available at a cheap price. But such an "ideal food" is difficult to obtain in actual practice and more or less it remains only as an ideal. In fact, no one food conforms to all these conditions. Rather a mixture of different foods can be made to approach this ideal. On the whole a mixed food is better than a single food.

Not only our food should contain all the proximate food constituents but also the constituents should be in proper proportion. All of them are vitally necessary for the welfare of the body mechanism but their exact requirements vary according to circumstances. For example, children require more proteins for purposes of body building and also require carbohydrates as an easy means to supply energy for their physical activities. In cold climates more fats and oils are necessary to keep up the warmth of the body. A diet that contains all the food constituents in proper proportion is known as a "well-balanced diet." On the other hand if any of the food constituents are wanting or in excess such a diet is known as "ill-balanced diet." Our Indian diet contains more of the carbohydrates and less of proteins and fats. Mineral salts and vitamins are also deficient in Indian diets. In India even the energy-giving food constituents are also wanting in many cases. Mostly our Indian diet is an "ill-balanced diet." In Moslem countries, in Europe, America and European colonies, the diet is rich in proteins and fats. The total quantity of food-stuffs also is sufficient for all the needs of the body. The diet there is, therefore, mostly a "well-balanced diet."

Our physical, mental, moral, and social backwardness is due to this ill-balanced diet of ours. Well-balanced diet of the Europeans may be said to be the main cause of their all-round advance.

The Japanese diet was ill-balanced like ours and they were also backward like us. But in re-

cent years inclusion of fish and soya bean in their diet in sufficient quantities has produced a wonderful regeneration. Their main diet at present consists of rice, soya bean and fish. But with a proper balance between these food-stuffs their food has become well balanced. Rice is our staple diet. Fish is available in our country and with a little effort its supply can be made adequate. Soya bean can be cultivated in India also, or the Indian common pulses can be used in its place. By a proper adjustment and without the involvement of extra cost we can make also our diets well balanced, thus we can also have an all-round advance.

In our country it is generally seen that the Moslems living in the same surroundings as Hindus are stronger and hardier and have got a stronger vitality and are more disease-resisting. They are more capable of harder and more sustained work. During the epidemics, the mortality among the Moslems is seen to be less than among the Hindus. Among many other causes, the comparatively more well-balanced diet of the Moslems is the contributing factor for this condition. Among the Hindus there are many diet restrictions on religious grounds. Moslems' diet is definitely better and more well-balanced than that of the Hindus.

NUTRITION AND MALNUTRITION

If the diet is well-balanced, if it is digestible and absorbable and if it brings a sense of satisfaction and well-being, the nutrition of the body as a whole is well maintained. In its absence, the normal

functions of the body get a set-back and they are immensely disturbed. As a result, malnutrition sets in. Nutrition is the basis of a sound health. Malnutrition similarly is the cause of most of the diseases. The diet which contains more of milled rice and less of proteins, mineral salts and vitamins is necessarily an ill-balanced diet and will surely cause malnutrition. Such an ill-balanced diet being very common in our country, cases of malnutrition are also very common. Mostly due to malnutrition, diseases like beri-beri, anaemia, night blindness occur. In many cases there may not be any definite disease but there is a general bad health and the body construction is defective. Growth is stunted, the body weight is less in proportion to age. This condition is due to a prolonged state of malnutrition.

Our school children show many common diseases like enlarged tonsils, caries of teeth, deformed dentition, scabies, ring-worms and short sight. They are shy of any hard physical labour. The natural youthful enthusiasm and exuberance are seen to be absent in them. All these are due to absence of a well-balanced diet.

The diet of the students in the boarding houses and hostels on analysis shows the deficiency of the essential food-stuffs and it is hopelessly insufficient and ill-balanced. It is no wonder that our school children are mostly ill-nourished.

The Health Bulletin No. 23 (Coonor Institute Publication) mentions at page 14 the result of analysis of a diet of an institution which is as follows:—

The daily diet per head consists of

							<i>Tolas</i>
Milled Rice	..	..	..	..	..	..	37.5
Milk	..	..	..	..	..	..	2.5
Pulses	..	..	..	..	..	..	2.5
Brinjals	..	..	..	..	..	..	2.5
Ladies' fingers	..	..	..	..	..	..	1.75
Amaranthus	..	..	..	..	..	..	1.75
Gengilly oil	..	..	..	..	..	..	1.75

In terms of food constituents the above diet will be as follows:—

Protein	..	..	..	..	..	..	38 grammes
Fat	..	..	..	..	..	..	19 grammes
Carbohydrate	..	..	..	..	..	..	357 grammes
Energy in terms of heat unit	..	..	..	..	..	..	1,750 Calories

In such a diet, there is a big deficiency of mineral salts, fats, vitamins, and proteins. The total energy value is also much less than what ought to be. In place of the required 2,400 Calories this diet yields only 1,750 Calories. The above diet schedule is typical of the ill-balanced diet that prevails in most of the boarding houses of our country. Probably there are worse conditions prevailing in some institutions. Under these circumstances physical and mental activity is impossible. A dynamic personality, a strong individuality, *spirit de corps*, leadership are virtues which are impossible of achievement with such an ill-balanced and insufficient diet. Yet the future citizens, the future leaders of the country are given this kind of food and on these people will depend the future of the country!

BETTER DIET

A well-balanced diet should have the following daily composition:—

	<i>Calories</i>	<i>Grms</i>	<i>Tolas</i>
Protein .. .. .	..	65	5.5
Fat or oil .. .. .	..	45-60	3.75
Carbohydrate for a man engaged in manual work	2,160	540	48
For a man doing moderate manual work	2,600	650	56.5
For a man engaged in hard manual work	2,800-3,000	700	61
Nursing mother	3,000	600	53
Young man above 14 years	2,600	650	56.5
Adult female above 14 years	2,100	525	46

Pregnant women, nursing mothers and growing children require more protein. Only 65 grms. or 5.5 tolas of protein as shown above will not satisfy their requirements. Besides these, they require more vitamins and mineral salts.

Many a well-balanced diet schedule can be worked out by combining different food-stuffs. It is difficult to assess the monetary value for well-balanced diets for the self-supporting villagers. People who grow and get their food from their own fields do not assess the value of their diets in terms of money. In these cases there is no necessity

to evaluate the price of food-stuffs. It is sufficient if their diet contains the above mentioned constituents. For the convenience of all the people, the diet schedules should be worked out from easily available common articles of food. For the people who purchase their food-stuffs, well-balanced diet tables of different monetary values are to be given. With this end in view, the Public Health Department of Orissa planned well-balanced diet schedules of different monetary values at the pre-war market rate of various food-stuffs. Details of these are given below. From these it will be quite evident that balanced diet can be had at a very low price. People belonging to different strata of society, whether a capitalist or a labourer, rich or poor, landlord or tenant, may choose any of the schedules that suits their economic condition and adopt them in their daily life.

Diet Schedule No. 1

(Balanced diet per adult man per diem at an expenditure of Rs. 3/12/- per month excluding the cost of cooking of the food.)

<i>Articles of Food</i>	<i>Quantity required per diem</i>
	tolas
Home-pounded parboiled rice	35
Ragi (Mandia)	12.5
Pulses (Red gram)	7.5
Green leafy vegetables (amaranthus)	7.5

<i>Articles of Food</i>	<i>Quantity required per diem</i>
	tolas
Small fish	7.5
Mustard or Gingelly oil	2.5
Brinjals	5
Ladies' fingers	2.5
Yam	2.5
Jaggery	3.75
Ground-nut fried	2
Salt and spices	0.5

Diet Schedule No. 2

(Balanced diet per adult man per day at an expenditure of Rs. 5/2/- per month excluding the cost of cooking of the food.)

