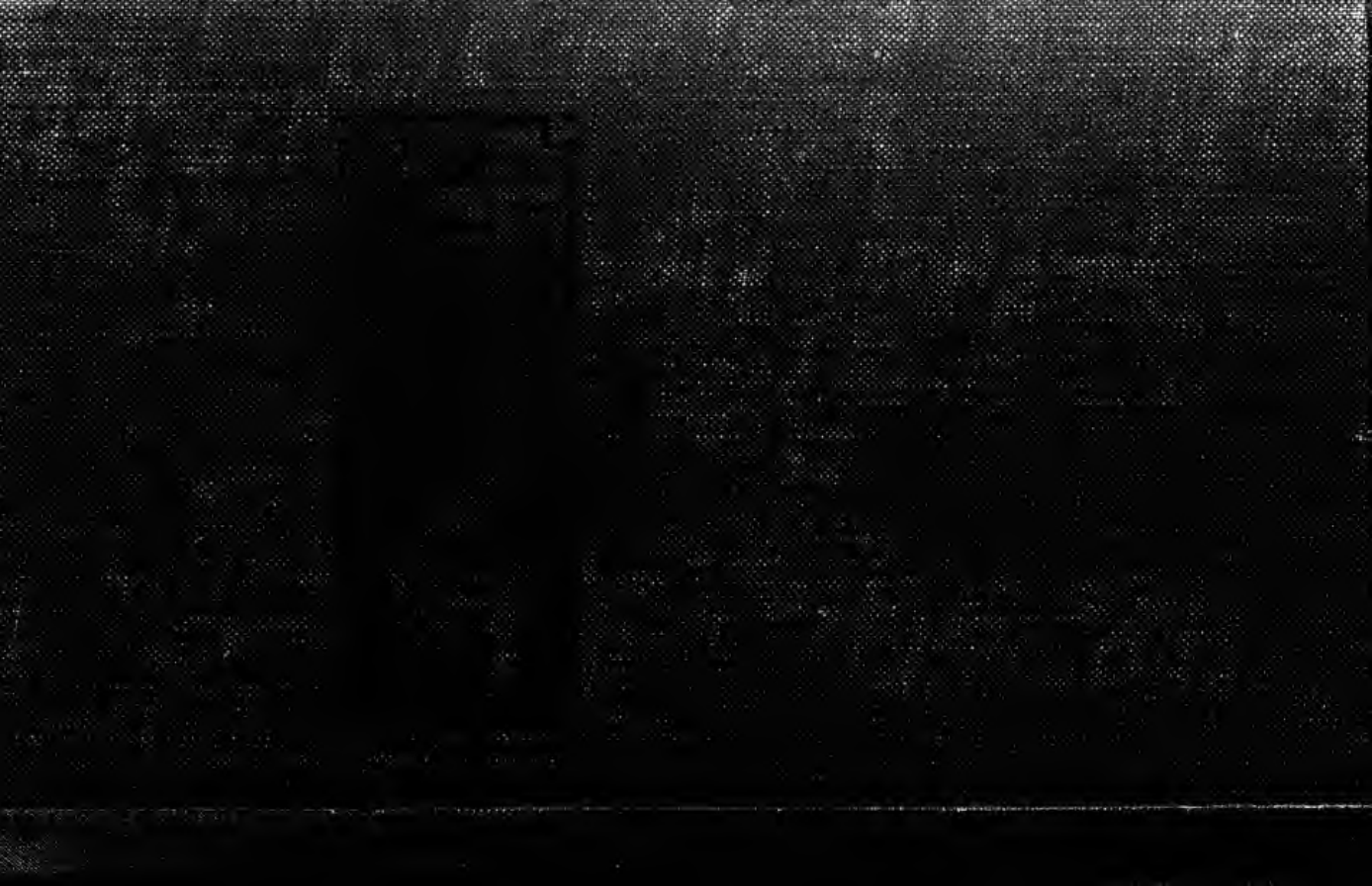
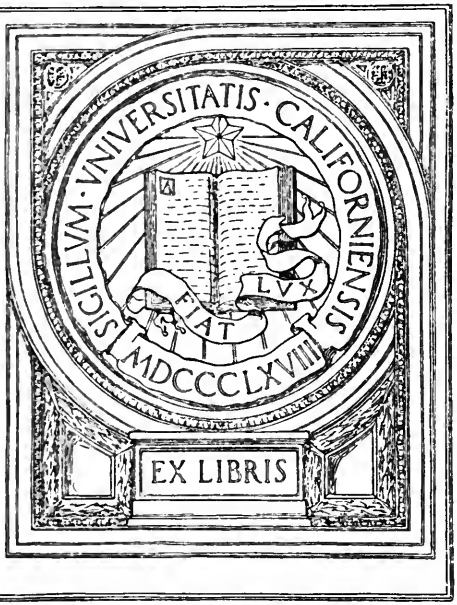


UNIVERSITY OF CALIFORNIA
AT LOS ANGELES



SOUTHERN BRANCH
UNIVERSITY OF CALIFORNIA
LIBRARY
LOS ANGELES, CAL.

SOUTHERN
UNIVERSITY
LIB

Digitized by the Internet Archive
in 2007 with funding from
Microsoft Corporation

http://www.archive.org/details/dieteticsforhigh00williala

DIETETICS FOR HIGH SCHOOLS

THE MACMILLAN COMPANY
NEW YORK · BOSTON · CHICAGO · DALLAS
ATLANTA · SAN FRANCISCO

MACMILLAN & CO., LIMITED
LONDON · BOMBAY · CALCUTTA
MELBOURNE

THE MACMILLAN CO. OF CANADA, LTD.
TORONTO

DIETETICS FOR HIGH SCHOOLS

BY

FLORENCE WILLARD, B.S.

CHAIRMAN OF THE DEPARTMENT OF HOUSEHOLD SCIENCE
WASHINGTON IRVING HIGH SCHOOL
NEW YORK CITY, N.Y.

AND

LUCY H. GILLETT, M.A.

DIRECTOR OF THE DIETETIC BUREAU
BOSTON, MASS.

New York
THE MACMILLAN COMPANY
1921

All rights reserved

40525

Copyright, 1920,
By THE MACMILLAN COMPANY.

Set up and electrotyped. Published July, 1920.

Norwood Press
J. S. Cushing Co. — Berwick & Smith Co.
Norwood, Mass., U.S.A.

QTX
551
W66d
1924

PREFACE

As our knowledge of physiology and hygiene on the one hand, and of the composition of foods on the other, increases, we are more and more impressed with the extent to which a healthy efficient body depends upon the adaptation of food to bodily needs.

Those who provide the food for a family, especially where there are growing children, have an opportunity to serve not only the few members of a family as individuals, but these individuals as part of a whole community. The health of a community depends on individual welfare in which food plays a very important part. It is important therefore that those who select the food for a family should be intelligent with regard to the composition of food and its use in the body.

The purpose of this book is to teach, in a manner adapted to high schools, the applications of the principles of nutrition to the feeding of the family, with especial emphasis on the relative values of different foods, economy in buying, and the importance of good food habits. The problems are in the form of practical exercises dealing with the food problems of the average family and may be modified to suit the immediate needs of any class. The subject matter has direct application to the work given in the Hygiene and General Science courses in many high schools. It is hoped this book may be of use also to Women's Clubs as the basis of lectures, and to social workers and public health nurses.

The presentation of the material is the result of several years' experience of both authors in the teaching of the sub-

ject, and of one of them in dealing directly with individual family problems where malnutrition had resulted because of lack of proper attention to diet.

The authors wish to acknowledge their indebtedness to Professor Henry C. Sherman of Columbia University for valuable advice and helpful criticism in the preparation of the manuscript.

F. W. AND L. H. G.

MAY, 1920.

CONTENTS

CHAPTER I

CHAPTER II

CHAPTER V

CHAPTER VI

CHAPTER VII

CHAPTER VIII

CHAPTER IX

CHAPTER X

CHAPTER XI

CHAPTER XII

LIST OF TABLES

APPENDIX A

APPENDIX B

LIST OF CHARTS

LIST OF FIGURES

DIETETICS FOR HIGH SCHOOLS

DIETETICS FOR HIGH SCHOOLS

CHAPTER I

OUR DEPENDENCE ON FOOD

PROPER food, plenty of sleep, fresh air, exercise, regularity of habits, and proper clothing are all controlling factors in health. Although food is only one of these factors it is very important to have the diet well selected to suit the needs of growth, health, and activity.

FOOD SERVES SEVERAL PURPOSES

Food should be adequate to maintain normal growth. If we compare the size and strength of a baby with that of a full-grown, strong, healthy man or woman twenty-one years of age and five feet six inches tall, we realize that a tremendous change has taken place in growing from an infant to an adult. The bones are larger, the teeth have appeared, the muscles have developed, and the man or woman has gained strength. These changes have been brought about gradually through the building up of the body by means of food suited to its needs. A diet must be adequate both in kind and amount in order to produce normal, healthy men and women.

During the period of high school life, girls and boys of twelve or fourteen years of age should gain from nine to ten pounds in a year, or from twelve to thirteen ounces per month.

If they are not making an average gain in weight, they should be examined by a physician to find out whether there is some physical defect or other cause for retarded growth. Then the diet should be investigated to determine whether or not it is adequate in kind and amount. The ability to work, to accomplish one's aim and to compete with those who are physically strong, may depend upon the attention given to laying a good foundation for health early in life.

The following tables give the average weight and height for boys and girls of various ages:

TABLE I. — HEIGHTS AND WEIGHTS FOR CHILDREN UNDER FIVE YEARS OF AGE. (BASED ON DATA PUBLISHED BY THE CHILDREN'S BUREAU, U. S. DEPARTMENT OF LABOR)

AGE	BOYS		GIRLS	
	Height	Weight	Height	Weight
	Inches	*Pounds*	*Inches*	*Pounds*
Birth	20.6	7.6	20.5	7.2
3 mos.	23.5	13.0	—	—
6 mos.	26.5	18.0	25.9	16.8
9 mos.	28.1	20.4	27.6	19.1
12 mos.	29.4	21.9	28.9	20.8
15 mos.	30.8	23.6	30.1	21.9
18 mos.	31.8	24.6	31.1	23.4
21 mos.	32.9	25.8	32.3	24.8
24 mos.	33.8	27.1	33.4	26.4
27 mos.	34.8	29.0	33.9	27.3
30 mos.	35.4	29.5	34.9	28.3
33 mos.	36.1	30.6	35.6	29.1
36 mos.	37.1	32.3	36.8	30.5
39 mos.	37.9	33.1	37.3	31.6
42 mos.	38.6	33.8	38.0	32.5
45 mos.	39.0	34.5	38.5	33.3
48 mos.	39.5	35.9	39.0	33.8
5 years	41.6	41.1	41.3	39.7

TABLE II. — HEIGHT AND WEIGHT FOR CHILDREN OVER FIVE YEARS OF AGE: A, BOYS; B, GIRLS

(Prepared by Dr. Thomas D. Wood)

(A^1) **Right HEIGHT and WEIGHT for BOYS**

Weights and measures should be taken without shoes and in only the usual indoor clothes. Boys should remove their coats.

HEIGHT INCHES	5 YRS.	6 YRS.	7 YRS.	8 YRS.	9 YRS.	10 YRS.	11 YRS.	12 YRS.	13 YRS.	14 YRS.	15 YRS.	16 YRS.	17 YRS.	18 YRS.
39	35	36	37											
40	37	38	39											
41	39	40	41											
42	41	42	43	44										
43	43	44	45	46										
44	45	46	46	47										
45	47	47	48	48	49									
46	48	49	50	50	51									
47	....	51	52	52	53	54								
48	....	53	54	55	55	56	57							
49	....	55	56	57	58	58	59							
50	....	....	58	59	60	60	61	62						
51	....	....	60	61	62	63	64	65						
52	....	....	62	63	64	65	67	68						
53	....	....	....	66	67	68	69	70	71					
54	....	....	....	69	70	71	72	73	74					
55	....	....	....	....	73	74	75	76	77	78				
56	....	....	....	....	77	78	79	80	81	82				
57	....	....	....	....	....	81	82	83	84	85	86			
58	....	....	....	....	....	84	85	86	87	88	90	91		
59	....	....	....	....	....	87	88	89	90	92	94	96	97	
60	....	....	....	....	....	91	92	93	94	97	99	101	102	
61	....	....	....	....	....	....	95	97	99	102	104	106	108	110
62	....	....	....	....	....	....	100	102	104	106	109	111	113	116
63	....	....	....	....	....	....	105	107	109	111	114	115	117	119
64	....	....	....	....	....	....	....	113	115	117	118	119	120	122
65	....	....	....	....	....	....	....	....	120	122	123	124	125	126
66	....	....	....	....	....	....	....	....	125	126	127	128	129	130
67	....	....	....	....	....	....	....	....	130	131	132	133	134	135
68	....	....	....	....	....	....	....	....	134	135	136	137	138	139
69	....	....	....	....	....	....	....	....	138	139	140	141	142	143
70	....	....	....	....	....	....	....	....	....	142	144	145	146	147
71	....	....	....	....	....	....	....	....	....	147	149	150	151	152

Tables I and II represent the average weight and height of thousands of boys and girls, and while the measurements of very few individuals will correspond exactly with the figures in the tables, a weight or height 7 per cent below, or 15 per cent above, the average should be investigated.

In exceptional cases a child with normal health and strength may seem to be underweight according to the above figures, but if there is a normal increase in weight either by the year or by the month there is probably little cause for alarm. Table III gives a normal increase in weight per month:

[1] Copyrighted Child Health Organization.

(B^1) **Right HEIGHT and WEIGHT for GIRLS**

Weights and measures should be taken without shoes and in only the usual indoor clothes.

Height Inches	5 Yrs.	6 Yrs.	7 Yrs.	8 Yrs.	9 Yrs.	10 Yrs.	11 Yrs.	12 Yrs.	13 Yrs.	14 Yrs.	15 Yrs.	16 Yrs.	17 Yrs.	18 Yrs.
39	34	35	36											
40	36	37	38											
41	38	39	40											
42	40	41	42	43										
43	42	42	43	44										
44	44	45	45	46										
45	46	47	47	48	49									
46	48	48	49	50	51									
47	....	49	50	51	52	53								
48	....	51	52	53	54	55	56							
49	....	53	54	55	56	57	58							
50	....	....	56	57	58	59	60	61						
51	....	....	59	60	61	62	63	64						
52	....	....	62	63	64	65	66	67						
53	....	....	....	66	67	68	68	69	70					
54	....	....	....	68	69	70	71	72	73					
55	....	....	....	....	72	73	74	75	76	77				
56	....	....	....	....	76	77	78	79	80	81				
57	....	....	....	....	....	....	81	82	83	84	85	86		
58	....	....	....	....	....	....	85	86	87	88	89	90	91	
59	....	....	....	....	....	....	89	90	91	93	94	95	96	98
60	....	....	....	....	....	....	....	94	95	97	99	100	102	104	106
61	....	....	....	....	....	....	....	99	101	102	104	106	108	109	111
62	....	....	....	....	....	....	....	104	106	107	109	111	113	114	115
63	....	....	....	....	....	....	....	109	111	112	113	115	117	118	119
64	....	....	....	....	....	....	....	....	115	117	118	119	120	121	122
65	....	....	....	....	....	....	....	....	117	119	120	122	123	124	125

Table III. — A Normal Increase in Weight per Month during Growth

For Boys		For Girls	
Age	Average gain per month	Age	Average gain per month
	Ounces		*Ounces*
First year	14 to 18	First year	14 to 18
Second year	10 to 12	Second year	10 to 12
Third year	7 to 8	Third year	7 to 8
Fourth to eighth years (inclusive)	5 to 6	Fourth to eighth years (inclusive) . . .	5 to 6
Ninth to eleventh years (inclusive)	7 to 8	Ninth to twelfth years (inclusive) . . .	7 to 9
Twelfth and thirteenth years	11 to 12	Thirteenth to fifteenth years (inclusive) .	11 to 13
Fourteenth to sixteenth years (inclusive) .	12 to 16	Sixteenth and seventeenth years . . .	4 to 8
Seventeenth year . .	8 to 10		

[1] Copyrighted Child Health Organization.

PROBLEMS

1. To ascertain the weight and height of each member of the class:
   How much should a boy or girl of your age and height weigh?
   How much do you weigh? Record your weight.
   How tall are you? Record your height.
   Compare your weight with the average. What per cent above or below the average are you? Can you account for it?

2. To find the average age, weight, and height of the whole class:
   Add together the weights of all the members of the class and divide the total by the number in the class. Do the same for the heights and ages. What is the average weight, height, and age of the whole class?
   Compare these averages of the class with the average in the table. What is the percentage variation?

Proper food is important for health. Weight is not the only factor to be considered in judging normal conditions. There are boys and girls who are normal in height and weight, and yet are not strong. Although the twenty-one-year-old man or woman referred to above may have attained average weight and height, and is apparently well, he or she may be very susceptible to colds or other diseases because of low resistance, or there may not be strength enough to admit of much muscular work without extreme exhaustion. Generally food will be used to support the needs of growth first, and if there is an insufficient amount for both growth and health, health will suffer. Food should be so planned as to provide for increase in size, to supply strength, and to build up resistance.

It should be the duty of boys and girls to keep well, not only for their own sakes, but for the sake of those about them and for the welfare of their country. Each should be able to do his or her share in the world's productive work.

Perfect health knows no pain except through accident

and should enable the possessor to do a day's work or enjoy a day's pleasure without undue fatigue. We seldom appreciate the value of health until we are inconvenienced by some ailment, such as frequent headaches, indigestion, or lack of energy. We are inclined to reason that these ills are our misfortunes. On the contrary they are blessings in disguise because they are nature's warnings that we are doing something wrong. The first warning should be heeded and the condition investigated. Unfortunately we cannot begin life over again, and too often these warnings are neglected until they become severe and unbearable. Then it is often too late to remedy the harm done.

Again, from childhood we may be so accustomed to a lack of energy that we are not conscious of our inability to do a normal amount of work. A boy may be able to go to school every day, but he may not be able to play as hard as the other boys; he may have to content himself by being an onlooker at baseball; he manages to make his grades at school, but this leaves him no time for exercise. Because he is not sick enough to go to bed, no one bothers to investigate his condition. He is pitied as being unfortunately frail, naturally dull, and destined to go through life handicapped. There have been many such cases where the health has been improved, and the boy or girl has advanced more rapidly at school, merely by changing the type of food eaten. Quite frequently it is not so much the amount of food as the kind of food eaten that is at fault. White bread and coffee for breakfast, no matter what the quantity, can never supply what a boy or girl needs for robust muscles, rosy cheeks, and eyes beaming with health ready to enjoy life.

Food is the source of our activity. Activity is a necessity. In fact, the very things that keep us alive involve some activity. The muscles of the stomach and intestines are

in motion while caring for the food we eat, the muscles of the chest move when we breathe, the heart, too, is in constant motion. All these motions are going on while we sleep. They involve activity over which we have no control, and, slight as they may seem to us, use considerable energy in doing work.

Then there is voluntary activity which enables us to climb stairs, to write, to sew, to play basketball, and to do work of all kinds whether for business or pleasure. The person sitting in an office or a schoolroom does not need as much food as the person working in a machine shop or taking gymnastics, because the harder we work with our muscles, the more food is required for the energy used. Food must provide the power to do the work whether it be voluntary or involuntary.

The Composition of Foods Should Be Such as to Serve the Needs of the Body

Relation between the composition of foods and the composition of the body. Since we are dependent to such a large extent upon food for the material from which our bodies are built up, for strength, for resistance to disease, and for energy, it is important to know about the composition of various foods and what we may expect each to do for us.

We learn about foods from the work of the food chemists. They have analyzed foods and found them to be composed of proteins, fats, carbohydrates (starch, sugars, and cellulose), mineral elements, vitamines, and water. (Starch, sugars, and cellulose are grouped together because of their similarity in composition.)

The physiologist tells us that these same substances are the materials needed to make a child gain in weight and in height, that they are all needed to keep boys and girls, men

and women, strong and healthy, and that they enable us to work and play.

In other words, these substances provide material to form and repair tissues, to stimulate and regulate the rapidity with which the various internal processes of living are carried on; they provide energy needed for work and for keeping the body warm. Sugars, starch, and fats are the chief sources of energy, though proteins may be used for this purpose. In an ordinary diet about nine tenths of the energy is furnished by carbohydrates and fats, and about one tenth by proteins. If food contains more fats and carbohydrates than are needed for energy, the surplus will be stored as fatty tissue.

Muscles, bones, and tissues other than fatty tissues are composed chiefly of proteins, mineral elements, vitamines, and water, with perhaps the addition of a small amount of carbohydrate and fat. Mineral elements and vitamines help to keep order throughout the body. They enter into the composition of the tissues, or stimulate activity here, check it there, and act as regulators generally.

For the best results each of these foodstuffs should be present in the right proportions. After further discussion of the composition of foods and the amount of each foodstuff required by the body, it will be quite possible to plan a diet that will contain the proper amount of each foodstuff to suit the needs either of an individual or of a whole family.

Digestion of food. Before the food can be used by the body, however, it must go through the preparatory process of digestion. As it passes through the mouth, stomach, and intestines it is very finely divided and brought into solution through the influence of the digestive juices.

The first requirements in good digestion are good teeth and a cheerful frame of mind. The army, recognizing the importance of the teeth as a factor in preserving the health

of its men, requires that every soldier have his teeth in good condition. Bad teeth may be responsible for poor health, not only because their owner cannot chew his food properly, but because of the bacteria that lodge and multiply in the cavities. The bacteria may invade other parts of the body and form poisonous products which will be absorbed into the system. Bad teeth are as objectionable as decayed or dirty food. Sound, clean teeth are among the most important safeguards of the stomach and of the whole body.

In the mouth the food should be thoroughly chewed, mixed, and moistened with saliva. This enables the food to pass down into the stomach easily. In the stomach and intestines it is churned and mixed with the digestive juice peculiar to each of these organs. The process of digestion should be continuous from the time saliva begins to act upon food in the mouth until it becomes a soluble mass in the intestines.

Chewing the food prepares the way for quick digestion by separating it into small pieces, and by stimulating the flow of the digestive juice in the stomach. "Bolting food" is not only bad manners, but it is injurious to health as well. It adds to the work of the stomach and prolongs the length of time the food has to remain in the stomach. This increases the danger of fermentation and the production of injurious substances.

Pleasant anticipation of food also stimulates the flow of the digestive juice, while worry and anger retard it. Becoming angry over or displeased with food placed before one, or worrying over examinations or lessons poorly prepared, may interfere with digestion so seriously as to cause "indigestion." Work well done should help to bring about cheerful conversation so that the mealtime may be a joyous occasion.

Absorption of food. Digested foods in a soluble state are absorbed chiefly through the intestinal wall, taken by

the blood to all parts of the body, and built up into tissues. As the blood with its digested products flows through the body, each part selects the material it needs to build bones, muscles, and other tissues, or stores it up for some future use. In this way growth takes place, the body is kept in repair, and a reserve is set aside to provide for an emergency. After growth has ceased, there is still need of these digested products in the repairing of the tissues that are constantly wearing out.

Excretion of waste. The worn-out parts are carried away in the blood, to be eliminated through the skin, the lungs, the kidneys, or the intestines. It is of vital importance that this material be disposed of before it accumulates to such an extent as to produce poisoning. Headaches, a muddy complexion, and a dull, stupid feeling with no apparent cause may all be the result of improper elimination of these substances.

Exercise, plenty of water, and the right kind of food should keep the system flushed and rid of this waste material. Since much of it is disposed of through the intestines, great care should be taken to prevent constipation. The bowels should always move at least once a day, while two or three movements a day at regular times are better.

Water. Water is present not only in every food but in every part of the body. It does not change during the process of digestion like most of the other foodstuffs, but serves as a medium for carrying the other five types of material throughout the body, holding them in solution so that they may be absorbed and used properly.

Plenty of water in the diet keeps the tissues in a moist condition, stimulates the flow of digestive juices, aids in digestion, absorption, and excretion, and promotes circulation. We need plenty of water to flush the system so that we may get rid of the waste material before it becomes

injurious. It is no longer considered unwise to drink a moderate amount of water with meals, provided it is not used to wash down the food. With an average amount of exercise, at least six to eight glasses of water should be taken every day. A convenient and easy rule to remember is to take one glass of water before breakfast, a glass or two with each meal, a glass about two hours after each meal, and a glass before going to bed. More may be taken with increased exercise and a corresponding increase in evaporation or perspiration. There is, however, danger in drinking too much water without a proper amount of exercise because of the extra work thrown upon the stomach and kidneys, and in some cases the heart also.

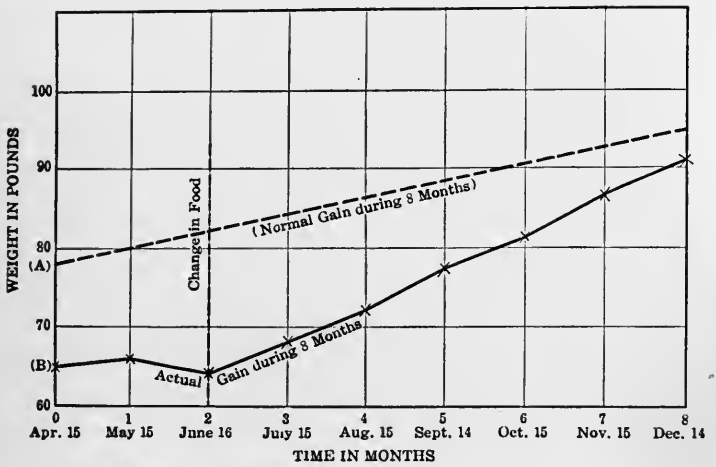
The foods containing comparatively large amounts of water are chiefly fruits and vegetables.

How much water do you drink during the day?

Selection of Food Should not Be Left to Chance

We eat to supply real needs, — needs greater than the mere satisfying of the appetite. How well our food serves its purpose is dependent upon the intelligence with which we select it. The appetite is not always a reliable guide. Often it has been pampered and abused until it can no longer be trusted to protect us from errors in diet and consequent lowered vitality.

People are realizing more and more the importance of adjusting food intake to their individual needs. Crops and live stock have long been carefully watched and fed to produce better products, while children have too often been allowed to eat more or less as they pleased. Few brought up under these conditions continue healthy throughout their threescore years and ten, and our attention is called constantly to the large number of people who are only half-



Boy, 12 yrs. old, 4 ft. 7 in. in Height
A = Normal Weight, 78 lbs.
B = Actual Weight, 65 lbs.

A. 1. C. P., N. Y.

CHART I. — To show increase in weight with change of food habits.

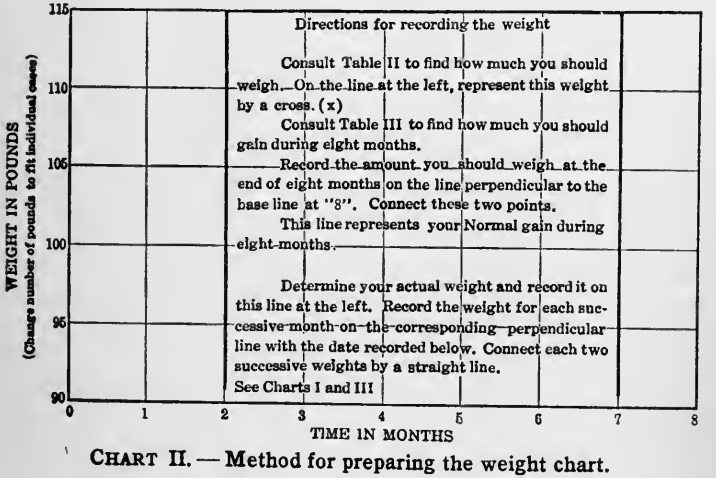


CHART II. — Method for preparing the weight chart.

fit physically during " the last of life for which the first was made."

We hear much concerning the numbers of undernourished school children, — of children who are below normal in weight, in height, in strength, and in grades at school; and we feel that something should be done to prevent these boys

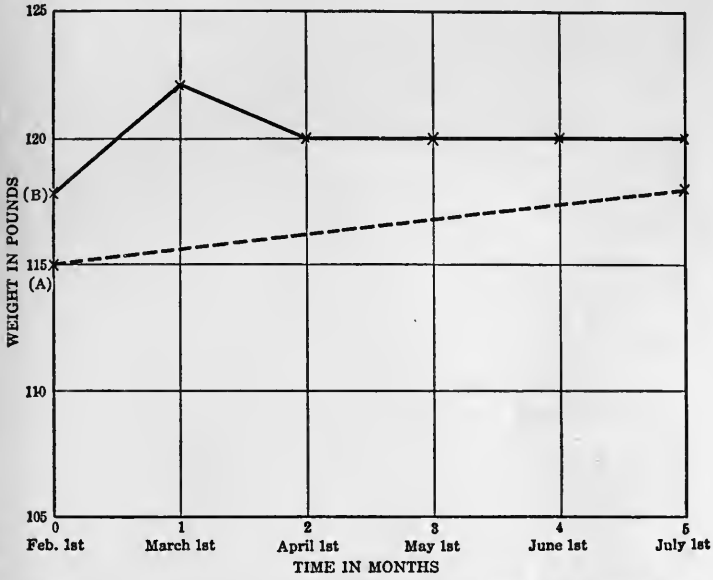


CHART III. — An actual record kept by a Washington Irving High School girl, 17 years old, 5 ft. 3 in. in height.

and girls from becoming handicapped for life. The first step is to find out whether a boy or girl is normal in weight and height.

Chart I represents the story of a boy twelve years of age who was found not to be gaining as he should. Although he was not sick he was unable to accomplish much either at school or at home and was branded as having little ambi-

tion. Finally he was examined by a physician who said there was no physical cause for underweight, but that the boy was undernourished. The mother could not understand this, as he ate a loaf of bread a day, about half a pound of meat, and had all the coffee he wanted to drink. Some one who understood the relation of food to health advised the mother to stop the coffee, to reduce the meat, and to add milk and vegetables to his diet. The change was finally made, with the result that at the end of eight months he was nearly up to average weight. His improvement at school was equally marked, and he became a strong, healthy boy with time and energy for play as well as work. Food then must supply growing material, it must be of such a nature as to keep us well, and it must provide energy or the ability to work.

PROBLEMS

3. To start a chart record of your weight:

   Secure a piece of plotting or graph paper and mark it like the illustration in Chart II. On this sheet draw a line representing the average weight and increase in weight for a person of your age and height and record with dots your present weight and height. On the first of each month determine your weight and place a dot in its respective place on the chart, connecting it with the dot of the previous month by a straight line. (Chart III represents the actual record kept by a girl at the Washington Irving High School, New York City.)

4. Select a seven- or eight-year-old child of your acquaintance and start a chart of its weight. (As you progress in the course you may be able to give helpful suggestions regarding the diet of the child.)

REFERENCES

Feeding the Family, Chapters I and II. Rose, Mary S. Macmillan Company.

Home and Community Hygiene, pages 18 to 30. Broadhurst, Jean. J. B. Lippincott Co.

CHAPTER II

A STANDARD FOR MEASURING FOOD — THE CALORIE

As we have seen in Chapter I, foods and the body are composed of the same kinds of materials, and our well-being depends on the proper amounts of the various foodstuffs eaten. The average person, however, would be somewhat discouraged if each day before eating he had to calculate his food requirement in terms of carbohydrates, fats, proteins, mineral elements, vitamines, and water. But it is possible to become so familiar with. the composition and relative values of different foods that choosing the right ones may be done with very little thought.

We will begin our acquaintance with the uses of foods by considering them first as a source of energy. A much larger amount of the foodstuffs goes to provide the energy used in working and in keeping us warm than for any other purpose. The other factors are much more likely to be supplied in sufficient amounts if the energy is adequate. The fuel value of a food is a measure of the energy it will produce.

The Fuel Value of Foods

The Calorie. We are familiar with, and appreciate the value of, the burning of coal, which produces heat to keep us warm on cold days in winter, or which will produce power to make a steam engine run. Perhaps we are not so familiar with the fact that food burned in the body is the source of the energy which keeps us warm internally and gives us

power to do work. The amount of heat any given food will produce outside of the body may be measured. This makes it possible to tell how much energy each food will provide in the body, and thus to judge how much food we need during the day. For the sake of convenience it is necessary to have a name to designate a definite amount of heat produced by foods, just as for other units of measure. This unit of heat is called a Calorie.

100-Calorie portions. A piece of good coal weighing 0.6 ounce will when burned yield 100 Calories. A potato weighing 5.3 ounces will give the same amount of heat. If an apple weighing 7.5 ounces were burned it would produce 100 Calories; a tablespoon of oil weighing 0.4 ounce, 0.9 to 1.0 ounce of sugar, starch, dry cereal, or flour, 1.4 ounces of bread, about 10 ounces of carrots, or 24 ounces of lettuce will each produce the same amount of heat, or 100 Calories. It is comparatively easy to find a potato weighing 5.3 ounces, or an apple weighing 7.5 ounces, each of which will give 100 Calories; but it would be extremely difficult to weigh the amount of either the potato or the apple that would give one Calorie. For convenience, then, foods are frequently measured in 100-Calorie portions instead of in smaller quantities.

Weighing 100-Calorie Portions

Scales. The laboratory should be equipped with Harvard Trip scales or some other accurate scales for weighing food. Either the metric or the avoirdupois system of weights may be used, or both.

PROBLEMS

5. To learn to use the scales:

   Place the scales directly in front of you with the box of weights in front of the scales. Balance the scale by means

of the small balance wheel until the pointer swings as far to the left as to the right, and when at rest is in the center. Use a pair of tweezers to remove the weights from the box. (If the weights are touched with the hands, grasp them by the handles only.) Replace the weights in the box as soon as you have finished weighing.

The articles to be weighed should be placed on the left side of the scales, the weights on the right. Filter paper or small pieces of paraffin paper should be used under the food. If pieces of paper of equal weight be placed on either side of the scales, the scales will not have to be readjusted. When a saucer or tin cup is used for holding any food, place one of corresponding size on the side with the weights and only slight adjustment will be necessary.

Find the weight of the tablespoon, the teaspoon, tin cup, white bowls, saucer, and china cup in the laboratory desk. Record these weights in your notebook.

Weigh out 28.35 grams[1] of flour. How many ounces have you? Measure the quantity with a tablespoon.

Weigh one cup of sugar. How many grams in one cup of sugar? How many ounces? What proportion of a pound is it?

100-Calorie Portions

The following tables contain many foods with the weights of 100-Calorie portions of food as purchased. These foods are to be weighed and measured. Each pupil should have a notebook ruled as given below. Copy the name of the food with the corresponding weights from the book. Weigh each food carefully and measure it by a standard tablespoon or cup. It is important that each pupil do the weighing and measuring herself so that she may become familiar with the measurements. If there are no scales in the laboratory, the weighing will have to be omitted, but the foods should be carefully measured according to the quantities given in the tables. The main object is to get a visual idea of the

[1] In practice it is usually sufficient to weigh to the nearest gram.

100-Calorie portions. Find out the local price per pound and calculate the cost of the portion. Record the results in the notebook.

Rule the notebook as follows:

100-Calorie Portions

Approximate Weight and Measure of the 100-Calorie Portion of Each of the Common Grain Products as Ordinarily Purchased

Food	Calories	Weight		Measure	Cost	
		Grams	Ounces		100 Calories	Pound
Barley	100	28	1.0	3 tbsp.	—	—

PROBLEMS[1]

6. To find the measure of the 100-Calorie portion of each of the common grain products:

   Weigh out the specified amount of each of the grain products given in Table IV. Find the measure and record results in your notebook. Record the cost per pound and per 100-Calorie portion.

7. To find the measure of the 100-Calorie portion of each of the common fruits:

   Weigh out the specified amount of each of the fruits given in Table V, find the measure and record the results in your notebook. Find and record the cost of each. Arrange according to cost and compare them.

8. To find the measure of the 100-Calorie portion of each of the common vegetables:

   Weigh out the specified amount of each of the vegetables given in Table VI and record the quantity in your note-

[1] The abbreviations used throughout the text of this book are as follows: tbsp. for tablespoon; tsp. for teaspoon; c. for cup.

TABLE IV. — APPROXIMATE WEIGHT AND MEASURE OF THE 100-CALORIE PORTION OF EACH OF THE COMMON GRAIN PRODUCTS AS ORDINARILY PURCHASED. (Based on Rose's *Laboratory Handbook for Dietetics* and *Feeding the Family.*)

FOOD — GRAIN PRODUCTS	CALORIES	WEIGHT		MEASURE
		Grams	Ounces	
Barley, pearl	100	28	1.0	3 tbsp.
Bread, brown	100	51	1.8	$\frac{3}{4}$ in. slice, 3 in. diam.
Bread, graham	100	40	1.4	3 slices, $\frac{3}{8}$ in. $\times 2$ in. $\times 3\frac{1}{4}$ in.
Bread, white	100	39	1.3	2 slices, $2\frac{1}{2}$ in. $\times 2\frac{3}{4}$ in. $\times$ $\frac{1}{4}$ in.
Bread, whole wheat	100	40	1.4	2 slices, 3 in. $\times 3\frac{1}{2}$ in. $\times \frac{1}{2}$ in.
Cornflakes	100	28	1.0	$1\frac{1}{4}$ cups
Cornmeal	100	28	1.0	3 tbsp.
Cornstarch	100	28	1.0	3 tbsp.
Crackers, graham	100	23	0.8	2 crackers
Crackers, saltines	100	23	0.8	6 crackers
Crackers, soda	100	26	0.9	4 crackers
Farina	100	28	1.0	3 tbsp.
Flour, graham	100	28	1.0	3 tbsp.
Flour, white	100	28	1.0	4 tbsp.
Flour, entire wheat	100	28	1.0	3 tbsp.
Grapenuts	100	28	1.0	3 tbsp.
Hominy	100	28	1.0	$3\frac{1}{2}$ tbsp.
Macaroni	100	28	1.0	$\frac{1}{4}$ cup
Oats, rolled	100	28	1.0	$\frac{1}{3}$ cup
Rice	100	28	1.0	3 tbsp.
Tapioca	100	28	1.0	3 tbsp.
Shredded wheat	100	26	0.9	1 biscuit
Zwieback	100	23	0.8	3 pieces, $3\frac{1}{4}$ in. $\times \frac{1}{2}$ in. $\times$ $1\frac{1}{4}$ in.

book. Can you account for the different amounts of the various vegetables needed to give 100 Calories?