<i>Articles of Food</i>	<i>Quantity required per diem</i>
	tolas
Home-pounded parboiled rice	30
Home-made whole wheat flour	12.5
Pulses (Red gram)	7.5
Amaranthus tender	2.5
Green plantain	2.5
Potato or season vegetables	3.75
Gingelly or mustard oil	3.75
Jaggery	10
Milk	5
Ripe plantain or other ripe fruit	1.25
Salt and spices	0.5

Diet Schedule No. 3

(Balanced diet per adult man per diem at an expenditure of Rs. 7/- per month excluding the cost of cooking of the food.)

<i>Articles of Food</i>	<i>Quantity required per diem</i>
	tolas
Home-pounded parboiled rice	30
Whole wheat flour	12.5
Red gram (Arhar dal)	7.5
Amaranthus tender	7.5
Brinjals	5
Green plantain	2.5
Ladies' fingers	5
Potato	2.5
Gingelly or mustard oil	3.75
Meat or fish or both	7.5
Jaggery	3.75
Milk	20
Ripe plantain or ripe fruit	10
Salt and spices	0.5

Diet Schedule No. 4 (Non-vegetarian)

(Balanced diet per adult man per diem at an expenditure of Rs. 15/- per month excluding the cost of cooking of the food.)

<i>Articles of diet</i>	<i>Quantity required per diem</i>
	tolas
Home-pounded parboiled rice	15
Whole wheat flour	15

<i>Articles of Food</i>	<i>Quantity required per diem</i>
	tolas
Red gram (Arhar dal)	5
Meat or fish (small)	7.5
Egg	(two) 5
Drumstick, Brinjals	} Each 2.5.
Beans, other fresh vegetables	
Amaranthus tender	10
Cow's milk	20
Sugar	3.75
Gingelly or mustard oil	0.62
Ghee	3.10
Ripe plantain or other ripe fruits	15
Salt and spices	0.5
Tea or Coffee	If necessary a little

Diet Schedule No. 5 (Vegetarian)

(Balanced diet per adult man per day at an expenditure
of Rs. 15/- per month excluding the cost of cooking.)

<i>Articles of Food</i>	<i>Quantity required per diem</i>
	tolas
Home-pounded parboiled rice	15
Whole wheat flour	15
Dal	7.5
Milk	30

<i>Articles of Food</i>	<i>Quantity required per diem</i>
	tolas
Curd	12.5
Ghee	3.54
Sugar	3.75
Potato	3.75
Fresh vegetables	10
Green leafy vegetables	12.5
Ripe fruits	10
Tea, Coffee, spices, salt etc.	A small quantity

The amount of different food factors present in the above-mentioned scheduled diet are furnished below in a tabular form. The total calorific value of each schedule is also given for rational comprehension.

<i>Different constituents of food</i>	<i>Schedule No. 1</i>	<i>Schedule No. 2</i>	<i>Schedule No. 3</i>	<i>Schedule No. 4</i>	<i>Schedule No. 5</i>
	grms.	grms.	grms.	grms.	grms.
Protein	92.83	76.86	94.31	91.09	76.18
Fat	44.70	53.08	68.53	76.0	68.48
Carbohydrate	527.95	484.82	499.89	371.99	409.13
Mineral salt	14.0	14.17	..	15.99	15.83
Calorific value	2,843	2,727	2,997	2659	2610

We have calculated the total and gross Calories available in different diet schedules. But some of

the protein is utilised in the body for growth and repair, so this amount is not available for oxidation to yield kinetic energy. The average requirement of protein for an adult for growth and repair is 65 grms. per day and this should be deducted in calculation of available energy of various diet schedules. Accordingly modified calculations of the calorific value of various diet schedules enumerated above will be as follows:—

<i>No. 1</i>	<i>No. 2</i>	<i>No. 3</i>	<i>No. 4</i>	<i>No. 5</i>
2,577	2,461	2,731	2,393	2,344

Each of the above scheduled diets is fairly well balanced and will satisfy the calorific requirements of an average man. Of course those who perform very hard manual work will require more Calories and their intake of food should be correspondingly higher. Keeping other things equal as in the scheduled scale, they may be provided with required extra energy by increasing the intake of carbohydrate in the form of some more rice. The diet of labourers is deficient in many respects and generally it is ill-balanced. It is poor in constructive food elements such as proteins and essential amino acids as well as disease-resisting factors such as vitamins. For this they invariably suffer from malnutrition and deficiency diseases. Poverty is the main stumbling-block in planning satisfactory diets for them. Still then it is often possible to make effective improvements in their diets with little increase in cost. We now proceed to discuss how dietetic improvements can be achieved by a

more rational use of the food-stuffs available in our country and which can be easily grown with least possible extra labour and least amount of extra cost. This we propose to consider under two heads of food-stuffs, namely, vegetable and animal food-stuffs.

CHAPTER VII

VEGETABLE FOOD-STUFFS

Rice.—Our country is predominantly rural and agricultural. The poverty of our villagers beggars description. Though the machine civilisation of modern era has considerably shaken the village life and organisation it has not shattered it completely. Still the village farmers grow their own food individually or communally from their own village lands. If they try they will succeed in improving the quality and quantity of their food crops from nutritional point of view. For instance, they may grow long-termer in place of short-termer rice crops which decidedly has more food value. Where the long-termer paddy cannot be grown ragi (*Mandia*) may be grown and used as food in place of rice as the former has better nutrition value than the latter specially in its calcium, iron, and other mineral contents.

In the process of preparation of dishes, there is a lot for improvement. The preliminary washing before and decanting of extra fluid after cooking robs most of its nutritive value; by this vitamins, mineral salts and greater portion of proteins are lost. So rice is to be prepared without preliminary washing and without the removal of extra fluid

when cooked. Just sufficient water is to be given to boil it well and no superfluous water should be used.

The outer layer, the pericarp and the embryo of rice grain contain most of the essential food factors such as vitamins, mineral salts, proteins and fat. When rice is well milled or over-milled it loses all or most of these and becomes poorer. So under-milled rice is to be preferred for its nutritive value. Coarse-grained rice is richer than finer varieties and has higher food value. Parboiled rice even when over-milled does not lose all valuable food factors like raw rice. Machine-milled rice, due to the thorough removal of its outer layer is poorer than home-pounded rice. In consideration of the above facts it is evident that food-conscious people will prefer coarse-grained, long-term, home-pounded, unpolished and parboiled rice as the best article of diet.

There is no difference in food value between ordinary cooked rice and cooked rice kept soaked in water after cooking. Soaked rice (Pakhala) if left over 24 hours undergoes fermentation due to yeast cells. These yeast cells are rich in vitamin B and so they increase nutritive value of the soaked rice. In tropical countries specially in hot season, soaked rice is palatable and wholesome for health.

There are other preparations from rice as well; flattened and puffed rice are taken in some cases. Flattened rice (Chuda) contains all essential food factors. So it is wholesome and nutritious. One advantage for it is that its keeping quality is good

and it can be taken raw. It can be kept for days together without any deterioration in quality. Puffed rice does not contain much nutrition but it is light and easily digestible and is used as an invalid and sick diet. There are many more rice preparations. From rice flour, bread, cake, pudding, porridge, etc., are prepared. These preparations are not poor, rather rich and wholesome.