Divide the 100-Calorie portion of each vegetable into averaged-sized servings and record the number.

TABLE V. — APPROXIMATE WEIGHT AND MEASURE OF THE 100-CALORIE PORTION OF EACH OF THE COMMON FRUITS AS ORDINARILY PURCHASED. (Based on Rose's *Laboratory Handbook for Dietetics.*)

FOOD — FRUITS	CALORIES	WEIGHT		MEASURE
		Grams	Ounces	
Fruit, dried				
Apples	100	34	1.2	½ cup
Apricots	100	37	1.3	9 halves
Currants	100	31	1.1	¼ cup
Dates	100	31	1.1	4½ dates
Figs	100	31	1.1	1½ large fig
Prunes	100	40	1.4	4 medium prunes
Raisins	100	31	1.1	¼ cup
Fruit, fresh				
Apples	100	213	7.5	1 large apple
Bananas	100	156	5.5	1 large banana
Blackberries	100	170	6.0	½ cup, 50 berries
Cherries, stoned	100	128	4.5	1 cup
Cranberries	100	215	7.6	2 cups
Currants	100	170	6.0	1½ cups
Grapes, Concord	100	142	5.0	1 large bunch grapes
Grape juice	100	102	3.6	½ cup
Huckleberries	100	133	4.7	1 cup
Lemons	100	323	11.4	3 large lemons
Muskmelon	100	510	18.0	1 medium sized
Olives, green	100	45	1.6	6 to 8 olives
Oranges	100	270	9.5	1 large orange
Orange juice	100	230	8.2	1 cup
Peaches, fresh	100	295	10.5	3 medium sized peaches
Peaches, canned	100	213	7.5	2 halves with 3 tbsp. juice
Pears	100	180	6.3	1 large pear
Plums	100	125	4.4	3 to 4 large plums
Pineapple, fresh	100	232	8.2	2 slices, 1 in. thick
Pineapple, canned	100	65	2.3	1 slice with 3 tbsp. juice or ¼ cup shredded
Raspberries	100	150	5.3	1⅛ cup
Rhubarb	100	434	15.3	4 cups, cut in small pieces
Strawberries	100	255	9.0	1⅓ cups
Watermelon (edible part)	100	332	11.7	

TABLE VI. — APPROXIMATE WEIGHT AND MEASURE OF THE 100-CALORIE PORTION OF EACH OF THE COMMON VEGETABLES AS ORDINARILY PURCHASED. (Based on Rose's *Laboratory Handbook for Dietetics* and *Feeding the Family.*)

FOOD — VEGETABLES	CALORIES	WEIGHT		MEASURE
		Grams	Ounces	
Asparagus	100	450	15.9	20 stalks, 8 in. long
Beans, Lima, fresh, shelled	100	80	2.9	½ c.
Beans, Lima, dried	100	28	1.0	2 tbsp.
Beans, string	100	240	8.5	2¼ cups, cut in pieces
Beans, white, dried	100	28	1.0	2 tbsp.
Beets	100	218	7.7	4 beets, 2 in. diam.
Cabbage	100	318	11.2	5 cups, shredded
Carrots	100	285	10.1	4 to 5 young carrots
Cauliflower	100	325	11.5	1 small head
Celery	100	540	19.1	4 cups, cut in pieces
Corn on cob	100	255	9.0	2 ears, 6 in. long
Corn, canned	100	102	3.6	⅓ cup
Cucumbers	100	666	23.5	2½ cucumbers, 7 in. long
Lentils, dried	100	28	1.0	2½ tbsp.
Lettuce	100	525	18.5	2 large heads
Mushrooms	100	225	7.9	22 mushrooms, 1 in. diam.
Onions	100	204	7.2	3 to 4 medium onions
Parsnips	100	198	7.0	2 medium parsnips
Peas, fresh	100	100	3.5	¾ cup, shelled
Peas, canned	100	125	4.4	¾ cup
Potatoes, sweet	100	102	3.6	½ potato, medium
Potatoes, white	100	150	5.3	1 medium white potato
Radishes	100	340	12.0	36 small radishes
Spinach	100	417	14.7	3 cups
Tomatoes, fresh	100	440	15.5	2 to 3 medium tomatoes
Tomatoes, canned	100	442	15.6	1¾ cups
Turnips	100	369	13.0	2 cups, cut in cubes

9. To find the measure of the 100-Calorie portion of the various dairy products and some fats:

Weigh out the specified amounts of the foods given in Table VII, measure and record the results.

TABLE VII. — APPROXIMATE WEIGHT AND MEASURE OF THE 100-CALORIE PORTION OF THE VARIOUS DAIRY PRODUCTS AND SOME FATS. (Based on Rose's *Laboratory Handbook for Dietetics* and *Feeding the Family.*)

FOOD — DAIRY PRODUCTS, FATS, AND EGGS	CALORIES	WEIGHT		MEASURE
		Grams	Ounces	
Bacon fat	100	11	0.4	1 tbsp.
Beef drippings	100	11	0.4	1 tbsp.
Butter	100	14	0.5	1 tbsp. (scant)
Buttermilk	100	285	10.0	$1\frac{1}{8}$ c.
Cheese, American	100	23	0.8	$1\frac{1}{8}$ in. cube
Cottage	100	91	3.2	$5\frac{1}{2}$ tbsp.
Cream	100	26	0.9	piece 2 in. $\times$ 1 in. $\times \frac{3}{8}$ in.
Swiss	100	23	0.8	$1\frac{1}{2}$ in. cube
Cotton seed oil	100	11	0.4	1 tbsp.
Cream, thin (18%)	100	51	1.8	$\frac{1}{4}$ c.
Cream, thick (40%)	100	26	0.9	$1\frac{1}{3}$ tbsp.
Cream, whipped	100	26	0.9	2 tbsp.
Eggs in shell	100	77	2.7	$1\frac{1}{3}$ egg
Egg white	100	196	6.9	7 whites
Egg yolk	100	28	1.0	2 yolks
Lard	100	11	0.4	1 tbsp.
Milk, whole	100	145	5.1	$\frac{5}{8}$ c.
Condensed (sweetened)	100	31	1.1	$1\frac{1}{2}$ tbsp.
Condensed (unsweetened)	100	60	2.1	$3\frac{3}{4}$ tbsp.
[1] Powdered—whole	100	23	0.8	
[1] Powdered—skimmed	100	28	1.0	
Skimmed	100	272	9.6	$1\frac{7}{8}$ c.
Oleomargarine	100	11	0.4	1 tbsp.
Olive Oil	100	11	0.4	1 tbsp.
Suet (rendered)	100	11	0.4	1 tbsp.

10. To compare the fuel value and cost of various foods:

Place the 100-Calorie portions of butter, oatmeal, bananas, prunes, and potatoes together. Which of these foods supplies fuel in the most concentrated form?

[1] Most of the milk powders now (1919) on the market are made of skimmed or partially skimmed milk.

Find the cost of each of these 100-Calorie portions. Which supplies fuel in the most economical form?

TABLE VIII. — APPROXIMATE WEIGHT AND MEASURE OF THE 100-CALORIE PORTION OF VARIOUS KINDS OF MEAT AND FISH. (Based on Rose's *Laboratory Handbook for Dietetics* and *Feeding the Family.*)

FOOD — MEAT AND FISH	CALORIES	WEIGHT		MEASURE
		Grams	Ounces	
Meat				
Beef, Corned, boiled	100	85	3.0	slice $4\frac{1}{2}$ in. $\times 1\frac{1}{2}$ in. $\times \frac{5}{6}$ in.
Dried	100	57	2.0	4 thin slices, 4 in. $\times 5$ in.
Hamburg steak	100	57	2.0	1 cake $2\frac{1}{2}$ in. diam. $\times \frac{7}{8}$ in. thick
Rib, roasted	100	45	1.6	slice 5 in. $\times 2\frac{1}{2}$ in. $\times \frac{1}{4}$ in.
Round, broiled	100	57	2.0	slice 4 in. $\times 3$ in. $\times 1\frac{1}{8}$ in.
Chicken, broiled	100	74	2.6	slice 4 in. $\times 2\frac{1}{2}$ in. $\times \frac{1}{8}$ in.
Frankforters	100	31	1.1	1 frankforter, $4\frac{1}{2}$ in. long
Lamb Chops	100	45	1.6	1 chop 2 in. $\times 2$ in. $\times \frac{1}{2}$ in.
Liver	100	60	2.1	slice 2 in. $\times 2\frac{3}{4}$ in. $\times \frac{1}{4}$ in.
Mutton, roasted	100	34	1.2	slice 3 in. $\times 3\frac{3}{4}$ in. $\times \frac{1}{8}$ in.
Pork, bacon, fried	100	14	0.5	4-5 small slices
Ham, boiled	100	37	1.3	slice $4\frac{3}{4}$ in. $\times 4$ in. $\times \frac{1}{8}$ in.
Sausage, fried	100	31	1.1	$1\frac{2}{3}$ sausage 3 in. $\times \frac{3}{4}$ in.
Turkey, roasted	100	37	1.3	slice 4 in. $\times 2\frac{1}{2}$ in. $\times \frac{1}{8}$ in.
Veal	100	65	2.3	slice 2 in. $\times 2\frac{3}{4}$ in. $\times \frac{1}{8}$ in.
Fish				
Bluefish	100	68	2.4	piece 3 in. $\times 3$ in. $\times \frac{1}{2}$ in.
Clams, raw	100	215	7.6	6 clams or $\frac{1}{2}$ c.
Halibut steak, broiled	100	85	3.0	piece 3 in. $\times 2\frac{1}{4}$ in. $\times 1$ in.
Mackerel, Spanish, broiled	100	74	2.6	piece 3 in. $\times 2\frac{1}{2}$ in. $\times 1$ in.
Oysters, raw	100	204	7.2	6 to 12 oysters, $\frac{2}{3}$ c.
Salmon, canned	100	51	1.8	$\frac{1}{2}$ c.
Sardines, canned	100	48	1.7	3 to 6 sardines
Scallops, raw	100	136	4.8	$\frac{3}{4}$ c.
Shrimps, raw	100	91	3.2	$\frac{1}{2}$ c.
Tunny fish, canned	100	79	2.8	$\frac{1}{2}$ c.

11. To find the measure of the 100-Calorie portion of various kinds of meat and fish:

Weigh out the specified amount of each of the various kinds of meat and fish given in Table VIII. Record the measure in your notebook. Find and record the cost. Compare and arrange them according to cost.

12. To find the measure of the 100-Calorie portion of some common nuts:

Weigh out the specified amount of each of the nuts given in Table IX. Record the measure in your notebook. Find and record the cost.

Compare the size and cost of these 100-Calorie portions with those of meat and fish. Which is the cheaper source of fuel? What advantages have nuts over meat and fish?

TABLE IX. — APPROXIMATE WEIGHT AND MEASURE OF THE 100-CALORIE PORTION OF SOME COMMON NUTS (EDIBLE PORTION). (Based on Rose's *Laboratory Handbook for Dietetics* and *Feeding the Family*.)

FOOD — NUTS	CALORIES	WEIGHT		MEASURE
		Grams	Ounces	
Almonds	100	14	0.5	12 to 15 nuts
Brazil nuts	100	14	0.5	2 nuts
Butternuts	100	14	0.5	4 to 5 nuts
Coconut	100	17	0.6	$\frac{1}{5}$ c.
Chestnuts, Italian	100	43	1.5	7 nuts
Filberts	100	14	0.5	8 to 10 nuts
Hickory nuts	100	14	0.5	15 to 16 nuts
Peanuts	100	17	0.6	20 to 24 (single)
Peanut butter	100	17	0.6	$2\frac{1}{2}$ tsp.
Pecans	100	14	0.5	12 (single)
Pine nuts	100	17	0.6	$\frac{1}{4}$ c.
Walnuts, English	100	14	0.5	8 to 16 nuts

13. To find the measure of the 100-Calorie portion of chocolate, various sweets, and some common sugars:

Weigh out the specified amount of each of the foods given in Table X. Measure the quantity of each and record the results. Compare these results with those from the weighing of vegetables, fruits, and fats.

TABLE X. — APPROXIMATE WEIGHT AND MEASURE OF THE 100-CALORIE PORTION OF CHOCOLATE, VARIOUS SWEETS, AND SOME COMMON SUGARS. (Based on Rose's *Feeding the Family* and *Laboratory Handbook for Dietetics.*)

FOOD — CHOCOLATE, SWEETS, ETC.	CALORIES	WEIGHT		MEASURE
		Grams	Ounces	
Cherries, candied	100	28	1.0	10 candied cherries
Chocolate, milk, sweetened	100	20	0.7	piece $2\frac{1}{4}$ in. $\times 1$ in. $\times \frac{1}{8}$ in.
Chocolate, unsweetened	100	17	0.6	piece $\frac{3}{4}$ in. $\times 1\frac{1}{4}$ in. $\times \frac{7}{8}$ in.
Cocoa	100	20	0.7	$3\frac{1}{2}$ tbsp.
Corn sirup	100	43	1.5	$1\frac{3}{4}$ tbsp.
Ginger, crystallized	100	28	1.0	6 pieces, $1\frac{1}{2}$ in. $\times \frac{3}{4}$ in. $\times \frac{1}{4}$ in.
Honey	100	31	1.1	1 tbsp.
Maple sirup	100	34	1.2	$1\frac{1}{2}$ tbsp.
Maple sugar	100	31	1.1	4 tbsp.
Molasses	100	34	1.2	$1\frac{1}{2}$ tbsp.
Sugar, brown	100	26	0.9	2 tbsp.
Sugar, granulated	100	26	0.9	2 tbsp.
Sugar, loaf	100	26	0.9	$3\frac{1}{2}$ tbsp.
Sugar, powdered	100	26	0.9	2 tbsp.

14. To select a luncheon from the 100-Calorie portions:

From the various foods weighed select an attractive luncheon which shall consist of from 600 to 700 Calories. Calculate the cost.

15. Arrange another luncheon of the same food value as that in Problem 14, selecting from the 100-Calorie portions a very economical combination, containing variety. The luncheon should be suited to the needs of the one for whom it is intended.

A Comparison of the Energy Value of Different Foodstuffs

Of the various foods weighed out, it is interesting to note that it takes less of fat or oil to produce 100 Calories than of any other food. In this connection, however, it must be remembered that most foods contain so much water in addition to the fuel constituents that it is difficult to compare the relative value of the latter. Oil, lard, sugar, and starch are more nearly free from water than any other of the foods in these tables. By comparing the 100-Calorie portions of these three foods,

0.4 ounce of oil
0.9 ounce of sugar
0.9 ounce of starch (if dry),

we see that it takes two and one fourth times as much sugar or starch (dry) as oil to give 100 Calories. The larger amount (1.0 oz.) given for starch in the table is due to a small amount of water contained in it. If 1.0 oz. of ordinary starch were put in the oven and dried, enough moisture would be given off to leave it approximately pure with a weight of 0.9 ounce. Except for dry gelatin, we have no food composed of pure protein, but it takes just as much pure protein to produce 100 Calories as it does of either sugar or starch.

Every gram of fat eaten should provide nine Calories which may be used by the body either as heat or as energy, while each gram of sugar, starch, or protein can provide but four Calories. Therefore fats are our most concentrated fuel foods, but they are sometimes difficult to digest and usually should not be taken in very large amounts. Sugar ferments easily and causes digestive disturbances, hence cannot be relied upon to too great an extent, while protein should be reserved to build and to repair tissues. Starch

is a relatively safe source of energy, and foods containing it should occupy a prominent place in the diet.

REFERENCES

Food and Health, Chapter VI, Lesson 28. Kinne and Cooley. Macmillan Company.

Foods and Household Management, Chapter XVIII. Kinne and Cooley. Macmillan Company.

Laboratory Manual for Dietetics. Rose, Mary S., Macmillan Company.

CHAPTER III

FOOD PROVIDES FUEL NEEDED FOR ENERGY

The Human Engineer

The engineer who knows when to add more fuel to the fire under his engine, who oils this rod and that wheel at proper intervals, who opens this draft or closes that one at the right time, and who avoids accidents by the careful repairing of his engine, is a skillful workman. But intricate as the work of the engineer may seem, each boy or girl has, in his or her own hands, the control of a far more delicate piece of mechanism than the ordinary engine, and one that requires much more skill and intelligence if the best results are to be obtained.

The Body, a Human Engine

It is sometimes said that the body is like a steam engine, but this is a very crude comparison. We are like steam engines in so far as we burn fuel (food) to get the energy that makes it possible for us to work, but there are functions of the human engine other than the production of energy. In fact there are more points of difference between the human engine and the steam engine than there are similarities.

In the first place, an extra amount of coal added to the fire under an engine to-day won't help if the coal supply runs low next winter, nor will it produce extra energy to-day that may be used to-morrow. The steam engine cannot store a surplus of fuel against some future need. It has to use the fuel as fast as it is received.

Extra fuel may be stored in the body. If on any given day the human engine receives more than enough fuel food to supply the energy needed for that particular day, the extra amount may be stored in the tissues in the form of fat which may be used later in case of an emergency. The reserve thus stored will provide excess fuel which may be used during very cold days in winter, or it may be useful in " unexpected happenings " during any part of the year. It is always well to have a reserve supply, as is illustrated by the following incident:

Two girls started in an automobile for a town ten miles away. When half way there the gasoline gave out. As the car refused to go without fuel the girls had to walk, thus needing an unforeseen supply of body fuel. One of them completed the journey without much fatigue because she had a reserve supply of fuel in her tissues, a supply that had been accumulating from day to day. The other girl arrived at her destination too, but much exhausted. She had not been eating the kind of food that had allowed her tissues to fortify themselves against the unexpected. " If she had no reserve then how could she walk any more than the automobile could go? " you ask. She did what no automobile or steam engine can do; she borrowed her energy from the body tissues themselves. In other words, she burned the " walls of her house " for energy, but in so doing she weakened the tissues and made them more susceptible to disease.

Food should contain materials other than fuel. When repairs have to be made to the steam engine the fire is put out, the machinery comes to a standstill, repairing material is supplied from without, and new parts are added or the old ones patched up by a mechanic. No engine can repair itself.

The human engine also wears out, but its repairing in the

hands of a competent engineer should take place automatically, even while one is studying or playing tennis. Sometimes we are "laid up for repairs" because of illness, but even then repairing must be done while the heart is beating, the blood circulating, and while we are breathing. These motions could not be discontinued for more than a few seconds without fatal results. The work done by the internal organs requires energy just as truly as the swinging of an ax, and fuel must be produced every minute to supply it.

But unlike the fuel used in the steam engine, the fuel the body burns contains the materials that may be used in these repairing and regulating processes. These are chiefly proteins, mineral elements, and vitamines, though fats and carbohydrates may in a sense contribute to these processes as well as to the production of energy. Our skill as engineers lies in our ability to provide the proper fuel foods which shall contain not only fuel, but building and regulating materials for all needs so that we may be in good working condition every day.

The Amount of Energy Needed by the Human Engine

Although the needs of the body are varied, we usually speak of them in terms of energy used in doing work and in keeping the body warm.

For every bit of work done there is a certain amount of heat produced which incidentally keeps us warm. Everyone must have had the experience of feeling increasingly warmer while working rapidly. The harder we work the more heat is produced, for the heat is in proportion to the work done. If all this heat were to stay "bottled up" inside, the temperature of the body would quickly rise above what we could endure. But, fortunately for us, we are kept at a nearly constant temperature internally, regardless of

the weather outside, because any excess heat above a certain amount is given off through the pores of the skin and from the lungs.

The excess heat given off may be collected, measured, and used as an index of the energy being produced. This is done by placing the person who is to serve as a subject for the experiment in an air-tight chamber where all conditions are carefully controlled, all heat given off is collected, and the amount of heat is determined. This device for measuring heat is called a calorimeter, meaning that it measures heat in terms of Calories.

The Amount of Energy Varies with Conditions

It has been found by repeating such experiments on hundreds of people that the amount of heat given off under the same conditions is very nearly the same for all individuals of the same age and size, but that it increases in proportion to the size and activity of the individual, and is considerably influenced by age. This gives us confidence in using it as a basis for estimating the number of Calories needed by different people under varying conditions.

Influence of activity on the amount of energy needed. The amount of heat given off during different degrees of activity has been studied by several scientists, notably Atwater and Benedict, Lusk, and others. Many of their experiments have been made in the calorimeter, where all the conditions were controlled, and the effect of light, moderate, or vigorous exercise was studied by means of a stationary bicycle.

It was found that when a man is lying on a flat surface apparently motionless there is still considerable heat given off. The work being done to produce the heat consists in the internal processes, such as breathing and the circulation

of the blood. This condition represents the lowest amount of work a healthy man can be doing when awake, and the energy needed for these processes is often spoken of as the *basal* requirement. As soon however as the person raises his head, or his arm, or his hand, or moves his body in any way, the amount of heat produced increases and this increase in heat is a measure of the energy used in moving.

The heat produced is not only in proportion to the amount of muscular work done, but is also in proportion to the size of the muscles used in working. For example, the swinging of the arm of a large man will produce more heat than an equally vigorous, similar motion of a smaller man, or of an equally rapid motion of the fingers of the same man.

The results of a large number of such experiments have been averaged and are given in the following table:

TABLE XI. — ENERGY USED BY AVERAGE-SIZED MEN (154 POUNDS) PER HOUR UNDER DIFFERENT CONDITIONS OF ACTIVITY (APPROXIMATE AVERAGES ONLY) [1]

Sleeping quietly	60 to 70 Calories
Awake, lying still	70 to 85 Calories
Sitting at rest	100 Calories
Standing at rest	115 Calories
Tailoring	135 Calories
Typewriting rapidly	140 Calories
"Light exercise" (stationary bicycle)	170 Calories
Shoemaking	180 Calories
Walking slowly (about $2\frac{3}{4}$ miles per hour)	200 Calories
Carpentry or Metal Work	240 Calories
"Active exercise" (stationary bicycle)	290 Calories
Walking briskly (about $3\frac{3}{4}$ miles an hour)	300 Calories
Stoneworking	400 Calories
Severe exercise such as sawing wood	450 to 480 Calories
Running (about $5\frac{1}{4}$ miles an hour)	500 Calories
"Very severe exercise" (stationary bicycle)	600 Calories

Sleeping quietly means that the only outward sign of motion is the breathing of the subject. If he tosses about

[1] Copied from Sherman's *Chemistry of Food and Nutrition*, Revised Edition.

he increases the energy used in proportion to the vigor of the motion.

Sitting at rest means reading, sitting at meals, or sitting in a classroom. Much wriggling about in one's seat increases the heat produced, the energy used, and the food required.

Light exercise corresponds to light housework, laboratory work, or running a sewing machine. It does not refer to washing or sweeping. Students, bookkeepers, stenographers, clerks, and teachers are in this class.

Active exercise corresponds to exercise in the gymnasium, light athletics like tennis or basketball, housework like washing, scrubbing, and sweeping. Athletic girls, general houseworkers, and carpenters are in this class.

Severe muscular exercise includes rapid swimming, fast running, baseball, football, or working with a pick and shovel. This class includes boys engaged in athletics.

Very severe exercise applies chiefly to lumbermen, miners, and men who load and unload freight by hand.

Since the energy requirement of the body may be estimated in Calories, and since the fuel value of foods may be expressed in Calories, we have in the Calorie a common measure for both the needs of the body and for the foods supplying those needs. We frequently speak of the energy requirement in terms of the food value, meaning the number of Calories that the food must supply to provide the energy needed.

To find the Calories needed by an individual weighing 154 pounds and doing a certain kind of work, take for example a man teaching in a high school who walks to and from the building both morning and afternoon and works in his garden part of the day. His energy or food requirement is as follows:

Sleeping — 8 hours	8× 65 — 520 Calories
Sitting at meals — 2 hours	2×100 — 200 Calories
Sitting in the classroom — 4 hours	4×100 — 400 Calories
Walking leisurely about the classroom — 3 hours	3×170 — 510 Calories
Walking briskly to and from school — 1 hour	1×290 — 290 Calories
Working in the garden — 2 hours	2×290 — 580 Calories
Reading at night — 3 hours	3×100 — 300 Calories
Dressing, bathing, etc., — 1 hour	1×170 — 170 Calories
	Total 2970 Calories

Energy requirement varies with size. The figures given above are for a man weighing 154 pounds. Just as the amount of energy required to run a large engine is greater than the amount of energy required to run a smaller engine, so the amount of energy required by a man weighing 130 pounds but doing the same amount of work is less than that of a man weighing 154 pounds.

If the requirement for a man weighing 154 pounds doing the above-mentioned type of work is 2970 Calories, then a man weighing 129 pounds and doing the same kind of work would require one sixth less food or 2488 Calories. It is sufficiently accurate for all practical purposes to consider the requirements of these two men as 3000 and 2500 Calories respectively.

Since it is easier to calculate the food requirement of one individual without referring to that of another, the following table showing the Calories needed per pound per hour may be more convenient. The Calories needed by any adult may be calculated from it directly without referring to the 154-pound man. (Remember that these figures are for adults only; children require a larger number of Calories per pound. Estimates for children in Calories per day and per pound per day are given in Tables XIII and XIV.)

TABLE XII. — AVERAGE CALORIE REQUIREMENT PER POUND PER HOUR FOR ADULTS

Sleeping	0.42 Calories
Sitting at rest	0.65 Calories
Light muscular exercise	1.10 Calories
Active muscular exercise	1.90 Calories
Severe muscular exercise	3.00 Calories

Difference in energy requirement of men and women. There is very little difference in the requirements of men and women of the same age and weight and doing the same kind of work. The average weight of women, however, has been found to be about 20 per cent less than that of men of the same age so that her requirement is ordinarily spoken of as 0.8 of that of man.

To find the energy requirement of a woman let us take for example a young woman weighing 125 pounds whose occupation is stenography. She walks to and from work, plays tennis or takes some other form of exercise at night, and helps with the housework. Her food should supply the following number of Calories to provide for her energy requirement:

Sleeping — 8 hours	$(125 \times 0.42 \times 8) = 420$ Calories
Sitting at meals — 2 hours Sitting in the office — 7 hours Reading, etc., at night — 1 hour	$(125 \times 0.65 \times 10) = 813$ Calories
Walking leisurely about the office — 1 hour Dressing, etc., — 1 hour Helping with the housework — 2 hours	$(125 \times 1.10 \times 4) = 550$ Calories
Active walking — 1 hour Active exercise — 1 hour	$(125 \times 1.90 \times 2) = 475$ Calories
	Total 2258 Calories

Professor Lusk of Cornell in summarizing the work of some Finnish investigators gives the following requirements for women doing various kinds of work:

A seamstress sewing with a needle	1800 Calories
Seamstresses using a sewing machine	1900–2100 Calories
Bookbinders	1900–2100 Calories
Cleaners of windows and metals	2300–2900 Calories
Washerwomen	2600–3400 Calories

Tigerstedt gives estimates of food requirements for different degrees of activity as follows:

Shoemaker	2000–2400 Calories
Weaver	2400–2700 Calories
Carpenter or mason	2700–3200 Calories
Farm laborer	3200–4100 Calories
Man digging ditches (excavator)	4100–5000 Calories
Lumberman	Over 5000 Calories

PROBLEMS

16. To find the food requirement of a salesman weighing 154 pounds:

    Yesterday Mr. Jones, a salesman weighing 154 pounds, spent 2 hours at his meals, he was 1 hour walking to and from the car line, and spent 2 hours on the car. He worked 8 hours behind the counter selling dry goods, spent 2 hours at the theater, and sat 1 hour reading. He slept 8 hours out of the 24 hours. Calculate the food requirement of Mr. Jones.

17. To find the food requirement of a miner weighing 154 pounds:

    If a miner weighing 154 pounds sleeps 10 hours, works in the mines 8 hours, sits at his meals 2 hours, walks 2 hours, and rests and reads 2 hours, what is his food requirement?

18. To find the food requirement of the adult members of your family:

    (*a*) Calculate the food requirement of your father, your mother, and your grown brothers and sisters. Record the results in your notebook.

    (*b*) Compare the food requirement of the fathers of the various members of the class. Account for variations. Find the average food requirement of all the fathers.

Growth influences food requirement. We have been considering the amount of food required by an adult under normal conditions. In determining the needs of any given family where there are growing children and elderly people there are additional factors to be considered.

If the energy in the food eaten by a child were all used in running about or playing, the child could never grow. He must have food enough to provide for both his play and his growth. For this reason the amount of food needed by a growing boy or girl cannot be reckoned on the same basis as that for an adult. To calculate the requirement of a girl weighing 50 pounds as one third of that of a man weighing 150 pounds would give an insufficient allowance and result in an undernourished child.

The food of the child must be adequate to support a constant increase in weight in addition to providing energy for both internal and external activity. In the same way in which the food requirement of adults has been determined, an allowance for each child of each age has been made as follows:

TABLE XIII. — FOOD ALLOWANCES FOR CHILDREN [1]

AGE — YEARS	CALORIES PER DAY		AGE — YEARS	CALORIES PER DAY	
	Boys	Girls		Boys	Girls
Under 2	900–1200	900–1200	9–10	1700–2000	1550–1850
2–3	1000–1300	980–1280	10–11	1900–2200	1650–1950
3–4	1100–1400	1060–1360	11–12	2100–2400	1750–2050
4–5	1200–1500	1140–1440	12–13	2300–2700	1850–2150
5–6	1300–1600	1220–1520	13–14	2500–2900	1950–2250
6–7	1400–1700	1300–1600	14–15	2600–3100	2050–2350
7–8	1500–1800	1380–1680	15–16	2700–3300	2150–2450
8–9	1600–1900	1460–1760	16–17	2700–3400	2250–2550

[1] Food Allowances for Healthy Children, Pub. 120, A. I. C. P., N. Y.

40525

The range of from 300 to 700 Calories per day for a child allows for differences in the size and activity of boys and girls of the same age. " If a child is tall and growing rapidly at six years of age, he may, and probably will, require 1600 Calories. If of smaller frame, an allowance of only 1400 to 1500 Calories will be necessary with a normal amount of activity. If he is both large for his age and very active, he will doubtless require the upper limit of the allowance of 1700 Calories," or sometimes even more. Children who are below average weight because they have not been properly fed will require a more liberal allowance than normal children either of the same age or of the same weight. A liberal allowance should be made for underweight children.

The boy playing football or the girl playing basketball requires more food than the boy or girl of the same weight who prefers to sit quietly in the house studying or reading. This, however, should not be used as an argument against vigorous exercise in moderate amounts. There is no doubt that exercise is necessary for the best development. It helps to stimulate healthy growth, and starts rapid circulation of the blood, which helps to carry away waste products. Food should be sufficient for growth and exercise, otherwise growth is interfered with.

The above table applies to the boy or girl of average weight, but there are some children who are very much under or over the average weight for their age. In such instances it is sometimes better to calculate the food requirement according to the weight rather than the age, though every child should have his needs satisfied regardless of the average for either his age or his weight. Generally when the results of calculating according to age or weight differ, it is safer to allow the larger of the two estimates. The following table gives the number of Calories usually required per pound per day during the growing period:

TABLE XIV. — CALORIES REQUIRED FOR EACH POUND OF BODY WEIGHT PER DAY DURING EACH YEAR OF THE GROWING PERIOD[1]

Under 1 year	40–45 Calories
During the second year	40–43 Calories
During the third year	37–40 Calories
During the fourth year	37–40 Calories
During the fifth year	35–37 Calories
During the sixth year	34–35 Calories
During the seventh year	32–34 Calories
During the eighth year	30–35 Calories
During the ninth year	30–35 Calories
During the tenth year	28–32 Calories
During the eleventh year	28–32 Calories
During the twelfth year	28–32 Calories
During the thirteenth year	25–30 Calories
During the fourteenth year	20–25 Calories
During the fifteenth year	20–25 Calories
During the sixteenth year	20–25 Calories
From the seventeenth year on	From 18 Calories up according to activity

Boys and girls of 17 and over will need at least as much food as equally active men and women.

PROBLEMS

19. To find your own food requirement:

    How does your height compare with the average given in Table II for a girl of your age? Consider your activity. If you are of normal height and weight for your age find your food requirement. Record the result in your notebook. If you are above or below the standard, calculate your food requirement according to Table XIII.

20. Find the food requirement of your younger brothers and sisters. Consult Tables XIII and XIV. Record the results in your notebook.

21. Find the food requirement for your entire family. Record the results in your notebook.

[1] Compiled from data in *Feeding the Family*, by Rose.

Energy requirement after middle age. As a man or woman advances in age, the heart beats more slowly, the breathing is less rapid, and the internal activities in general become somewhat slower, so that the food needed or energy used to keep up these processes is gradually lessened, until by the eightieth year the food requirement is from one fifth to one third less than during the more active period of life. A woman of eighty needs not more than 2200 Calories where she may have needed 3000 Calories fifty years earlier. The body cannot use as much food as it previously used, and if a person still eats as much as he did during the more active years, there is danger of overtaxing the heart, the kidneys, the liver, and the digestive organs. This in turn may bring about disease directly, or it may weaken the whole system, making it more susceptible to disease or less able to overcome disease that may be brought about through accident. In old age, an extra amount of food eaten over and above the amount actually needed is contrary to the laws of health.

The following table has been suggested by Von Norden as a guide in calculating the food requirements of people sixty years of age and over:

TABLE XV. — TO MODIFY THE FOOD REQUIREMENTS OF ADULTS AFTER MIDDLE AGE

Reduce the normal adult requirement as follows:

For people from 60–70 years of age make a reduction of 10 per cent
For people from 70–80 years of age make a reduction of 20 per cent
For people from 80–90 years of age make a reduction of 30 per cent

PROBLEMS

22. To find the food value of a lunch that has been packed to eat at school:

    (Each girl should be asked in advance to bring a box luncheon to be examined in class.)

Open several lunches that have been brought to school and determine the fuel value of each luncheon, estimating it in terms of 100-Calorie portions.

23. To plan by means of 100-Calorie portions the food for one day for a girl of fifteen.

(*a*) Plan the breakfast in which the Calories shall be from one fourth to three tenths of the day's supply. Does the breakfast seem sufficient?

(*b*) For this same girl, plan a dinner that will provide from two fifths to one half of the day's supply of energy.

(*c*) Complete the day's meals with a supper that will contain the rest of the Calories needed for the day.

24. Calculate the cost of these three meals. Figure the cost per 100 Calories.

Does mental work increase food requirement? All experiments seem to show that mental work does not increase the food requirement. This may not seem to agree with the experiences of most high school girls and boys, each of whom will doubtless be ready to testify that he or she is more tired after two or three hours of hard study and steady concentration on some difficult Latin translation or Geometry problem than after two or three hours of tennis or football. As a matter of fact these students doubtless are more conscious of a feeling of exhaustion as the result of study than from the exercise. This may be due to "poisons" produced during nervous tension that settle in the tissues because of lack of exercise and so bring about a feeling of fatigue.

It is advisable to do both mental and muscular work in as calm a frame of mind as possible, reserving tense effort for real emergencies. "Fatigue products," if too frequently produced, will cause injury to the body, perhaps by lowering resistance. Any person, experiencing a feeling of exhaustion after concentrated mental work, should exercise vigorously to start circulation so that the "fatigue products" may be carried away from the tissues and eventually be disposed of.

The relation of clothing to the amount of food needed. How can clothing have any effect on the amount of food required? As has previously been stated, heat is produced in the body in proportion to the energy used. By means of a self-regulating system only enough of this heat remains in the body to keep it at uniform temperature. Any excess is given off chiefly through the skin by means of perspiration, and through the lungs in moisture exhaled.

In the summer we are seldom concerned about conserving any of this excess heat, but in winter it is a necessity. Nature helps to conserve the heat on very cold days by causing the blood vessels near the surface to contract under the influence of cold, thus preventing the warm blood from coming to the surface where it would give up its heat to the outside air. This provision of nature is not sufficient protection in cold weather, and if we are wise we wear warm clothing to keep the outside air from absorbing heat; but if the clothing is not warm enough to prevent heat from escaping, the surface is chilled, the nerves in the skin telegraph to the muscles that more heat is needed, and the muscles begin to work to produce heat. If the work which the muscles do for the sole purpose of producing heat is vigorous enough to be apparent it is called shivering, but however slight it may be, it makes the body do extra work, for which extra food is needed. This energy has been produced either from food just eaten, or from a reserve source of energy in the tissues, or from the tissues themselves.

A reserve supply will protect the tissues so long as the reserve lasts. If there is no reserve, then the tissues will be burned to produce the energy, and this is expensive as well as dangerous. If not replaced there is a loss of weight, and the way is opened for disease to gain a foothold. Whether the reserve or the tissues have been used the loss should be made good by eating more food.

Food eaten to keep one warm, where warm clothing should have been used, is wastefully consumed, and any waste of food when so many people are suffering, even starving because of a lack of it, is unjustifiable.

Our judgment should rule our pride so that we will not be tempted to wear too thin clothing in cold weather and thereby increase our need for food, or cause us to use reserve energy.

REFERENCES

Feeding the Family, Chapter III, pages 46, 51, 54, 55, 74, 75, 76; Chapter X. Rose, Mary S. Macmillan Company.

Food and Health, Chapter II, Lessons 1, 2, 3, and 7. Kinne and Cooley. Macmillan Company.

CHAPTER IV

FATS, CARBOHYDRATES, AND PROTEINS IN FOODS

Of all the food we eat, the lion's share is burned to produce energy; yet the person who chooses a food for its energy alone is like the man or woman who chooses a house with a huge furnace regardless of the strength of the walls of the house that help to keep out the cold, or of the number of windows that let in air and sunshine. Just as it is not safe to judge all the qualities of a house by a single, very desirable one, neither is it safe to assume that the remaining requirements of the body will be supplied by food providing sufficient energy. There is only one way in which we may be sure that all the needs of the body will be provided in adequate amounts, and that is by planning intelligently.

We know that foods contain fats, carbohydrates (sugars, starch, and cellulose), proteins, mineral elements, and substances called vitamines. Of these foodstuffs, fats, carbohydrates, and proteins are the ones to be considered in this chapter.

FATS AND CARBOHYDRATES

Sources of Fats and Carbohydrates

Fats. It is needless to mention the more common foods valuable for fat, such as butter, lard, fat meat, oil, and cream, but perhaps it is not so generally known that when we eat cheese, milk, eggs, oatmeal, olives, and nuts we get considerable fat from them. Table XVI gives the number of grams of fat in the 100-Calorie portions of the various foods.

TABLE XVI. — GRAMS OF FAT AND CARBOHYDRATE IN THE 100-CALORIE PORTION OF EACH OF THE COMMON FOODS. (Arranged from Rose's *Laboratory Manual of Dietetics.*)

SUGARS AND GRAIN PRODUCTS	Grams of		FRUITS	Grams of		VEGETABLES	Grams of		MILK, NUTS, FISH, EGGS, CHEESE, MEAT, FATS	Grams of	
	Fat	Carbohydrate		Fat	Carbohydrate		Fat	Carbohydrate		Fat	Carbohydrate
Sugars			Apples	0.6	22.9	Asparagus	0.9	14.9	Milk		
Honey		24.9	Apricots	0.4	22.5	Beans, white	0.5	17.3	Con'd, sweet	2.5	16.8
Maple sirup		25.0	Bananas	0.6	22.3	Beans, limas	0.4	18.9	Skimmed	0.8	13.9
Molasses		24.2	Blackberries	1.7	18.9	Beans, string	0.9	17.8	Buttermilk	1.4	13.4
Sugar		25.0	Blueberries	1.0	21.7	Beets	0.3	20.9	Whole	5.8	7.2
Grain Products			Cantaloupes		23.5	Cabbage	0.8	18.1	Con'd, unsweetened	5.6	6.7
Barley	0.3	21.8	Cherries	1.1	21.4	Carrots	0.6	21.1	Nuts		
Bread (avg.)	0.5	20.4	Currants	0.5	23.1	Cauliflower	1.6	15.4	Almonds	8.5	2.7
Cornmeal	0.5	21.2	Dates	0.8	22.6	Celery	0.7	17.5	Coconut	8.6	4.7
Farina	0.4	21.1	Figs	0.1	23.4	Chard	1.6	13.1	Chestnuts	2.2	17.3
Flour (avg.)	0.4	21.2	Grapes	1.7	19.9	Corn	1.2	19.4	Filberts	9.3	1.8
Hominy	0.2	22.3	Lemons	1.6	19.1	Cucumbers	1.3	17.3	Peanuts	7.0	4.5
Macaroni	0.3	20.7	Olives	9.2	3.9	Dandelions	1.6	17.4	Pecans	9.6	2.1
Oatmeal	1.8	16.7	Oranges	0.3	22.8	Egg-plants	1.1	18.3	Walnuts	9.1	1.9
Rice	0.1	22.5	Peaches	0.3	22.9	Kohlrabi	0.3	17.8	Fish, lean	0.7	
Shredded wheat	0.5	20.6	Pears	0.7	22.5	Lentils	0.3	17.0	Fish, oily	5.0	
			Pineapples	0.7	22.5	Lettuce	1.3	15.8	Eggs	7.1	
			Plums		23.9	Onions	0.7	20.3	Cheese (Am.)	8.2	0.1
			Prunes		21.3	Parsnips	0.8	20.1	Meat, lean	5.0	
			Raisins	1.0	22.1	Peas	0.3	17.4	Meat, fat	11.0	
			Raspberries	1.5	19.1	Peppers, green	0.4	19.2	Fats		
			Strawberries	1.6	18.9	Potatoes, sweet	0.6	22.2	Bacon	10.4	
			Watermelons	0.8	21.6	Potatoes, white	0.2	22.0	Butter	11.1	
						Pumpkins	0.8	19.6	Cream, 18%	9.5	2.3
						Radishes	0.5	19.5	Cream, 40%	10.5	0.8
						Rhubarb	2.9	15.7	Lard	11.1	
						Spinach	1.3	13.4	Oils	11.1	
						Squash	0.9	19.9	Pork, salt	11.0	
						Tomatoes	1.8	17.1			
						Turnips	0.4	20.9			

According to average figures fruits, vegetables, and grain products in general contain less than 1 per cent by weight of fat: oatmeal and olives are the exception to the rule, with 7 and 20 per cent respectively. Lard and oils are 100 per cent fat, while butter has only 85 per cent. From 50 to 60 per cent of most nuts is fat, with the exception of peanuts, which have only 38 per cent, and chestnuts, which have only

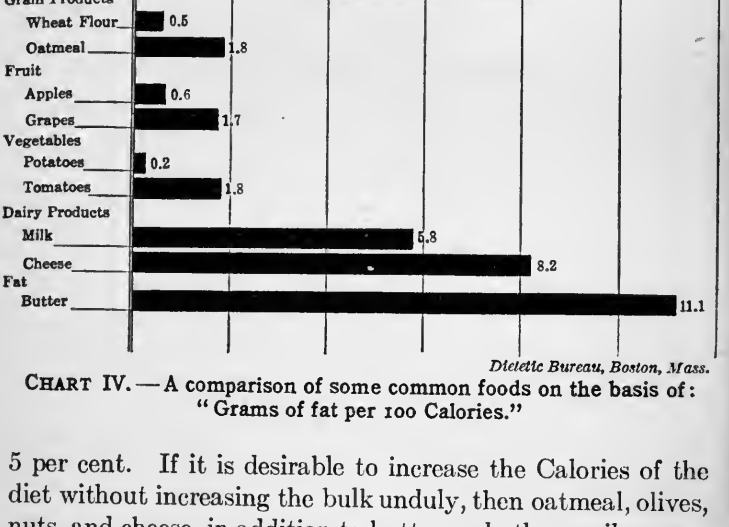


CHART IV. — A comparison of some common foods on the basis of: "Grams of fat per 100 Calories."

5 per cent. If it is desirable to increase the Calories of the diet without increasing the bulk unduly, then oatmeal, olives, nuts, and cheese, in addition to butter and other easily recognized fatty foods, may be used effectively.

Chart IV shows the comparative richness in fat of the various types of foods. It contains one or two representative foods from the grain products, vegetables, fruits, dairy products, and fats.

Carbohydrates. Carbohydrates are found chiefly in foods of vegetable origin such as grain products, vegetables,

and fruit, although sugar is also found in milk. With few exceptions the foods rich in fats have little carbohydrate, while those with a large amount of carbohydrate contain only a small amount of fat. This relationship is brought out more clearly in Chart V, where the foods represented in Chart IV are given with the carbohydrate content per 100 Calories.

Milk contains one of the most easily digested carbohydrates in the form of lactose or the sugar of milk. This sugar, with

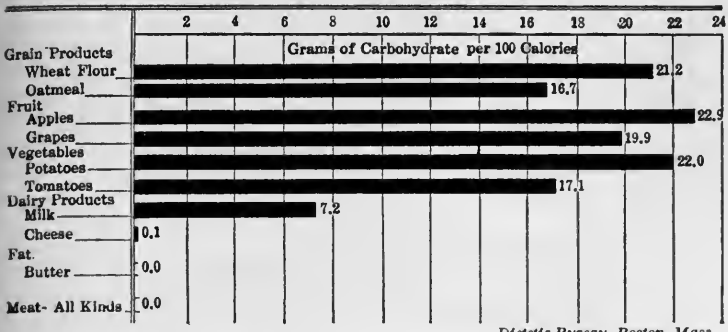


CHART V. — A comparison of some common foods on the basis of: "Grams of carbohydrate per 100 Calories."

the fat in the milk, provides energy for the infant during the first year of life before he is able to digest any other kind of nourishment.

Cane sugar, maple sugar, maple sirup, molasses, and honey are the foods ordinarily considered as important sources of sugar for older children and adults, but there is also a valuable supply in some other foods such as dates, raisins, and prunes among the fruits, and beets, green peas, carrots, sweet corn, sweet potatoes, and squash among the vegetables. Sugars are soluble in water and hence cannot be seen in moist fruits and vegetables, but when fruits are

dried sugar is frequently seen in small lumps, especially in raisins.

By the use of dried fruits it is quite practicable to increase the Calories by several hundred without noticeably increasing the bulk, and the sugar thus obtained is in a dilute and harmless form. Although most vegetables are not very rich in sugar and cannot be relied upon to provide much energy, they introduce other qualities very essential to health.

Starch is usually the chief source of energy after the first year of life. It is digested and absorbed much more slowly than sugar and can thus be disposed of as absorbed. It occurs in largest amounts in all grain products such as cereals and flour, rice, barley, and macaroni. It should furnish about one third of the energy of growing children after the second year.

Of the common vegetables the richest in starch are corn, potatoes (both white and sweet), dry peas, and dry beans. Animal products such as eggs, milk, and meat contain no starch, and there is very little starch in fruits.

Cellulose is the fibrous material holding the food constituents of grain products, vegetables, and fruits in shape. If a potato is grated, the grated material put into a piece of cheese cloth, and the mass thoroughly washed in a bowl of cold water, the bulky, fibrous residue in the cloth is chiefly cellulose. The white material that settles to the bottom of the bowl is starch. Cellulose and starch with water form the bulk of the material in vegetables and fruits, though they are by no means the only important constituents.

Uses of Fats and Carbohydrates

Fats and carbohydrates are more generally thought of as fuels and as such were considered in Chapter III, but

they have other important uses also, some of which can be supplied to the body in no other way.

Cellulose provides bulk. So far as we know cellulose is not digested in the human digestive tract. For this reason it can be used neither for fuel nor for growth, yet it plays a very important part in health. It gives bulk to the food, thus stimulating the intestines to greater activity in eliminating the undigested residue and other waste products that have accumulated.

Some fats have a growth-stimulating quality. Most animal fats, especially milk fat, have dissolved in them a substance which has just recently been discovered and recognized as essential in growth. This substance is one of the so-called vitamines. Children cannot grow without it, and adults need it in the repair work which goes on daily in their tissues.

Fat protects nerves and vital organs. Adipose tissue is built chiefly from fats and carbohydrates. While we all desire a moderate amount of fatty tissue for the sake of appearance, it is also necessary for the protection of other tissues, such as the nerves, muscles, and vital organs, and helps to hold the latter in position.

Fat serves as a reserve supply of fuel. A moderate amount of fat serves as a storehouse of energy which may be called upon in an emergency, as in the case of the two girls referred to in Chapter III. They had not eaten enough breakfast to provide extra fuel for an unexpected walk of five miles. It is neither necessary nor advisable, however, to have a very large surplus of fatty tissue. Too much fat means an extra burden for the heart and other organs, which results in discomfort, inefficiency, and waste of energy. One has only to watch the very fat man or woman, hurrying to catch a passing car or struggling up a pair of stairs, to realize one of the very apparent disadvantages of a burden of fat and the extra work it entails.

The Amount of Fat and Carbohydrate Needed

While fats and carbohydrates should occupy a prominent place in the normal, properly balanced diet, it is well to avoid eating an excess, since an amount over and above what is needed for daily use may be built up into excessive fatty tissue, or be the cause of digestive disturbances. Then, too, foods containing the most concentrated forms of fats as well as sugars do not in general contain much else in the way of nourishment, and if a large proportion of the energy is derived from these foods there is danger that the other foodstuffs will be deficient.

Fats. There is a limit to the amount of fat with which the human digestive tract can cope without difficulty, consequently there is a limit to the amount the diet should contain. Fat is digested slowly, and in its slow digestion it sometimes hinders the digestion of other foods, and this in turn may cause a variety of ills.

Although the amount of fat in the diet will vary with the individual's own ability to take care of it, the minimum allowance estimated by scientists is between two and three ounces (57 to 85 grams) a day. If boys and girls get at least this amount from such foods as butter and its substitutes, cream, bacon, fat meat, and oils, additional amounts from other foods will provide a margin of safety without overtaxing the digestive system.

Carbohydrates. Sugar when taken in too great quantity may ferment before it can be absorbed and may thus cause digestive disturbances; besides, sugar itself in concentrated form is directly irritating to the stomach. The use of much sugar is also a bad habit because it tends to make foods that are really more important because they contain mineral elements and vitamines, seem less attractive. It is well to limit the amount of sugar to two or three tablespoonsful

a day *at the most* (preferably less), this amount used preferably diluted, as in cocoa, on cooked fruit, and in simple desserts. If any concentrated sugar is eaten, it should be taken at the end of a meal, but never early in the meal or between two meals, as it takes away the appetite for the more substantial foods.

It is much safer to obtain the major part of one's energy from starchy foods, particularly from those containing considerable amounts of the other essential materials, such as protein, mineral elements, and vitamines. The diet, especially of growing children, needs to contain a generous amount of cereals, of bread, and of other grain products, so that the energy received daily may be sufficient to protect the body tissues. Many children are underweight because they play so hard that they need more energy than the food eaten can supply. Then they have to burn body tissue to get the remaining energy needed. This is as unwise as the person who is continually going into debt for the sake of having a good time. Such children should either eat more or play less vigorously.

PROBLEMS

25. To compare the fat content of various foods:

Calculate the amount of each of the following foods necessary to give two ounces (56.7 grams) of fat.

Butter	Cream (18%)	Milk	Olives	Olive Oil
Peanuts	Almonds	Eggs	Apples	Rice
Potatoes	White flour	Lean beef	Medium fat beef	Sugar

(Consult Tables IV, V, VI, VIII, VIII, IX, and XVI.) How much energy does each of these amounts represent? Which of these foods needs to be supplemented with more fat?

26. Plan an 800-Calorie meal containing one ounce of fat. How does this quantity of fat compare with the amount of fat you usually eat at one meal?

27. Arrange a meal for yourself in which one third of the energy will be supplied by cereals and breadstuffs.

28. Prepare and calculate the amount of energy in one pound of fudge. Cut it into pieces one inch thick and one inch square and estimate the energy in one piece. To how many pieces should you limit yourself in one day? When is the the best time to eat it?

29. To compare the economic value of various foods as sources of energy:

How much would it cost to get one-third of the energy you need in one day from each of the following foods?

Lean Beef	Eggs	Milk	Dry Beans
Butter	Cream (18%)		Olive Oil
Bread	Macaroni		Cornmeal

(Calculate the cost at current prices.)

PROTEINS

Use of proteins. Years ago people had the impression that protein was paramount in importance in the strength-giving qualities of food. It was found to be in every living cell, both animal and vegetable. For a long time scientists thought it was the source of life, but the more they experimented the more they realized that protein was only one of several essentials. Little by little they discovered the value of both the mineral elements and the vitamines and their interresponsibility in human welfare. While no one food may be said to be more important than all others, yet it is true that protein is needed in larger quantity for growth than all the other materials that enter into body tissue.

Protein is necessary to keep young tissues growing, to keep grown tissues in repair, and to replace those wasted by disease. Growing boys and girls must have protein enough and of the right kind to help them to become healthy men and women; people who have been sick must have it to help them to get back their strength; all need it to keep

up their strength. But the protein must always be accompanied by a proper amount of other foodstuffs to make it of most value.

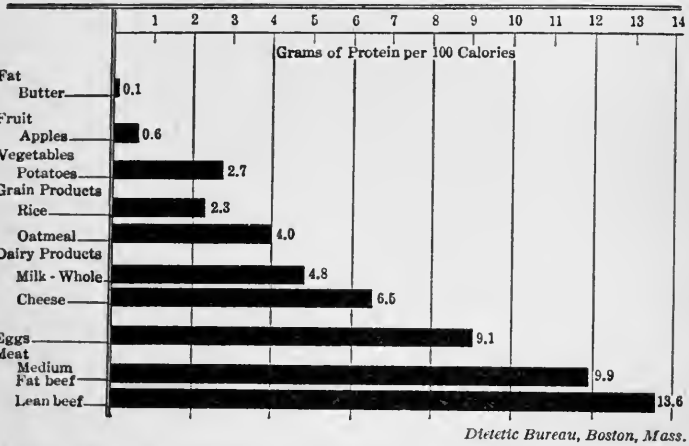
Protein may be burned to produce energy, but to use much of it for fuel is like burning the walls of the house to heat the rooms. There should be enough fat and carbohydrate in the diet so that the body will not have to burn protein as fuel. Protein foods are usually expensive, hence it is extravagant to use them for fuel when fats and starch may do the same work at much less cost.

Where do we find proteins? Protein is found naturally in every food that grows, some foods being very rich in it and some foods having so little that the protein content is almost negligible. Some foods like white sugar have had all protein removed by artificial refining processes. Table XVII gives a general idea of the relative amount of protein in the various common foods. The foods are grouped according to type and arranged in the order of the amount in each food, the upper groups containing those in which protein is most abundant, while the lowest groups are made up of those foods having least protein. Chart VI represents graphically the relative protein content of some common foods.

We find in general for every 100 Calories that the protein is highest in animal products and lowest in fruits, fats, and sugars. If we were told to increase the protein content of a child's diet, we should add such foods as are found in the column headed "Milk, Eggs, Cheese, Meat, and Fish."

Relative value of proteins. All proteins are not equally valuable any more than all foods have the same food value. Of two foods containing the same amount of protein, one may do much better service than the other. The most complete proteins serve for growth, for repairing, and for keeping up the strength of a healthy individual.

Each protein is made up of a large number of smaller parts called amino acids, some of which have such an influence on growth, that growth is interfered with when foods containing these particular acids are not in the diet. Those foods that do not contain the best type of protein are by no means useless, however, as it takes a comparatively small amount of the best kind of protein in connec-



Dietetic Bureau, Boston, Mass.

CHART VI. — A comparison of some common foods on the basis of: "Grams of protein per 100 Calories."

tion with those that are less effective to make the latter very useful.

At present it is not known just how all the various proteins do compare with one another in their ability to build tissues and to keep up the strength of those already grown, but it is known to be very desirable to safeguard the health of every individual by including in his diet at least a small amount of protein from some animal source, such as milk (preferably), eggs, meat, or fish. With this small amount

of protein from some animal product the bulk of the protein may be from cereals and vegetables.

Amount of protein required per day. There has been a great deal of work done by scientists to find out how much protein a person needs in his food each day. These experiments, made with different people, have given results so similar that it seems safe to assume that the average may be used as a guide in estimating the amount required by any individual under normal conditions.

The amount stated as adequate to maintain the health and strength of an adult with a liberal margin for safety is 0.5 gram of protein for every pound of body weight,[1] or 70 grams for a person weighing 154 pounds. This 0.5 gram does not provide for growth, for which an extra allowance must be made. The amount of protein required by children varies from one and one half to two grams per pound of body weight for very young children and gradually decreases with an increase in age to 0.5 grams for an adult. To calculate protein requirement of children according to weight is difficult. A better and perhaps more reliable way of determining the protein needed by children is to allow at least 25 grams of protein in every 1000 Calories.

The amount may vary somewhat with the kind of protein, and may be influenced by the quantity of other foodstuffs in the diet. It is considered best to have some protein from animal source; and there must be an adequate amount of each of the other foodstuffs, such as mineral elements and vitamines.

Contrary to a very common idea, the amount of protein needed will not vary with the kind of work being done. The studious boy or girl will need as much protein as the one who enters vigorously into athletics, provided the two are of the same age and weight. The athlete will require more

[1] See Sherman's *Chemistry of Food and Nutrition*, Revised.

energy than the "student" but not necessarily more protein.

In making any accurate dietary calculations it is necessary to have accurate figures. The exact amount of the number of grams of protein in the 100-Calorie portion of each of the common foods is given in Table I in Appendix B. (The amount needed for the work of the body is always expressed in grams to avoid speaking of inconveniently small fractions such as a hundredth part of an ounce.)

PROBLEMS

30. To find the daily protein requirement for your family:

    Calculate according to your Calorie requirement your own protein requirement. How much energy will this supply? How much energy must be supplied by fats and carbohydrates? Does protein supply about 10 to 13 per cent of the total calories?

    Calculate the amount of protein needed by each of the other members of your family (by weight if possible).

31. If a boy needs three ounces of protein a day, how much lean beef would be necessary to supply it? How much milk would supply the same amount of protein? How much white bread? How many beans (measured dry)? How much cabbage or other green vegetable?

    Calculate the difference in cost of the amount of each of these foods necessary to supply the three ounces of protein. Is the cost of a food always an indication of its value?

32. How much milk would you have to drink in a day to get all the protein you need? How much cheese would you have to eat? How much white bread? How many beans (measured dry)? How much lettuce?

33. Analyze the meals planned under Problem 27, to find whether or not the protein is adequate. Make any changes necessary to make them adequate, and prepare one of the meals in class.

    Calculate the cost. Compare the cost of the high and low protein meals of the various members of the class.

TABLE XVII. — FOODS GROUPED AND LISTED IN THE ORDER OF THE AMOUNT OF PROTEIN (IN GRAMS) IN THE 100-CALORIE PORTION OF EACH FOOD. (Arranged from tables in Sherman's *Chemistry of Food and Nutrition.*)

Keep in mind the size of the 100-Calorie portion of these foods.

	VEGETABLES	FRUITS	MEAT, FISH, MILK, EGGS, CHEESE, NUTS	GRAIN PRODUCTS	FATS, SUGARS
Over 10 grams .			Fish (lean), clams, veal, oysters, beef (lean)		
5–10 grams . .	Spinach, chard, asparagus, lentils, brussel sprouts, peas, kohlrabi, shell beans, lettuce, cauliflower, string beans, cabbage		Milk (skimmed), eggs, pork (lean), fowl, buttermilk, beef (med. fat), lamb, mutton, cheese		
3–5 grams . .	Cucumbers, peppers (green), radishes, egg plant, tomatoes, dandelions, pumpkin, beets, onions, turnips, corn, squash		Milk, whole, fresh, dried, or condensed (unsweetened), peanuts, pork (fat), cocoa, almonds	Oatmeal, entire wheat bread, entire wheat flour, graham flour, macaroni, shredded wheat, rye bread, white bread, graham bread, white flour, farina	
1–3 grams . .	Potatoes, rhubarb, parsnips, carrots, celery	Currants (fresh), raspberries, strawberries, blackberries, lemons, apricots, peaches, oranges, cantaloupe, figs, grapes, bananas, watermelon, plums, grapefruit, cherries, pears	Milk, condensed (sweetened), chestnuts, walnuts, hazelnuts, chocolate, pecans, coconut	Boston brown bread, cornmeal, crackers (soda), hominy, rice (white), rye flour, buckwheat flour	Bacon, Cream, 18%
Below 1 gram .		Cranberries, pineapple, blueberries, currants (dry), raisins, prunes, apples, dates, olives		Tapioca	Molasses, butter, honey, maple sirup Cream, 40%

REFERENCES

An Adequate Diet, Stiles, P. G., Harvard University Press.

Food Products, Chapter I. Sherman, H. C. Macmillan Company.

Fundamental Basis of Nutrition, Chapter III. Lusk, Graham. Yale University Press.

CHAPTER V

MINERAL ELEMENTS AND VITAMINES

Mineral Elements

What is meant by mineral elements? We are familiar with the residue or ash left from the burning of wood. When any kind of food except oils, pure fats, pure starch, or sugar is burned there is a similar residue left, which is also ash. This ash is made up of several different substances, each of which in turn is made up of two or more elements from the mineral kingdom.

These mineral elements will not burn inside the body any more than they will burn outside the body, hence they are not used as fuel. They are in part held in solution, which admits of their being carried to every part of the body, and in part they are deposited as the hard matter of bones and teeth.

There are twelve of these mineral elements in foods. Some foods are valuable for one, some are valuable for another, and some are valuable for several; but very few foods are equally valuable for all of them. Hence we need a variety of foods to make sure that we get all of the twelve mineral elements in the quantities needed. Since it has been found that the diet of a family is sometimes deficient in phosphorus, calcium, and iron, three of the most important mineral elements, these should be especially considered in the planning of meals.

Uses of mineral elements. Some of the mineral elements enter into the building of tissues, and some of them are

dissolved in the blood and tissues, where they help to control and to regulate body processes. They make breathing and digestion possible, they help to determine steadiness of

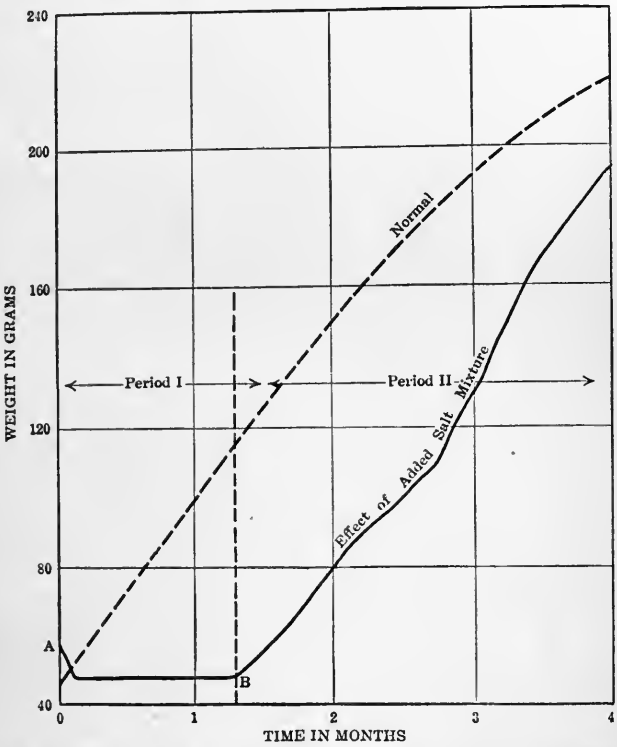


FIGURE 1. — Effect upon growth of the addition to a diet otherwise adequate, of a salt mixture of such composition as to make the composition of the total ash similar to that of milk. *Courtesy of* Dr. E. V. McCollum.

nerve, they keep the blood in good condition, they enable the food to be burned to yield energy, and they are responsible for the contraction and relaxation of the muscles. Life would cease to exist without the mineral elements.

Figure 1 shows what happened to some rats that were fed on a diet without proper minerals. From A to B there were not enough of certain mineral elements in the diet and no growth. At B mineral elements were added and the animals then grew normally. Figure 2 shows the effect of a diet, good in all other respects and giving some minerals but

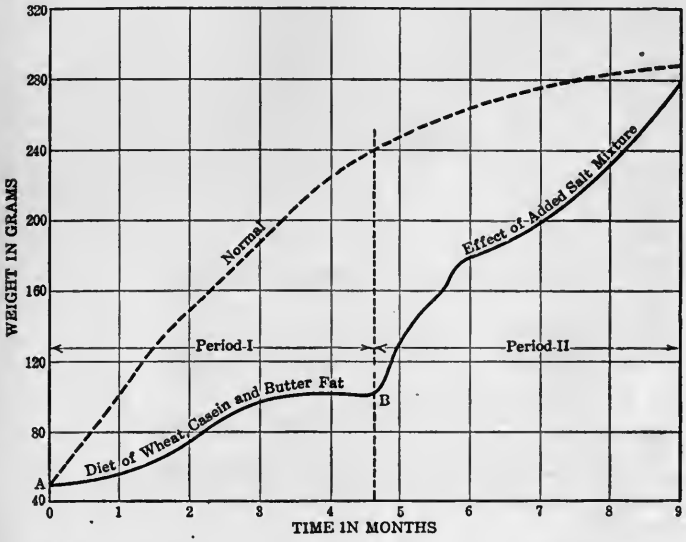


FIGURE 2.—Growth at much less than half the normal rate through the greater part of the normal growth period, followed by accelerated growth upon adding a suitable salt mixture to the diet. *Courtesy of* Dr. E. V. McCollum.

not enough of the right kind. At B the mineral content of the diet was made adequate and growth was normal. Many boys and girls are perhaps underweight because they are not getting the right kind and amount of some of the mineral elements.

Iron helps to make good, red blood. It is also in a sense the " key " with which the energy is released from food. The

food then should contain plenty of iron to make the energy available.

Calcium and phosphorus make up the bulk of the bones and the teeth. Day by day, from infancy to the end of the growing period, the bones and teeth are gradually built up from these substances, which are taken into the body in food.

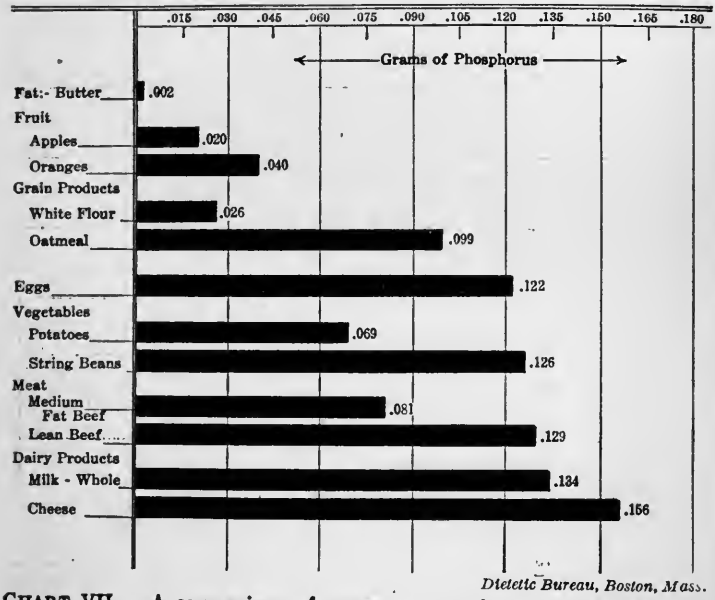


CHART VII. — A comparison of some common foods on the basis of: "Grams of phosphorus per 100 Calories."

Because of the very apparent increase in the size of these tissues it is easy to see why these elements are sometimes called "building materials." Other uses of mineral elements have been mentioned on pages 8 and 59.

Amounts of calcium, phosphorus, and iron needed each day. The usual mental picture of starvation is that of complete or partial deprivation of food in general, but it is

quite possible to eat a large amount of food and still suffer from starvation. We may have an insufficient amount of iron and suffer from iron starvation which may show itself in anæmia; there may be calcium starvation which in young children will result in stunted growth and weakness (perhaps rickets), or in adults in a complication of ills. A doctor's prescription containing iron, phosphorus, or calcium is an indication that there has been a deficiency of that element in the diet. The boy referred to on page 13, Chapter I, was being starved, not because he was not eating enough but because he was not getting all the mineral elements needed for growth.

If there is to be harmony within the human mechanism it is obviously important that all the factors essential to its well-being be present in proper amounts to perform their various duties.

Each day as the work of the body is performed under the influence of these various elements, there is used up and excreted through the kidneys and intestines a certain amount of each element. This loss must be replenished by food so that the amount required to do the work in the body may be kept up to normal. Experiments indicate that the amount of each element required daily by an adult is as follows:[1]

Phosphorus	0.01 gram per pound of body weight
Calcium	0.0045 gram per pound of body weight
Iron	0.0001 gram per pound of body weight

Then the food of an average man weighing 154 pounds should supply daily, 1.54 grams of phosphorus, 0.69 gram of calcium, and 0.015 gram of iron. Like the protein the amount of these elements does not vary with occupation. A man digging ditches needs no more of them than the man who sits in an office, provided the two are of the same weight.

[1] Sherman's *Chemistry of Food and Nutrition.*

While the exact amount of each of these elements required for growth has not been determined, all evidence available would seem to indicate that the diet of the child should contain considerably more in proportion to the weight of the child than that of an adult. The more satisfactory method of calculating the amount of mineral elements needed by children is to base it on the Calorie requirement as follows:[1]

Phosphorus	0.48 gram or more per 1000 Calories
Calcium	0.25 gram or more per 1000 Calories
Iron	0.005 gram or more per 1000 Calories

A boy ten years of age and requiring 2000 Calories should have food supplying 1.0 gram or more of phosphorus, 0.50 gram or more of calcium, and 0.010 gram or more of iron.

PROBLEM

34. Calculate the amount of phosphorus, calcium, and iron needed daily by each member of your family. What is the total amount of each required by your family?

Frequently where people are unmindful of the planning of the diet so as to obtain these elements in sufficient amounts, they become conscious of serious results after it is too late to remedy them. A study of the food in 100 families where there had been no training in food values showed a deficiency of one or more of the important mineral elements in about half the instances. This meant that these people were not as well nourished as they should have been. Is it not significant that the number of underweight children in the schools compares very closely with these figures? The welfare of the future citizen is enough to justify the short time it will take to acquaint one's self with the foods necessary to supply these elements.

[1] Sherman's *Chemistry of Food and Nutrition.*

Foods valuable for mineral elements. In general, vegetables, fruits, and milk are the chief sources of mineral elements; but there are other foods especially valuable for some one particular element. Milk is the only food that supplies calcium in large enough quantities to insure an adequate supply to the body. Eggs are valuable for iron and phosphorus, grains from which the outer coating has not

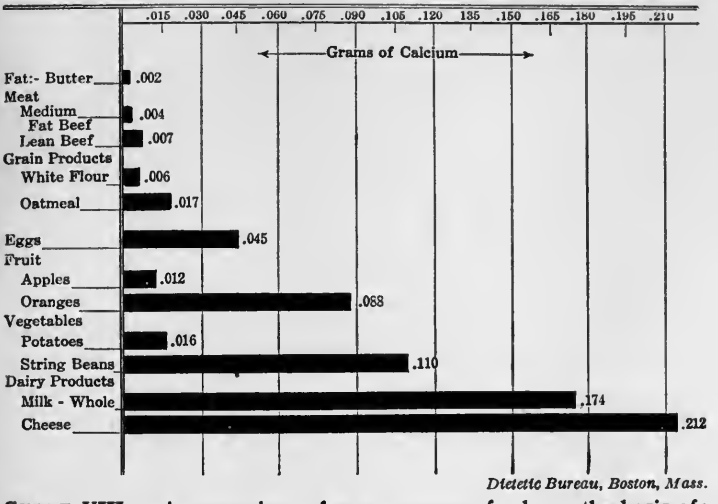


CHART VIII. — A comparison of some common foods on the basis of: "Grams of calcium per 100 Calories."

been removed are rich in mineral elements and are to be recommended above the more refined grain products. Sugars and fats are noticeably deficient in minerals.

By studying Tables XVIII, XIX, and XX, one may become so familiar with the relative value of the common foods for phosphorus, calcium, and iron that it will be comparatively easy to include in the diet such foods as will insure a sufficient amount of each of them.