OTHER CEREALS

Rice alone as a staple food will not satisfy modern standard of nutrition. It should be supplemented with other cereals grown in our country. Wheat, ragi, millet and oat are important among them. These cereals are not abundantly grown in some parts of our country particularly in Orissa. These foodgrains generally are richer than rice from dietetic point of view. A stimulus in the form of a campaign should be given to the farmers to grow them more intensively wherever possible and where climatic conditions permit. There is a prejudice against ragi. People think it a poor article of diet while it is not so at all. On the contrary, it is richer than rice. It can be grown in comparatively less fertile land unsuitable for rice. There are enormous fallow and waste lands in our country and most of them are just suitable for its cultivation. If this crop is grown abundantly, it will improve our standard of diet to a great extent. The position of millet and maize is exactly similar to that of the ragi. Wheat and oat of course cannot be grown everywhere. Still then, wherever

possible climatologically, no pains should be spared to cultivate these. Wheat is very nutritive and is used as a staple food in many parts of the world. We should at least have one wheatened meal a day and try to grow it enough as to be self-sufficient in this respect in our own country.

Oatmeal is a very rich food, richer than wheat. For the growing child it is very wholesome and nutritive. We should try to produce as much oatmeal in our country as possible specially to meet the needs of our growing children. As in rice so in all other cereals the essential food factors are contained in the outer layers, pericarp and embryo. The whole grain should be used in the diet such as whole wheat flour. What is true for wheat is also true for oatmeal, maize, millets including ragi.

On the whole if the health consciousness of our people can be aroused and they become food-conscious, a great deal of improvement in our standard of diet could be effected without any extra cost.

Table of Food Value of Cereals

<i>Name of the Cereals</i>	<i>Water</i>	<i>Protein</i>	<i>Fat</i>	<i>Mineral salt</i>	<i>Fibre</i>	<i>Carbohydrate</i>	<i>Calories per 100 grms.</i>
	%	%	%	%	%	%	
Millet ..	12.4	11.6	5.0	2.7	1.2	67.1	360
Oatmeal ..	12.5	11.5	1.3	1.5	3.9	69.3	335
Maize Ten-der ..	79.4	4.3	0.5	0.7	..	15.1	82

<i>Name of the Cereals</i>	<i>Water</i>	<i>Protein</i>	<i>Fat</i>	<i>Mineral salt</i>	<i>Fibre</i>	<i>Carbohydrate</i>	<i>Calories per 100 grms.</i>
	%	%	%	%	%	%	
Maize ..	14.9	11.1	3.6	1.5	2.7	66.2	342
Oatmeal ..	10.7	13.6	7.6	1.8	3.5	62.8	375
Ragi ..	13.1	7.1	1.3	2.2	..	76.3	345
Home-pounded raw rice	12.2	8.5	0.6	0.7	..	78.0	351
Home-pounded Parboiled rice ..	12.6	8.5	0.6	0.9	..	77.4	349
Machine-milled Parboiled rice	13.3	6.4	0.4	0.8	..	79.1	346
Machine-milled raw rice ..	13.0	6.9	0.4	0.5	..	79.2	348
Flattened rice (flakes) ..	12.2	6.6	1.2	1.8	..	78.2	350
Puffed rice	14.7	7.5	0.1	3.4	..	74.3	328
Wheat whole	12.8	11.8	1.5	1.5	1.2	71.2	346
Whole wheat flour ..	12.2	12.1	1.7	1.8	..	72.2	353
Fine wheat flour ..	13.3	11.0	0.9	0.4	0.3	74.1	349

PULSES

Pulses are rich in vegetable proteins. Animal protein is costly. In a country, proverbially poor as ours, where majority of the population will not be able to get animal food, pulses are indispensable. It will materially increase the

nutritive value of our diets largely composed of cereals.

Pulses, e.g., Bengal gram, black gram, green gram, red gram, cow gram, horse gram, lentils, peas, etc., are abundantly grown in our country. These grow comparatively in less fertile soil and require less moisture. Their cultivation and outturn can be increased considerably with comparatively less effort.

Pulses are commonly taken as "dal" and dal soup. But various palatable dishes can be prepared with these. Bara, Piaji, Pakodi, different kinds of cakes, pudding, gruel, etc., can be made from pulses or pulse flour. These are good preparations and will be relished for breakfast and lunch. Pulses are rich in vitamin A and vitamin B₁. When grams are allowed to germinate, vitamin C and some ferment develop in them. The ferment converts the complex food material contained in the gram into simpler things and so helps in digestion and assimilation. Vitamin C content of germinated grams is fairly high. So it becomes rich and easily digestible food. It may be taken raw along with sugar or jaggery or it may be lightly fried with some oil or ghee for a few minutes. But it should not be over fried, as in that case vitamin C which is thermolabile is destroyed completely.

Soya bean belongs to this leguminosae order. It is a kind of pulse which is very rich in proteins, fats and vitamins. In quality its protein approaches very nearly to that of the animal proteins. But unfortunately it is not grown abundantly

in our country. In countries like Manchukuo, China, Japan, U. S. A., it is cultivated extensively. Its industrial, commercial, economic and food value is immense. Its value as a commodity in world market is high. The climate and soil of our country is not unsuitable for its cultivation. If grown extensively and extensively consumed it will enrich our food value and the surplus will fetch a good price, materially improving our economic condition.

The table of contents of the Common Pulses is given below:—

Table of Contents of Pulses in P. C.

	<i>Water</i>	<i>Protein</i>	<i>Fat</i>	<i>Mineral Salt</i>	<i>Fibre</i>	<i>Carbohy- drates</i>	<i>Calo- rific value 100 gm.</i>
Bengal gram ..	9.8	17.1	5.3	2.7	3.9	61.2	861
Black gram (Bari-Urid) ..	10.9	24.0	1.4	3.2	..	60.3	350
C o w g r a m (Borugudi) ..	12.0	24.6	0.7	3.2	3.8	55.7	327
Green gram (Moong) ..	10.4	24.0	1.3	3.6	4.1	56.6	334
Horse gram (Kulthi) ..	11.8	22.0	0.5	3.1	5.3	57.3	322
Khesari (Chana)	10.0	28.2	0.6	3.0	..	58.2	351
Lentil (Masur)	12.0	25.1	0.7	2.1	..	59.7	346
Peas (Matar) ..	16.0	19.7	1.1	2.1	4.5	56.6	315
Red gram (Ar- har)	15.2	22.3	1.7	3.6	..	57.2	333
Soya bean ..	8.1	43.2	19.5	4.6	3.7	20.9	432

GREEN LEAFY VEGETABLES

We require an adequate amount of vitamin A and mineral salt in our diet. Animal fat is very rich in vitamin A and D but its cost is prohibitive for our indigent population. Green and leafy vegetables contain a pigment known as Carotene, which is the precursor or mother substance of vitamin A. This Carotene plays the same roll in the body as vitamin A. So, if taken sufficiently, this will fulfil the requirements of vitamin A. Green and leafy vegetables such as amaranthus tender, agasti, drumstick leaves, coriander leaves, curry leaves, spinach, lettuce, etc., are very rich in Carotene content. These often grow wild in nature. Also these can be cultivated very easily. Every family can grow them in their homestead lands sufficiently for their requirements or they may be collected fresh from nature and utilised. When cooked these make very good dishes. People should be encouraged to add these cheap things to their diet to make it balanced.

OTHER VEGETABLES

Other vegetables such as roots, tubers, fruits, stems, etc., should be taken sufficiently. Vegetables are rich in mineral salts and vitamins. When added to a diet largely composed of rice they enrich it and make it balanced. With little effort every householder will be able to grow them in the homestead lands. No employment of extra labour is necessary. Every member of the house including

children will be interested and take part in the vegetable gardening. That will give them a sort of diversion from their monotonous daily work and provide physical exercise. Moreover garden products will enrich their diet and make them healthy.

FRUITS

The effect of heating and cooking destroys some of the essential food factors. Vitamin C is thermolabile and is destroyed by moderate degrees of heat. Some of the salts and vitamins they contain pass into the water and are lost if the water is discarded. By simple washing also some of the salts are lost. So inclusion of some fresh fruits, green or ripe in the diet is absolutely necessary. Many a fruit grows wild in nature. Many of them can be grown with a little effort. Almost with no extra cost, fruits can be added to our diet if we have a mind to do it. Amala is the richest source of vitamin C found in nature. Next comes country guava. Plums, berries, orange, lime, water melon, papaya, cucumber, banana, tomato, tamarind, etc., are other easily procurable and cheap fruits.