TABLE XVIII. — FOODS GROUPED AND LISTED IN THE ORDER OF THE AMOUNT OF PHOSPHORUS (IN GRAMS) IN THE 100-CALORIE PORTIONS OF EACH FOOD. (Arranged from tables in Sherman's *Chemistry of Food and Nutrition.*)

	VEGETABLES	FRUITS	MEAT, FISH, MILK, EGGS, CHEESE, NUTS	GRAIN PRODUCTS	FATS, SUGARS
Above 0.2 gram	Brussels sprouts, spinach, pumpkin, lettuce, celery, cauliflower		Oysters, clams (long), fish (lean), buttermilk, milk (skimmed, fresh, or dried)	Cottonseed meal	
0.1–0.2 gram	Cucumbers, kohlrabi, asparagus, peppers (green), beans (white), rhubarb, string beans, lentils, eggplant, peas, dandelions, parsnips, turnips, tomatoes, chard, corn, carrots		Cheese, veal, fish (oily), milk (con'd — unsweetened), cocoa, milk (fresh — whole), beef (lean), eggs, clams (round)	Graham flour	
0.05–0.1 gram	Radishes, beans (lima), onions, cabbage, beets, potatoes (white), squash	Raspberries, strawberries, currants, pineapple, blackberries, peaches	Pork (lean), fowl, beef (med. fat), chocolate, milk (con'd — sweetened), almonds, peanuts, lamb, mutton, hazelnuts, pecans	Oatmeal, shredded wheat, Boston brown bread, graham bread, rye flour, entire wheat bread, entire wheat flour, buckwheat flour, rice (brown), rye head, corn meal	
0.01–0.05 gram	Potatoes (sweet)	Lemons, apricots, pears, oranges, cherries, cantaloupe, plums, raisins, figs, grapefruit, prunes, grapes, bananas, cranberries, apples, dates, blackberries, watermelon	Pork (fat), chestnuts, coconut, walnuts	Macaroni, white bread, farina, hominy, rice (white), white flour, crackers (soda), tapioca	Cream, bacon, molasses
0.001–0.01 gram		Olives			Honey, maple sirup, butter

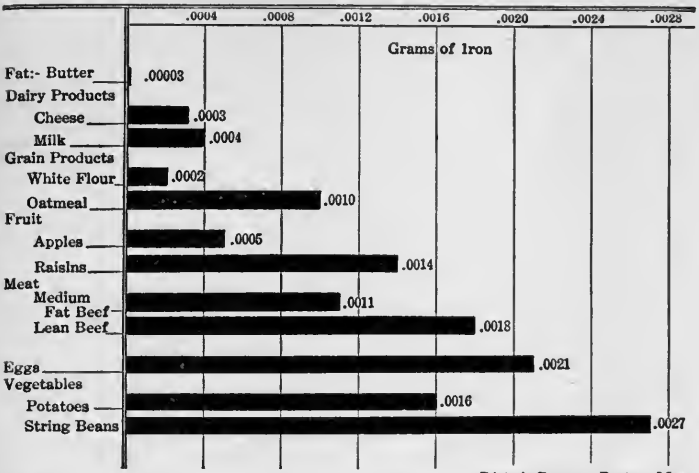
TABLE XIX. — FOODS GROUPED ACCORDING TO THE AMOUNT OF CALCIUM (IN GRAMS) IN THE 100-CALORIE PORTION OF EACH FOOD. (Arranged from tables in Sherman's *Chemistry of Food and Nutrition*.) FOODS ARE LISTED IN THE ORDER OF AMOUNT CONTAINED.

	VEGETABLES	FRUITS	MEAT, FISH, MILK, EGGS, CHEESE, NUTS	GRAIN PRODUCTS	FATS, SUGARS
Over 0.3 gram	Celery, cauliflower, chard		Milk (skimmed, fresh, or dried)		
0.1–0.3 gram	Spinach, kohlrabi, lettuce, rhubarb, dandelions, turnips, cabbages, carrots, asparagus, string beans	Strawberries	Buttermilk, clams, cheese, milk (con'd—unsweetened), milk (whole), oysters		
0.05–0.1 gram	Parsnips, cucumbers, pumpkin, Brussels sprouts, radishes, onions, beets, tomatoes	Oranges, lemons, raspberries, figs	Milk (sweetened—con'd)	Cottonseed meal, Boston brown bread	Molasses, cream (18%)
0.025–0.05 gram	Beans (white), eggplant, squash, peppers (green), lentils, peas	Currants, cantaloupe, olives, pineapple, grapefruit, cranberries, peaches, watermelon, blackberries, blueberries, cherries	Eggs, fish (lean), hazelnuts, almonds		Maple sirup
0.01–0.025 gram	Beans (lima), potatoes	Pears, plums, apricots, dates, grapes, raisins, prunes, apples	Fish (oily), cocoa, chocolate, chestnuts, peanuts, walnuts, pecans	Bread (entire wheat, graham, white), oatmeal, shredded wheat, buckwheat flour, graham flour	
Below 0.01 gram	Corn	Bananas	Veal, beef, fowl, pork, lamb, mutton, coconut	Bread (rye), flour (rye, white, entire wheat), crackers (soda), farina, macaroni, corn meal, tapioca, rice, hominy	Bacon, butter, honey, sugar, lard

TABLE XX. — FOODS GROUPED AND LISTED IN THE ORDER OF THE AMOUNT OF IRON (IN GRAMS) IN THE 100-CALORIE PORTION OF EACH FOOD. (Arranged from tables in Sherman's *Chemistry of Food and Nutrition.*)

	VEGETABLES	FRUITS	MEAT, FISH, MILK, EGGS, CHEESE, NUTS	GRAIN PRODUCTS	FATS, SUGARS
Above 0.005 gram	Spinach, lettuce, chard				
0.002–0.005 gram	Asparagus, dandelions, rhubarb, cabbage, Brussels sprouts(?), string beans, celery, lentils, peppers (green), radishes, cauliflower, shell beans	Strawberries	Eggs		Molasses
0.001–0.002 gram	Kohlrabi, eggplant, tomatoes, peas, potatoes (white), beets, carrots, squash, turnips, cucumbers, onions, pumpkin	Lemons, raisins, cranberries, pineapple, blueberries, blackberries, prunes, figs, olives, watermelon	Beef, pork (lean), fowl, fish (lean), lamb	Boston brown bread, entire wheat flour, shredded wheat, graham flour, graham bread, oatmeal	Maple sirup
0.0005–0.001 gram	Parsnips, corn	Currants, dates, raspberries, cantaloupe, peaches, bananas, grapefruit, plums, apples, apricots, cherries, pears	Mutton, buttermilk, milk (skimmed), pork (fat), fish (oily), almonds, hazelnuts, cocoa	Entire wheat bread, entire wheat flour, rice (brown), tapioca	
0.0001–0.0005 gram	Potatoes (sweet)	Oranges, grapes	Milk (fresh, whole), milk (con'd), chocolate, peanuts, pecans, cheese, chestnuts, coconut, walnuts	Rye flour, white bread, rye bread, crackers (soda), buckwheat flour, corn meal, hominy, macaroni, rice (white), farina, white flour	Honey, bacon, cream, butter

Charts VII, VIII, and IX represent graphically the relative value of some of the common foods for phosphorus, calcium, and iron respectively. Phosphorus is much more generally distributed among the various types of foods, though there are wide variations in each individual group. This is particularly noticeable among the grain products. Oatmeal, with the outer coating of the grain left on, con-



Dietetic Bureau, Boston, Mass.

CHART IX. — A comparison of some common foods on the basis of: "Grams of iron per 100 Calories."

tains almost four times as much as wheat flour from which the bran has been removed.

Very few foods are valuable for calcium. Dairy products are easily "first," though all green and leafy vegetables, carrots, turnips, and parsnips are also rich in calcium. The influence of the commercial preparation of the grain is again evident in the larger amount of calcium in the oatmeal than in the more refined white flour.

Vegetables, eggs, lean meats, and dried fruits are the foods in which iron occurs most abundantly. The green and leafy vegetables are the foods most valuable for iron, and should be used freely to insure an adequate amount in the diet.

Table I in the appendix gives the average amount of each of these elements in each of the common foods and is a basis for accurate calculations.

PROBLEMS

35. To become familiar with the foods that are rich in phosphorus, calcium, and iron:

    Make a list of the foods valuable for each of these mineral elements. Record them in your notebook. Select from the list some common inexpensive foods that you are not in the habit of eating. Plan to cook and serve these foods at home. Report your experiment.

36. Plan for a girl, 14 years of age and weighing 100 pounds, a day's meals furnishing at least 1 gram of phosphorus, 0.5 gram of calcium, and 0.012 gram of iron.

    How do the amounts of mineral elements you are getting in your food correspond with these? Weigh out the foods planned (raw material).

37. If a boy weighing 100 pounds needs 1.5 grams of phosphorus a day, how much potato would supply it? How much meat? How much bread?

38. If this same boy needs 0.8 gram of calcium and 0.02 gram of iron each day, how much milk would supply the calcium? How many eggs? How many white beans? How much spinach would supply the iron? How many oranges? How much molasses?

39. Plan a day's meals consisting of a variety of foods that will supply this boy, 15 years of age and weighing 110 pounds, with a sufficient amount of phosphorus, calcium, and iron.

40. If you work moderately hard during the week, how much energy, protein, phosphorus, calcium, and iron do you need each day? If you play basket ball or tennis on some of these days, which of these requirements will be increased and why?

The Vitamines

The significance of vitamines. Only a few years ago we believed we had a perfect diet if it contained the right amount of protein, phosphorus, calcium, and iron with enough fat and carbohydrate to supply the energy to do the day's work. But when Hopkins, a prominent scientist of England, was feeding some rats on different diets he discovered in addition to these foodstuffs something else in milk which was also necessary for growth. The growth curve of these rats given in Figure 3 shows how great is the influence of this newly discovered factor. Without it, growth continues for a time, then declines, and finally ceases entirely. With a generous amount of it growth is rapid. We can then imagine that with only half enough of it children might be stunted in their growth. This substance was called vitamine by another investigator and is often so called to-day.

Later Osborne and Mendel of Yale University, and McCollum and Davis of the University of Wisconsin found that there was the same or a similar substance in butter fat, and later McCollum found this same growth-stimulating quality in the leaves of plants. After much experimenting they have discovered at least two different vitamines, with probably a third, all of which have different uses in the body. They are all known to be as essential to life as any other part of the food.

Because scientists have known for such a short time that these substances are in food and are necessary for growth and health, they have not yet had time to find out how much is needed by the body nor how much each food contains. We know that they are necessary, that some foods are more valuable for them than others, and that the health of every individual should be safeguarded by the use of foods containing them.

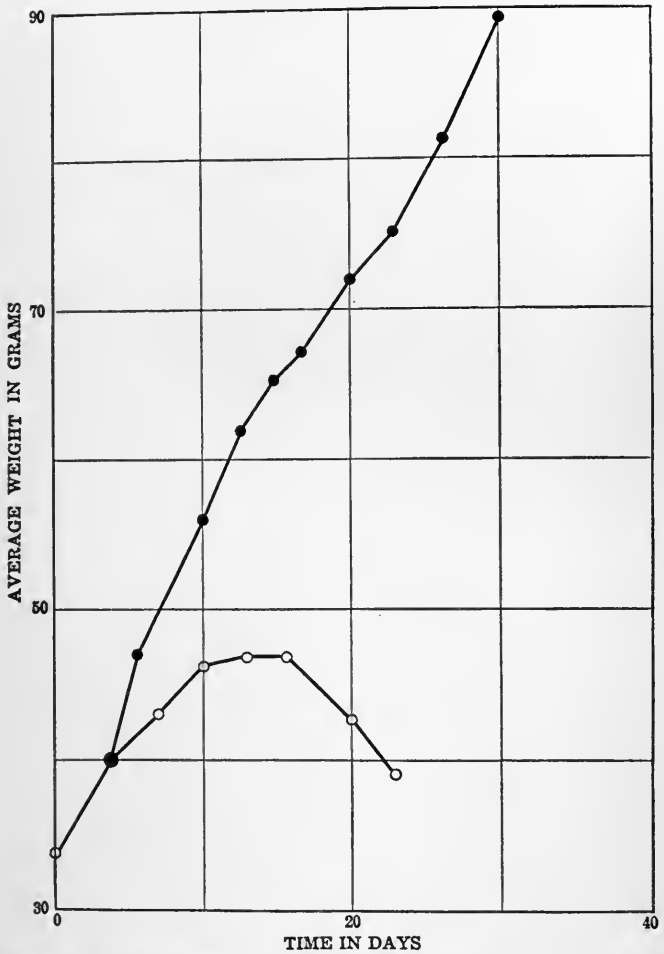


FIGURE 3. — Growth curve of rats. Lower curve, six rats on an artificial diet. Upper curve, six similar rats receiving in addition 2 c.c. of milk. *Courtesy of* Dr. F. G. Hopkins.

"**Fat soluble A.**" One of these important substances occurs dissolved in animal fats, such as milk fat, eggs, beef fat, and cod liver oil, but it is not found to any appreciable extent in vegetable oils. It is in glandular organs, such as liver and the pancreas ("sweetbreads"), and also in the leaves or the young sprouting parts of plants, such as asparagus, Brussels sprouts, cabbage, celery, kale, lettuce, spinach, and other greens. Because it may be dissolved in fat it is frequently called "fat soluble A" to distinguish it from the other vitamines. Figure 4 shows what happens when rats are fed with and without this "fat soluble A." Those receiving it in their food grew normally, while those with practically none failed to grow at all.

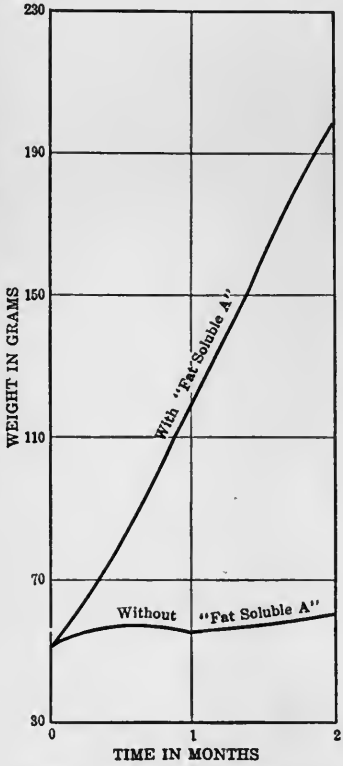


FIGURE 4.—Effect upon growth of the addition of "fat soluble A" to a diet adequate in all other respects. *Courtesy of* Dr. E. V. McCollum.

Some one of the foods containing this substance, and preferably two of them for safety, should be in the diet each day if boys and girls are to grow to be strong and healthy, if adults are to keep up their strength and resistance, or if those with tissues wasted by disease are to regain strength.

"**Water soluble B.**" The second vitamine may be dissolved in water and is often called "water soluble B."

It occurs in a larger number of foods than the vitamine soluble in fat, and because of this wider distribution there is much less danger of a deficiency of it in the diet. It is in almost all foods except white flour, white rice, new process corn meal, starch, fats, and sugars. If one ate these foods exclusively there would be danger of loss of control of the nerves with perhaps paralysis, but such a one-sided diet is unusual in this country. Nevertheless this water soluble vitamine is an important factor in food value and should be conserved.

Because of the solubility of this vitamine considerable of it may be lost if the water in which vegetables are boiled is thrown away. Whenever possible this water should be saved and used in soups and gravies.

"Water soluble C." There is probably a third vitamine necessary for growth and which protects against scurvy. It is also soluble in water and even more likely to be lost or destroyed in cooking than "water soluble B." This vitamine is called "water soluble C." Fresh fruits and vegetables are the best sources of it; fresh milk contains it in fair amounts; bread and meat contain almost none, while butter and sugar contain none at all.

Effect of heat on the vitamines. The vitamine value of a food may be destroyed or lessened by heat. Consequently the foods upon which we are dependent for these important substances should not be cooked at too high a temperature or for too long a time. At present very little definite information on this subject can be given. To be on the side of safety it is important to have in the diet each day at least one cup of unboiled milk, or some fresh fruit or vegetable, or preferably liberal amounts of both.

PROBLEM

41. Make a list of the foods valuable for their vitamine content. Classify them under the following headings, including the same food under more than one heading if necessary:

"Fat soluble A"; "Water soluble B"; "Water soluble C." Consult this list when planning meals.

What precautions should be taken in the preparation of meals so that the vitamine content will be preserved as much as possible?

Planning the Diet

It is advisable for the sake of health and for the sake of good work that the diet be planned in such a way as to contain sufficient amounts of the various food factors. The diet of adults should contain, for every pound of body weight, foodstuffs as follows:

Protein	0.5	gram or more
Phosphorus	0.01	gram or more
Calcium	0.005	gram or more
Iron	0.0001	gram or more

The diet of children should contain, for every 1000 Calories, foodstuffs as follows:

Protein	25.00	grams or more
Phosphorus	0.48	gram or more
Calcium	0.25	gram or more
Iron	0.005	gram or more

There should be enough fat and carbohydrate to supply the energy needed in addition to what the protein will supply. Care must be taken to use one, and preferably two, of the foods that contain the vitamine soluble in fat; milk with one of the leafy vegetables is a safe rule. If the other food factors, such as iron, calcium, and phosphorus, are provided in sufficient amounts, it is probable that enough of the water-soluble vitamines will also be present, but there should always be some fresh food to insure against any tendency toward scurvy.

With a general idea of the amount of each of the foodstuffs required and of a knowledge of the foods that supply them, it is possible for a student to master the art of menu making.

PROBLEM

42. Make a summary of the food requirements of the different members of your family. Find the totals.

After this discussion of the basis for the planning of meals, it would be interesting to take up the food problem of the family of each individual member of the class, but this is obviously impossible. We are, therefore, going to take a family, the Irving family, and discuss the proper food for each member of it in such a way that it should be possible for each member of the class to adapt the suggestions given to her own individual problem.

REFERENCES

Chemistry of Food and Nutrition, pages 332, 343, 344, and 345. Sherman, H. C. Macmillan Company.

Fresh Fruits and Vegetables as Conservers of other Staple Foods, Farmers' Bulletin No. 871. U. S. Department of Agriculture.

Text Book of Cookery, Division V. Greer. Allyn and Bacon.

CHAPTER VI

FEEDING THE IRVING FAMILY—LUNCHEON FOR A HIGH SCHOOL GIRL OR BOY

The Irving Family

Mrs. Irving, like many another mother, had a large family to plan meals for. There was baby Betty who was a year old. Betty was the pet of the household, good-natured, and a joy when some one was with her, but most unhappy when not receiving attention. As a result she was frequently given something to eat to keep her quiet. She was thin for her age, restless and easily disturbed when asleep, but otherwise apparently healthy.

Jack, who was three years old, was a bright, keen boy, active, excitable, and always too busy to take a nap. He bolted his food at mealtime so as to get back to his rocking horse or his ball, and was frequently seen eating sweet cakes and fruit between meals. Although usually healthy, he frequently had a cold that kept him from gaining as he should.

Dick, who was seven years old, had a weak heart and was thin for his age. Much exercise was forbidden, and he frequently had to remain at home from school to rest. He was fond of reading and was often allowed to sit up late at night to finish a story. He drank coffee, preferred his eggs fried, seldom touched milk, never ate potatoes or other vegetables, but was very fond of meat. Mrs. Irving often wondered why he was so frail, as he had been active like Jack when he was Jack's age.

Clare was ten and the only strong and healthy member of the family. She had rosy cheeks and sparkling eyes, was wide awake, and always well and happy. Although she was extremely fond of having a good time, she applied herself diligently to her lessons, mastered them in a short time, and was off to her play. She was busy all day long, but she was ready for bed by nine o'clock and slept sound till morning. She had a splendid appetite, she loved milk, she ate plenty of bread, cereals, vegetables, and fruit, but she was not so very fond of meat and often ate none at all. Neither did she care for sweets and seldom ate between meals.

Alice and Tom Irving were in the last part of the sophomore year in high school. For two years Alice, who was fourteen years old, had been at the head of her class as well as being a leader in social activities, but of late her records had not been up to standard. She was getting thin and pale, she was losing her usual charm and vivacity of manner, and was too tired to play with the other girls after school. Because her marks had been poor, every minute outside of school was devoted to the preparation of her lessons for the next day. Although she spent several more hours studying than formerly, she did not seem to accomplish as much in the same length of time.

Tom, although two years older than Alice, was in the same class. He was somewhat indifferent to his repeated failures in his class work because he was not fond of studying, but there was a "sting" in the taunts of his friends to the effect that he could no longer maintain his old athletic record. He was not only getting so stout that he found it more and more difficult to run and jump, but his strength was not increasing in proportion to his weight. He laughed good-naturedly, however, pretended not to mind, and tried to drown his disappointment in the pleasure of eating, for no one seemed to care if he did eat and grow fat and lazy.

Mrs. Irving was perplexed to know how to prepare meals to suit the needs of all six of these children. Let us see what solution to the problem she found.

Meals of Alice and Tom

She was worried about Alice and consulted a physician, who said that the girl was not sick but that she was growing rapidly and needed more food. This was hard to believe, as Alice ate frequently when she was home, she could have anything she wanted for luncheon, and she was eating at the same table with Tom, who was fifty pounds above the normal weight for boys of his age. But her mother tried to persuade her to eat more by coaxing her with sweet buns covered with jam for breakfast, with much sugar in her coffee and on her cereal, and with all kinds of expensive fruits.

Alice's luncheon. Alice's mother gave her an extra allowance with which to buy her luncheon at noon, so that she might have whatever she wanted. Since sweets and pickles appealed to her, she bought cake, a pickle, and ice cream, or an ice cream soda with a bar of chocolate, or some fruit.

After school in the afternoon, she would eat a large piece of cake, an apple or two, and occasionally a piece of candy (perhaps two or three ounces during the afternoon). As she was not very hungry at six o'clock, her dinner consisted of a moderate-sized piece of meat, a small serving of one or two vegetables (if they appealed to her), with a very large serving of some sweet dessert.

Was it any wonder that Alice was getting thin and pale, and unable to keep up her usual standard of work?

Typical meals eaten by Alice and Tom. The doctor had said that there was as much danger in eating too much of the wrong food as there was in eating too little of the right

food, and that there was as much cause for alarm in Tom's overweight and lack of energy as in Alice's underweight. As it was all a perplexing problem to Mrs. Irving, she began to watch the children to see what they were eating. The following meals are typical of those eaten by Alice and Tom day after day:

ALICE	TOM
Breakfast	
Orange Cornflakes (1 c.) Cream Roll (1) Butter ($\frac{1}{2}$ oz.) Coffee Eggs (1) Jam (3 tbsp.)	Orange Cornflakes (1 c.) Cream Rolls (4) Butter (2 oz.) Coffee Eggs (3) Bacon (4 slices)
Luncheon	
Ice cream ($\frac{1}{2}$ c.) Cakes (3) Pickles	Ice cream (1 c.) Cakes (4) Bananas (2-3)
Afternoon Luncheon	
Cake Candy Apples	Cold Meat Sandwich Apples
Supper	
Meat (3 oz.) Potatoes (1 small) Bread (1 slice) Butter ($\frac{1}{2}$ oz.) Tomatoes Apple Tapioca (1 c.)	Meat (6 oz.) Potatoes (2-3) Bread (4 slices) Butter (2 oz.) Tomatoes Apple Tapioca (1 c.)

Inadequacy of the food value of these meals. The average food value of the meals eaten by Alice and Tom is as follows:

	Calories	Protein	Calcium	Phosphorus	Iron
		grams	*grams*	*grams*	*grams*
Alice's meals . .	2200	42	0.40	0.73	0.009
Tom's meals . .	4500	120	0.65	1.63	0.022

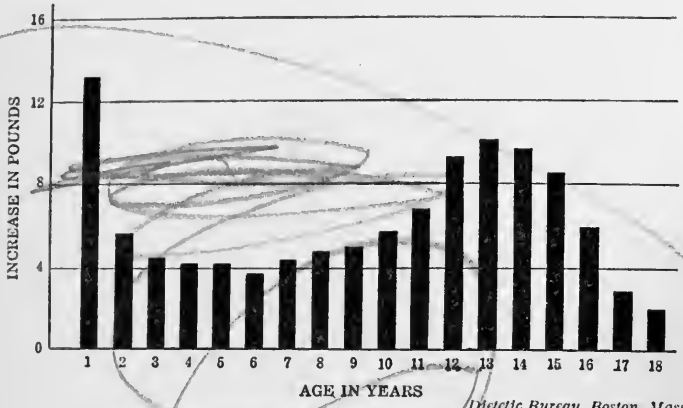
If the normal weight of a girl as old as Alice was 90 pounds and of a boy the age of Tom was 120 pounds, then each would require approximately:

	Calories	Protein	Calcium	Phosphorus	Iron
		grams	*grams*	*grams*	*grams*
Alice	2200	55	0.55	1.10	0.013
Tom	3000	75	0.75	1.50	0.018

According to these figures, Alice and Tom were not getting all the materials needed for growth, though Tom was getting much more energy than he required. Alice's food did not contain enough iron to make good red blood, and neither of them had had sufficient calcium to help in the proper regulation of the internal activities.

Alice had been eating too much sugar and white starchy foods, foods not only deficient in iron and calcium, but which take away the appetite for the foods one ought to eat. Her midday luncheon of sweets was of little value except as a source of energy, and even in this respect was not sufficient to keep her from getting tired. Oftentimes her own body tissues were burned to get enough energy for the work of the afternoon. Since candy destroyed her appetite for the six o'clock meal she did not get enough growing material to rebuild the tissues burned and consequently lost weight.

Tom had been getting too much fat and white starchy food, both of which are deficient in mineral elements. In all probability he had enough protein for building good muscles and other tissues, but the protein without the proper amount of mineral elements is as useless as are the stones of a house without cement to hold them together. The large amount of food eaten by Tom was converted into fat instead of

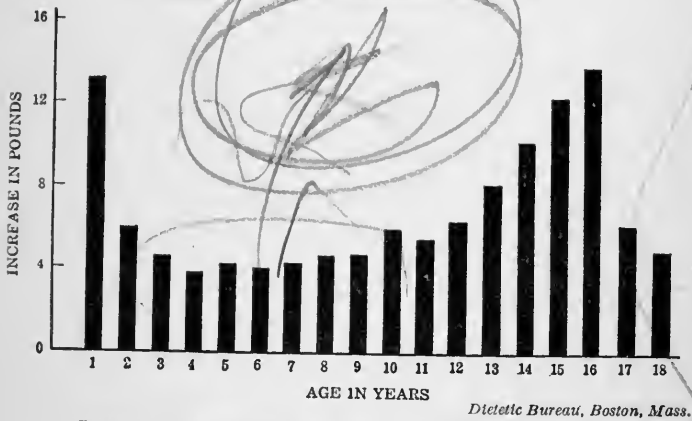


Dietetic Bureau, Boston, Mass.

CHART X. — Increase per year in the weight of girls.

strong muscles, and consequently his strength was not in proportion to his weight.

Food should provide for the rapid growth of high school boys and girls. Charts X and XI show clearly how necessary it is for boys and girls, especially of high school age,



Dietetic Bureau, Boston, Mass.

CHART XI. — Increase per year in the weight of boys.

to eat plenty of foods containing growing materials. During the first year of a child's life he gains from 12 to 14 pounds. During the second year of life he has to eat enough to gain on an average of 6 pounds, and in addition must keep in repair the 12 or 14 pounds gained during the first year of life. Then during the third year he must keep in repair 25 or 26 pounds of bone and muscles, and must eat enough in addition to gain from 4 to 5 pounds more, and so on year after year. By the time a boy or girl is twelve or thirteen years old, or of high school age, there are between 80 and 100 pounds to keep in repair. About this time the weight increases very rapidly, as is shown by the charts. Extra precautions should then be taken to eat the right food with the proper kind of materials to provide for this rapid increase. At the same time there should be enough energy so that the food needed for growth is not used in other ways. Many boys and girls are thin at this age, and more susceptible to disease because they have not eaten sufficient food to provide for growth, energy, and resistance.

PROBLEMS

43. Reconstruct Alice's meals given on page 80 so that they correspond to her requirement. Increase the protein, calcium, phosphorus, and iron. Include foods that will supply the vitamines. Make a record of the corrected meals in your notebook.

44. Reconstruct the meals given for Tom on page 80 so that they correspond to his requirement. Decrease the total number of Calories, and increase calcium and phosphorus. Include the vitamines. Make a record of the corrected meal in your notebook.

A Nourishing Luncheon is Necessary to Health

It is very important for every boy and girl to have three good meals a day. It is very important that these meals be

at regular hours as the stomach is a delicate piece of machinery needing periods of rest.

If Alice and Tom had had their meals regularly with the right foods there is little doubt that each would have been in a better physical condition. Had there been a substantial luncheon at noon, they would have needed only a light luncheon, if any, after school and would have had normal appetites at six o'clock. When a mid-afternoon luncheon is necessary, it should by no means be a complete meal, neither should it be sweets of any kind. A glass of milk or a piece of whole wheat bread and butter is sufficient in case of extreme hunger.

You may be wondering, as did Mrs. Irving, what arrangements may be made for children who can neither go home at noon nor buy their luncheon at school. If children live so far away from the school that they have to hurry home, eat rapidly, or eat only half enough, and then hurry back to school, they ought not to go home. They may take a very satisfactory luncheon with them. It may be inconvenient to prepare the luncheon, but if the trouble it takes spells HEALTH it is worth while.

The box luncheon. The box or basket luncheon is a difficult problem. It is hard to plan an appetizing meal with enough variety to tempt the fickle appetite of growing girls, or to satisfy the appetite of growing boys. It should be more tempting than the corner grocery products and more satisfying than confectionery. If the luncheon really satisfies there will not be that craving for sweets which is the cause of many an illness.

The luncheon should contain from 500 to 700 Calories of such foods as will provide a well-proportioned amount of the various foodstuffs. The more satisfying combinations are made from sandwiches, simple desserts, a bottle of milk, and some fruit. The maximum amount of nourishment

may be furnished in sandwiches made of whole wheat, oatmeal, brown, raisin, or nut bread. They may be plain bread and butter sandwiches, or the food value may be increased by such fillings as eggs, peanut butter, chopped meat, baked beans, jam, cheese (plain or combined with dried fruit, jam, jelly, or chopped green vegetables), or a combination of nuts and dried fruits, such as raisins, dates, or figs. By referring to Table I in the appendix it will be noticed that the foods mentioned are those richest in either protein or iron or both.

A bottle of milk will supply protein and vitamines. It is also the only food containing enough calcium to supply the amount needed and should be included in the luncheon either as a beverage, or in some cooked form, such as a bowl of custard, a cornstarch or rice pudding.

If fruit is not included in the filling of the sandwiches, it can be supplied by a jar of stewed fruit, either dried or fresh, some ripe fresh fruit, or a few dates (plain or stuffed with peanut butter or cheese).

Simple desserts are to be preferred. Gingerbread, ginger cookies (the molasses provides both iron and calcium), peanut cookies, date cookies, and sponge cake are always good. A jar of custard or sweet chocolate would be nourishing, easy to carry, easy to prepare, and are among the types of dessert best suited to the luncheon of school girls and boys.

Care should be taken to provide protein, phosphorus, iron, calcium, and the vitamines, and at the same time there must be energy enough to last during the afternoon, so that the body will not have to burn its own tissues to keep going. It is not necessary to provide a different food for each of these factors, as many foods are valuable sources of several of them. As simple a luncheon as whole wheat bread and butter sandwiches and milk would provide all the requirements.

PROBLEMS

45. Plan and pack a luncheon of 700 Calories. The luncheon should consist of sandwiches, fruit, and a sweet dessert.

46. Plan and pack (for a girl 15 years of age) a luncheon that will contain at least one third of the iron and protein needed for the day, and that can be packed in small space.

47. Suggest five "box" luncheons that will be well-balanced, inexpensive, and at the same time attractive. (If you carry your luncheon to school try your menus for the coming week.)

    Note. Wash all fruit before putting it in the lunch box. When packing a luncheon, wrap each article in waxed paper. Line the box with a paper napkin. Pack the food carefully. Paper drinking cups may be used to hold salads and soft desserts. Fold a napkin neatly over the top. Use fresh clean paper when wrapping the box, and tie securely with clean, strong string.

The school luncheon. Although the basket luncheon may be made both satisfying and inviting, a hot dish is much to be preferred to a "cold luncheon." The child who can purchase hot soup or a cup of cocoa at or near school is fortunate. Either of these may be easily supplemented by sandwiches and fruit from home, but in no case should a child be encouraged to buy cake to take the place of the sandwiches. Neither should he be encouraged to have both a thin soup and a cup of cocoa in the same luncheon, as the volume of liquid will give a feeling of satisfaction without supplying all the requirements of growth and energy. Not only will the child get hungry before the afternoon is over, but the chances are that he will not be able to apply himself to his lessons properly.

It may be possible to purchase a whole luncheon at school, in which case the same principles may be used in its selection as have already been given.

PROBLEM

48. To select a luncheon from a school menu:

Menu

Bean soup (made with milk)
Vegetable soup (made with water)
Lamb stew
Fish hash
Cocoa
Milk
Ham sandwiches
Peanut butter sandwiches
Cake
Baked apple
Fresh fruit

Select luncheons for the following people:

(*a*) For a girl who has brought plain bread and butter sandwiches from home.
(*b*) For a girl who has brought fruit from home.
(*c*) For a girl who has brought such a light luncheon that it does not satisfy her.
(*d*) For a girl who has brought no luncheon.
(*e*) For a boy who has brought no luncheon.

The meal at home. Most fortunate of all is the boy or girl who can go home for his midday meal where he may sit quietly and eat slowly. Every mother should know that this meal ought to be so planned that it may be eaten in a minimum of time without haste. A simple meal with plenty of time in which to get back to school is much healthier than a more elaborate meal eaten hurriedly. Who has not experienced that feeling of drowsiness in the one o'clock classes, and who can do good work when half asleep? Let the luncheon then be simple, but ample, and a one-dish meal if necessary.

A luncheon should be planned with care. The smaller the amount to be spent, the more necessary it is that it be

spent to good advantage. The cost is not an indication of food value. The two luncheons given below show the comparison between food value on the one hand, and cost, labor, and ease in eating on the other.

PROBLEM

49. To prepare a suitable noonday meal to be eaten at home:

Menus

(*a*) Creamed potatoes 1 c. combined with 0.8 oz. cheese
Whole wheat bread 3 oz.
Butter $\frac{1}{2}$ oz.
Baked apple
Cocoa made entirely with milk

(*b*) Tomato bisque $\frac{3}{4}$ c.
Broiled fish 3 oz.
Lettuce 1 oz.
Oil 1 tbsp.
Whole wheat bread $1\frac{1}{2}$ oz.
Butter $\frac{1}{2}$ oz.
Sliced banana 1
Top milk $\frac{1}{4}$ c.

Prepare these luncheons, calculate the protein, phosphorus, calcium, iron, energy, and cost of each. Record, in tabulated form, the results from the two luncheons in your notebook. Compare the two luncheons as to food value and cost.

Is the food value suited to the needs of a school girl 15 years of age?

REFERENCES

Food and Health, Chapter III, Lessons 9, 10, and 11. Kinne and Cooley. Macmillan Company.

School Lunches, Farmers' Bulletin No. 712, U. S. Department of Agriculture.

The Box Luncheon, Browning. Cornell Reading Course for Farmers' Wives.

CHAPTER VII

FOOD FOR THE BABY

At the end of two months of well-planned meals, Alice and Tom Irving were so much improved in health, and were getting on so much better at school, that Mrs. Irving was thoroughly convinced of the importance of proper food. The more she thought about her family of six children, the more clearly she could see that their manner of living was not such as to insure the greatest amount of health and strength. She realized that if her children were to go out into the world to accomplish things requiring strength, a steady nerve, and endurance, she must do her part by fortifying them with, and teaching them to eat, the kind of food this marvelous machine, the human body, needs.

Although Mrs. Irving felt she had little time in which to learn and to put into practice a new order of eating, she was a sensible and a far-seeing woman and was determined to make the effort. She was all the more determined when one day Alice said: "Mother, if you had made me eat the things that were good for me before, perhaps I would not have lost that prize for scholarship." Alice made this remark laughingly, for what she really meant was, "If I had only made myself do it." Mrs. Irving pondered: Would she be confronted by a more serious charge when the children were grown men and women? Would she really be responsible for their failures if they were not successful because of lack of strength and vitality?

"An ounce of prevention is worth a pound of cure,"

she said. "While it may take two or even five years to teach the children to like the things that are good for them, and to learn to eat them at the proper time and in the proper way, if I can save them from many years of regret later, it will be time well spent."

Baby Betty — One Year Old

Nature provides a perfect food. Baby Betty had been very unfortunate because it had not been possible for her mother to give her the food nature intended her to have, her mother's milk. Mother's milk has just the right amount of protein, phosphorus, calcium, and iron that the growing baby must have to provide for the daily increase in the size of its bones and muscles, and enough fat and carbohydrate to furnish energy for the kicking, crying, and playing of the child. The child fortunate enough to be fed this perfect food has a much better chance of living, of having good teeth, strong bones and muscles, and of being able to resist disease.

The best substitute for mother's milk. Although Betty had been deprived of this perfect food, she had been fed the best substitute, cow's milk, and had survived her first summer fairly well. She had been sick occasionally, but the doctor had been called immediately and nothing serious had happened.

Cow's milk has the right amount of growing material for the calf just as mother's milk has for the baby, but the calf grows more rapidly than the baby and needs a different proportion of energy and growing materials. When cow's milk is to be fed to babies, its composition must be changed or modified to make it more like mother's milk. This is called modified milk. It is difficult to modify milk to get it just right for each individual child, as the changes made

must vary with the age, weight, and strength of the child, and his ability to digest it. The larger child naturally requires more nourishment than the smaller one of the same age. A very active child requires more than a quiet one, and much crying increases the demand for energy considerably. Some children cannot digest as much food as others. Too much food may weaken the digestive system for life. All these things must be considered, and a physician's advice is very important.

The formulæ in Table XXI are suggested in case there are no specific directions given, but they should be used only as a guide. The amount given should be adapted to the ability of the child to digest it.

The energy requirement of a child during the first year of its life may be stated briefly as follows: [1]

During the 1st three months, 50 Calories per pound of body weight.

During the 2d three months, 45 Calories per pound of body weight.

During the 3d three months, 40 Calories per pound of body weight.

During the 4th three months, 35 Calories per pound of body weight.