OIL SEEDS

The Calorie value of oil, oil seeds and nuts is very high. Manual labourers should take these in abundance.

These are comparatively cheap. Animal fat though richer is very costly. To a considerable degree, vegetable oil, oil seeds, nuts can replace animal fats in our diet. Oil seeds and nuts such

as gingelly, ground-nut, cocoanut, linseed are taken raw or in some prepared forms. Oil is also expelled from oil seeds and used in cooking vegetables and other articles of diet. These when added to our diet increase its calorific value. Vegetable oil is poor in vitamin content except red palm oil. But vitamins can be secured in our diet from other cheap food-stuffs. Of course well-to-do people who can afford may take animal fat such as ghee, butter, etc.

The following table shows the compositions and calorific value of different oil seeds and nuts available in our country:—

<i>Name</i>	<i>Protein %</i>	<i>Fat or oil %</i>	<i>Carbohy- drates %</i>	<i>Mineral salt %</i>	<i>Water %</i>	<i>Fi- bre %</i>	<i>Calo- rific value of 100</i>
Almond (Kabuli Badam) ..	20.8	58.8	10.4	2.9	5.2	1.7	655
Groundnut (China Badam)	21.2	46.9	22.3	2.4	5.9	1.3	596
Cocoanut (Narial) ..	4.5	41.6	13.0	1.0	36.3	3.6	444
Pestachionut (Pesta) ..	10.8	53.5	16.2	2.8	5.6	2.1	626
Walnut (Akhrot)	15.6	64.5	11.0	1.8	4.5	2.6	687
Cashewnut (Lanka Badam)	21.2	46.9	22.3	2.4	5.9	1.3	596
Soya bean ..	43.2	19.5	20.9	4.6	8.1	3.7	432
Mustard seeds..	22.0	39.7	23.8	4.2	1.8	1.8	441
Gingelly seeds..	18.3	43.3	25.2	5.2	5.1	2.9	564

CHAPTER VIII

ANIMAL FOOD-STUFFS

In the preceding pages an attempt has been made to show that a fairly wholesome diet can be obtained from the vegetable kingdom. By a rational adjustment and mixture of purely vegetable food-stuffs a tolerably good diet may be constructed. But from the purely physiological point of view a really balanced diet in practice cannot be obtained purely from vegetable food-stuffs. A purely vegetable diet will leave some loopholes in the individual and social nourishment. A strong individuality, an active life, and advanced society and a militant nationalism are impossible without animal food. If this be our object in view, we have to banish the pervading darkness of ignorance, superstition and conservatism of our countrymen and include animal food in our national diet. With all possible self-sufficiency we have to increase the earning capacity of our countrymen, remove their economic backwardness and give them the means to provide themselves with an animal diet although it is a little more costly than vegetable diet. Now we proceed to consider a little in detail the different items of animal diet and discuss how best we can get them with as little cost as possible.

Milk:—Heretofore it has been shown that

the casein of milk is the best form of animal protein. This protein is very essential for the body construction. Not only the milk casein but also all other constituents of milk are good and wholesome food elements.

Milk is the infant food. Nature has provided all the essential food elements for the infant in milk. At birth, infant is absolutely helpless. It cannot gather its essential food-stuffs. The kind Nature has foreseen this and has provided for it in its mother's milk all that it requires. Not only all the food elements are present in milk but also they are present in the required proportion and they are in the most digestible form. Not only food but also drink is present in milk. For the infant, milk may be considered to be approaching the "ideal food" to the greatest extent. It is at least a fairly well-balanced diet for the infant. With advance in age milk alone cannot provide the qualifications of a well-balanced diet. Other food-stuffs need, therefore, be added. With milk alone, an enormous amount has to be consumed by an adult to yield all the essential requirements. This is not practicable in life. Milk, therefore, needs to be, proportionately curtailed with advancing age of the child and along with increasing addition of other food-stuffs. But milk being physiologically the best single food, every child up to 16 years should have a quantity of milk in its everyday diet. If possible, everybody should take some milk every day in some form or other. As an invalid diet its position is unassailable.

But in actual practice, milk is too costly to be universally used. But the scheme of self-sufficiency presupposes that every family unit should have their own milk cattle. The question of the cost of milk in terms of rupees, annas, and pies would hardly arise if self-sufficiency is our ideal. In highly advanced and wealthy countries, the production, distribution and consumption of milk is so admirably arranged and controlled that milk is available to everybody very cheap. However, this is a subject of high economics and is beyond the scope of this book.

From the beginning of the Aryan civilisation, cows and other milch cattle are being regarded as the highest objects of individual and social wealth. The cows were worshipped as gods. Among the Hindus, the cow worship is still prevalent. But unfortunately the reverence is on the wane. The people have missed the essence and have retained the form only. In spite of the age of machines, the cattle still retain their predominant importance in the individual and social life. But in practice we have lost sight of that. Cattle are being grossly and criminally neglected. Their stock is now poor, dwindling and moribund. As a result we are not getting enough of milk and its manifold products. Consequently our health has suffered grossly. Milk happens to be a natural food, and confers disease-resisting strength on its users. Due to insufficient milk consumption the disease incidence and mortality rate have enormously increased in our country. This is the result of our criminal neglect of our cattle.

A ray of hope has, however, appeared in the offing. The leaders of the country have realised the gravity of deterioration of our cows and cattle and inaugurated a country-wide movement to help and advise people to improve their live-stock and increase their efficiency and milk yield. This is a hopeful sign indeed.

The first milk of the infant is its mother's milk. Subsequently milk of other animals is taken. Therefore, different milk from different sources is to be considered. Moreover there are different preparations of milk. A comparative table of these with their constituents is given below:—

	<i>Water</i>	<i>Protein</i>	<i>Fat</i>	<i>Mineral salts</i>	<i>Carbohydrates</i>	<i>Total Calories per 100 grms.</i>
Mother's milk ..	88.0	1.0	3.9	0.1	7.0	19
Cow's milk ..	87.6	3.3	3.6	0.7	4.8	18
Buffalo's milk ..	81.0	4.3	8.8	0.8	5.1	33
Goat's milk ..	85.2	3.7	5.6	0.8	4.7	24
Butter milk ..	97.5	0.8	1.1	0.1	0.5	4
Curd ..	90.3	2.9	2.9	0.6	3.3	14
Cheese (whole milk)	40.3	24.1	25.1	4.1	6.3	99
Koa (Khua) from whole milk ..	30.6	10.2	13.2	3.1	20.5	120
Koa from Skimmed milk ..	46.1	22.3	1.6	4.3	25.7	56
Powder milk ..	4.1	38.0	0.1	6.8	51.0	101

Eggs:—Like milk, egg is also meant for a growing animal. Nature provides food for the young of the bird in the white and yellow of the egg. By slowly and continuously using the food materials present inside the egg shell, the different tissues of the body of the chick are laid out. When the body construction of the young bird is complete none is left of the food materials present inside the shell. It is now that the young bird comes out of the shell fully prepared to face the vicissitudes of life.

The same thing is present in the vegetable world also. The seeds contain food materials for the future plant. The future plant is the minute embryo found in the seed. With suitable conditions the embryo germinates and sprouts into a seedling; as growth proceeds, there is a progressing absorption of the food materials present in the seed. But before absorption takes place chemical rather biochemical changes occur in the seed by which the complex food substances are simplified and made easily absorbable by the seedling. That is why germinating seeds provide easily the most digestible and wholesome food for all. In the same way, the food materials present in the egg, originally meant for the growing chick are, therefore, also very digestible and wholesome.