PROBLEM

50. To determine the food requirement of a baby six months old, weighing 14 pounds:

Calculate energy supplied by the formula on page 92 for a six months' old baby. Is it adequate? How much protein does it provide? What percentage of the Calories are supplied by the protein?

Since Mrs. Irving had begun to think about the relation of the composition of food to the health of the family, she

[1] See Rose's *Feeding the Family*.

TABLE XXI.—SUGGESTIONS FOR THE FOOD OF A CHILD DURING THE FIRST YEAR. (Based on Holt and Shaw's *Save the Babies.* Pub. by Am. Med. Ass'n.)

TIME	MILK IN OUNCES	WATER IN OUNCES [4] (BOILED AND COOLED)	SUGAR [1]	NO. OF FEEDINGS [3]
1st and 2d days		1 to 3 tbsp. every 3 hrs.		
3d and 4th days	3	7	2 tsp.	7
5th, 6th, and 7th days	4	8	1 tbsp.	7
8th day	5	10	1½ tbsp.	7
8th day to end of 3d month	Increase ½ oz. every 4 days	Increase ½ oz. every 8 days	Increase ½ tbsp. every 2 wks.	7–6
End of 3d month	16	16	3 tbsp.	6
First of 4th month to end of 6th month	Increase ½ oz. every 6 days	Reduce by ½ oz. every 2 wks. (Cook barley in the water if food is not well digested)[2]	3 tbsp.	6–5
End of 6th month	24	12	3 tbsp.	5
First of 7th month to end of 9th month	Increase ½ oz. every week if child is digesting food well and seems hungry	Reduce by ½ oz. every 2 wks.	3 tbsp.	5

Beginning with the 7th or 8th month (or earlier if the physician approves), give from one to two tablespoons of strained orange juice or prune juice halfway between two morning feedings; orange juice earlier when pasteurized, evaporated, or dried milk is used.[5]

End of 9th month	30	Cereal gruel (3 tbsp. of cereal cooked in 10 oz. water)	2 tbsp.	5
First of 10th month to end of 12th month	Increase 1 oz. per month	Cereal gruel (as above)	Reduce by 1 tbsp. per month	5–4

Add one or two pieces of toast, stale bread, or zwieback by the end of the 11th month. Part of a soft-cooked egg may be given occasionally with the noon meal by the end of the 11th month.

Near the end of the first year a child should begin to take undiluted milk with strained cereal twice a day.

[1] Milk sugar is best, but malt sugar may be used.

[2] Barley water: cook ½ tbsp. barley flour in the water with which the milk is to be diluted, for twenty minutes. Cool before adding to the milk. Or, one or two ounces of limewater may be added to the milk if it is hard to digest.

[3] Time between feedings: 3 hrs. up to the 6th month, 4 hrs. after 6th month. Up to 4th month, 1 night feeding between 10 P.M. and 6 A.M. After 4th month, no night feeding after 10 P.M.

[4] Give an ounce of cool, boiled water two or three times a day between feedings.

[5] Recently Hess has reported the juice of canned tomato as a good substitute for orange juice.

was somewhat concerned because the amount of iron in a baby's usual diet seemed low. Upon investigation she found that while the amount of iron in milk is small, nature has provided for this seeming deficiency in two ways: first, by making the iron in milk a very valuable form of iron, and second, by bringing the baby into the world with enough iron stored up in its tissues to make foods rich in iron unnecessary before the ninth or tenth month. At this time, however, some food rich in iron should be added to the diet of the child, something that a stomach, accustomed to mild foods like milk, can digest easily, such as fruit juice, eggs, or some well-cooked and strained cereal, or vegetable.

Regularity of meals is essential. Betty was a very clever little girl. One of the first things she had learned was that she could get something to eat whenever she cried long and loud enough. As a result she was getting into the habit of eating frequently and training her stomach to take small amounts at frequent intervals.

Every book to which Mrs. Irving referred, and every mother who had happy, contented babies of her own, said that regularity of both eating and sleeping was the first essential to the health and disposition of the child. Some doctors say that in many instances the dissatisfaction and irritability of later boyhood and girlhood may be traced to the food habits established during the first two or three years of life.

The hours at which the food is given are not important so long as they are the same hours each day by the clock, with the same length of time between each two feedings during the day. The number of feedings and the amount of food given will vary with the strength of the baby and are best determined by a physician who knows the condition of that particular child. One of the following schedules may be useful in deciding upon feeding times:

1. 6.00 A.M. — 10.00 A.M. — 2.00 P.M. — 6.00 P.M.
2. 6.30 A.M. — 10.30 A.M. — 2.30 P.M. — 6.00 P.M.
3. 6.30 A.M. — 10.00 A.M. — 1.30 P.M. — 5.00 P.M.
4. 7.00 A.M. — 10.30 A.M. — 2.00 P.M. — 5.30 P.M.
5. 7.30 A.M. — 11.00 A.M. — 2.30 P.M. — 6.00 P.M.

Betty's schedule. The following schedule was the one adopted for Betty:

Breakfast: 7.00 A.M.

Cereal — 2–3 heaping tbsp. thoroughly cooked and strained rolled oats, oatmeal, wheatena, or barley.
Bread — small piece of toast, day-old bread, or zwieback.
Milk — 1 cup of warm milk.

At 9 A.M.

Fruit pulp — 1–3 tbsp. baked apple, prune pulp, or orange juice.

Luncheon: 10.30 A.M.

Milk — 1 cup.
Bread (as above).

Dinner: 2.00 P.M.

Milk — 1 cup, and cereal, 1–2 tbsp.
Or cereal soup made with milk
Or broth ($\frac{1}{4}$ cup), with cooked rice or barley } Piece of day-old bread or toast
Or egg with milk (1 cup)

Supper: 5.30

Milk — 1 cup.
Cereal (as in the morning).

Mrs. Irving pinned this schedule on the wall beside the clock. She felt sure Betty would cry for fifteen or twenty minutes at first, but she had been told that she must not depart from the schedule if she wanted the experiment to be successful. Betty did cry for fifteen minutes the first time her desire for something to eat was not gratified and then she fell asleep exhausted. When gently aroused at the schedule hour she took her food with more eagerness than she had shown for some time. She not only cried frequently during the first day without results, but she felt

very much abused all the rest of that week. Occasionally some member of the family who also felt she was being abused would feed her, but this only gave her courage to cry more vigorously next time.

Mrs. Irving had to enlist the coöperation of the whole family before she finally had Betty trained to know that food would be given to her only at stated hours. If any one through mistaken kindness smuggled a cracker or a piece of cake, or candy, to her there was always sure to follow a "tempest," until finally every one learned that absolute regularity was the only safe rule.

By the end of a month Betty was reconciled to her new mode of living and accepted water as a substitute for food between meals as a matter of course. With regular hours for feeding came regular hours of quiet sleep, almost as essential as the food itself. Betty became quite a model, contented baby, fretting less, sleeping better, and more of a joy than ever.

Add new foods gradually. Tom was usually the guilty one in tempting Betty, but when he finally realized that he must not give her a bite of whatever he might be eating, he said: "That's reasonable. It is just like the boys who are training in athletics. We do easy things at first and are able to do harder and harder work gradually. A boy may injure himself for life by trying to do things too hard for him at first, but which would be easy for him after several years of practice."

Tom was right. A baby must be given new foods cautiously so as to train his digestive tract to take them without injury. If a child does not like a new food the first time it is offered to him, it may be the strangeness of it that he refuses; he may learn to like it upon further acquaintance. One way in which to teach a child to like a new food is to let him taste it daily, or every other day, until it becomes

familiar to him, gradually increasing the amount until he will take a teaspoonful, then a tablespoonful. This may take a week, or it may take a month or even longer. It will be very hard to teach a child to like a new food if, when he refuses to take it, something more appetizing is given in place of it.

Select clean milk. Too much care cannot be used in selecting the best milk for a baby. By referring to Charts X and XI in Chapter VI, we see that a child gains more pounds during the first twelve months of its life while milk is its main source of nourishment than during any other period of the same length of time. If anything is wrong with the milk during this period, it will influence the health of the child much more quickly than later, when other foods are forming part of the diet.

Keep the milk clean. Milk is a very fertile garden for germs. They grow rapidly in it unless the milk is kept cold. If the baby drinks milk in which germs have been growing there is grave danger of illness. Every precaution, then, should be taken

1. To get clean milk
2. To keep it clean by putting it only into clean utensils
3. To keep it cold
4. To keep it covered to prevent germs in the air from falling into it
5. To wash off the top of the bottle before opening so that any germs on the mouth of the bottle will not be in the first cupful poured out
6. To pour no milk back into the bottle after it has once been poured out, as it may collect germs on the way. (If no more than is needed is poured out there will be no temptation to return any to the bottle.)

PROBLEMS

51. To pasteurize milk:

Prepare the food for a baby according to one of the formulæ in Table XXI and put it in the feeding bottles. Milk is pasteurized to destroy any germs that may be in the milk. To do this, stand the bottles in a saucepan deep enough to cover the bottles up to their necks, cover with cold water up to this point, and bring the water slowly to boiling. Now remove the saucepan from the fire and let the bottles of milk stand in the hot water for twenty minutes. Then remove the bottles and put them in cold water so as to cool the milk rapidly. Put the bottles on ice and keep them there until used.

52. To keep milk cold without a refrigerator:

(*a*) Materials needed:

A wooden box about 18 inches square.
A tin pail deep enough to hold a milk bottle.
Sawdust, excelsior, or pieces of paper (crumpled) for packing.

Cover the bottom of the box with a layer of packing to a depth of four inches, set the pail in the middle of the box, and fill the space between the pail and the sides of the box with sawdust, excelsior, or crumpled paper (if paper or excelsior is used it must be packed in very solid). Set the milk bottle in the pail and surround with ice, broken in small pieces. Cover with many thicknesses of newspaper and set in a shady place.

(*b*) Set the milk bottles in cold water and change the water frequently. The water must come to the neck of the bottle.

(*c*) Wrap a wet cloth around the milk bottle with one end of the cloth dipped in a pan of cold water and set in a shady place where the wind blows over it.

Try each of these methods and determine the temperature of the milk at the end of three hours in each case.

The care of the feeding bottles is very important. The best milk may be spoiled and the healthiest baby made ill by improper care of the feeding bottles and nipples. The

following suggestions should insure the baby against danger from this source:

Feeding bottles:

Rinse the bottle in cold water as soon as the baby has finished his meal (do not let the milk sour in it).

Wash with hot water and soapsuds, then scald in boiling water.

Boil for 10 or 15 minutes once a day.

Stopper with clean cotton and keep stoppered until used.

Nipples:

Wash inside and out, first with cold water and then with hot water.

Keep in a cup of borax water when not in use.

Dip in boiling water just before using.

After the nipple has been dipped in boiling water, let nothing touch that part which the baby puts in his mouth.

To test the flow or the temperature of milk, shake some of it out on the back of the hand, but do not under any circumstances put the nipple to the lips.

PROBLEM

53. To modify and pasteurize the milk for the baby six months old:

Modify it according to the directions given on page 92 and divide it into the number of feedings for the day, putting each portion into a separate bottle. Pasteurize according to directions in Problem 51.

Estimate the cost of the food for a child of this age for a day and for a week.

Weaning a baby. Betty had a cousin just her age who had been more fortunate than Betty because she had had

her mother's milk. She had grown faster and stronger than Betty and had not been held back by illness. Since her mother did not want to change her food during the hot summer weather, she began to wean her when she was only nine months old. Ordinarily she would not have weaned her before she was eleven or twelve months old.

As her mother knew she must become accustomed to cow's milk gradually, she began with one bottle of modified milk a day in place of one of the nursings. She also began with the formulæ for a child two months younger at first, but the strength was increased so much more rapidly than it is for a bottle-fed baby that by the end of the twelfth month she was eating the same kind of food as Betty.

PROBLEMS

54. Prepare a day's meals for Betty and her cousin, following the schedule given on page 94.
55. Calculate the food value of the meals prepared in terms of energy and protein. How much energy is needed by a child one year old, weighing 20 pounds? Is the food value of Betty's diet sufficient for a child her age?
56. Estimate the cost of feeding a child one year old, for one day and for one week.

REFERENCES

Feeding the Family, Chapter V. Rose, Mary S. Macmillan Company.

Infant Care: Care of Children, Series No. 2. West, Mrs. Max. U. S. Department of Labor.

The Well-baby Primer. Hedges, Carolyn, M. D. Elizabeth McCormick Memorial Fund, Chicago.

CHAPTER VIII

FOOD FOR CHILDREN FROM ONE TO FIVE YEARS OF AGE

Jack's Diet

Appearance is not always an indication of health. Jack appeared to be the picture of health. He weighed 34 pounds, which is average for his age of three years, and had every appearance of being well fed, but Dick had been like him at that age and not until recently had it been apparent that he was not a strong and healthy boy.

It is not always possible to judge the strength and endurance of people by looking at them. Two new automobiles may look equally strong and well-built, one of which will retain its substantial appearance in spite of hill climbing and heavy loads because of the good quality of the material in it, while the other, made of poor material, will soon show the effect of strenuous work and in a short time will have to be laid up for repairs.

And so it may be with two boys or with two girls, both of whom may be very active and may look well, but who may have had different kinds of growing material. There may be weak spots in the nerves, or the bones, or the muscles, or other tissues, which do not show as defects until they are tested by vigorous exercise whether it be work or play.

Mendel, a prominent scientist of Yale University, had some rats that were being fed a diet adequate in all respects except that the calcium was low. The rats thrived at first but suddenly became sick. After this same thing had hap-

pened with many rats, he concluded that perhaps many hitherto unexplained illnesses of boys and girls and men and women may be due to an insufficient amount of some one food factor, especially the calcium contained in milk.

Milk, the Food that has no Substitute

Jack frequently refused to drink milk. He sometimes had one and occasionally two cups of milk a day, but more often he had none at all. Milk is the best food and should be the chief growing material in the diet of a child even after he begins to take other food. All boys and girls **need** a quart of milk daily through the second year and every child **ought** to have a quart a day until he is five or six. If this amount is impossible, then two cups a day is the very least any child under five should have.

Jack's mother decided that he must have a quart of milk daily. The first day this rule went into effect Jack happened not to want the milk, but without arguing the question and getting Jack into a bad humor, his mother read to him the story of the Three Bears. Then they played a game in which Jack was the Tiny Bear and his warm milk was the Bear's soup. After this game his mother had little difficulty in getting him to drink milk provided it was warm, put in a bowl, and called Bear's soup.

Stories, games, and imagination will oftentimes accomplish what talking cannot do. It is better, however, to try the game before the feelings have been aroused to the point of obstinacy, as it is important that the child get his food in a happy frame of mind so as to avoid interference with digestion. Stormy scenes caused by "forced feeding" are often more harmful than beneficial.

Oftentimes Jack's mother disguised a part of the milk in some cooked food, a change that helped considerably in

getting the food value of a whole quart of milk a day into Jack's diet. It is advisable however for a child to drink at least two cups of uncooked milk daily, as there is danger that a part of the vitamines may be destroyed if the milk is heated at the boiling point for too long a time. The two cups of uncooked milk will be a protection for this very important constituent. If after every known way has been tried it is found that a child really cannot drink milk, the whole quart may be given in some cooked form such as milk soups, milk toast, custards, junket, cocoa, or milk cooked in the cereal. The cereal may then be eaten with milk or with butter, or, by the older children, with molasses. Where no uncooked milk is taken, fresh fruit, vegetables, and butter should be given liberally to guard against the possibility of a deficiency of vitamines.

Too many people fail to recognize the part milk is going to play in the lives of the children in future years, and in consequence feel that milk is an extravagance and that tea and coffee are cheap substitutes. This is a mistake, as no other food can supply the protein in so suitable a form and no other food can so well supply the amount of calcium and the vitamines needed by the body. Children will have a very poor chance of growing normally if they have no milk.

Tea and Coffee

Tea and coffee are not substitutes for milk. Milk is a real food, while tea or coffee is only a delusion in the form of a stimulant. They have dulled the appetite of Dick, Jack's older brother, so that he is not getting enough food and his growth has been retarded, — perhaps because of insufficient food, perhaps because of over stimulation. Tea and coffee have no food value whatever.

Chart XII shows the relative value of a cup of milk, a

cup of cocoa, and a cup of coffee or tea. All the food value in the cup of coffee or tea is supplied by the milk or sugar added. It would, therefore, be far better to take the milk without the stimulant and thus avoid its injurious effects.

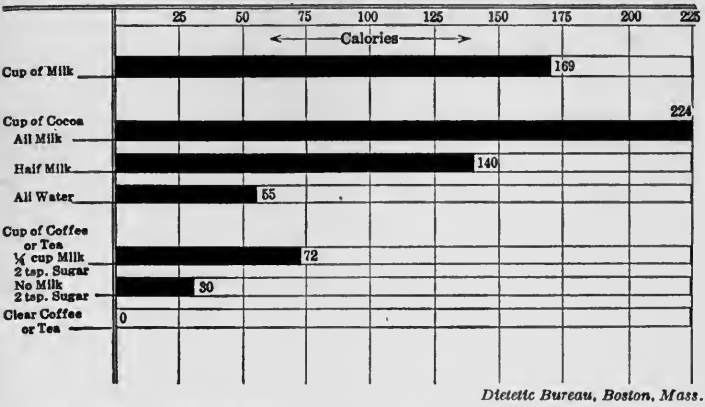


CHART XII. — Relative fuel value of milk, cocoa, and tea or coffee.

Tea and coffee ought never to be given to children, even in milk. It is much better to drink half a cup of milk alone than half a cup of milk and half a cup of tea or coffee combined.

PROBLEM

57. Plan and compare two breakfasts, each consisting of 500 Calories.

a — bread, jam, and coffee
b — oatmeal and milk

Calculate the protein, mineral content, and cost of each breakfast.

Cereals, Breads, and Other Grain Products

As a child grows older, his weight will increase, he will get more and more vigorous, and he will need more energy

and other growing materials than the quart of milk will furnish. The extra energy may best be supplied at each meal by bread or cereal as a supplement to the milk. The bread or cereal will also increase the growing material. Every 100 Calories of most grain products will increase the protein by three or four grams. The mineral elements, especially the iron, will vary with the type of bread or cereal eaten. Hence it is wise to include those most valuable for their ash, particularly the iron. Since those grain products most valuable for mineral elements are also rich in vitamines, the vitamine content of the diet will be increased by the larger use of these same foods.

PROBLEM

58. To become familiar with the grain products furnishing mineral elements in largest amounts: (Consult tables in Chapter V.)

List under "Calcium" the grain products giving more than 0.01 gram of calcium per 100 Calories.

List under "Phosphorus" the grain products giving more than 0.05 gram of phosphorus per 100 Calories.

List under "Iron" the grain products giving more than 0.0005 gram of iron per 100 Calories. Combine these lists so that you have a list of at least five grain products rich in all three mineral elements.

Jack was very fond of the crisp, crunchy cereals. The bulk eaten of most of these prepared cereals is apt not to be sufficient to give the necessary food value, neither are they to be recommended as sources of iron, so that it is well to reserve them for variety, or for supper in the summer time.

Warm cooked cereals are to be preferred for a regular diet, as no extra heat is needed in warming the food taken into the stomach. Oatmeal and rolled oats contain more food value per pound than any other cereal preparation. They furnish more nourishment in a small bulk, which is

quite important where a child is so active that he does not like to take much time to eat. Oatmeal and other coarse cereals contain coarse particles of husk liable to irritate the intestinal tract of the very young child. Therefore such cereals should be strained before feeding to children under 15 to 16 months of age.

PROBLEM

59. With the aid of the data in your notebook from Problem 6, p. 18, make a chart similar to Chart XII in this chapter, showing the amount of energy obtained for the money spent for rolled oats, cornmeal, cornflakes, rice, farina, shredded wheat, and macaroni.

Jack learns to like oatmeal. When Jack's mother realized that oatmeal was much better for him than those cereals to which he was accustomed, she also remembered that oatmeal was his pet aversion. Nevertheless a dish of it was placed before him. In surprise he pushed it away and confidently asked for something else. As his mother had learned that it is wise not to deceive children she had been careful to wait before offering the oatmeal until she had no prepared cereal in the house so that she could truthfully say she had none for him. Jack took this excuse as final the first morning, but preferred not to eat the oatmeal. His mother did not urge it, but gave him some whole wheat bread toast that was on the table. The next morning he was not so happy about the change, but since he refused to eat the toast and milk and no substitute was offered he had to go without breakfast. An hour later he was asking for a cookie and was somewhat surprised to see the oatmeal and milk appear instead. As he did not want it his mother did not urge it, but she did not give him anything in place of it. Jack was most unhappy for the rest of the morning, but at noon he had his regular dinner and forgot his sorrow.

The next morning, without reference to what had previously happened, a little oatmeal was added to the milk to make "Tiny Bear grow big and strong like Tom." With a little firmness on the part of the mother it was eaten, and from then on the difficulty diminished and the amount eaten increased until Jack was taking his full amount of three tablespoons in the morning and the same quantity in the evening.

No sugar was added as a bribe, however. If children are taught from the first to eat cereal without sugar they will not miss it, and there will not be a constant struggle to keep the amount within reason. What is most important, they will not tire of the unsweetened cereal so soon.

Cereal should be well cooked. Mrs. Irving found the children liked the cereal better if it was cooked for a long time, and would eat more of it if it was not too stiff. The long cooking improves the flavor. This is best accomplished over boiling water, either by the use of a double boiler, or by placing one saucepan in another, the outer one containing water kept at the boiling point. In order to make the cooking of cereal less expensive, where the cost of fuel must be considered, it may be cooked when the fire is being used for other things. It may then be reheated in the morning by setting the cereal kettle in a pan of hot water on the stove. Or where a fire is kept during the night it may be cooked all night in a double boiler on the back of the range. In summer enough cereal may be cooked one day for two mornings, but care must be taken to keep the unused portion cold to prevent souring.

One of the best ways for cooking cereal is by the use of the fireless cooker. Mrs. Irving had one she had been in the habit of using during the summer, but when she found the children liked the cereal so much better when it had been cooked for a long time she began to use it in the winter as

well. It was so easy to cook the cereal for fifteen minutes in the evening, put it in the cooker, and have no more thought about it until the next morning, when it was ready to serve.

A fireless cooker may be made very easily and satisfactorily at home and for very little expense, but as a home-made one will frequently not hold the heat for more than three hours, it is better to cook the cereal for this length of time in the evening in the cooker, then remove it before going to bed and reheat it in the morning.

PROBLEM

60. To make a fireless cooker:

Send to the United States Department of Agriculture, Washington, D. C., for Farmers' Bulletin No. 771, "Home-made Fireless Cookers and their Use," and Farmers' Bulletin No. 927, "Farm Home Conveniences." Make a fireless cooker according to the directions given in either of these bulletins.

What and how much cereal may be given? After the first year a child may eat almost any cereal, the chief consideration being thorough cooking. Beginning with from one to two tablespoonfuls during the first part of the second year, the amount should be gradually increased to about one half cup during the third and fourth years, the exact quantity depending on the size and activity of the child. If it seems difficult for a child to eat the required amount of cereal as mush for breakfast or supper, part of it may be put into soups or made into simple cereal puddings with any of the fruits mentioned on page 108. Raisins should be used cautiously if at all at this age, and if used they should not only be very thoroughly cooked but also well chewed.

Bread furnishes exercise to help develop the teeth. By the beginning of the second year there must be something hard to chew to help develop the teeth, for the teeth, like the

muscles, will not get hard and strong unless they are exercised. It is not wise to have the entire energy requirement of the child satisfied by milk and cereal, as neither of these needs much chewing. These foods should be supplemented with a slice of day-old bread (day-old for the sake of better mastication and better digestion) at two or three meals a day, the size of the slice and the frequency of giving, varying and increasing with the needs of the child. Any plain wholesome bread may be given, but if there is any danger of iron or vitamine deficiency, whole wheat bread will help to overcome it.

More exercise may be obtained by giving the bread in the form of crisp toast or zwieback at least once a day. (Homemade zwieback is to be preferred to that bought at the store because it may be made less sweet. To make it, toast in a moderate oven slices of ordinary bread until a golden brown throughout.)

Fruit is Very Important

Value of fruit. Fruit is valuable for ash and vitamines, and it helps in preventing or overcoming constipation. Fresh fruit should form a regular part of the diet if possible.

Amount and kind of fruit. Midway between breakfast and luncheon during the first half of the second year, a child should have from one to three tablespoons of baked or stewed apples, prune pulp, orange juice, or other fruit as recommended by a physician. After this time three tablespoons may be given with the breakfast and the fruit between breakfast and luncheon omitted. This amount may be gradually increased as the child grows older, and by the end of the second year stewed dates, dried apples, apricots, and peaches or baked bananas will help to give variety.

There should be no uncooked fruit, and the cooked fruit

should not be very sweet. All fruit given should be in good condition. Fruit decomposed or spoiled in any way is dangerous. Some fruit should be given once every day, and may be given twice a day by the end of the second year provided the energy value of the diet is not sacrificed thereby. Most fruits are low in energy and protein for the bulk consumed, and the appetite should not be satisfied by foods poor in these food values. It is usually not difficult to get a child to eat all the fruit that is advisable.

A Child Should be Taught to Eat Vegetables Early in the Second Year

Most children have to be taught to like vegetables. Although there is no need of forcing a child to eat them during the first few months of the second year, providing he is getting milk, cereals containing iron, and plenty of fruit each day, yet it is well to get the habit started early.

Quantity of vegetable needed. A small baked potato, either mashed or in soup, may be given at the beginning of the second year and should be added to the diet regularly by the end of the 15th month. This adds protein, energy, vitamines, and mineral elements. Beans or peas in soups will also add energy, protein, and mineral elements, while other vegetables are valuable chiefly for mineral elements and vitamines. If each day during the 15th month just a taste (half a teaspoonful) of some strained or mashed, easily digested, mild-flavored vegetable be given in addition to the potato, the child will become accustomed to vegetables so that the quantity may be gradually increased during the 16th and 17th months to about a tablespoonful by the end of the second year, and to three tablespoons by the end of the third. Jack, who is three years old, should be having about three tablespoonfuls a day of some suitable vegetable in addition

to a whole potato. (In some instances vegetable soups or well-cooked and mashed vegetables are given before the time stated, but it is advisable to be guided by the advice of a physician when giving them earlier than the 14th or 15th month.)

Since it is especially important to have the iron content of the diet increased during the second year, it is well to add those green and leafy vegetables valuable for their iron, such as spinach, chard, lettuce (boiled), asparagus, and green peas. They should be strained or very finely mashed for children less than three years old.

Ways of serving vegetables. Mrs. Irving often disguised the vegetables by putting them in soup where they were so finely mashed that no distinct particles could be seen. Sometimes, even then, Jack had to be persuaded to eat his soup "to see the butterfly on the bottom of the bowl." Sometimes a change in the way of serving added to the eagerness with which it was eaten. Oftentimes it was concealed in a scrambled egg or in milk toast, but very frequently the vegetables were given clear so that Jack might become accustomed to the taste. If he refused to eat any particular vegetable one day, his mother was sure to give him another taste of it a few days later, repeating it again and again, but never forcing him to eat it. After a time when he became acquainted with the new taste he would begin to swallow some of the vegetable and so the habit of eating a variety grew very, very slowly. No raw, strong-juiced, or fried vegetables were ever given.

The following vegetables are the ones allowed:

Asparagus	Peas
Beans — dry (in soup)	Potatoes (white or sweet)
Carrots	Spinach
Celery (only stewed)	Squash
Chard	Tomatoes (strained)
Lettuce (stewed)	Turnips (mild)

Value of vegetables. Vegetables should be given for their mineral elements, for their vitamines, and for their stimulating quality. They also add bulk to the diet, which makes them useful in overcoming constipation. One cannot afford to do without them, both for the sake of economy and for the sake of health. The quantity of food eaten may be less and the diet cheaper in consequence where vegetables are eaten.

PROBLEM

61. To become familiar with the vegetables furnishing mineral elements in largest amounts:

Make a list of those vegetables containing in 100 Calories more than 0.1 gram of phosphorus, a list of those with more than 0.1 gram of calcium, and another list of those vegetables with more than 0.002 gram of iron.

At current prices which vegetables will be the cheapest source of iron?

Eggs

Sometimes eggs do not agree with small children. Their ability to take them should be cautiously tested until it is quite evident that that particular child can take eggs without ill effects. In case of hives or illness as a result they should not be given again without consulting a physician.

Number and frequency of eggs in the diet. It may be recalled that Betty, during the latter part of her first year, had a part of an egg occasionally; but eggs were not to be a part of her regular diet until the 14th month. By this time she might have one every other day, or three or four a week. Jack, who was three years old, should have four or five eggs a week. It is possible to have too many eggs and it is seldom wise to give more than one in any one day.

Eggs may be given in a variety of ways, such as soft boiled,

poached, coddled, scrambled, and in eggnogs, but they should never be given to young children either fried or hard-cooked.

Meat is not a Necessity

Meat is too stimulating for the majority of children, and is not necessary in the diet if a child has plenty of milk and some vegetables every day, especially if an egg is given every other day. The broth from meat may be used combined with vegetables and cereals, but the broth itself contains so little food value that there is no reason why the meat should be purchased for the sole purpose of making the broth.

Butter and other Fats

Butter is a valuable food. Some milk fat is essential for growing children. While butter is important because of its high energy value it is much more important because of the vitamine (fat soluble "A") dissolved in it. Since the cream of whole milk is fully as valuable as the butter made from it, and since this same substance is also in leafy vegetables, it is probable that the necessary amount of this growth-stimulator will be provided where a child is getting a whole quart of unskimmed milk with some green vegetable every day. Butter is, however, an agreeable and a desirable addition.

In some cases a teaspoonful of butter may be given on the bread or with baked potato as early as the 14th or 15th month, but a new food should be tried cautiously. During the third and fourth year the amount of butter may be increased to a tablespoonful.

Other fats. No butter substitute is as rich in vitamines as butter itself, but if the cost of butter is prohibitive, a good quality of either nut margarine or oleomargarine may be used.

A piece of crisp bacon may sometimes be given to increase the energy during the third year. A small amount of olive oil or salad oil may be given also, but too much fat is harmful. It should be remembered that substitutes should not entirely replace butter fat unless special care is taken to supply the vitamines in other ways, *e.g.*, by making sure that each child in the family takes a liberal amount of milk and green vegetables.

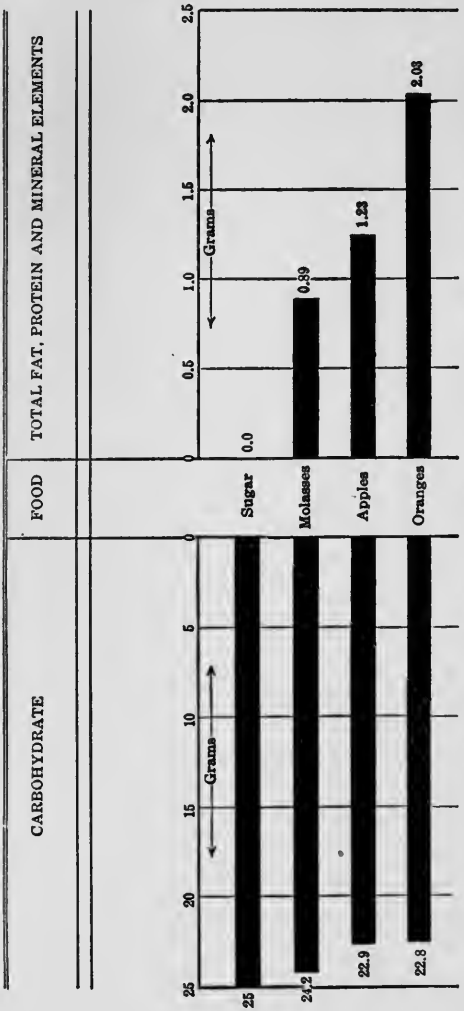


CHART XIII.—Relative food value in 100-Calorie portions of sugar, molasses, and fruit.

Sugar and Sweets

There is perhaps more danger of eating too much sugar than of any other kind of food unless it be meat or eggs.

Table XVI shows how valuable sweets and sugars are for energy. They are among the most concentrated forms of energy we have, but at the same time they have very few other good qualities. For this reason there is grave danger of getting so much of the daily requirement of energy from sweets that the growing materials will not be obtained in proportional amounts. Look at Table I in the appendix to see how deficient sugar, honey, and sirups are in protein, in iron, in calcium, and in phosphorus.

Sugar is a valuable food in its place and is an easy and an agreeable way in which to increase the energy, but it must be used cautiously. It is better not to put it on cereal, but to give it in a dilute form as in cocoa, custard, junket, or cooked fruit. Chart XIII represents the value of sugar compared with molasses, apples, and oranges. What we see here graphically represented corresponds to the previous statement that sugar contains little else than carbohydrate. The same amount of energy may be obtained from fruit or molasses, and at the same time mineral elements will be added to the diet. In this way the value of the sugar is obtained without destroying the appetite for other foods. A little jelly or molasses may be given during the third year.

The amount of all sweets given should not be more than one tablespoonful a day during the third and fourth years.

Forbidden Foods for Children from One to Five Years of Age

Tea, coffee, strong cocoa, or chocolate.

All fried foods, including griddlecakes, doughnuts, and fried potatoes.

All raw vegetables including cucumbers and radishes, and all spoiled fruit.

All hot breads, pies, pastry, rich cake and cookies.

All rich puddings and sauces.

All pickles, nuts, and sweet preserves.

Canned, dried, or salted meat or fish, pork (except crisp bacon), game, sausage, frankfurters, and bologna.

Good Habits help Good Food to Build Strong Bodies

The way in which food is eaten, and habits of rest and exercise, are almost as important as good food. Jack was unfortunate for many reasons. Both his food and his habits of rest and exercise were wrong. His good fortune lay in the fact that his mother realized his danger before it was too late. He had been eating fruit and sweets between meals, he drank very little water, he had been "bolting" his food and rushing off to play, he had been sitting up after seven o'clock at night, and he took no rests during the day. After his habits were regulated he had nothing except water between meals, he ate slowly, he had a nap each day, he went to bed early, he had his bedroom windows open so as to get fresh air while sleeping, and he was out of doors much more during the day. His finicky appetite soon gave way to one ready for whatever was placed before him, his disposition improved, and he was much less nervous, but he was still bright and lively.

The meals of a child from the first to the fifth year should be made up only of those foods a young child can digest and take care of without taxing the digestive system unduly. Milk, bread, cereals, eggs, easily digested vegetables, and simple fruits should be the chief articles of diet.

With the mealtimes and rest properly regulated, a great variety of food is not only unnecessary but inadvisable. The amount of food and the caloric value of the meals will depend on the age and size of the child. These points have been summarized in the following table:

TABLE XXII.—FOOD FOR A CHILD DURING THE SECOND YEAR[1]

40 Calories per Pound

	12–14 MONTHS WEIGHT 21–23 LBS.	CALORIES 840–920	14–18 MONTHS WEIGHT 23–25 LBS.	CALORIES 920–1000	18–24 MONTHS WEIGHT 25–27 LBS.	CALORIES 1000–1080
Breakfast 6–7.30 A.M.						
Cereal[2]	2 tbsp. (0.3 oz. dry) (strain)	30	3 tbsp. (0.4 oz. dry) (strain oatmeal)	40	½ cup (0.5 oz. dry)	50
Milk	½ pt. (9 oz.) (some on cereal)	170	½ pt. (9 oz.) (some on cereal)	170	½ pt. (9 oz.) (some on cereal)	170
Bread[3]	1 slice (0.4 oz.)	30	1 slice (0.7 oz.)	50	1 slice (0.7 oz.)	50
Butter	. . . . .	. . .	1 tsp. (0.15 oz.)	33	1 tsp. (0.15 oz.)	33
Fruit[4]	1–3 tbsp.	15	1–3 tbsp.	20	1–3 tbsp.	25
		245		**313**		**328**
Luncheon 10–11 A.M.						
Bread	1 slice (0.7 oz.)	50	1 slice (0.7 oz.)	50	1 slice (0.7 oz.)	50
Milk	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170
		220		**220**		**220**
Dinner 1.30–2.30 P.M.						
	½ c. potato or cereal soup, or ½ c. broth with 1–2 tbsp. cooked cereal	30	Egg (3–4 times a week) or 1 c. milk, soup, or 1 c. broth with cooked cereal	50	Egg (4–5 times a week) otherwise the same as 14–18 months	50
Milk[5]	¾–1 c. (6.9 oz.)	130	½–1 c. (4–8 oz.)	95	½–1 c. (4–8 oz.)	95
Bread	1 slice (0.4 oz.)	30	1 slice (0.5 oz.)	40	1 slice (0.7 oz.)	50
Butter	. . . . .	. . .	1 tsp. (0.15 oz.)	33	1 tsp. (0.15 oz.)	33
Vegetable[6]	. . . . .	. . .	1 tsp. (strained)	3	1 tsp. (strained)	10
Fruit[7] or Plain dessert	1–2 tbsp.	15	1–2 tbsp.	15	2–4 tbsp.	50
		205		**236**		**288**
Supper 5–6 P.M.						
Cereal	2 tbsp. (0.3 oz. dry)	30	3 tbsp. (0.4 oz. dry)	40	½ cup (0.5 oz. dry)	50
Milk	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170
Fruit	. . . . .	. . .	. . . . .	. . .	1–2 tbsp.	15
		200		**210**		**235**
Total for day		**870**		**979**		**1071**

[1] If more food is wanted, it should be given in the form of milk.

[2] Cereals: oatmeal, rolled oats, wheatena, pettijohn, or barley to be preferred.

[3] Toast, day-old bread, or zwieback, whole wheat or oatmeal bread to be preferred.

[4] Cooked apple, prune pulp and juice, or orange juice. Cooked dried fruit may be given during the last few months. Fruit should be given 2 hrs. after breakfast during the first 18 mo.

[5] Eggs, cereals, vegetables, and milk may be combined in various soups and desserts.

[6] Asparagus, dry beans or peas (in soups), chard, carrots, celery (stewed), lettuce (stewed), peas, potatoes, spinach, string beans, tomatoes.

[7] For desserts give custard, junket, well-cooked cornstarch, or cereal puddings.

TABLE XXIII.—FOOD FOR A CHILD DURING THE THIRD, FOURTH, AND FIFTH YEARS [1]

	2 YEARS OLD (3D YEAR) WEIGHT 27–32 LBS.	CALORIES 1000–1300	3 YEARS OLD (4TH YEAR) WEIGHT 30–36 LBS.	CALORIES 1100–1400	4 YEARS OLD (5TH YEAR) WEIGHT 34–40 LBS.	CALORIES 1200–1500
	37–43 Calories per pound		35–40 Calories per pound		33–37 Calories per pound	
Breakfast 6–7.30 A.M.						
Cereal [2]	½ c. (0.5 oz. dry)	50	¾ c. (0.75 oz. dry)	75	¾ c. (0.75 oz. dry)	75
Milk	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170
Bread	1 slice (0.7 oz.)	50	1 slice (0.7 oz.)	50	2 slices (1.4 oz.)	100
Butter	1 tsp. (0.15 oz.)	33	1 tsp. (0.15 oz.)	33	½ tbsp. (0.23 oz.)	50
Fruit [3]	3–4 tbsp.	25	3–4 tbsp.	25	3–4 tbsp.	25
		328		**353**		**420**
Dinner [4] *11.30* A.M.–*12.30* P.M.						
	Egg or soup	75	Egg or soup	75	Egg or soup	75
Potato	1 small one (4 oz.)	75	1 medium (5.6 oz.)	100	1 medium (5.6 oz.)	100
Other vegetable [5]		10		15		20
Milk	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170
Bread	1 slice (0.7 oz.)	50	1½ slices (1 oz.)	75	2 slices (1.4 oz.)	100
Butter	½ tbsp. (0.23 oz.)	50	½ tbsp. (0.23 oz.)	50	½ tbsp. (0.23 oz.)	50
Plain dessert	See note 7 on page 116.	75	See note 7 on page 116.	75	See note 7 on page 116.	75
		505		**560**		**590**
Supper 5.30–6 P.M.						
Cereal and bread or Bread	½ c. (0.5 oz. dry) 1 slice (0.7 oz.) 2 slices (1.4 oz.)	100	¾ c. (0.75 oz.) 1 slice (0.7 oz.) 2½ slices (1.8 oz.)	125	¾ c. (0.75 oz.) 2 slices (1.4 oz.) 3 slices (2.1 oz.)	150
Butter	½ tbsp. (0.23 oz.)	50	½ tbsp. (0.23 oz.)	50	½ tbsp. (0.23 oz.)	50
Milk	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170	½ pt. (9 oz.)	170
Cooked fruit [3]		50		50		75
		370		**395**		**445**
Totals for the day		**1203**		**1308**		**1455**

[1] If more food is wanted, increase the amount of bread and milk.

[2] Use any thoroughly cooked cereal: oatmeal, rolled oats, wheatena, pettijohn, or barley to be preferred.

[3] All fruit except orange should be cooked: apples, bananas, prunes, or dates, and dried apricots, peaches, or apples, may be given *cooked*.

[4] Eggs, vegetables, cereals, and milk may be combined in a variety of ways. The following suggestions (on p. 118) are given:

a. An egg, 1 slice bread or toast, 1 tbsp. spinach, 1 cup milk.
b. An egg, 1 slice bread or toast, 1 tbsp. carrot, ½ cup junket, ½ cup milk.
c. An egg, ½ cup green pea soup, rice and milk, ½ cup milk to drink.
d. ½ cup string bean soup, 1 slice bread, ½ cup custard, ½ cup milk to drink.
e. ½ cup potato soup, bread, spinach, ½ cup junket, ½ cup milk to drink.
f. ½ cup split pea soup, 1 tbsp. carrot, oatmeal pudding and milk.
g. Baked potato, bread, green peas (strained), 1 cup milk.
h. ½ cup beef broth with 1–2 tbsp. cooked rice, barley, or hominy and 1 tbsp. spinach, bread, ½ cup bread pudding (no fruit).

[b] Vegetables which may be given are as follows: asparagus, dry beans and peas (in soup), young beets, carrots, celery (only stewed), chard, lettuce (stewed), peas, potatoes, spinach, squash, string beans, tomato. All coarse vegetables should be strained or mashed very fine.

PROBLEM

62. Prepare according to the schedule given in Table XXII the day's meals for a child 14 to 18 months old.

63. Following the schedule given in Table XXIII, prepare the day's meals for a child 3 years old.

64. Following the schedule given in Table XXIII, prepare the day's meals for a child 4 years old.

65. Compare these meals with those you have seen children of the same age eating. In what respects are they alike? In what respects do they differ?

REFERENCES

Feeding the Family, Chapters VI and VIII. Rose, Mary S. Macmillan Co.

Feeding Young Children. Farmers' Bulletin No. 717, U. S. Department of Agriculture.

Food Primer for the Home, Gillett, L. H. A. I. C. P., New York City.

CHAPTER IX

FOOD FOR SCHOOL CHILDREN AND ADULTS

After the fifth year, the food of the child becomes more varied and gradually assumes the dignity of "grown-up" meals, but it is wise to be cautious in introducing new foods. We do not learn arithmetic, English, carpentry, or any other subject or occupation all at once. The teacher who tries to give to a class too much at one time finds them making slow progress because of mental indigestion. And so it may be with an overburdened digestive tract that is trying to meet the demands of too many kinds of food. "Make haste slowly" is as applicable in making the acquaintance of new foods as it is in making new friends.

Dick and Clare

Dick, it will be remembered, was seven years old. Because of a weak heart and little endurance, he had been deprived of the pleasure of playing for long at a time until he had almost forgotten the joys of real health.

We also recall that he was very fond of coffee, that he drank it in place of milk, that he ate much meat and few vegetables, and that he sat up late at night, thus violating some of the fundamental laws of health.

Clare, who was ten years old, was a joy to all her friends because of her untiring energy, her sparkling health, and her contagious good-nature. Her companions singled her out first of all as the most welcome member of any group. She was quite a contrast to Dick in both health and habits,

particularly food habits. She liked milk and vegetables, but cared little for meat and never touched coffee. The teacher at school had told the pupils that coffee was not good for them, that it would keep them from being strong, and might be a very great hindrance at some critical time when they would like to do especially good work. As Clare had ambitions for a life of useful service she did not want to run any risks. Although the good-natured jests of the rest of the family oftentimes tempted her to try to sit up after half past eight o'clock at night, wise nature usually protected her by causing her to fall asleep over her books. Then she was up bright and early the next morning and had her lessons prepared in about half the time it would have taken her the night before.

Are the Same Foods Suited to the Needs of Both Children and Adults?

In too many families, where the food is not planned to provide for the needs of the children, the mother thinks she has given a sufficient reason for it when she says she has no time in which to prepare extra foods for the different members of the family. This is probably true. On the other hand, some people maintain that the foods prohibited in the diet of the child after the fifth year are so few that there is no reason why the same meals cannot be planned to provide for the needs of the whole family, or for all of those over five years of age. There must of course be some exceptions for very young children, but even their meals may be such as to reduce the extra work to a very small amount.

Let us see wherein lies the difficulty and what suggestions may be made to help the mother plan such meals.

Is it impossible to plan and prepare meals suited to the needs of the whole family?

Has the mother time to plan and prepare such meals?

Do the children see the older people eating something they want and ought not to have, but get because they ask for it?

Do adults have a tendency to eat foods hard to digest?

Is it possible to make the necessary adjustments so that all may eat the same things and all be well-fed?

Uses of Food Reviewed and Applied to the Needs of School Children

Milk is good for both children and adults. Milk is still the best and most important food all through the period of growth. Every child must have at least a pint a day and a quart is better where it can be afforded. Every adult, including young men and women, the middle-aged, and the elderly ought to have at least one third of a quart of milk. It would be better to have more than this minimum amount when possible. It may be given as plain milk to drink, or it may be prepared in some cooked form, such as cocoa, soups, or pudding for the whole family.

No other one food can be eaten in large enough quantities, either by children or adults, to supply enough calcium for the proper development and up-keep of the bones, and for the control of the nervous system and the heart. There is no substitute for it and no food "just as good." In the absence of fresh milk, evaporated, condensed, or dried milk should be used, in which case it is well to protect the health with leafy vegetables and plenty of fruit.

Dick was so weak that his stomach could take care of only the simplest and most easily digested foods, hence he was required to take a whole quart of milk a day. Although he had thought he did not like it, nevertheless his mother planned the meals of the family so that each received about

a half a quart of milk a day in some cooked form, and then, without asking Dick whether he wanted it or not, she insisted that he drink another half quart. Tea and coffee were now forbidden. At first Dick had a headache without the stimulant, but this disappeared at the end of a week, and the change from coffee to milk marked the first step in his improvement. Strange to say, he began to like milk when he found his strength returning because of it. Mr. and Mrs. Irving still felt that they must have their tea and coffee, but it was no extra work to set glasses of milk on the table for the children.

Expense is a very real factor to be considered in most families. Many mothers say they cannot afford the milk because the children eat just as much other food whether the milk is provided or not, and this makes the meals expensive. In such cases it is probable that the children need both the milk and the other food, but if anything has to be sacrificed the milk is the last thing to be omitted from the meals of the children. Meat may be reduced with very much less harm than milk. In reality Dick ate less meat when he had the milk, his food was less expensive, and he felt better besides.

Cheese has most of the good qualities of milk in a condensed form. A pound of cheese has the food value of six to eight pounds of milk with the water removed. It is very concentrated and should be given to children only after it has been combined with other foods in such a way that it will not be swallowed in large pieces. One of the best ways of serving it is melted in white sauce or in soups. One of most indigestible forms in which to serve it is browned as on the top of macaroni and cheese or on top of escalloped potatoes or other similar dishes. These dishes are to be recommended, however, when the cheese is melted in the sauce combined with the macaroni or potato. It becomes

objectionable only when exposed to the surface, where it becomes brown.

PROBLEMS

66. Plan a day's meals for Dick with one half quart of milk concealed in cooked food.
67. Plan a day's meals for the Irving family, using in cooked food one third of a quart of milk for each member of the family. Prepare the dishes in which milk is used.
68. To compare the cost of milk and meat:

    Plan two meals of 1500 Calories each, one to include 4 to 6 ounces of meat, the other with an equivalent number of Calories from milk. Calculate the difference in cost.

Breads, cereals, and other grain products should provide one third of our energy. When we say "grain products" we mean such foods as bread of all kinds, breakfast cereals, rice, macaroni, and spaghetti. The food value of any one of these resembles that of the average bread or cereal and may be used in place of either of them in so far as energy and protein is concerned. This type of food is quite essential, for the energy and protein it furnishes is in a very wholesome and easily digested form.

Table XIII, Chapter III, tells us that a boy of seven needs from 1500 to 1800 Calories a day. This range allows for ordinary differences in the size of boys and in the vigor with which they play. Extraordinarily active or rapidly growing boys of this age may need more than 1800 Calories. Dick, who sits on the curb watching his playmates run a race, does not need as much energy as Sam, who is entering into the sport. If the two boys were sitting at the same table it would be easy for Sam to obtain the increased amount of energy required by eating an extra large dish of cereal, another piece of bread, a second helping of rice pudding, or more macaroni. Fully one third of all the energy of a

well-balanced and adequate diet should be provided by grain products of some kind.

In addition to energy, grain products increase the protein content of the diet considerably. The iron, phosphorus, and calcium content depend upon the kind of grain used and its commercial preparation. Since the removal of the outside coating of the grain reduces its food value, it is well to use some grain products that have not been too highly refined.

As Dick's mother wanted him to get the advantage of this outer coating she insisted that he eat oatmeal, wheatena, and pettijohn, and so obtain the maximum amount of nourishment in a minimum of bulk. Dick did not like the change from corn flakes to a cooked cereal any better than Jack had, but when he rebelled his mother asked him if he wanted Jack to show him how a man should act, whereupon his seven years prompted him to set Jack a good example. Have you ever realized how much influence the old brothers and sisters have on the likes and dislikes of the younger children?

PROBLEM

69. Plan a day's meals for Dick in which about one third of the energy will be supplied by bread or other grain products. Add enough Calories from the same sources to make the meal adequate for Sam, the playmate, who has entered the races.

Since practically any well-cooked cereal may be given after the second year, the only difference in the bread and cereals for Jack, Dick, Clare, Alice, Tom, and the older members of the Irving family need be in the quantity eaten by each. Soups, puddings, breads, and combinations of cereals with meats and vegetables, all of which may serve for the whole family, help to get a generous quantity into the diet in a variety of forms.

There was one difficulty in the Irving family. Both Mr. and Mrs. Irving had lived where hot breads and fried cereals were often served. They were still very fond of them, but they realized now that these foods should not be given to children. Grandma Irving ate them sometimes, but more frequently she felt they disagreed with her. To omit them was going to be a great sacrifice to Mr. and Mrs. Irving, yet to have them presented a difficulty in the preparation of the same meals for both children and adults.

Mrs. Irving put the following questions up to the older members of the family:

1. Is the health of the children of more importance than the pleasure of the adult?
2. Shall we deny ourselves for the sake of the children?
3. Shall I prepare extra things for the children?

They decided as follows: first, the children must not have foods that are not good for them; second, they themselves would be content with fried foods a little less frequently; and third, when fried foods were to be served for them something else must be prepared for the children. Grandma Irving felt it would be best for her to leave fried foods alone, so she decided to eat the foods prepared for Dick and Clare.

Thereafter when Mr. and Mrs. Irving had fried mush the children and Grandma Irving had cereal and cooked fruit molded in a cup and served with sirup or molasses. Mrs. Irving sometimes gave them raisin bread when the rest of the family were having muffins or griddlecakes (the raisin bread was not served at other times so that it might be a treat at this particular time), or perhaps she made toast, spread it with a little jelly, and moistened it with hot milk. But since these things did take extra time, more than she could afford, gradually they all had less fried food, and all felt better for it.

PROBLEM

70. If there were children under 12 years of age in your own home and if your family were in the habit of eating huckleberries, raw bananas, fried mush, fried cakes, fried meats, fried eggs, hot breads, rich pies and cakes, and heavy salads, how would you arrange to substitute other foods for the children or prepare these same foods in a manner suitable for them to eat?

Vegetables Should be Eaten Freely by Both Children and Adults

By the end of the fifth year the variety of vegetables allowed is so great that it is much easier to enumerate the ones to be avoided rather than those that may be used. Cucumbers are forbidden to children entirely, so may be dismissed without further comment. Cabbage and corn should be given very cautiously before the twelfth year. If properly cooked it is probable that the chief danger is in eating too much of them, in eating them in too concentrated a form, or in not chewing them thoroughly.

Mrs. Irving had a way of preparing the corn that made it possible for children seven years old and over to eat small amounts of it. She scraped out the juicy, inner part of the kernel in such a way as to leave the outside part remaining on the cob. This was done by cutting the kernels through the middle of each row and scraping out the inside with a knife. With milk and seasoning the corn was then cooked in a double boiler for at least a half hour. Corn prepared in this way is better for both adults and children. Grandma Irving also appreciated this method of cooking corn because she had difficulty in eating the corn from the cob.

Cabbage is a valuable vegetable because of the iron and vitamines in it, but care must be exercised in its preparation. One of the ill effects from the eating of cabbage is due to

the fat so often cooked with it. Where it is to be given to children it should not be cooked with salt pork, bacon, oil, or other fat. It should, however, be cooked until very tender and served with other foods. It should also be well chewed or chopped very fine.

The chief value of vegetables lies in the mineral elements and vitamines they contain. The green, leafy vegetables, such as spinach, dandelions, chard, beet and turnip tops, lettuce, celery, cabbage, Brussels sprouts, asparagus, and cauliflower are regarded as especially valuable for the same vitamine that is in butter fat. Where fresh whole milk, cream, or butter are not possible, the diet should contain an abundance of these vegetables, some one of them at least every other day, and oftener if possible. In addition to the mineral and vitamine content vegetables have another very valuable use. Their bulky nature helps to overcome constipation, which may lead to disease. Vegetables are "necessities."

Clare was unconsciously laying a good foundation for health by eating vegetables, while Dick was slowly drifting away from it by refusing to eat them. Mrs. Irving now took especial care to prepare the most attractive vegetables in a variety of ways until Dick's strength began to return, and with returning strength came returning appetite. Grandma Irving found she was eating more vegetables since the children were talking about them, and attributed the added feeling of energy to this new practice.

It is neither practicable nor possible to give the definite amount of any vegetable necessary for health. All vegetables are not equally valuable, and the amount may also vary inversely with the amount of fruit eaten. In general we give Mrs. Irving's method as a very sensible one to follow. She planned to have potatoes at least once a day and often twice. Although she knew it would be for the well-being

of her family to have two vegetables or more in addition to the potatoes, she frequently could not afford it. She felt, however, that the health of her family demanded some root or tuber vegetable in addition to the potato at least three or four times a week, and leafy vegetables three or four times, depending on the amount of milk, butter, fat, or fruit used. Potatoes may very safely furnish from 100 to 300 Calories a day and other vegetables from 25 to 100 Calories, depending on the age of the person.

PROBLEM

71. Plan the vegetables for the Irving family for a week. Distribute them according to days. Include potatoes at least once every day, a leafy vegetable at least four times during the week, and a root vegetable at least five times during the week. Consider season, cost, and adaptability to both children and adults.

Fruit offers no difficulties in the preparation of the same meals for both children and adults. It is very obvious that no extra trouble need be taken for the children in the serving of fruit. Almost any fruit may be given after the fifth year. Dick (aged seven) is now eating uncooked fruit, such as very ripe peaches, pears, apples, grapes (seeds removed), and very ripe bananas with his midday meal. He should not be allowed to have any uncooked fruit for supper until he is ten years old. Berries are given cautiously to both Dick and Clare.

Because fruit and vegetables are somewhat interchangeable in their uses in the body, it is impossible to state any definite amount required of either. We can say, however, that there should be some fresh fruit in the diet of children every day unless cost makes its daily use impossible, in which case dried fruits may be substituted on alternate days. It is well to get not more than from 100 to 300 Calories from fruit

because of its bulky nature and correspondingly low energy value. Vegetables are usually more economical than fruit.

Jams and jellies are better sources of energy than fresh fruit, but are so sweet that they may interfere with digestion. They should not be used too frequently nor in too large amounts. It may be "conservation of bread," as Dick said when he was trying to persuade his mother to give him an extra large amount of jam, "to use one slice of bread for a double quantity," but it is not conservation of health.

Eggs present no problem in the planning of meals for the family. When a child is as old as Dick the variety of foods allowed is sufficiently great to make it unnecessary to say that any food except milk is absolutely essential. Nevertheless eggs are a valuable food for children, and it would be well for every child over five to have four or five a week, but not more than one in any one day, the number depending somewhat upon the amount of meat and fish eaten. Eggs may be given to children prepared in any way except fried or hard-cooked. Since eggs are usually cooked individually they present no problem in the planning of the meals for the family.

Meat, fish, and fowl ought to present no difficulties. Where the diet contains plenty of milk and vegetables, and especially if eggs are also used, meat is not a necessity for the majority of either children or adults; in fact eggs are to be preferred for the children and elderly people. Yet in the ordinary family the meat question is the point from which most of the trouble in the feeding of the children radiates. There is no reason why Dick should eat more meat than is good for him, even though his father does enjoy a generous amount. Neither is there any reason why Dick cannot eat all the vegetables he needs, though there may be meat on the table.

It is probable that a little meat or fish given before the seventh year will not be injurious, but the quantity given

should not exceed an ounce a day. Dick should have not more than two ounces a day before he is ten years old, Clare should have not over three ounces before she is as old as Alice, while Alice and Tom ought not to have over four ounces, which amount is liberal even for adults.

Meat decomposes easily, and any undigested portions remaining in the intestines will soon be decomposed, in part into poisonous products which in turn will be absorbed into the system. This kind of poisoning may cause a variety of ills, depending on the strength of the individual. It is probable that Dick's heart trouble has been intensified by the poison thus produced. Plenty of vegetables keep waste material from accumulating in the intestines, and this is an added reason why they should always accompany meat in the diet. With both meat and vegetables served at the same meal the children and grandma may then have a small amount of meat and a generous quantity of vegetables. As soon as Dick learned to like vegetables his mother noticed a change in his general health immediately.

PROBLEM

72. How much meat would you consider a fair allowance for the Irving family for one day? How much milk? Compare the cost of your estimates.

Sweets had better be reduced to a small amount for both children and adults. Sugar is a good food in its place, but when eaten between meals it takes away the appetite for better foods. Of all bad food habits to overcome perhaps a "sweet tooth" is the hardest. Poor Dick! He seemed to have been committing every dietetic sin. He was very fond of candy and quite often ate it between meals. When his mother refused to let him have it except at the end of his meals he had a very annoying craving for it. He was encouraged to eat more bread and cereals at breakfast and

dinner, he was given an occasional piece of fruit in the middle of the morning because that sudden withdrawal of an immediate source of energy made him feel faint, and he was told to drink plenty of water. In time the craving wore off and the normal appetite returned.

The craving for something sweet may be natural, but nature does not furnish pure sugar nor candy. The natural food to satisfy the craving for sweet is sweet fruits. This is much better than eating sugar or candy, because the fruits furnish sugar and at the same time are an important source of mineral elements and vitamines. Sugar contains no mineral elements nor vitamines, and if too much of the energy is obtained from it there is danger of a deficiency of some one of these important elements. This is the reason the amount of sugar should be limited. Molasses will add considerable iron and calcium, and since it is a good laxative will help to overcome constipation. Its use is to be recommended, but there is danger in using it too freely.

Fat is needed by every one. Fat is excellent as a source of energy, but it cannot be taken in such large quantities as either bread or cereal without interfering with digestion. Many foods contain more fat than we realize. Hence those which are practically clear fat should hardly be relied upon to provide more than from 200 to 300 Calories a day for Dick and Clare, and from 300 to 500 for the adults. Dick and Clare must have butter or milk fat in some form, for the growth-stimulating vitamine that it contains. Although eggs and green vegetables contain this same substance, it is probable that the diet will not contain enough of it without some milk or butter or a combination of the two.

Cottonseed, olive, corn, and peanut oils are all good sources of energy, but with the possible exception of corn oil do not contain any important amount of the growth-promoting substance; hence they should not be used in place

of butter where there is a minimum of milk. Peanut butter provides oil in addition to protein and mineral elements, and is therefore a comparatively cheap form of energy.

Nuts are better for adults than for children. The food value of nuts in general is high, and they may very properly replace meat to any desired extent in the meals of adults. It is claimed by some that they are hard to digest, but this is probably due either to insufficient mastication or to eating them at a time when that distressed feeling in the stomach is its only way of saying that it is already overworked.

Nuts play such a small part in the diet of children it seems hardly necessary to mention them in this connection, except to say that, with the exception of peanut butter, children under seven ought not to be allowed to eat them. They are apt not to chew them well, and when not thoroughly chewed, nuts are hard to digest. This difficulty is obviated with the peanut butter, as it is already in a very fine state. Its food value is high, and peanut butter sandwiches are excellent for luncheons.

Water is highly recommended. Water has not been mentioned throughout the whole chapter, but it is very important nevertheless and should be taken freely between meals by both children and adults. In the majority of cases there is no reason why water may not be taken with the meals, but it should not be used to wash food down. One or two cups at mealtime is probably a good aid in digestion, provided it does not take the place of thorough chewing of the food. Water is absolutely essential, and the advice of all physicians is to drink plenty of it.

The important points to be remembered are that the food of all children should be selected so as to meet the needs of growing boys and girls. It should provide all growing materials in proper amounts; it should be easy to digest, well cooked, and given at regular hours.

PROBLEMS

73. Plan a day's meals for Dick and Clare conforming to all the above suggestions. Prepare these meals. Would they be suitable meals for girls and boys of your age? If not, how might they be modified to make them so?
74. Plan and cook for the Irving family a Sunday dinner suitable in all respects for children and adults. What difficulties do you encounter? Record them and look for the solution in the next chapter.

REFERENCES

Feeding the Family, Chapters VIII and IX; Appendix, Table III, pages 355 to 425. Rose, Mary S. Macmillan Company.

Food and Household Management, Chapter XVIII, pages 307 to 317. Kinne and Cooley. Macmillan Company.

Food and its Preparation, Chapters VII, VIII, IX, X, XII, XIII, XIV, and XV. Dowd and Jameson. Wiley and Sons.

Food for School Boys and Girls. Rose, Mary S. Teachers College Bulletin No. 23.

CHAPTER X

PLANNING THE MEALS FOR A FAMILY

Mrs. Irving found the preparation of food much more interesting and much less like drudgery when she realized that there was something vital in the planning of meals. She said the feeding of a family reminded her of the "planning of a house," where plans must be carefully made to provide for all the needs of its various uses, without waste of material or energy.

The feeding of a family should include a plan of the needs of the family in terms of Calories, protein, phosphorus, calcium, and iron, with an estimate of the amount of food required to provide this material. The food should be selected with regard also to its vitamine values, variety, and flavor. It should be prepared in a digestible, palatable, and attractive manner.

Mrs. Irving's Food Problem

In planning the meals for her family, Mrs. Irving had to consider the following conditions:

Mr. Irving, a salesman, was 45 years old and weighed 145 pounds. He had a good appetite and enjoyed hearty meals, but his work was light.

Mrs. Irving was 40 years old, weighed 135 pounds, and did the housework with the exception of the washing and the heavy cleaning. She was not very strong and frequently did not eat much because the meals prepared were heartier than she could digest.

Grandma Irving, who was 72 years old, weighed 120 pounds and had trouble with her stomach, though she ate practically everything served for the rest of the family. She helped with the light work and the mending.

There were Tom, Alice, Clare, and Dick, who were at school, and Jack and baby Betty, not yet of school age.

Mrs. Irving estimated the food requirement of her family to be as follows:

TABLE XXIV. — THE FOOD REQUIREMENTS OF THE IRVING FAMILY

	AGE	WEIGHT	OCCUPATION	CALORIES	PROTEIN	CALCIUM	PHOSPHORUS	IRON
	years	*pounds*			*grams*	*grams*	*grams*	*grams*
Mr. Irving.	45	145	Salesman	2800	73	0.65	1.45	0.015
Mrs. Irving.	40	135	Housework	2800	68	0.61	1.35	0.014
Grandma Irving.	72	120	Very light work	1670	60	0.54	1.20	0.012
Tom . .	16	170 [1]	High school	3000	75	0.75	1.50	0.018
Alice . .	14	90	High school	2200	55	0.55	1.10	0.013
Clare . .	10	65	In school	1900	48	0.48	0.95	0.012
Dick . .	7	40	In school	1800 [2]	45	0.45	0.90	0.011
Jack . .	3	34		1300	33	0.33	0.65	0.008
Betty .	1	20		1000	25 [3]	0.20	0.40	0.005
Totals for the day				18470	482	4.56	9.50	0.108

This was her problem: to plan attractive and digestible meals providing about 18,000 to 19,000 Calories, about 500 grams of protein, at least 4.50 grams of calcium, about 9 to 10 grams of phosphorus, and at least 0.110 gram of iron every day.

[1] Although Tom's actual weight is 170 pounds, his food requirement is estimated according to the average weight for a boy of his age, which is 120 pounds.

[2] Because Dick is underweight he needs extra food.

[3] Ten per cent of the Calories from the protein.

It is obviously out of the question for any woman with a family as large as the Irving family to sit down and figure out each day the exact amount of food required to furnish the exact amount of these foodstuffs, but Mrs. Irving wisely thought it would be well to work out careful plans for two or three days. In this way the composition of foods and the effect of each on the total food value of the diet became so familiar to her that she was able to judge whether the meals were well-balanced or not without detailed planning. Her experiences and conclusions are given here with the hope that the readers of this book may find a few suggestions for the planning of their meals.

Mrs. Irving Planned Her Meals Systematically

The first step was an inventory as it were of the food products in relation to the needs of the body.

The Inventory

1. The children must have plenty of milk for growth. Milk is by far the best food from which to obtain both calcium and vitamines in the quantities needed by either children or adults.

2. Grain products, fats, and sugars are the chief sources of energy. Fat and sugar are practically without protein or mineral elements and must not be depended upon for energy to any great extent. Where economy is desirable, grain products should occupy a prominent place in the diet. Those made from whole grains are preferable because of their better mineral and vitamine content, and the more one depends upon grain products, the more important it becomes to select those foods rich in these substances.

3. Vegetables and fruits must be used freely to provide mineral elements and vitamines. There should be some

leafy vegetable three or four times a week to provide the fat-soluble vitamine. Children under five should have fresh fruit, though not necessarily uncooked.

4. Foods rich in iron should be used freely.

5. Foods in season should be used for the sake of economy.

6. Where there is only one person to do the work, the foods served to adults should be such that the meals of the children may be selected from them.

Planning the Meals

In planning the meals milk was Mrs. Irving's first consideration. There was a quart a day each for Betty, Jack, Dick, and Clare, one half quart each for Alice and Tom, and another quart to be divided between Mr. Irving, grandma, and herself. This made six quarts. It seemed like a large amount, but since it was so important for the health of the children Mrs. Irving preferred to economize on something else. Of the entire amount of foodstuffs required for the day, this amount of milk furnished 3768 Calories, 180 grams of protein, 6.5 grams of calcium, 5.05 grams of phosphorus, and .013 gram of iron. Mrs. Irving recorded this in a table similar to the one on page 141.

From force of habit she allowed three pounds of meat for the family, but as this seemed to make the protein too high, she compromised between what she thought the family would like, and what they needed, by using only one pound of solid meat. This one pound of meat did not seem very bountiful for seven people, but combined with two pounds or so of rice and some left-over vegetable, it made a very attractive dish. The rice was cooked, mixed with the chopped meat and some carrot that had been left from the day before, and the loaf baked in the oven for a half hour. Mrs. Irving had made a similar dish once before when there was a small

amount of cooked meat left over, and Tom had said at that time, " My, but that's good, mother! Why didn't you ever have it before? " Before the rice was mixed with the meat Mrs. Irving took some of it out for Betty; Jack had some of the rice cooked with the meat but with the meat removed. She and Grandma Irving would eat some meat and a larger amount of rice.

Her next concern was to get something to make the dietary richer in iron. The family was very fond of cauliflower, but that was out of season, asparagus was too expensive, cucumbers were hard to digest. But spinach was in season, it contained iron and the fat-soluble vitamine, it would go well with the meat loaf, the whole family including Betty and grandma could eat it, so spinach was the choice for a vegetable. Oatmeal had now become their regular cereal for breakfast, and this too contained more iron than did most other cereals. Then gingerbread, made with molasses, added still more to the iron content of the meal and provided a sweet dish to help allay the craving that many have when meat is wholly or partially withdrawn from the diet.

Potatoes were not needed for dinner, but they helped out for supper, increasing both the energy and the mineral elements without unduly increasing the protein. They are good either creamed, escalloped, or baked, but Mrs. Irving decided to cream them so as to use some of the cream sauce on graham bread toast for Betty and Jack. Prunes, in prune pudding for supper dessert, provided the fruit for the day, added more iron, and supplied in a very harmless form the sweetness all children crave.

By the time Mrs. Irving had the food value of these foods calculated, she found the energy higher and the protein just a little lower than she had planned; but instead of adding more meat to increase the protein, which was her first impulse, she decided it would give more variety to the meals

to scramble five eggs with a quantity of crumbs made from graham bread toast for breakfast. Then by reducing the rice in the meat dish to one pound and three quarters, the proportion of energy was made correct.

The only thing that had to be made extra for the children was the custard, a little of which was given to Betty at noon, and the rest to Jack for his supper. With an orange for Betty and Jack, the meals as planned are shown in Table XXV, with the food values calculated in Table XXVI.

Although the food values were slightly higher than the estimated amounts, this was an error on the right side of the equation, as the chances were that some of the meat loaf, or the spinach, or the potato would be left to go toward the food value of the following day's meals.

When Mrs. Irving figured up the cost of the food for the day, she could hardly believe her eyes. It was more than a dollar less than she had been in the habit of spending. This seemed unbelievable! She had written down the six quarts of milk with determination, as she knew the children needed it, but she had done it in fear and trembling, expecting her food bill to be much higher in consequence.

As she was curious to see how the food value of the meals she had been in the habit of preparing compared with this one she worked out a typical one, and the results are shown in Table XXVII.

PROBLEM

75. Prepare the meals carefully planned by Mrs. Irving for her family. Calculate the cost of these meals. Calculate the cost of the day's meals not planned according to food values. Which are cheaper?

Is Appetite a Reliable Guide?

As Mrs. Irving compared the two diets, she saw that her former meals were below requirements in some respects

TABLE XXV. — A DAY'S MEALS PLANNED TO PROVIDE FOR THE NEEDS OF EACH MEMBER OF THE IRVING FAMILY

	BETTY	JACK	DICK AND CLARE	ALICE AND TOM	MR. AND MRS. AND GRANDMA IRVING
Breakfast	Oatmeal Top milk Small amount of scrambled egg Toast Milk to drink	Oatmeal Top milk Scrambled egg Bread and butter Milk to drink	Oatmeal Top milk Scrambled egg Bread and butter Milk to drink	Oatmeal Top milk Scrambled egg Bread and butter Milk to drink (small cup)	Oatmeal Top milk Scrambled egg Bread and butter Coffee Top milk Sugar
9 A.M.	Orange juice	Orange			
Mid-morning luncheon	Graham bread Milk				
Dinner	Boiled rice Milk Toast Baked custard	Rice from the meat loaf Spinach Toast Milk to drink Custard	Rice and meat Spinach Bread and butter Milk to drink	Rice and meat Spinach Bread and butter Ginger-bread Water to drink	Rice and meat Spinach Bread and butter Ginger-bread Water to drink
Supper	Graham bread toast Cream sauce Milk	Graham bread toast Cream sauce Milk Prune pudding	Creamed potato Bread and butter Prune pudding Milk	Creamed potato Bread and butter Prune pudding Milk to drink (small cup)	Creamed potato Bread and butter Prune pudding Tea

TABLE XXVI. — THE FOOD VALUE OF THE MEALS GIVEN IN TABLE XXV

FOOD REQUIREMENTS OF THE IRVING FAMILY	QUANTITY	CALORIES	PROTEIN (Grams)	CALCIUM (Grams)	PHOSPHORUS (Grams)	IRON (Grams)
		DAILY ESTIMATED REQUIREMENT				
		18500	480	4.50	9.50	0.110
Supplies–General						
Milk	6 qt.	3768	180	6.56	5.05	0.013
Bread						
white	1 lb.	1174	42	0.13	0.41	0.004
graham	1 lb.	1180	40	0.24	0.99	0.011
Fat	12 oz.	2616	3	. . .	. . .	. . .
Sugar	6 oz.	680	. . .	. . .	. . .	. . .
Breakfast						
Oatmeal	12 oz.	1352	57	0.23	1.34	0.013
Oranges	2	150	2	0.13	0.06	0.001
Eggs [1]	6	446	41	0.20	0.55	0.009
Dinner						
Meat	1 lb.	867	86	0.05	0.93	0.013
Rice	1¾ lb.	2784	73	0.03	0.75	0.007
Carrots	10 oz.	106	3	0.13	0.11	0.001
Spinach	2 lb.	216	19	0.61	0.62	0.033
Gingerbread		1460	24	0.44	0.09	0.015
Supper						
Potatoes	3 lb.	912	24	0.15	0.63	0.014
Flour	2 oz.	200	6	0.01	0.05	0.001
Prunes	½ lb.	580	4	0.10	0.20	0.006
Totals		18491	604	9.01	11.78	0.141

and higher in others. The energy was high and the mineral elements were comparatively low. Had the amount of food been only just enough to satisfy the energy needs of the family, the mineral elements would have been sadly deficient. The cost was also high, so that there had been waste of both food and money in trying to get what the sys-

[1] Includes egg for custard.