The eggs of different birds differ in the constituents. Below is given a table of the constituents of the egg of the fowl and duck:

	<i>Water</i>	<i>Protein</i>	<i>Fat</i>	<i>Salts</i>	<i>Carbohy- drates</i>	<i>Calories per 100 grms.</i>
Fowl egg ..	73.3	13.5	13.9	1.0	0	49
Duck egg ..	71.9	13.8	13.3	1.0	0	51

Except for carbohydrates, egg is rich in proteins, fats and salts. In addition egg is also rich in vitamins.

Besides the egg shell, egg consists mostly of the white and yellow of the egg. The yellow matter is called yolk of the egg also. The constituents of these two parts are a bit different. The white of the egg consists mostly of proteins—albumins. It contains very little fat. Therefore, it is comparatively more digestible. The yellow of the egg on the other hand is much richer in proteins and fats. It contains also vitamin A, vitamin B₂ and vitamin D. In addition it also contains the salts of calcium and iron. Because of the presence of a lot of fat, yellow of the egg is a bit less digestible than the white of the egg. But on the whole the yolk of the egg is very wholesome food as it contains the most of the good food constituents. However, if the white and yellow of the egg are taken together, it is much better and much more nutritious.

Half boiled or lightly cooked egg is easier of digestion than raw egg. But hard boiled egg and over-cooked egg is difficult of digestion. Egg poach is better than omelette. Puddings are, however, easily digested as they are steam cooked.

The usual method of egg cooking by first boiling hard, removing the shell, frying in ghee in an iron pan over the fire and lastly cooking it with other vegetables with a lot of spices and condiments is definitely bad for health. Most of the vitamins are destroyed by this means and the protein part is made very difficult of digestion. It causes tympanitis in the large bowels and produces very offensive winds.

It has experimentally been found that:—

Raw egg is digested in 2 hours.

Half boiled egg is digested in $1\frac{3}{4}$ hours.

Hard boiled egg is digested in 3 hours.

Omelette is digested in 3 hours.

If egg is taken in a digestible form, almost the whole of it is digested, absorbed and utilised by the tissues. People who have no religious and social objection, should take at least two eggs a day as a supplement to their normal diet. This will enhance the wholesomeness of their diet. Their general health will be better and their physical stamina will be maintained.

It is, however, not practicable to purchase eggs for their daily consumption. Eggs are always costly to buy. Therefore, every household should rear fowls, swans or ducks. Then alone egg taking will be within the reach of average people. Domestic poultry farming is fairly easy and it does not practically cost anything.

In our country the important work of poultry farming and the production of eggs is left to some

backward, uneducated and poor castes. Commercial poultry keeping is almost unknown. The quality of eggs produced and put to market is very poor indeed. They are ignorant of the scientific methods of poultry keeping and egg producing. If they are taught and if they adopt the improved methods of poultry farming, a wholesome food like eggs could be available to the people and they themselves would get a very good profit and their economic backwardness and therefore their low social status would vanish. This proposition is not at all impossible of achievement.

In certain places in India, of late, training is being imparted in the art of improved method of poultry farming. The trained personnel are disseminating this useful knowledge in the country. Some of them who have the necessary capital have started improved and modern poultry farms. State subsidy is also available if sought for. If advantage is taken even of the limited and inadequate facilities now available there will be an improved breed of fowls in our country and people will get better eggs at cheaper rates.

Fish:—Very few people hate to take fish. Rather there is a general liking for fish. There is little or no religious objection to it in practice, whatever scriptures may say. Fish is a very nutritious food. It contains proteins and oils rich in vitamins. In addition it contains a lot of calcium salts. So fish provides all materials for body construction, yields good energy, and possesses disease-resisting properties.

The food constituents of different varieties of fish differ a lot. The small fish contains less oils than larger ones. But more calcium is obtained from small fish because the whole fish including its bones are eaten. Because of low oil content, small fish is more digestible and it is often prescribed as an invalid and convalescent diet. But, on the whole, large fish is nutritive although a little more difficult of digestion. Steam cooking of fish is the best and most economical way of cooking of fish. By this means all the food elements of the fish are retained intact. None of them get lost or rendered useless. Steam-cooked fish is also more digestible. Too much frying of fish destroys the very essential food elements, namely, the proteins and vitamins and at the same time it becomes much more difficult of digestion. Quick frying of fish in simmering hot oil in a pan, however, is harmless and most of the food elements remain intact. Small fish covered over completely by several layers of edible tender leaves like that of pumpkin and then put in low naked fire for some time, forms a very delicious and at the same time a nutritious food. Cooking of fish with too much of initial frying and with too much of spices renders a good wholesome food unwholesome and unhealthy.

Although there is so much liking for fish on the part of general public, fish is not available in sufficient quantity. Yet there is no want of proper facilities in our country for rearing fish for human consumption. If a rational and improved method of pisciculture (rearing fish) could be devised a good

and wholesome food like fish could be made available to the general public.

The average middle class householder can easily rear fish of different varieties in his own tank or pond and provide himself and his family with a good food throughout the year. He may as well get an income in cash by selling the excess after meeting his needs. There is a Government department of pisciculture. Any body so desirous may get a supply of fish fry from the department and start a fish farming in his own tank or pond. He can get all advice and help from the workers of the department. Besides, any body may gather fish fry from the sides of rivers in flood times and grow them himself in his pond or tank. Communal pisciculture can also be undertaken in the village tanks with success if a certain amount of co-operation could be procured by the villagers themselves. Provided there is a will and the spirit of co-operation the undertaking is not at all difficult. With a little foresight it could be made very profitable. Besides this controlled production of fish, nature produces an enormous number of fish in natural collection of water like lakes, rivers, and seas. If the fishermen could be encouraged and if their profession could be run in a co-operative basis not only that class of people will profit immeasurably but also general people get a wholesome food in their everyday diet. Not that there is not the sufficient natural production nor there is any dearth of consumers but the proper and rational mechanism of distribution is unfortunately absent. In these

days almost all the parts of the country are approachable and communications are quick and easy. It only requires a certain amount of enterprise to tap the open market and make fish easily and regularly available to the consumers. This, however, is matter of high economics and is beyond the scope of the present discussion.

Meat:—All animals are generally divided in two classes, namely, “carnivorous” and “herbivorous” according whether their food is derived from the animal world or the vegetable world. But there are only a very few animals who are entirely carnivorous or herbivorous. Animals get themselves habituated to animal diet or vegetable diet according to various and varying circumstances of their life. “Survival of the fittest” is inevitable law of nature. In the struggle for life this law alone stands supreme. One life kills another life for its own advantage. Be it vegetable or animal, in the destruction of one life lies the advantage of the other. No one can change this unchangeable fact. Under the influence of this law of life, the food of any group of life is determined according to the immediate environment, internal necessity and available opportunity.

In fact in the struggle of life complete non-violence is an impossibility. Unquestionable geological and palæontological proofs are there to show that the primitive man was eating all living matter raw. Neither vegetable nor animal food was considered unfit for his consumption. Even now this does obtain in some backward tribes of men. Only

in advanced societies certain foods are considered unfit for human consumption. But in aboriginal tribes like the Savaras in Orissa who still lead a primitive life nothing practically is considered unfit for eating. Even in the present times there are some tribes in some countries who are still cannibals.

The dental structure of the carnivorous animals is different from those of the herbivorous. So also certain organic differences are noted between these two sets of animals. The human dentition and the peculiarity of certain internal organs of man go to show that man is adapted both to animal and vegetable foods.