TABLE XXVII. — THE FOOD VALUE OF MEALS PLANNED BY MRS. IRVING WHERE CALCULATIONS HAD NOT BEEN MADE

FOOD REQUIREMENTS OF THE IRVING FAMILY	QUANTITY	CALORIES	PROTEIN (Grams)	CALCIUM (Grams)	PHOSPHORUS (Grams)	IRON (Grams)
		DAILY ESTIMATED REQUIREMENT				
		18000	480	4.50	9.50	0.110
General supplies						
Milk	2 qt.	1256	60	2.19	1.68	0.004
Bread, white	1 lb.	1174	42	0.13	0.41	0.004
Butter and fat	1 lb.	3488	5	. . .	. . .	. . .
Sugar	1½ lb.	2721	. . .	. . .	. . .	. . .
Breakfast						
Cream of wheat	½ lb.	802	25	0.05	0.28	0.002
Cream (18%)	½ pint	440	6	0.22	0.19	. . .
Eggs	6	447	41	0.20	0.55	0.009
Bananas	7	700	9	0.06	0.28	0.005
Luncheon						
Potatoes	1½ lb.	456	12	0.07	0.32	0.007
Tomatoes	3 lb.	309	12	0.16	0.35	0.005
Oil	½ lb.	2041	. . .	. . .	. . .	. . .
Cake	1 lb.	1600	32	0.18	0.56	0.006
Dinner						
Lamb chops	2 lb.	2850	167	0.10	1.80	0.025
Potatoes	2 lb.	608	16	0.10	0.42	0.009
Beets	1 lb.	167	6	0.11	0.14	0.002
Tapioca	½ lb.	804	1	0.03	0.20	0.004
Apples	½ lb.	107	1	0.01	0.02	0.001
Totals		19970	435	3.61	7.20	0.083
"Extras" eaten *during the day*						
Candy	¾ lb.	1413	8	. . .	. . .	. . .
Cake	1 lb.	1600	32	0.18	0.56	0.006
Apples	2 lb.	428	4	0.04	0.08	0.004
Meals and "extras"		23411	479	3.83	7.84	0.093

tem needed. Mrs. Irving realized that in the past her chief idea had been to give them something to satisfy the appetite. This method had proved to be expensive. There was also too much of a chance for error in working without a plan. Therefore she concluded that in the future she would not risk the health of her children by any uncertain methods, but would give careful thought to the planning of the family's dietary.

A Practical Method for the Planning of Well-Balanced Meals

The conclusions Mrs. Irving gathered from her accurate plans are as follows:

In order that one may be sure of getting all the materials needed by the body for growth, repair, regulating, and energy, the diet should contain:

1. Milk.[1] 1 quart for each child under two years of age.
   At least one half quart for each child from two to five years of age and a quart wherever possible.
   At least one third of a quart for every person over five and as much more as can be afforded.

2. Grain Products	*Amount depending on the activity of the person*
For children under two years of age	1–3 oz. a day
For children from two to five	2–5 oz. a day
For children from five to twelve	5–9 oz. a day
For those over twelve years	9–16 oz. a day
3. Meat or its equivalent	*No meat needed and*
For children under five	no meat should be given.
For children from five to ten	not more than 1-2 oz. should be given.

[1] Rose, M. S., of Teachers College, New York City, recommends 1 quart of milk a day until the child is 6 years old, at least a pint from 6 to 16 years of age, and at least one half pint thereafter.

(*a*) Meat, Fish — For children from ten to fourteen . . . . . not more than 2-3 oz. should be given.
All people over fourteen years . not more than 2-6 oz. should be given.

(*b*) Eggs — For children under five years . . . . . 3-5 a week.
Eggs are better than meat for all children and may be substituted for it entirely.

(*c*) Peas, Beans, Cheese — These may be used in place of a part or all of the meat as a source of protein, but there should be plenty of milk with the beans and peas.

4. Vegetables

Serve at least two vegetables every day, one of which should usually be potatoes, with a leafy vegetable three or four times a week or as much oftener as possible.

5. Fruit

Serve fruit at least once every day. Dried fruit may be used for adults, but there should be fresh fruit three or four times a week for the children under five.

6. Sweets

Have a sweet dessert once or twice a day if desired, but serve very little if any clear sugar as on cereals.

7. Fats

Use two to three ounces of fat (purchased as such) for each person over five, the amount depending on the age.

If a meal contains the right foods in the right proportions, and if each person eats enough to maintain a normal weight, has good color in his cheeks, a sparkle of health in the eye, and has good resistance, one need feel no further concern about the quantity eaten.

Combinations for Meals

The manner of combining foods is not so essential as the foods themselves. A meal may be a several course dinner or it may consist of but one dish, but to be ideal each meal should contain all the foodstuffs needed. It may be bread

and milk. Whole wheat bread is to be preferred, but if white bread is served there should be something with it to increase the iron. A meal may consist of soup alone, but if so there should be plenty of cereals and vegetables in it to provide energy, as there is danger of deficiency in energy where one depends too much upon a liquid diet.

There are a few suggestions that it is well to keep in mind when planning meals:

There should be only one heavy protein dish in any one meal.

There should always be plenty of energy, vitamines, and iron at each meal.

Clear soups are expensive. Their chief function is to stimulate a "lazy" appetite. They should not be given to children as a regular diet. The capacity of the stomach of a child is limited, and there is danger that he will not get all the energy needed when too much soup is eaten.

A thin soup and cocoa make a poor combination for the reason just stated. A thin soup and a fruit salad make a combination deficient in energy and protein. With a soup it is far better to have a cereal or custard dessert containing concentrated food value.

A cream soup, a heavy meat dish, and an egg or milk dessert make a poor combination.

A cream soup with a hearty dessert is sufficient for a meal provided they supplement one another in food value.

Meals Should be Served Attractively

Other important considerations, especially for school children, are the regularity with which meals are eaten and the manner in which the food is served. Food that

should appeal to the appetite might be served in such a way as to make it seem quite unappetizing. Milk served in a plain white cup, with some toast on a clean white plate and a neatly cut piece of butter at the side, and all on a white cover (it may be very cheap white muslin, or it may be clean oilcloth, or it may be clean white paper) may be much more appetizing than a costly luncheon served unattractively.

Dishes and table as well as food should be kept clean, not only for sanitary reasons, but for the psychological effect it has on the eye, which in turn is reflected in the nerves to the stomach. It may not be possible to have expensive dishes, silver, and linen, but it is always possible to keep those one has clean and shining.

PROBLEMS

76. Plan a series of one-dish meals where the one dish contains the desired amount of energy-producing foods, protein, mineral elements, and vitamines for a family of four. Let the various members of the class prepare these dishes, compare, and serve them in an attractive manner.
77. Plan, prepare, and serve a day's meals for the family of some member of the class, applying all suggestions and rules given throughout the chapter.

The Score Card, a Means of Judging the Relative Merits of a Meal

There are various factors to be considered in judging the relative merits of two or more meals. If each student in the class were to prepare a meal as a test of her ability to plan, purchase, and prepare the meals for a family, and if the teacher were to give each a mark, she would doubtless have some difficulty, because there would be favorable and unfavorable points about each one. Therefore the following score card has been devised whereby the various points are marked according to a score:

Score Card

I. *Planning the meal* . . . . . 70 points

Energy — 30 points

Considering the ages, weights, and occupations of the various members of the family, is the energy of the diet sufficient?

Protein — 10 points

Is the protein suitable in kind and amount?

Mineral elements — 10 points

Is there a generous supply of the foods providing the necessary mineral elements?

Vitamines — 10 points

Are the vitamines provided?

Digestibility and bulk — 10 points

Is the food sufficiently bulky?

Is the food easy of digestion?

II. *Purchasing of the food* . . . . . 10 points

Is the food fresh and of good quality?

Is there a good return for the money spent for the food?

Is the food adapted to the family income?

III. *Preparation and service of the food* . . . . . 20 points

Is the food properly cooked and in a digestible manner?

Are combinations of food pleasing to the appetite and to the eye?

Is the food properly and attractively served?

PROBLEM

78. With the aid of the above score card, score the meals planned in Problems 75 and 77.

REFERENCES

Feeding the Family, Chapters XII and XIV. Rose, M. S. Macmillan Co.

Food and Health, Chapters IV and V. Kinne and Cooley. Macmillan Co.

How to Select Foods, Farmers' Bulletins, Nos. 808, 817, and 824. U. S. Department of Agriculture.

Lessons in Cookery, Book I, Part III. Stewart, Frances. Rand, McNally and Co.

Some Food Facts to Help the Housewife in Feeding the Family. Rose, M. S. Teachers College Bulletin No. 27.

CHAPTER XI

THE MARKET ORDER AND ECONOMY IN BUYING

Alice Does the Marketing

During the summer vacation, Alice was to be initiated into the secrets of wise buying and the family market order. She was to plan the meals, buy the food for the family for a certain amount each week, make sure that the food requirements of the family were satisfied, and hand to her mother at the end of each week an itemized bill of expenses. The only condition imposed was the use of at least six quarts of milk a day.

As Mrs. Irving looked back over the last eighteen years during which she had been responsible for the feeding of a family, her method of planning the meals and of marketing seemed like a bit of "hit or miss" drudgery. There was not that feeling of satisfaction which should be the reward of work well done. Many a pleasant afternoon out had been spoiled by the annoying query all the way home as to what she was going to have for dinner, and whether there was any of this or that in the house. Then with the one idea of getting something easily prepared, she would start for market and go from one place to another only to hear the dealer say, "all out, madame." Or else she would find the stock picked over, a poor quality left, or the price more than she could afford to pay, and not knowing what else to do would buy the higher priced food and try to economize on something that was more essential than the thing purchased. This "last minute planning" was one reason

why she had relied upon meat to such an extent. Meat is almost always obtainable, and the more expensive cuts may be cooked quickly.

Planning Ahead

As Alice, like most novices in buying, thought it would be too much work to plan in advance the groceries she would need for the week, her mother decided that a little experience in planning both by the day and by the week might be valuable for purposes of comparison. During the first week Alice planned the meals each day with a great deal of care, calculated the exact quantity of each food needed, and bought just the right amount, sometimes going to market two or three times during the day. Frequently the calculating of food values was not completed until evening after the meals were eaten. Oftentimes she would find the family had had too little iron, or calcium, or more protein or energy than they needed. The protein was most perplexing, for it was always too high, and yet she did not see how it could be reduced. At the end of the sixth day the money for the week gave out, and she had to borrow from her mother.

Leaks in Buying

When her mother went over the accounts at the end of the week, Alice was $3.00 in debt. The first item catching her attention was three pounds of meat on each of the first four days of the week, at from 40 to 60 cents per pound. In response to her mother's suggestion that meat had not only increased the protein unduly but was also expensive, Alice replied that these purchases were made at the first of the week before she had realized how quickly the money was going to give out. "That is just the reason," said her mother, "why it is well to work on a weekly basis so that

you will be sure to have as much money for food on the last day of the week as on the first."

The rest of the itemized bill showed that she had bought cheese at five different times during the week, each time getting only ten cents' worth. To calculate the food value of the cheese, however, it had been necessary to weigh it at home, where she found she had received about three and one third ounces each time for her ten cents. Her mother asked her how much it was a pound, but it had not occurred to her to inquire. Upon inquiry she found the cheese to be 40 cents a pound, although she had been paying for it at the rate of 50 cents a pound. Then her mother told her it is always well to ask how much things are a pound, and to ask for a certain number of ounces or pounds, rather than to tell how much one has to spend. The ten cents wasted on the cheese would have bought two fine oranges for Betty. Betty had had to go without fresh fruit several days because the funds were getting low. The list in Table XXVIII gives an itemized account of other similar leaks that had caused her to go into debt.

$2.92 multiplied by 52 makes $151.84. Then a leakage of $2.92 a week means a total loss for the year of over $150, which might have been spent for more food, or for other items of expense, or saved against a "rainy day." Had there not been a standing order for six quarts of milk daily, she might have bought her milk a pint at a time, and would thus have wasted still more money. Planning at short range is an extravagant use of time, money, and, if food value is sacrificed thereby, of health.

Economy in Buying

After the experience just related Alice was quite ready to follow her mother's suggestions: first, to calculate the food value needed for the whole week; second, to plan the meals

TABLE XXVIII. — LEAKS IN ALICE'S GROCERY ORDER WHERE FOOD VALUE DISAPPEARED

		WHAT SHE PAID	WHAT SHE SHOULD HAVE PAID	LOSS
		cents	*cents*	*cents*
Butter	One pound of butter at 78¢ a pound purchased in 4 different lots. Each purchase cost 20¢	80	78	2
Cheese	One pound of cheese purchased in five 10¢ lots with cheese at 40¢ per pound	50	40	10
Eggs	Six eggs purchased singly at 6¢ each when eggs were 66¢ a dozen	36	33	3
Macaroni	One package (10 ounces) for 15¢, making macaroni 24¢ a pound when in bulk it was 12¢ a pound	15	8	7
Meat	Six to eight pounds more than was necessary, but as something else would have been substituted for part of this, there might have been a saving of perhaps $2.40			240
Potatoes	One and one half pecks potatoes purchased in three-pound lots at 4¢ a pound, when potatoes were 45¢ a peck	96	68	28
Prunes	Two pounds of prunes at 19¢ a pound were purchased in half pound lots at 10¢ each lot	40	38	2
	Total waste			$2.92

in a general way so as to make out the market order for the week; and lastly, to buy the dry groceries all at once and save leaks in expense.

If there were a standing weekly order for some staple articles, such as bread, potatoes, and eggs as well as for milk, this would not only help to make good use of the money and tend to give a well-balanced diet without detailed calculation, but would help to save time, and keep housekeeping systematic. It also saves useless waste of thought in making the same decisions day after day.

Her mother told her it would be impossible to make detailed plans for the meals until she knew what she would have in the way of left-overs or what she could get in the way of fresh fruit and vegetables each day, but in general she said that the changes would be in the form of substitutions, such as using peas instead of beans, or oranges for apples. Alice found this all true by experience. One day she planned to have fresh bean and carrot soup, but as the beans were unobtainable, and it was too late to cook dry beans, she made the soup of potatoes, onions, and a little cheese instead.

With a tentative plan made in advance, she went to market early in the morning with a better chance of getting the things needed and of having her mind free for other things for the rest of the day. When it seemed hard to plan ahead she would recall that her mother had said, "It may be hard, but the successful person is the one who overcomes difficulties."

By the time Alice had purchased and calculated the food values of a few weekly orders she could judge approximately the amount of each of the various types of foods required to provide the proper kind of meals for the family. She soon became quite expert in planning and buying on a moderately liberal food allowance. Then her mother reduced the allowance to the point where Alice would have to spend every cent to good advantage if the family was to get all the nourishment required. "But with less money to spend how am I to get the same number of pounds of bread, cereal,

meat, and vegetables I have found to be necessary, and how can I get enough food value for the family without these amounts?" asked Alice. Her mother thought it best for her to solve this problem for herself. Alice finally decided that there were two ways in which she could try to get the same food value for less money. One of these was to buy less expensive meat and to prepare it attractively in combination with vegetables and cereals. The other was to buy those foods with the most concentrated food value.

Alice soon learned that the more limited the amount to be spent, the more necessary a weekly plan if the family is to be saved from eating nothing but bread and tea during the last two or three days of the week. She also found the more one has to economize the more the following points need to be emphasized:

1. Buy in quantities as large as money, storage facilities, and keeping qualities will permit.
2. Cereals are cheaper when purchased in bulk (but they should be purchased at a clean store where the bins are mice-proof).
3. Ready-to-eat cereals are relatively expensive.
4. Among the grain products, oatmeal and whole wheat flour have highest food value because of the high ash content, especially iron.
5. The more one has to economize the more necessary it is to use the required amount of milk for the children.
6. The more one has to economize the less meat should be used. The cheaper cuts of meat not only cost less but contain more food value per pound. A fireless cooker will save fuel.
7. Dried and skimmed milk may be used to good advantage in cooking.

8. If canned vegetables and fruits have to be purchased at the store it should be kept in mind that with the exception of canned spinach and an occasional can of peas or tomatoes, canned goods are usually an extravagance.
9. Dried fruits are more economical than fresh fruit for adults.
10. Very small prunes or very large prunes are relatively expensive (the latter because they command high prices, the former because they are so largely stone). Those numbering 60–90 to the pound are most economical.
11. At all times it should be kept in mind that fat and sugar contain practically no ash and the ash of the diet will be deficient where these foods are depended upon to furnish too large a percentage of the energy.
12. Molasses is unlike sugar in that it is rich in both iron and calcium and is a good laxative.
13. Butter substitutes may be used for all persons over five years of age and for children under five where the maximum amount of fresh milk and some green vegetables are given every day.
14. It is poor economy to buy butter by the quarter of a pound. If one has no ice in summer, put the butter in a covered bowl or jar and arrange to keep it as suggested for milk on page 97.
15. When marketing, specify the amount wanted of any article and be sure to get the full amount paid for.
16. Use all left-overs and use the water in which vegetables are boiled in making soups and sauces.
17. Save fuel by frequently cooking enough cereal, vegetables, or meat at one time for two meals.
18. Make an inventory of the food on hand before starting for market each day.

PROBLEMS

79. Make a list of the foods you think could be ordered in weekly quantities or in larger quantities when there is room for storage.
80. Estimate the number of pounds of each of the supplies listed in Problem 79 which in your judgment would be needed by the Irving family for a week. Figure these estimates in terms of your own family and make out the weekly market order.
81. How many pounds of meat a week would you allow the Irving family? Which will be the more economical type to order: roasts, steaks, chops, fish, poultry, or tougher cuts of meat? What kind of meat should be purchased for meat pies, casserole dishes, hash, and one-dish meals? Suggest ways of preparing meat so that a little goes a long way in the flavoring of the dish.
82. Make a list of foods that might be purchased at a good delicatessen store. Calculate and compare the delicatessen store price and the price when cooked at home. Are time and fuel to be considered in food economy?
83. Compare the price of prunes by the 10-pound box in the fall, with the price of prunes later in the winter. How does the size of the prune affect the price? Do large prunes contain any more nourishment than small prunes?
84. When fresh fruit is high how will you manage to supply the family with its equivalent? What members of the family must have some fresh fruit each week? Compare the cost of dried-apple sauce with fresh-apple sauce. Compare the cost of stewed dried peaches with canned peaches. Do oranges go farther in marmalade than when fresh? Do you think jellies and jams and canned fruit could take the place of fresh fruit with the adults?
85. When and how could you use dried milk? How much does dried milk cost per quart? When and how could you use oleomargarine or nut butter? If oleomargarine or nut butter is used instead of butter, how much is there saved?
86. Compare the cost of cereals bought in bulk with cereals bought in a package. Compare the cost of cereals bought ready to serve with cereals that must be cooked. Are time and fuel the only things to consider here?

87. Compare the prices of food purchased in stores where no telephone orders are taken and no deliveries made, with the prices of food purchased in stores where such accommodations are given. Does it pay to take the time to do your own marketing?

A Short Way to a Well-planned Diet

As Alice struggled with her problem during the summer months she often wondered how people who have no one to advise them make "both ends meet." She wondered particularly about those who know nothing of food values and those who have gone directly from the shop or factory into homes of their own. The more she thought about it the closer seemed the relationship between the wistful, hungry look in the thin, pale faces of so many underweight children and the family market order. In her short experience she had found it quite possible to spend plenty of money for food without getting "plenty of food value."

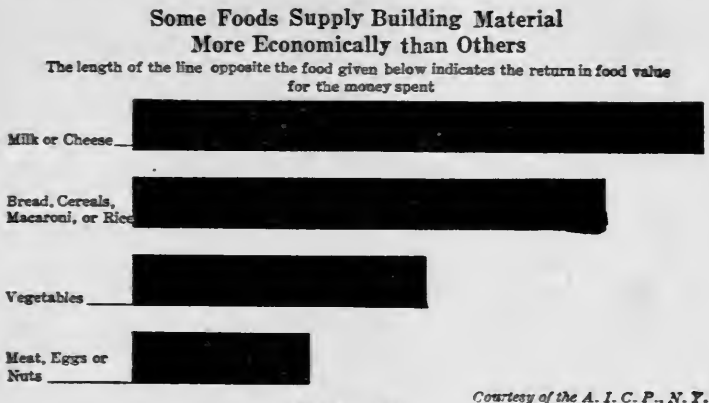
Others have thought about this same thing. Sherman of Columbia University of New York City, who has studied food chemistry a very great deal, thought about it so much that he felt it ought to be possible to devise some way whereby families, especially the children, would be getting all the food value needed though it were not possible to calculate the value of the diet. He felt the suggestions might be made so simple that even though the one who did the buying had no knowledge of the relative value of different foods, she might be guided aright.

He was instrumental in having made, and supervised the study of, the diet and market orders in 100 families where there were growing children. As a result of this study he concluded that the diet would be suited to the needs of the family if the following suggestions were used in making out the market order:

Of the money spent for food —

1. As much or more should be spent for milk as for meat.
2. As much or more should be spent for vegetables and fruit combined as for meat. Or
3. Spend no more for meat than for either milk or vegetables and fruit combined.

Rearranging the family market order according to these suggestions without increasing the amount spent for food



Courtesy of the A. I. C. P., N. Y.

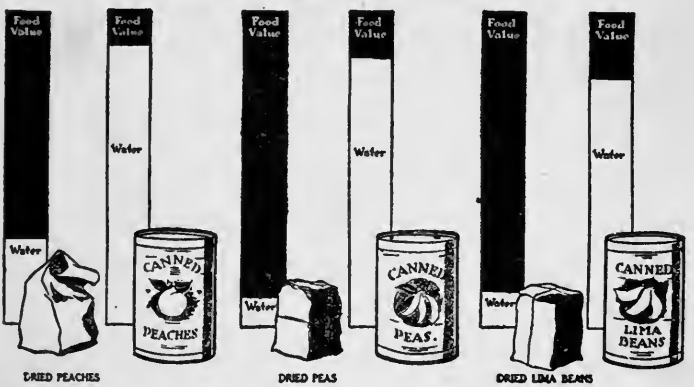
CHART XIV.

has since been tried in hundreds of families where there have been malnourished children with whom the doctors said nothing was wrong except their food. The quick response in improved physical condition, in the color of cheek, and in the sparkle of the eye is enough to assure us that it is a very satisfactory method.

In the majority of families the amount of money spent for food is sufficient to have the children well fed if it were spent wisely. In one family in which there were eight children, three of whom were suspected of having tuberculosis and all of whom were under weight, the mother spent five dollars

less a week after her diet and market order was readjusted to conform to the above suggestions. It is almost unbelievable that for the first time in months the children began to gain in weight on the new diet. The changes made were "more milk and vegetables and less meat." This is only one of many similar instances where the children have

COMPARATIVE FOOD VALUE OF DRIED AND CANNED VEGETABLES AND FRUITS



When you buy canned vegetables and fruits you pay for water which might be added at home for much less money.

FOOD CHART No. IV

A.I.C.P., 105 East 22nd Street, New York

Courtesy of the A. I. C. P., N. Y.

CHART XV.

improved wonderfully and where the amount of money spent for food is considerably less with a properly planned diet.

It is well known that the more one has to economize the more grain products should be used to provide sufficient energy. In the studies referred to above, the low-cost diets were not furnishing all the energy needed by active children unless the mother was spending about one fourth or one third of all the money spent for food for the more economical of the grain products. This then gives us another

very helpful suggestion where we must provide a large amount of nourishment for a very limited amount of money.

Chart XIV represents the amount of nourishment the family already referred to were receiving in return for the money they were spending for the various types of food.

Courtesy of the A. I. C. P., N. Y.

CHART XVI.

Charts XIV, XV, XVI, and the other charts in this book helped Alice to use large quantities of those foods from which she could get the most nourishment for the least expenditure.

PROBLEMS

88. Plan the meals for a week for the family of some member of the class.
89. Work out the grocery, dairy, butcher, and fish orders for these meals, and calculate the cost. How does it compare with the amount ordinarily spent by families (of a corresponding size) of the various members of the class?

Keep a Record of Food Purchased

With such a guide as Sherman has devised it is possible for any one to adjust her food expenditures so as to get a good return in food value for the money spent. But to know whether or not one is getting fully adequate amounts of nutriments it will be necessary to keep some kind of a record of the food purchased. After a few weeks of accurate record keeping, one should be able to estimate the divisions of her food expenses without this detailed account.

The following sheet [1] has been found useful in helping

Weekly Record for Food

Is the food well-planned for the health of the children?
(Put down amount, kind and cost)

Date.....

Bread, Cereals, Cakes, Flour, Rice, Macaroni		Milk, Cheese, Cream		Meat, Fish, Eggs		Vegetables, Fruits		Other Groceries, such as Butter, Sugar, Tea, Coffee	
	Cost		Cost		Cost		Cost		Cost
	$		$		$		$		$
Totals									

[1] Dietetic Bureau, Boston, Mass.

the mothers of these same underweight children to study and to plan the proper spending of the food money. It has helped many mothers to keep their children from becoming underweight.

Some such record as this will enable one to compare the totals spent for each type of food and to see whether the expenditures have been wise or not.

PROBLEMS

90. From the weekly record of food made, judge its "balance of food values" according to the relation of the amount spent for each type of food.

91. During the Christmas or the Easter vacation assume the entire responsibility for the ordering of the food in your home. For purposes of discussion, bring your results to class recorded on a form similar to the one on page 160.

REFERENCES

Cost of Food. Richards and Norton. Whitcomb and Barrows.

Cost of Living, Chapters I, II, III, and IV. Ellen H. Richards. Wiley and Sons.

Foods and Household Management, Chapter XVII. Kinne and Cooley. Macmillan Company.

CHAPTER XII

THE RELATIVE ECONOMY OF FOODS

After one has become familiar with the composition of different foods and their value in meeting the various needs of the body, it is easy to plan meals consisting of the foods that will provide for these needs. But if, in the planning of meals, cost must be considered, it is quite important to be able to judge the relative values of two or more foods of a similar nature at varying prices. For instance, the grain products are all valuable sources of energy, but they differ considerably in their protein, iron, and vitamine contents and consequent uses in the body. This makes it very desirable that we have some further means of telling from which one will get the best all-round return for the money spent.

A Method for Judging the Relative Value of Different Foods

To help in the selection of the more economical foods, Professor Sherman of Columbia University has worked out a scheme that may serve as a guide. In this method, protein, calcium, iron, phosphorus, and the energy value of a food are given certain values in "points" as in the score card for planning of meals. In this case the factors are marked according to the ability of the food to supply the various food constituents to the body in the quantities needed. This rating also resembles the mark one gets on an examina-

tion paper telling how near one has come to meeting the requirements.

The method explained. Of five questions in an examination, let us say that the first one asks for the answers to several points and if all are answered perfectly will be given a mark of 40, while each of the other questions, if answered satisfactorily, will be marked 15, making 100 in all as a perfect score. If the first one is only half correct it will be given a mark of 20, while any of the others with an answer only two thirds satisfactory will be marked 10, and so on according to the degree of perfection.

In a similar way foods are "examined" to determine their ability to "answer" to the question, "Energy, are you there in the amount needed by the body?" "Protein, calcium, phosphorus, and iron, are you there?" The energy is responsible for the largest amount of work and is given a value of 40. Protein is given a value of 15. If in any food there are 75 grams of protein to every 3000 Calories of that food, or as much as is needed in a well-balanced diet of 3000 Calories, it would be marked 15; but if there are only 37.5 grams, or half as much as is required in a well-balanced diet, the protein would be given a mark of only 7.5.

Unlike the examination paper, a food may score above 100. If the amount of protein in 3000 Calories were twice as much as is required by a person needing that number of Calories then it would be marked 30. In a similar way each of the other factors is judged and marked, and the resulting figures may be used in judging the relative merits of foods. These ratings are not intended to express the exact food value of any given food, but are good for purposes of general comparison.

The rating for each food. The following table gives the rating which has been worked out for each common food.

TABLE XXIX. — A COMPARATIVE RATING FOR EACH COMMON FOOD[1]

FOOD	RATING PER POUND	FOOD	RATING PER POUND
Cheese		Grain Products	
Cottage	1700	Bread, entire wheat	1700
Hard American	5700	Bread, white	1100
Eggs	1350	Bread, rye	1100
Fish		Corn meal	1400
Cod, salt	1700	Crackers	1400
Salmon, canned	1100	Cornflakes	1100
Meat		Farina	1300
Beef, sirloin	1450	Flour, graham	2100
Bacon	1300	Flour, rye	1400
Milk		Flour, white	1200
Condensed (sweetened)	2200	Hominy	1100
(unsweetened)	2000	Macaroni	1400
Skimmed	670	Oatmeal	2500
Whole	700	Rice, white	1100
Nuts		Sugar	700
Almonds[2]	2000	Vegetables	
Cocoa	3200	Asparagus, fresh	370
Filberts[2]	1750	Beans, dry, white	3400
Peanuts[2]	2100	Beans, dry, Limas	2800
Peanut butter	5700	Beans, fresh, Limas	420
Pecans[2]	1450	Beans, string	470
Walnuts[2]	670	Beets	280
Fats		Cabbage	370
Butter	1750	Carrots	340
Cream (18% fat)	860	Cauliflower	640
Cream (40% fat)	1150	Celery	350
Lard	1650	Corn, canned	520
Olive oil	1650	Cucumbers	150
Fruits		Lentils, dry	3500
Apples, fresh	150	Lettuce	380
Apples, dried	950	Onions	330
Bananas	250	Peas, dry	3000
Dates	1250	Peas, fresh	500
Grapefruit	170	Parsnips	400
Grapes	270	Potatoes, sweet	370
Lemons	230	Potatoes, white	400
Olives	1000	Radishes	200
Oranges	230	Spinach	900
Peaches, fresh	180	Squash	150
Pears	230	Tomatoes	200
Pineapple	250	Turnips	300
Plums	340		
Prunes	1150		
Raisins	1550		

[1] Adapted from *Chemistry of Food and Nutrition* by Sherman, H. C.
[2] With shell.

These figures in Table XXIX should be used only for purposes of comparing two foods of the same nature and cannot be used to compare vegetables and grain products, or milk and fruit.

The use of the rating. To show how this rating may be used, let us take, for example, potatoes with a rating of 400 per pound, and turnips with a rating of 300. Then pound for pound potatoes will answer more of the requirements of the body than turnips. If we want to know which of these two foods will be more economical when potatoes are 7 cents a pound and turnips are 5 cents a pound, we shall find that the return for every cent spent for potatoes is 57(400÷7) against 60(300÷5) for turnips. According to this rating, potatoes are practically as cheap at 7 cents as turnips at 5 cents.

If potatoes and turnips were each 5 cents a pound the relative economy of the two would be as 80(400÷5) is to 60(300÷5), and potatoes at the same price as turnips are more economical.

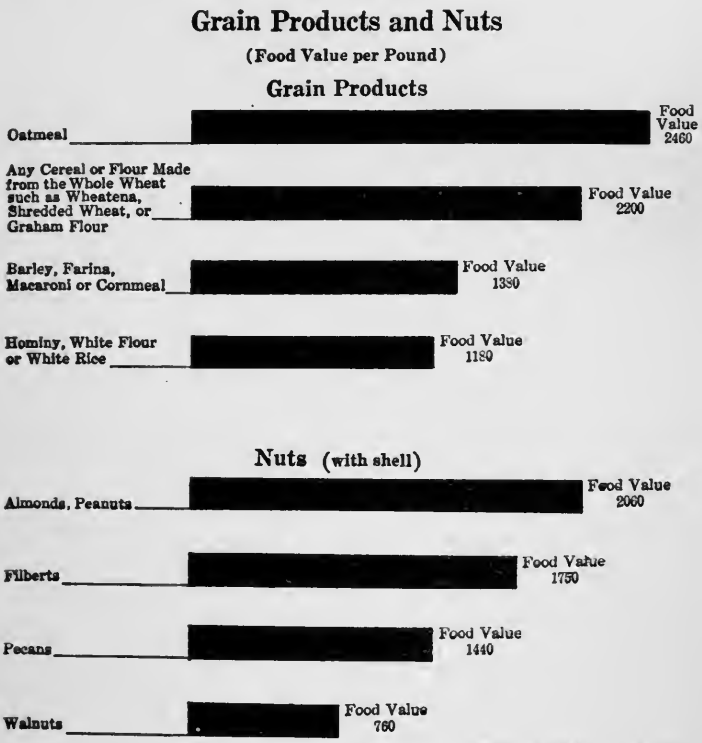
PROBLEMS

92. When eggs are — cents a pound (9 eggs), meat is — a pound, fish is — cents a pound, and cheese is — cents a pound, from which is there the best return for the money? Use current prices.

93. With milk at 15 cents a quart (2 pounds), sweetened condensed milk at 20 cents a can (1 pound), and unsweetened condensed milk at 20 cents a can (1 pound), how do they compare as to the value received in return for the money spent?

Grain products and nuts. The relative value of grain products and nuts is represented in Chart XVII. "He who runs may read" that the foods ranking highest on the scale of the grain products are oatmeal and whole wheat products. These are the grain products with the outer

coat of the grain left on in their commercial preparation. The refining process removes much valuable food material, so that if we consider the mineral elements and the vitamines, the whiteness of flour is in inverse proportion to its



Courtesy of the A. I. C. P., N. Y.

CHART XVII.

food value. The bran coats not only increase the food value but are excellent in helping to counteract constipation, a very common evil resulting from a starchy diet. Because these foods have a high food value per pound they should

be used most freely, especially where the strictest economy is necessary.

PROBLEM

94. Make a chart showing the food value received in return for 10 cents spent for each of the following grain products: oatmeal, cornmeal, cornflakes, graham flour, white flour, and rice.

Nuts have a high food value per pound. They are often called meat substitutes because of their high protein, fat, and ash content (especially iron), but they are frequently thought to be hard to digest. This is probably because they are not always chewed thoroughly, and because they are eaten in addition to meat and not in place of it. Nuts may be served plain or in nut loaves, nut croquettes, in salads, in cookies, and in sandwiches.

PROBLEM

95. Make a chart showing the relative value of almonds, peanuts, peanut butter, pecans, and walnuts on the basis of the food value received in return for the money spent.

Fruits and vegetables. A comparison of the return in food value for the same amount of money spent for dried and canned fruits and vegetables has been shown in Chart XV, Chapter XI. If dried peas are 15 cents a pound, and a can of peas weighing 20 ounces may be purchased for 20 cents, then for the same amount of money there is received from the dried peas about four times as much nourishment as from the canned vegetable. If canned vegetables have to be purchased at the store, and if every cent spent for food has to be made to do its maximum amount of work, canned fruits and vegetables are not economical. If, however, expense does not have to be considered, or if the food is canned at home, the canned vegetables and fruits are to

be recommended. They are a good food, although they are expensive if purchased at the store.

In Table XXIX dry beans are given a value of 3400, spinach is rated at 900, while potatoes have a value of only 400. To compare these three foods on this basis is hardly fair, as they represent respectively the seed, the leaf, and the tuber of the vegetable plant with different characteristics as foods. We should compare spinach with other green and

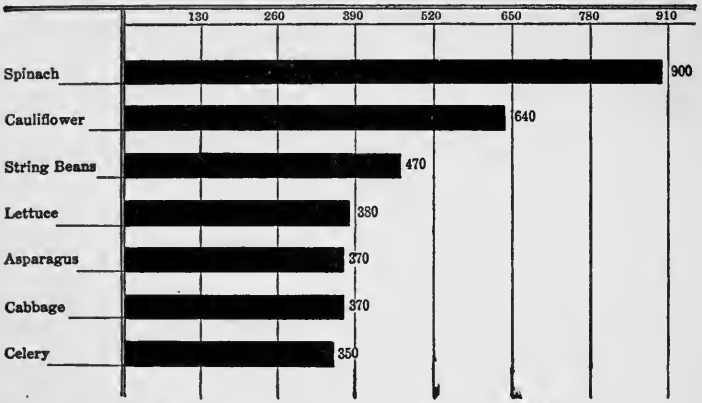


CHART XVIII. — GREEN AND LEAFY VEGETABLES.
A comparison of the score value per pound.

leafy vegetables, and potatoes with the roots and tubers. These comparisons are shown in Charts XVIII and XIX on pages 168 and 169 respectively. If cost is not to be considered spinach easily stands first among the leafy vegetables, then cauliflower, and then string beans. But the test in economy comes when the rating per pound is divided by the cost per pound to see how much one gets in return for each cent spent.

In Chart XIX, the potato is "king" of roots and tubers. The parsnip is a close second, but because of its strong

flavor it is not so commonly used. There is not much difference between the ratings for carrots, onions, turnips, and beets. The difference in cost as discussed on page 165 will determine their relative economy.

Tomato, though seemingly low in its ability to meet body requirements, is known to be a valuable source of the vitamine that protects us from scurvy, and its use is therefore to be

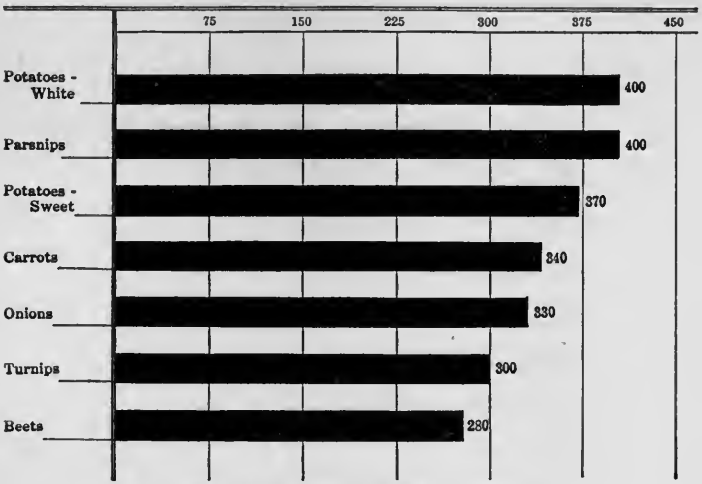


CHART XIX. — ROOTS AND TUBERS.
A comparison of the score value per pound.

recommended even in the most economical of diets. It would give a flavor to a diet that might be monotonous because of a larger use of grain products.