From the primitive ages, in fact, man has been in the habit of eating flesh. The climate of the country of his adoption, his own particular environments and the strict laws of society have modified this primitive instinct of man. Man was at first catching animals from nature to eat. When the natural food sources of animal origin became scarce, he devised means to catch animals alive and kept them for future use. Gradually animal husbandry came into vogue and he could get meat whenever he wanted and exactly in the quantity and quality as desired. Nowadays man depends almost entirely for his meat supply on domesticated animals. With increasing population and ever-increasing complexities of human society and necessity for specialisation in different branches of human activities, professional castes or classes of shepherds and butchers arose in course of time. In the modern age of widespread commerce and enterprise,

we find that sheep are reared in large numbers in Australia and their meat is used in far-off England. Similarly the United States of America produce pork and it is consumed in Great Britain.

Meat itself when eaten alone is not a well-balanced diet. It lacks in carbohydrates. Barring this, meat is a wholesome diet. Animal protein and animal fat we obtain from meat fairly easily. Meat is also rich in vitamin A and vitamin D. Meat is usually easily digested and gives a sense of satisfaction and well-being to the consumer. Lean meat is better and more digestible than fat meat. Birds' flesh contains much less fat. It is, therefore, more digestible. The wholesomeness of the flesh of the animal is inversely proportional to its size and its strength and muscle power. The flesh of the work cattle is, therefore, not very wholesome. The older the animal the worse the quality of its flesh. Again the method of cooking the flesh affects the wholesomeness or otherwise of the meat. Lightly cooked meat is easier of digestion. If too much of spices and condiments are used, if the meat is over-cooked or over-boiled, or over-fried it becomes unwholesome and unhealthy. Roasting and steam cooking are probably the best method of cooking of meat. The constituents of flesh of different animals differ a lot and the same is shown below in tabular form:—

	<i>Water</i>	<i>Protein</i>	<i>Fat</i>	<i>Salt</i>	<i>Carbohy- drates</i>	<i>Calo- ries per 100 grms.</i>
Crab	83.5	8.9	1.1	3.2	3.4	56
Lobster	77.9	20.8	0.3	1.4	..	86
Big fish	78.4	22.6	0.6	0.8	..	91
Small fish	77.9	21.5	1.6	2.0	..	100
Sheep liver	70.4	19.3	7.5	1.5	1.4	150
Sheep muscle	71.5	18.5	13.3	1.3	..	194
Pig muscle	77.4	19.7	4.4	1.0	..	114
Beef	74.3	22.6	2.6	1.0	..	114

The table shows that flesh food is important because of the proteins and fats. They also contain vitamin A and vitamin D. The quantity alone is not of special interest but the proteins and the fats being nearer to our own, are physiologically the best and therefore very easily absorbed and assimilated by the tissues of the body. In the modern world when the struggle for life is so much complicated, when individual, social, national and international competition and spirit of rivalry is so difficult, it is impossible to carry on without animal food particularly animal protein. It is almost impossible to build up a healthy manhood and a strong nationhood without taking recourse to some sort of animal food in our national diet. Theoretically speaking milk has been shown and is claimed to be the best animal food and its protein, the milk casein, is physiologically best adapted for absorption

and utilisation in the human body economy. But only a few people blessed with plenty in life can afford to consume milk to the extent of physiological requirements. Since the manufacture of milk by the animal body is possible by one sex only and again its yield is only a small fraction of the initial outlay of food, the cost of milk is bound to remain high at all times. Milk could be produced in proportionate abundance and could be consumed universally only when the population was very small and pasturage was abundant. Practically cow keeping was not then a costly proposition. All that was necessary was to look after them and herd them together. But that pastoral stage of human civilisation is no more. Gone is that easy-going pastoral age. We have already outlived it. Pasturage is scarce and the population is large and ever-increasing. Rationalisation and industrialisation of the communal dairy farming may and will increase the total yield of milk and its consumption but ultimately if only the children alone could get fairly sufficient quantity of milk for consumption, we should consider that the optimum condition is reached. When, however, we think of adult food supply with a view to provide a well-balanced diet to everybody, we have to think of other sources of animal food, namely, eggs, fish and meat. But only by suitably solving the problem of production and distribution of these three items of food, increasing its consumption by the people, can we ever think of approaching our dietetic salvation. The problem, namely, increasing the consumption of animal food is not at all diffi-

cult if the first two are solved because there is in reality, no innate or natural disinclination on the part of the people in general to consume animal food. The enthusiasm that people show in fishing and the interest they exhibit when an occasional meat diet is procured shows clearly that they have neither any dislike nor disinclination for animal food except for the scarcity and high cost of these food-stuffs.

The solution of these problems of production is possible only when poultry farming, pisciculture and animal husbandry of food animals are taken up in right earnest. There is the urgent necessity of animal food production drives in the country. There must be preplanned rational schemes based on principle of family, regional, and national self-sufficiency and finally of international adjustment by an equitable disbursement of national surpluses.

CHAPTER IX

DIET OF EXPECTANT MOTHER

Reproduction is a biological phenomenon. In higher life where sex is differentiated, two individuals of opposite sexes contribute to the initiation of the fresh biological entity—the Zygote—the product of union of the sperm from the male and the ovum from the female. Characteristics of both the individuals who themselves carry the characteristics of their countless progenitors are passed on to the new life thus created. Healthier the stock, better the progeny. Health again depends on proper diet. The diet of the parents determines to a great extent the vigour and vitality of the sperm and the ovum and thus it also determines the initial start to the life entity which is to grow in the mother's womb.

The male partner's work ends with the deposition of the sperm inside the sexual apparatus of the female. The female partner not only contributes the ovum but also provides a suitable nidus for the growth of the new life. She also provides suitable nourishment and looks to excretion of the growing embryo. In human beings, this process of the growth of a life within a life goes on for 10 months (ten lunar months—40 weeks).

The growing foetus inside the mother's womb

requires food for its nourishment and growth. The expectant mother requires food not only for her usual needs but also for the growth of her uterus (womb), placenta and membranes and in addition, for increased growth of her breasts and deposition of the precursors of milk in them for the child after birth. All these demands are to be met by the increased consumption by the mother of constructive foods, namely,—proteins, vitamins and minerals.

Further the pregnant woman has to carry an ever-increasing weight inside her. So she has to put up extra work. Further still, her digestive, assimilative apparatus has to work more to deal with extra food intake, her excretory apparatus has to work more to deal with the excrements of the growing foetus. These extra demands of increased work have to be met by increased consumption of energy-giving food-stuffs. These extra requirements of the mother in the later months of pregnancy and during lactation are given below:—

Calories of heat	..	..	..	..	..	25%
Proteins	..	..	..	..	..	50%
Fat	..	..	..	..	..	10%
Calcium	..	..	..	..	..	100%
Phosphorus	..	..	..	..	..	50%
Iron	..	..	..	..	..	More than 50%

Besides the above vitamin requirement is also raised.

The expectant mother, therefore, requires a diet which is very rich in proteins, fats, calcium, phosphorus, iron and vitamins. If this is not supplied from outside, the foetus will drain them from

the maternal tissues and consequently the health of the mother will suffer which again will lead to malnutrition of the foetus also. For the welfare of the mother and the child, therefore, sufficient milk and frequently eggs, fish, and meat, green leafy vegetables (sag), fresh fruits, germinating pulses and cereals should be given to the mother. The actual physiological requirements of the mother are reflected in the spontaneous desire for the particular articles of diet. This is Nature's indicator of the physiological needs. The desire for a particular food indicates its want in the system. It is, therefore, the duty of every householder to fulfil the dietetic desires of the expectant mother. Call it superstition or anything this is considered a social obligation in India which no householder tries to avoid. At least it was so in the older dispensation of things. The still prevailing custom in Orissa provides for the friends and relatives of the pregnant woman to arrange for sumptuous feeds for her throughout the period of pregnancy. This social custom at least is not based on superstition but on sound physiological principles. The long-standing social customs should not lightly be brushed aside without putting them to the acid test of scientific reasoning.

In the light of above remarks we find that it is rather the quality than quantity of diet that really matters. The expectant mother requires 25% extra of energy-giving food but she easily gets these extra Calories from her usual diet. Further, there is a tendency to a certain degree of lassitude during

pregnancy necessitating less output of work. Fat itself as a source of energy is not of much importance but as a vehicle of vitamin A and D its consumption is important. Proteins are important because of their tissue-building work. At least 100 grammes of protein (about 8 tolas) per diem is necessary. Of this at least half should be "first class" proteins, namely, derived from animal sources, milk, egg, meat.

Of the minerals, the expectant and the lactating mother requires 1 to 2 grammes each of calcium and phosphorus equivalent to one litre of milk a day, i.e., a little more than one standard seer. Other sources of calcium and phosphorus are ragi, green leafy vegetables, beans, eggs. Deficiency of these two minerals leads to caries of teeth and various complications during pregnancy, labour and confinement and to softening of bones (osteomalacia) in the mother and to a state of predisposition to rickets in the child after delivery. This predisposition to rickets is not curable by any subsequent liberal feeding of the child.

From the age of puberty to climacteric, women lose blood in variable amounts month by month during menstruation—a phenomenon peculiar to human beings. This may be one of the so many concomitant evils associated with man's attempt at control over Nature. However, as a result of this monthly loss, all women are prone to be anaemic and their iron reserve low. During pregnancy, the foetus draws heavily on the already low iron reserve of the mother for storing the same in

its tissues. This is drawn upon by the child during the period of lactation as the iron content of mother's milk is very low. Particular attention is therefore, to be paid to supply iron to the expectant and pregnant mothers by supplying food-stuffs rich in iron like liver, bone marrow, kidney, lean red meat, eggs, dried fruits, green leafy vegetables, gur (treacle). Should this be not possible in practice, medicinal iron has to be given by mouth in fairly big doses.

Sufficient iodine is usually obtained from our normal food and drink which contains traces of iodine salts derived from the soil. But in certain areas in the world, Chitral and North Bihar in India, soil is poor or devoid of iodine. Inhabitants of these places are likely to develop iodine deficiency and a disease called goitre—an ugly swelling in the neck. As the foetus draws heavily on the maternal iodine reserve which may be very low in "goitre areas" the expectant mother is liable to suffer from goitre during succeeding pregnancies. The child of such a mother is likely to develop a predisposition to goitre in later life. In such circumstances, sufficient iodine intake can be ensured by eating sea-fish, and cod liver oil or by a regular use of iodised table salt.

What has already been said about vitamin requirements in a preceding chapter for people in general holds good for expectant and lactating mothers, with still much greater importance. The anti-infective vitamin A is very essential for guarding her from the intercurrent infective diseases.

The anti-nuritic vitamin B₁ is necessary to keep her nervous system in tone, anti-dermatitis vitamin B₂ to keep her skin in good health. Anti-scorbutic vitamin C is necessary for the maintenance of the cardio-vascular tone. Anti-ricketic vitamin D is very much wanted to keep her bones strong and for preventing infantile rickets of her offspring. Anti-sterility vitamin E is absolutely essential in the first four months of gestation to prevent death and resorption of the growing embryo. Anti-haemorrhagic vitamin K is necessary to guard against haemorrhages during confinement and puerparium and from the cut umbical cord of the infant.

Further another very important fact has to be emphasised in this connection. The foetus in the womb and the infant for about one year after birth depends entirely on the maternal resources to fight against infective and deficiency diseases. The so-called natural immunity inherited by the infant depends on the good health of the mother. Any deficiency in the mother's diet is bound to reflect itself not only on herself but on the future life and happiness of her offspring. A properly balanced diet ensured for the expectant and nursing mother with emphasis on the mineral and vitamin requirements is, therefore, expected to lead on to a better health, a better society and on to a better world of to-morrow.

CHAPTER X

DIET OF THE LACTATING MOTHER

What has been said about the pregnant mother is also true for the nursing mother for another spell of at least 10 months after the termination of pregnancy. Her protential energy is drained away by the suckling child through her milk. This has to be compensated by suitably increasing her food supply. The nutrition of the suckling child will very badly suffer if the mother is under-fed or poorly fed with the tissue-building food elements. Further many food elements and some waste products even some drugs are excreted with mother's milk. It is a common experience that the child suffers whenever the mother is ill or takes bad food. She has to be always on guard.

The quality and quantity of her milk depend on her hygienic living, a wholesome, pleasing yet well-balanced diet which should be given. Her food should be supplemented by milk, butter, ghee, fish, egg, meat, fresh leafy and non-leafy vegetables, fresh fruits. But all this is not practical in the average life in India. Those who cannot afford to arrange for these food-stuffs, should at least endeavour to obtain a supply of cheap sag (*Amaranthus*) vegetables from their own homestead land garden,

occasional cheap season fruits, e.g., mangoes, black berries, plums, dates, tender palm fruit, figs, wood apple, bael fruit, kendu, and host of others which can still be collected from Nature—from the road side and from the jungle. Many other fresh fruits can be obtained from kitchen garden which are easily grown but very wholesome. Tomato, plantain, pineapple, lemons, oranges, guava, papaya are a few of the examples of good fruit plants and trees that can be grown in the homestead land. In addition, cheap articles of food like germinating pulses, rice polishings from raw rice, fish from paddy fields, crab, shell-fish from the same source could easily be collected. These are very nourishing. Some of these food-stuffs can be selected according to individual fancy and inclination. These will help the mother in getting a well-balanced diet and to yield a wholesome diet to her suckling baby.

CHAPTER XI

DIET OF INFANT

Nature provides ready-made and almost perfect food for the young ones of all mammals in their mother's milk. Unlucky is the infant who is deprived of its mother's milk. Mother's milk is the first fundamental right of citizenship of the newborn member of the State. The exclusion of the child from its mother's breast is a cruel and criminal denial of this most elementary right.

Simply putting the infant to mother's breast does not, however, absolve the society from all responsibility in this connection. Certain details about it have to be looked into. Certain investigations were carried out regarding the food requirements of the Indian infants in different age periods and as a result an Indian standard has been worked out. This is given below in a tabular form:—

<i>Age of the Infant</i>	<i>Required amount of energy (in Calo- ries</i>	<i>Required amount of mother's milk (in tolas)</i>
First week	200	25.00
First month	240	30.00
Second month	400	50.00
Third month	450	56.25
Fifth month	600	75.00
Eighth month	700	87.50
Twelfth month	800	100.00

(One tola of mother's milk is calculated to yield 8
Calories of heat.)

The figures given in the table refer to standard requirements of the Indian infants, based on average calculation. In a given case slight deviation may be necessary from the standard depending on the constitution of the infant, for example, a strong and active infant will require a little more and a weakling will require a little less than the standard figures. Basing broadly on this standard, individual cases require individual attention and variation.

It will be seen from the foregoing table that an infant 2 months old would require 50 tolas of mother's milk. At the rate of 10 tolas per feed, the infant should be fed five times in 24 hours. Generally no nursing mother can yield more than 75 tolas of milk in 24 hours. Thus it would be apparent that for an infant of 5 months, mother's milk alone would not be sufficient as the 5 months' infant would require a little more than 75 tolas per diem. Beyond this age limit the quantitative deficiency will be increased.

Nature probably desires that the infant should get some solid food after the sixth month as the first tooth appears at this time. Appearance of teeth is indicative of the capacity for chewing some solid food. However, it does not mean that milk should be completely replaced by solid food. This is, however, the time when an extra food other than mother's milk should be given. Preferably some natural milk suitably humanised should be added to the breast feeds in exclusion of any other foods. It may be cow's milk or goat's.

Weaning of the child is an important problem.

towards the end of the first year of the infant's life. An expert Commission of the League of Nations has recommended that the infant should take mother's milk exclusively up to the end of the sixth month. Up to the end of ninth month, however, the baby should have some breast feeds from time to time. But from the tenth month breast feeds must be discontinued. Tenth month is considered to be the most suitable time for weaning of the child. Weaning of the child at the tenth month does not mean exclusion of milk other than mother's milk. Cow's milk, buffalo's milk or goat's milk should continue to form an important item of the child's diet.

Delayed weaning off is harmful both to the mother and the child. Essential tissue constituents of the mother's body, namely, proteins, mineral salts, and vitamins are drained away in milk due to prolonged lactation. Her health suffers very badly and she becomes liable to wasting diseases like phthisis. The milk from such a mother cannot be expected to be conducive to the health of the child.

With the onset of the process of weaning off which really begins at the 6th month the child should be given soft food preparations like porridge from whole cereals, massed vegetable, fruit juice, yolk of the egg, germinating pulses made into a paste by wet grinding. As age increases more and more solid foods are added according to the digestive capacity of the child.

The employment of a wet nurse becomes absolutely necessary in certain circumstances like dis-

ease or death of the mother. But certain things are to be looked to when selecting a wet nurse. Her general health must be good, her habits must be hygienic, her life should be free from suspicion. Her own child should be near about the same age as that of the child whom she is going to nurse as a wet nurse. These precautions are very essential in the interest of the infant. Failure to take these precautions lead to undesirable consequences. If a suitable wet nurse is not available it is far better in practice to depend on cow's or goat's milk rather than employing a wet nurse who does not fulfil the essential prerequisite qualifications.

When animal milk is decided to be given to the infant from the beginning, certain steps should be taken to make it fit for the consumption of the infant. The cow's milk, for example, has to be made to approach human milk in constitution. This process is known as humanisation of cow's milk. Broadly speaking, in the first few weeks after birth, two parts of clean boiled water should be added to one part of cow's milk. To the resulting mixture some sugar has to be added. In the first week sugar is to be given at the rate of one tea spoonful (or half a tola) in 24 hours. As the child grows the proportion of the water has to be reduced and sugar increased. In the sixth month cow's milk and water should be of equal quantities, four tea spoonfuls of sugar (about 12 tolas) should be given in 24 hours. As the child grows further, the proportion of water should be less than milk and ultimately only pure whole undiluted milk can be given with

impunity. Fresh fruit juice should be given from the second month onwards. This meets any possible deficiency of vitamin C. It is a good plan to add a few drops of cod liver oil or shark liver oil to the milk feeds to meet vitamin D deficiency.

Artificial infant foods are sometimes necessary when neither mother's milk nor cow's milk is available. It must be clearly understood that no artificial food, however much praised, can approach the natural milk. Effort should always be made to procure natural milk for the infant. In exceptional circumstances alone, artificial milk or artificial infant food can be used. If used it should be discontinued when natural milk becomes procurable. At least some natural milk, however small in quantity, should be mixed with artificial milk or given alternately.

There are many artificial milk preparations in the market. Many of them are quite good but their superlative claims are mostly unwarranted. One need not be swayed by the advertised claims. There is always an element of commercial spirit in these hyperbolic claims. The one very great disqualification of the artificial milk foods is that they are long preserved in varying and unfavourable conditions. It may be, the product is manufactured, and tinned at one place and may be transferred to its antipode where it may be kept for an indefinitely long period. During this period the little amount of vitamin that was possible to have been retained at the time of manufacture is likely to have been lost at the time of its actual use. That is why a child

mostly fed on artificial milk should have natural milk from time to time or at least some fresh fruit juice should be given every day. Artificial milk foods are chiefly of two kinds, namely, (1) condensed milk (2) milk powder.

(1) Condensed milk is manufactured by eliminating great part of the water of the milk in vacuum. Milk is turned into a paste-like thing. It is then put in tin pots which are hermetically sealed and shouldered. In this condition the condensed milk stands undecomposed for a long time. Extra sugar is sometimes added to this before tinning. When using, suitable quantity of water is added and made to approach the natural milk in constitution.

(2) Milk powder is manufactured by drying the milk of all its water content completely and quickly by special processes. The solid contents of the milk alone are now present in a powder form. This is also tinned, and hermetically sealed when put to market. Even when exposed to atmosphere it stands for a longer time than condensed milk. When using, water is added in suitable quantity to make it approach natural milk. Most of the milk powder in the market, however, contain only a trace of fat and are very poor in vitamins A and D.

Besides the artificial pure milk foods there are a number of artificial foods in which powdered milk is mixed with malt powder. Purely vegetable products are also used as artificial infant foods. These should be given in the later period of infancy when the infant is ready to digest and assimilate

the non-milk foods. However, there is one vegetable food which approaches the natural milk food to the greatest extent. This is "soya bean milk" or "vegetable milk." It is also comparatively cheaper and can be safely recommended for the poor section of our population where provision of natural milk is practically out of question. Soya bean milk which is almost unknown in our country is not a new thing in the world. For ages it has been in use in China and Japan where getting milk from animals is not still much in vogue. Milk industry or dairy farming is still much worse there than even in our country. Because of our poverty, comparable with the poverty of the Chinese, the supply of milk or milk preparations to our children in proper quantity is almost impossible, however desirable. If we adopt the method of the Chinese to meet the want by soya bean milk, much of our problem of nutrition will be solved satisfactorily. The different methods of preparation of this so-called vegetable milk from soya bean are given below:—

1. The soya bean seeds are soaked overnight. In the morning they are wet ground and mixed with water to dilute it to suit the power of the digestion of the infant. This preparation looks very much like milk and possesses the most of the virtues of natural milk. Before use the preparation should be warmed a bit.

2. The seeds are roasted on pan over the fire. The soya bean oil is extracted. This oil is rejected along with the pungent part of the soya bean. The roasted beans are now ground dry. Necessary

quantity of water is now added to bring it to proper milk constituency.

3. The soya bean seeds are steamed for 10 to 15 minutes. As a result the pungent part of the seeds gets eliminated. But the oily parts remain preserved. After being treated to steaming the seeds are sundried. The pericarp or the outer covering is removed and the seeds ground by a grinding machine. The soya bean flour so formed is again steamed to eliminate the pungent substances further without rejecting the oil. The flour is again dried and preserved. This is used to prepare soya bean milk by addition of water as before. This is very nutritious as the oil content is not reduced.

4. Soya bean prepared by the last process is mixed with milk powder and the resulting mixed powder is kept preserved. The milk prepared from this powder is very suitable for infant feeding, and fairly wholesome.

5. Two parts of soya bean seeds and one part of ground-nut seeds are roasted together. The pericarp of the seeds are removed. The clean seeds are now soaked in water and later wet ground. The resulting paste is mixed suitably with warm water in a pot and whole thing is churned up by a machine churner or a hand churner. It is strained through a clean piece of thin cloth. The resulting fluid is the best kind of vegetable milk and is quite suitable for infant feeding. Sugar and salt be added if desired. It should be warmed a little before using. This is the best of all the processes described. This vegetable milk is sweet and palatable, at the same

time it has an agreeable odour.

In comparison with the natural milk the soya bean milks are inferior in their content of fat, carbohydrates, calcium salts and vitamins. If groundnuts and milk powder are added as in the last two methods the comparative fat deficiency is removed. Addition of a little sugar fills the gap in the carbohydrate content. Addition of a few drops of cod liver oil, shark liver oil or red palm oil and some fresh fruit juice meets the vitamin deficiency. If, however, some natural milk is mixed with any preparation of soya bean milk, that will be the best thing indeed. It may even surpass pure natural milk in practical utility.

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