PROBLEMS

96. Make a chart showing the relative return in food value for the same amount of money spent for potatoes, carrots, onions, turnips, and radishes at current prices.
97. Make a chart showing the relative return in food value for the same amount of money spent for spinach, string beans, celery, cabbage, and lettuce at current prices.

98. Make a chart showing the relative return in food value for the same amount of money spent for cucumbers, squash, and tomatoes at current prices.

99. Make a chart showing the relative return in food value for the same amount of money spent for dried apples, dates, prunes, and raisins at current prices.

Since fruit is such an essential part of the diet, especially of young children, and since scarcity of fruit at certain seasons of the year makes the price high and the fruit seem prohibitive, it is of great importance to know which fruit to select so as to get the best return for the money one can afford to spend. The rating for the dried fruits indicates that they are good investments, as indeed they are, but the dried fruit should not be used to the exclusion of the fresh fruit, especially for young children.

PROBLEM

100. Make a chart showing the return in food value for the same amount of money spent for apples, bananas, and oranges at current prices.

Fats and sugars. Of the five food factors entering into the calculation of the rating, energy is practically the only one present in fats and sugars. The rating of both fats and sugars is high, however, because both are high in energy. In judging butter on the basis of economy, or the return in food value for the money spent for it, we must not forget the invaluable vitamine dissolved in the fat which at present it is not possible to measure. We should be influenced by the knowledge of its presence when comparing its value with other fats. The amount of whole milk and green vegetables which also contain this vitamine will help to decide the use of butter even at a high price.

Milk, meat, eggs, fish, and cheese. Among the foods providing high proportions of protein, such as milk, meat,

eggs, fish, or cheese, hard cheese is the most concentrated food with a rating of 5700 per pound, or practically the same as peanut butter. It has the chief constituents of the milk in a very condensed form and may be used in numberless ways to serve as the "meat" dish. In addition to a high protein content, cheese has a large amount of calcium, is high in energy, and since it contains the fat of milk, is probably rich in the fat-soluble vitamine. It is therefore an ideal meat substitute, but should not be served with a heavy meat dinner. A very small amount of meat in a generous dish of macaroni, cheese, and tomato makes an ideal combination. The meat will provide iron and the flavor so much desired without making a dish overbalanced with protein.

PROBLEM

101. Calculate and compare the "rating" and cost of the following combinations:

	Rating	Cost
(*a*) 2 lbs. meat		
½ lb. macaroni		
¼ lb. cheese		
1 lb. can of tomato		
Totals	____	____
(*b*) ½ lb. meat		
2 lbs. macaroni		
½ lb. cheese		
1 lb. can of tomato		
Totals	____	____

Divide the total rating of each combination by the corresponding cost to find the return in food value for each cent spent. Which is the cheaper combination?

Fish is more readily recognized as a meat equivalent, for its rating shows that it is not unlike meat in its total food value. In some sections of the country the cost is within

the reach of almost every family. Although the energy per pound is low (except in the fat or oily kinds of fishes) this deficiency is easily remedied by the addition of a bread stuffing, a dish of macaroni and tomato, or jam or jelly. At the same time these would add to the flavor of the meal.

The rating of eggs is 1350 per pound as compared with 1450, the average figure given for meat. According to these ratings eggs answer practically the same purpose and with the same efficiency as meat. In addition eggs rank next to milk in their value as a source of protein adapted to growth. They also contain the vitamine soluble in fat, so that their use is to be especially recommended for children and for those whose tissues have been wasted by disease.

Meat and milk are somewhat alike in the use made of them. Let us compare 1 quart of milk (which weighs about 2.2 pounds) with 2 pounds of meat. The score value of milk is 700 per pound or 1540 per quart, and that of meat 1450 per pound or 2900 for 2 pounds. With milk at 15 cents for 2 pounds (1 quart) and meat at 30 cents per pound, or 60 cents for 2 pounds, the relative return in food value for the money spent for the milk and the meat is as $103(1540 \div 15)$ to $48(2900 \div 60)$. (These are New York prices in 1919. Change and recalculate according to the prices for any given locality or time.) These figures show that the total return in food value from the money spent for milk is greater than from the meat, and the argument we so frequently hear that people cannot afford milk when they are buying meat at 30 or 40 cents a pound has no foundation. As a matter of fact the advantage is even more strongly with the milk than these figures indicate, for milk is a most excellent source of vitamines, whereas the vitamine value of meat is very low. No food can take the place of milk for growth. There is no satisfactory substitute for it. Milk is "nature's most valuable food." It is the best

food on which to depend for protein to supply the needs of children, and both children and adults need it for its calcium. It also contains a valuable fat, a certain amount of which is needed by every one. Milk is not a particularly economical source of energy and iron, but combined with other foods, it makes the total food supply economical.

REFERENCES

Adequacy and Economy of Some City Dietaries, pages 20 to 35. Sherman, H. C., and Gillett, L. H. Pub. No. 121, A. I. C. P., New York City.

Chemistry of Food and Nutrition, pages 391 to 400. Sherman, H. C. Macmillan Company.

APPENDIX A

DIET FOR ABNORMAL CONDITIONS

Sooner or later in almost every family there comes the problem of changing the diet of a normal, healthy individual to suit the needs of some special condition due to illness.

Although it is desirable to have the most suitable and easily digested foods in every disease, there are conditions in which diet is more important than drugs and medicines. These are the so-called "diet diseases," such as diabetes, gout, tuberculosis, and excessive fatness (obesity). If diet were understood and controlled as soon as the first symptoms were apparent, acute stages or the setting in of other diseases might be avoided. Constipation and its resulting ill effects might very frequently be entirely prevented by diet.

The diet may be prescribed in considerable detail by the physician, or his directions may be general; but it is very essential for the one who plans the meals for the family to be familiar with some of the principles involved, so as to apply suggestions intelligently.

Diet in Constipation

As has been suggested in several instances throughout the preceding pages, constipation, if not a disease in itself, is a condition that paves the way for disease. Waste products accumulate in the intestines. There should be one, two, or three regular daily movements of the bowels to rid the body of this waste material; otherwise it will decom-

pose into poisonous products that will be absorbed by the blood and carried to all parts of the body. A harmful substance in the body, such as the poison thus introduced, lowers resistance and makes the tissues less able to cope with disease germs.

Some of the minor effects of constipation are headache, dizziness, "indigestion," a languid feeling, and a muddy complexion, or even trouble with breathing and circulation. Slight as these effects may seem, they may be the "forerunners" of serious illness or a complication of diseases. What might have been a very simple thing to remedy had the diet been such as to overcome or better still prevent constipation, may prove to be a condition that cannot be remedied by either food or drug.

Drugs provide a temporary relief, but not a permanent cure. Where drugs are used, oftentimes the quantity taken has to be gradually increased until finally the drug becomes ineffective. Regular exercise is more lasting than drugs and should be taken daily. Walking is especially useful, though tennis, basketball, rowing, and skating are all recommended.

Water assists in overcoming constipation by keeping the food in a semi-liquid state. Every one, but especially those troubled with constipation, should drink from six to eight glasses a day. This not only serves to prevent congestion of food in the intestines, but helps to carry poisonous products out of the system by way of the kidneys.

In general, coarse cereals, vegetables, and fruits are the most important foods in counteracting the condition. Candy and all other sweets, rich pastry, fried foods, and tea should be avoided.

Foods that should be used freely are given in Table I. If these foods predominate in the diet, other foods may not have to be excluded entirely.

TABLE I.—FOODS RECOMMENDED TO PREVENT OR OVERCOME CONSTIPATION

Avoid	Eat	Drink
Tea, coffee, candy, sweets, and rich pastry	Bulky vegetables, coarse cereals, and fruits	Plenty of water — at least 4–5 glasses during the day, and 1 glass before going to bed

The following foods are the ones that should be used most freely:

BREAD AND CEREALS	VEGETABLES (Large Servings)		FRUIT (Use Fruit Every Day)		OTHER FOODS	
	Most Economical	*More Expensive*	*Most Economical*	*More Expensive*	*Most Economical*	*More Expensive*
Breads Bran muffins Graham, oatmeal, or corn meal Brown bread (sweetened with molasses) Cereals *Most Economical* Oatmeal, corn meal, barley, and hominy *More Expensive* Shredded wheat	Beans, fresh or dry Beets Cabbage Carrots Dandelions Other greens Onions Peas, fresh or dry Potatoes Spinach Turnips	Artichoke (French) Asparagus Brussels sprouts Celery Corn Rhubarb String beans Tomatoes	Apples, sour Prunes Pears	Berries (except blackberries) Cherries Figs Grapes (eat seeds and skins if possible) Grape juice Grape fruit Pineapple Plums	Molasses Cottonseed oil Peanuts	Honey Olive oil Butternuts
					In obstinate cases use agar agar. Get it at a drug store and cut in small pieces, eat as it is, or boil in water, flavor, and cool. ½ oz. agar agar to one quart water. Judge quantity by results. Use daily.	
Stir bran into any cooked cereal. It is an excellent remedy for constipation.	Eat skins of vegetables, especially baked potatoes		Take fruit ½ hour before breakfast. Eat figs at bedtime. Wash fruit and eat skins whenever possible.			

The following is suggestive of the type of meals useful in cases of constipation:

Breakfast

FRUIT: Orange juice, stewed figs, or prunes.
CEREALS: Shredded wheat, oatmeal, cracked wheat, or pettijohn, with cream (if possible), molasses, or milk.
BREAD: Whole wheat or oatmeal bread, graham or bran muffins, with butter or butter substitute.
BEVERAGE: Milk to drink.

Luncheon

MAIN DISH: Cream of onion soup, vegetable salad with oil dressing, or stuffed eggs, lettuce and onion salad, or grated carrot salad, or other combinations containing foods suggested in the preceding table.
BREAD: Whole wheat, corn meal or oatmeal bread, bran muffins, or Boston brown bread with butter or butter substitute.
DESSERT: Baked apples and molasses cookies, or gingerbread, or appropriate substitutes.

Dinner

MAIN DISH: Small portion of meat (if any) with large servings of vegetables.
BREAD: As above.
DESSERT: Suet or graham pudding with figs or prunes or appropriate substitutes.

DIET IN OVERWEIGHT CONDITIONS

Excessive overweight is due to an accumulation of fatty tissue. The only remedy for such a condition is a reduction of the fat by well-regulated diet and exercise, but since reduction of weight through reducing fat may be dangerous, it is best to be guided by the advice of a physician.

We have seen that fat in the tissues will be used for energy when the Calorie content of the diet is less than the energy

requirement of the individual. One way, then, of reducing fatty tissue is to increase the amount of exercise (and the energy requirement) and decrease the amount of food taken so that the intake of energy will be less than the amount required. For an overweight person whose normal requirement would be from 2200 to 2700 Calories, the diet may be cautiously reduced until it contains not more than 1000 to 1500 Calories. If the fuel value of the diet is insufficient to provide enough energy for the work done, the body will have to burn its own fatty tissues to produce the remaining amount, and the weight is reduced because of the loss of fat.

It is probable that increased exercise will increase the appetite, but bulky foods such as vegetables and fruits will provide a minimum of energy while at the same time satisfying the craving for food. This type of food will also supply protein, mineral elements, and vitamines. It is quite important that these factors be provided in adequate amounts so that the internal activities of the body may go on normally. The body is under a heavy strain with its burden of fat, and should not be expected to adjust itself to other abnormal conditions. These constituents, however, need only be in proportion to muscular tissue, not in proportion to muscular tissue plus fat. For example, a woman 25 years old, 5 feet and 4 inches in height, and weighing 250 pounds, would need protein in proportion to 125 pounds rather than her actual weight.

Too much water should be avoided, as it tends to increase the appetite. Salt should be avoided, as it creates thirst. In general, fatty foods, sugars, and starches should be used cautiously, while vegetables, fruits, lean meats, and non-oily fish may form the bulk of the diet.

In Table II will be found a summary of foods allowed and those to be avoided.

Table II.—Diet for Overweight Condition

General Suggestions

Masticate food thoroughly (this decreases the desire for an excessive amount).

Eat bulky foods such as vegetables and fruit.

Use lean meats, dry fish, oysters, and clams, eggs, cottage cheese, skimmed milk, or buttermilk. Use day-old bread.

Gelatin and Irish moss may be used for desserts. Tea and coffee may be taken if without cream and sugar.

Avoid much liquid either in beverages or in thin soups. (Not more than 4 glasses a day).

Avoid much salt — it creates thirst.

Avoid cereals, crackers, and hot or fresh breads.

Avoid sugar, sirups, candy, jams, preserves.

Avoid cream, fats, and oils.

Avoid all fried foods, pies, cakes, and other pastry. Avoid too much variety — this increases appetite.

Meat and Fish

To Be Preferred	*To Be Avoided*
Fish (dry white fish) such as	*Fish* (oily fish)
Cod	Bluefish
Haddock	Mackerel
Halibut	Salmon
Meat, lean	Sardines
Beef	Shad
Mutton	*All fried fish*
Lamb	*Meat*, fat meat
Fowl	Bacon
	Ham
	Sausage
	Pork of all kinds

Fruits

To Be Preferred (Serve Without Sugar and Cream)		*To Be Avoided*
Blackberries	I	Bananas
Grape fruit	I	Dates
Oranges	I	Grapes
Peaches	I	Plums
Pineapple	I	Prunes
Strawberries	I	Raisins
Apples	II [1]	
Apricots, fresh	II [1]	
Blueberries	II [1]	
Cherries	II [1]	
Raspberries	II [1]	
Pears	II [1]	

Vegetables

To Be Preferred	*To Be Avoided*
Asparagus	Beans, shelled, fresh, or dry
Artichokes, French	Beets
Brussels sprouts	Carrots
Cabbage	Corn
Cauliflower	Parsnips
Celery	Sweet potato
Cucumbers	Avoid too much potato
Greens of all kinds	
Lettuce	
Onions	
Radishes	
Spinach	
Potatoes, one a day	
Squash	
String Beans	
Tomatoes	
Turnips	

Grain Products

Use Sparingly	*Avoid*
Bread, only day old	Much bread or cereal
Graham	
Entire wheat	
Oatmeal	

[1] To be avoided in severe cases.

The following plan is suggestive of the type of meals that will help to give the desired results in reducing the weight of an overweight person:

Breakfast

Uncooked fruit
1 to 2 eggs 1 slice day-old bread with 1 teaspoon butter
Clear coffee if desired

Dinner

Lean meat, non-oily fish, or shell fish
1 potato and 2 green vegetables
1 slice bread with 1 teaspoon butter
Gelatin dessert or fruit

Supper

Fruit or vegetable salad with cheese
1 slice bread with 1 teaspoon butter
Clear coffee if desired

Diet in Tuberculosis

Tuberculosis is a germ disease, but the chief essentials in helping the body to resist the growth of the germ, or in fighting it after it has grown, are plenty of nourishing, easily digested foods, fresh air, plenty of sleep, absence of worry, with a proper balance between rest and exercise. Sanitary conditions should be maintained to prevent the spread of the disease.

There should be a slow, steady gain in weight. A rapid increase in weight is not always a favorable symptom. It may indicate a storage of fat and a retention of water rather than the building of muscular tissue. In such cases, the strength does not increase in proportion to weight, and a relapse may occur.

Physicians differ in the diet prescribed in tuberculosis, but more and more a diet such as has been described in the preceding chapters of this book is thought to give the most satisfactory, lasting results. The amount of food will depend on the ability of the person to digest it. The quantity of food which any given person may take may be increased by eating four meals a day at regular hours, or by taking light luncheons mid-morning and afternoon. It is now quite generally believed that the patient should not be forced to eat an abnormal amount of food. Almost as much harm may result from eating too much as from eating too little. The quantity should not be such as to overtax the digestive system, the kidneys, or the heart. If a person has lost much weight and strength, he should reduce his exercise and increase the amount of rest so as to give the body a chance to use more of the food in rebuilding the tissues and increasing resistance by requiring less for the production of energy.

The quantity of food needed by a tubercular person is generally spoken of in terms of Calories, the number recommended varying with the age, size, and condition of the individual. It is probably safe to say that the Calories may be increased from one fifth to one sixth over the normal requirement in health, but we now believe it is quite as important that the protein, mineral elements, and vitamines are present in the right amount as that Calories are especially abundant.

In Table III there is a scheme by means of which it is possible to select a fairly well-balanced diet without a knowledge of food values. Table IV will help the untrained person in selecting more accurately a certain number of Calories which will at the same time provide the right amount of the other essentials. In using Table IV, to every 100 Calories of meat, fish, or meat equivalents, select from 100 to

TABLE III. — DIET FOR TUBERCULAR PEOPLE

Eat four times a day if it is impossible to eat the required amount in three meals.

Avoid tea, coffee, pastry, rich sauces, and fried foods.

MILK: 1 quart a day. (Some cream in addition is good if it can be afforded.)

BREAD AND CEREALS:

2–3 slices of bread each meal. Whole wheat and oatmeal are especially good.

Plenty of cereal, especially oatmeal or whole wheat products. Put cereals in soups, puddings, bread, and muffins.

Any cereal is good, but the following are most economical: oatmeal, barley, rice, corn meal, hominy, samp, wheatena, pettijohn, and cream of wheat.

VEGETABLES:

2–3 potatoes a day (white or sweet).

½ to 1 cup of one *or more* other vegetables. (Eat generous quantities of vegetables.)

String beans, shelled beans, peas, beets, cabbage, carrots, cauliflower, celery, lettuce, spinach, onions, tomatoes, parsnips, turnips. (Eat tops of any vegetables, except parsnips or rhubarb leaves. Turnip tops are especially good.)

MEAT, FISH, CHEESE, PEAS, AND BEANS:

Eggs, cheese, peas, and beans may be used in place of meat. Meat should not be excessive.

Quantities:

2–6 oz. meat or fish.

1–2 eggs a day and 1–2 oz. cheese, beans, or peas, or a smaller amount of each of several of the group.

FRUIT:

Some fruit at least once a day.

(Apples, bananas, berries, dates, oranges, prunes, raisins, figs, grapes, peaches, pears, plums, or other kinds.)

FATS:

At least 2–4 tablespoons of fat or oil. (Butter is especially desirable if it can be afforded.)

SUGAR:

Not over 4 tablespoons of sugar or sirup.

Molasses is particularly good and may be used freely.

FOODS rich in iron are especially to be recommended.

Green and leafy vegetables, prunes, raisins, dates, eggs, dry beans, peas, peanuts, molasses, oatmeal, and whole wheat are good sources of this element.

TABLE IV. — DIET FOR UNDERNOURISHED OR TUBERCULAR PEOPLE

Eat easily digested and the most nourishing foods. Avoid tea and coffee.

GROUP I

MILK; MEAT AND FISH; MEAT EQUIVALENTS

Use 1 qt. of milk (670)

Weight	Quantity		Calories
		Milk	
	1 qt.	Whole milk	670
1 oz.	1½ tbsp.	Sweetened condensed milk	100
2 oz.	¼ cup	Unsweetened condensed milk	100
		Select 200–300 Calories from *A* and *B*	
		***A* Meat**	
2 oz.		Lean beef (4″×3″)	100
1½ oz.		Medium fat beef	100
1 oz.		Medium fat pork	100
1 oz.		Lamb chop (eat the fat)	100
		Fish	
2–3 oz.		Fish in general	100
2 oz.	½ cup	Salmon (canned)	100
1.5 oz.	3–6	Sardines	100
		***B* Meat Substitutes**	
	1 medium	Egg	80
0.8 oz.	1½-in. cube	Cheese	100
1 oz.	2 tbsp.	Dry beans or peas	100
0.6 oz.	1 tbsp.	Peanut butter	100

GROUP II

VEGETABLES [1]

Select

300–400 Calories or more	Potatoes	200–300
	Other vegetables	50–100

Weight	Quantity		Calories
5 oz.	1 medium	Potato, white or sweet	100
3 oz.			100
4 oz.	5 stalks	Asparagus	25
1 oz.	1 small	Artichoke (French)	20
1½ oz.	¼ cup	Beans, fresh shelled	50
2 oz.	½ cup — 1-in. pieces	Beans, string	25
2 oz.	1 small	Beet	25
2 oz.	1 cup — cooked	Cabbage	20
2 oz.	1 (3″–4″ long)	Carrots	25
3 oz.	½ small head	Cauliflower	25
5 oz.		Celery	25
4½ oz.	1 ear — 6″ long	Corn	50
9 oz.	1 large head	Lettuce	50
2 oz.	1 medium	Onions	25
1½ oz.		Parsnips	25
1 oz.	3 tablespoons	Peas, fresh	25
3 oz.	½ cup — cooked	Spinach and other greens	20
5 oz.	1 medium	Tomatoes, fresh	30
5 oz.	½ cup	Tomatoes, canned	30
2½ oz.	½ cup cubes or ½ cup mashed	Turnips	25
		Turnips	25

[1] Cook potatoes and all other vegetables in skins so far as possible. Where this is not possible, use the water in which they are cooked in soups, gravies, etc. ¼ cup of white sauce 75–100.

200 Calories from vegetables, from three to four times as many Calories from grain products, at least 100 to 200 Calories from fruit, not over 200 Calories from sweets, and from 200 to 400 Calories from fat. Liberal amounts of fat

GROUP III CEREALS, BREADS, ETC. Select 800–900 Calories				GROUP IV FRUIT Select 100–200 Calories			
Weight	Quantity		Calories	Weight	Quantity		Calories
1 oz. (uncooked)	1 cup (cooked)	Oatmeal	100	7.5 oz.	1 large	Apple, fresh	100
				1.2 oz.	½ cup	Apple, dried	100
1 oz. (uncooked)	⅓–¼ cup (cooked)	Cereals, such as wheatena, pettijohn, corn meal, hominy, farina, barley, rice	100	1 oz.	9 halves	Apricots, dried	100
				5.5 oz.	1 large	Banana	100
				6.1 oz.	½ cup	Blackberries	100
				6.0 oz.	1 cup	Blueberries	100
				1 oz.	3–4	Dates	100
				1 oz.	1½ large	Figs	100
1 oz.	1¼–1½ cup	Ready-to-eat cereals: puffed rice, cornflakes	100	5 oz.	1 large bunch	Concord grapes	100
						Malaga	100
				3½ oz.	½ cup	Grape juice	100
				1.5 oz.	6–8	Olives	100
				10 oz.	3 medium	Peaches, fresh	100
1 oz.	1 large	Shredded wheat	100	1 oz.	6 halves	Peaches, dried	100
1.4 oz.	1 large slice	Bread or 1 roll	100	6 oz.	2 medium	Pears	100
1.8 oz.	1 slice (3″ x 3″ x ¼″)	Boston brown bread	100	4½ oz.	3–4 large	Plums	100
				1 oz.	¼ cup	Raisins	100
				1.4 oz.	3–4 medium	Prunes	100
1 oz.	2–3	Cookies (2″–3″ in diam.)	100				
1 oz.	2″ x 2″	Gingerbread	100				

For an adult weighing about 150 pounds, use 1 quart of milk (670 Calories), and select from 200 to 300 Calories from meat or its equivalents (Group I, A and B), from 300 to 400 Calories from vegetables (Group II), from 800 to 900 Calories from grain products (Group III), at least 100 or 200 Calories from fruit (Group IV), not over 200 Calories from sugars, etc. (Group VI), and from 200 to 400 Calories from fats (Group V). This selection provides about 2700 Calories a day. If more are desired, add more milk, cheese, fruits, vegetables, and fats, but not much more sugar, meat, or eggs.

GROUP V FATS Select from 200–400 Calories				GROUP VI SUGARS, ETC. Select about 200 (not over 300) Calories			
Weight	Quantity		Calories	Weight	Quantity		Calories
½ oz.	1 tbsp.	Butter		0.9 oz.	2 scant tbsp.	Sugar	100
		Butterine		0.9 oz.	3½ full-sized lumps	Sugar	100
		Lard			1½ tbsp.	Corn sirup	100
		Oil, corn, cottonseed, olive, or any fat	100	1 oz.	1 tbsp.	Honey	100
				1 oz.	1½ tbsp.	Maple sirup	100
	¼ cup	Thin cream or top milk	100	1 oz.	1½ tbsp.	Molasses	100
0.6 oz.	4–5 small slices	Bacon	100	Use sugar in diluted form as in cocoa, drinks, puddings, etc.			
½ oz.		Salt pork	100				

are usually recognized as beneficial, but should not be used to such an extent as to lower the mineral and vitamine content of the diet. Because of its vitamine butter is much preferable to other fats. If economy is necessary in the diet for tuberculosis one will do better to economize on meat and use genuine butter rather than a substitute.

DIET IN DIABETES

Diabetes so far as known is entirely a diet disease. The tissues cannot burn sugar. Consequently the sugar accumulates in and injures the tissues. This must be controlled by a diet with the amount of carbohydrate restricted to amounts varying with the severity of the disease. (Carbohydrate is chiefly starch and sugar and the starch yields sugar in the body.) The diet should be carefully supervised and the amount of sugar excreted through the kidneys determined frequently. Expert medical advice is very essential, especially when other diseases introduce complications, but any one preparing the food for a diabetic patient should be familiar with the type of food that may be eaten.

TABLE V.—PERCENTAGE OF CARBOHYDRATE IN VEGETABLES, FRUITS, AND NUTS[1]

VEGETABLES (FRESH OR CANNED)

Around 5%		About 10%	About 15%	About 20%
Lettuce	Tomatoes	Pumpkin	Green peas	Potatoes
Cucumbers	Brussels sprouts	Turnip	Artichokes	Shell beans
Spinach	Watercress	Kohlrabi	Parsnips	Baked beans
Asparagus	Sea kale	Squash	Canned lima beans	Green corn
Rhubarb	Okra	Beets		Boiled rice
Endive	Cauliflower	Carrots		Boiled macaroni
Marrow	Eggplant	Onions		
Sorrel	Cabbage	Mushrooms		
Sauerkraut	Radishes			
Beet greens	Leeks			
Dandelion greens	String beans			
Swiss chard	Broccoli			
Celery				

FRUITS

Ripe olives (20% fat)	Lemons	Apples	Plums
Grapefruit	Oranges	Pears	Bananas
	Cranberries	Apricots	Prunes
	Strawberries	Blueberries	
	Blackberries	Cherries	
	Gooseberries	Currants	
	Peaches	Raspberries	
	Pineapple	Huckleberries	
	Watermelon		

NUTS

Butternuts	Brazil nuts	Almonds	Peanuts
Pignolias	Black walnuts	Walnuts (English)	40%
	Hickory	Beechnuts	Chestnuts
	Pecans	Pistachios	
	Filberts	Pine nuts	

MISC.

Unsweetened and unspiced pickle, clams, oysters, scallops, liver, fish roe			

[1] Prepared by Joslin of Boston.

In the most restricted diets, only those foods containing practically no carbohydrate are allowed. These are meat, fish, gelatin, eggs, butter, and oils (with tea and coffee, which are not foods). Of these foods, fats are recognized as a good source of energy and may be used freely to provide it. They are often difficult of digestion, however, so that they cannot be used to too great an extent. They are also likely to produce a condition of acidosis if used in excess.

In quite severe cases, only those foods containing 5 per cent or less of carbohydrate are allowed. In slightly less severe cases, foods containing 10 per cent of carbohydrate may be used, and so on. In Table V, the per cent of carbohydrate in each common fruit and vegetable is given.

People afflicted with diabetes often crave sweets. Saccharine, which has a very sweet taste, is sometimes used, but it does not entirely satisfy the craving and one soon tires of its extreme sweetness.

The following meals are adapted to the diabetic condition where only 5 per cent of carbohydrate is allowed. Other foods in the second, third, or fourth columns of Table V may be added as the amount of carbohydrate allowed is increased.

Breakfast

Gluten breakfast food and cream
Eggs, meat, fish (including shell fish), or bacon
Gluten bread with butter or butter substitute
Greens, radishes, tomatoes, or other vegetables if desired
Coffee with cream but no sugar

Dinner

Meat, fish, clams, oysters, bacon, or salt pork
Any vegetable from first column in Table V served with butter or oil
Gluten bread with butter or butter substitute
Vegetable salad with cheese and oil
Butternuts or pignolias
Gelatin dessert
Coffee (if desired)

Supper

Clear tomato soup (other vegetables in column A may be added)
Eggs, meat, fish, or cheese
Vegetables from first column, Table V
Gluten bread with butter or butter substitute
Dessert as for dinner

Gout

Occasionally a physician tells a patient that he has too much uric acid in his system. In other words that person has gout. Uric acid is normally formed in the tissues as one of the waste products, but it is usually eliminated through the kidneys before injurious effects are noted. When accumulating in excess, it causes the symptoms recognized in gout. This means that there is something wrong with the habits of living or eating of that person.

Table VI. — Foods to Be Avoided in Gout

Meat and Fish	Vegetables	Fruits and Nuts	General Suggestions
Beef	Asparagus	Dried fruit	*Avoid*
Mutton	Beans	Lemons	Too much protein food (much meat)
Pork	Mushrooms		
Veal	Peas		Fried foods
Duck	Rhubarb		All foods hard to digest
Goose	Spinach		
Turkey	Tomatoes	Nuts	Sugar, sweets, rich sauces, and puddings
Liver		All nuts	
Kidney			Pickles
Sweetbreads			Spices
Salted meat			Coffee
Dried meat			
Fish			
Oily fish			
Salted fish			
Dried fish			
Preserved			

It may be that he is eating too much even of a well-selected diet without enough exercise to stimulate the proper excretion of waste products. Or the diet may contain an overabundance of food that is too stimulating, such as protein food, or alcoholic beverages may be taken in such quantities as to increase the tendencies.

If there is too much uric acid in the system, then it is obviously important to try to reduce it. At least, it should not be knowingly increased. Some foods contain the substance from which uric acid is produced more abundantly than others. These foods should naturally be avoided. Without trying to explain what uric acid is (for a knowledge of chemistry is necessary for an understanding of the term), Table VI tabulates the foods to be avoided in gout.

Suggestions for meals in chronic gout.

Breakfast

FRUIT: Fresh, either cooked or uncooked, but without sugar.

CEREAL: Those low in protein, such as hominy or rice. Milk or cream on the cereal.

Dinner

MILK: (May be made into milk toast or cocoa or other milk dishes.)

BREAD: Any bread or toast, but those lowest in protein to be preferred.

Butter or butter substitute.

MAIN DISH: Eggs, *very small* amount (if any) of beef, chicken, whitefish, or bacon.

VEGETABLES: Potatoes, and any other vegetables allowed.

Bread with butter or butter substitute.

DESSERT: Fruit as for breakfast; junket, custard, or cereal pudding.

Supper

(Supper should be light)

Cereal and milk, or bread and milk

or

Light vegetable soup with bread, toast, or crackers

Cereal pudding

APPENDIX B

TABLE I. — AMOUNT (IN GRAMS) OF PROTEIN, CALCIUM, PHOSPHORUS, AND IRON IN 100-CALORIE PORTIONS OF EACH OF THE COMMON FOODS. (Copied from Sherman's *Chemistry of Food and Nutrition.*)

VEGETABLES					FRUITS				
	Protein	Calcium	Phosphorus	Iron		Protein	Calcium	Phosphorus	Iron
	Grams	*Grams*	*Grams*	*Grams*		*Grams*	*Grams*	*Grams*	*Grams*
Asparagus	8.1	.122	.177	.0045	Apples	0.6	.012	.020	.0005
Beans, white	6.5	.047	.137	.0020	Apricots	1.9	.023	.044	.0005
limas	5.8	.020	.096	.0020	Bananas	1.3	.009	.031	.0006
string	5.6	.110	.126	.0027	Blackberrics	2.3	.029	.058	.0010
Beets	3.5	.064	.084	.0013	Blueberrics	0.8	.027	.011	.0012
Brussels sprouts	7.3	.086	.380	.0035	Cantaloupe	1.5	.044	.038	.0007
Cabbage	5.1	.143	.092	.0035	Cranberries	1.2	.025	.039	.0005
Carrots	2.4	.124	.101	.0013	Currants, dry	0.9	.039	.027	.0013
Cauliflower	5.9	.403	.200	.0020	fresh	0.8	.026	.061	.0009
Celery	1.3	.421	.201	.0027	Dates	2.6	.045	.066	.0009
Chard	8.4	.393	.105	.0066	Figs	0.6	.019	.016	.0009
Corn	3.1	.006	.102	.0008	Grapes	1.4	.051	.037	.0010
Cucumbers	4.6	.090	.191	.0012	Grapefruit	1.4	.019	.032	.0003
Dandelions	3.9	.172	.117	.0044	Lemons	1.2	.040	.036	.0006
Eggplant	4.3	.041	.122	.0018	Olives	2.3	.081	.049	.0014
Kohl-rabi	6.5	.249	.186	.0019	Oranges	0.4	.041	.004	.0010
Lentils	7.4	.031	.126	.0025	Peaches	1.6	.088	.040	.0004
Lettuce	6.3	.224	.224	.0079	Pears	1.7	.038	.057	.0007
Onions	3.3	.069	.093	.0010	Pineapple	1.0	.024	.041	.0005
Parsnips	2.5	.091	.117	.0009	Plums	0.9	.041	.064	.0012
Peas	6.7	.026	.120	.0017	Prunes	1.2	.024	.038	.0006
Peppers, green	4.6	.034	.145	.0022	Raisins	0.7	.018	.035	.0010
Potatoes, sweet	1.5	.016	.037	.0004	Raspberries	0.8	.019	.038	.0014
white	2.7	.016	.069	.0016	Strawberries	2.6	.074	.078	.0009
Pumpkin	3.9	.090	.229	.0013	Watermelon	2.6	.104	.072	.0021
Radishes	4.4	.073	.098	.0021		1.3	.038	.010	.0010
Rhubarb	2.6	.189	.134	.0043					
Spinach	8.8	.281	.285	.0150					
Squash, summer	3.1	.039	.035	.0013					
winter	3.1	.039	.061	.0013					
Tomatoes	4.0	.050	.113	.0018					
Turnips	3.3	.161	.117	.0013					

TABLE I. — *Continued*

MEAT, FISH, EGGS, CHEESE, NUTS	Protein	Calcium	Phosphorus	Iron
	Grams	*Grams*	*Grams*	*Grams*
Almonds	3.2	.037	.072	.0006
Beef, lean	12.0	.007	.129	.0018
medium fat	7.5	.004	.081	.0011
Buttermilk	8.4	.294	.271	.0007
Cheese (Am.)	6.1	.212	.156	.0003
Clams, long	19.8	.285	.282	.0097
round	14.0	.229	.100	.0097
Cocoa	4.4	.023	.143	.0005
Coconut	1.0	.006	.018	.0003
Chestnuts	2.6	.014	.044	.0003
Chocolate	2.1	.015	.075	.0004
Eggs	9.1	.045	.122	.0021
Fish, lean	22.6	.025	.259	.0012
oily	13.3	.015	.153	.0007
Fowl	8.6	.005	.093	.0013
Hazelnuts	2.2	.041	.050	.0006
Lamb	6.4	.004	.069	.0010
Milk, whole	4.8	.174	.134	.0004
skimmed	9.3	.331	.262	.0007
con'd — sweetened	2.7	.096	.072	.0002
unsweetened	5.8	.189	.146	.0004
Mutton	6.2	.004	.067	.0009
Oysters	12.3	.106	.306	.0089
Peanuts	4.7	.013	.073	.0004
Pecans	1.3	.012	.045	.0004
Pork, lean	9.1	.005	.098	.0014
medium fat	4.5	.003	.049	.0007
Veal	14.5	.008	.156	.0022
Walnuts	2.6	.013	.015	.0003

CEREAL PRODUCTS; FATS AND SUGARS	Protein	Calcium	Phosphorus	Iron
	Grams	*Grams*	*Grams*	*Grams*
Bread, Boston brown	2.6	.056	.082	.0013
entire wheat	4.0	.020	.071	.0010
Graham	3.4	.020	.084	.0010
rye	3.5	.009	.058	.0004
white	3.5	.011	.035	.0004
Corn meal	2.6	.005	.053	.0003
Cottonseed meal	?	.066	.298	?
Crackers, soda	2.4	.006	.025	.0004
Farina	3.1	.006	.035	.0002
Flour, buckwheat	1.8	.011	.065	.0002
entire wheat	3.9	.009	.066	.0007
Graham	3.7	.011	.101	.0010
rye	2.0	.005	.082	.0004
white	3.2	.006	.026	.0002
Hominy	2.4	.002	.027	.0003
Macaroni	3.7	.006	.040	.0003
Oatmeal	4.2	.017	.099	.0010
Rice, brown	?	.003	.060	.0006
white	2.3	.001	.027	.0003
Shredded wheat	3.5	.011	.089	.0012
Tapioca		.004	.025	.0005

FATS AND SUGARS				
Bacon	1.7	.001	.018	.0003
Butter	0.1	.002	.002	.00003
Cream, 18%	1.3	.050	.044	.0001
40%	0.6	.020	.020	.00005
Honey	0.1	.002	.006	.0003
Maple sirup	0.0	.037	.003	.0010
Molasses	0.8	.074	.015	.0026

TABLE II. — FUEL VALUE PER POUND OF FOODS AS PURCHASED. (From Sherman's *Chemistry of Food and Nutrition.*)

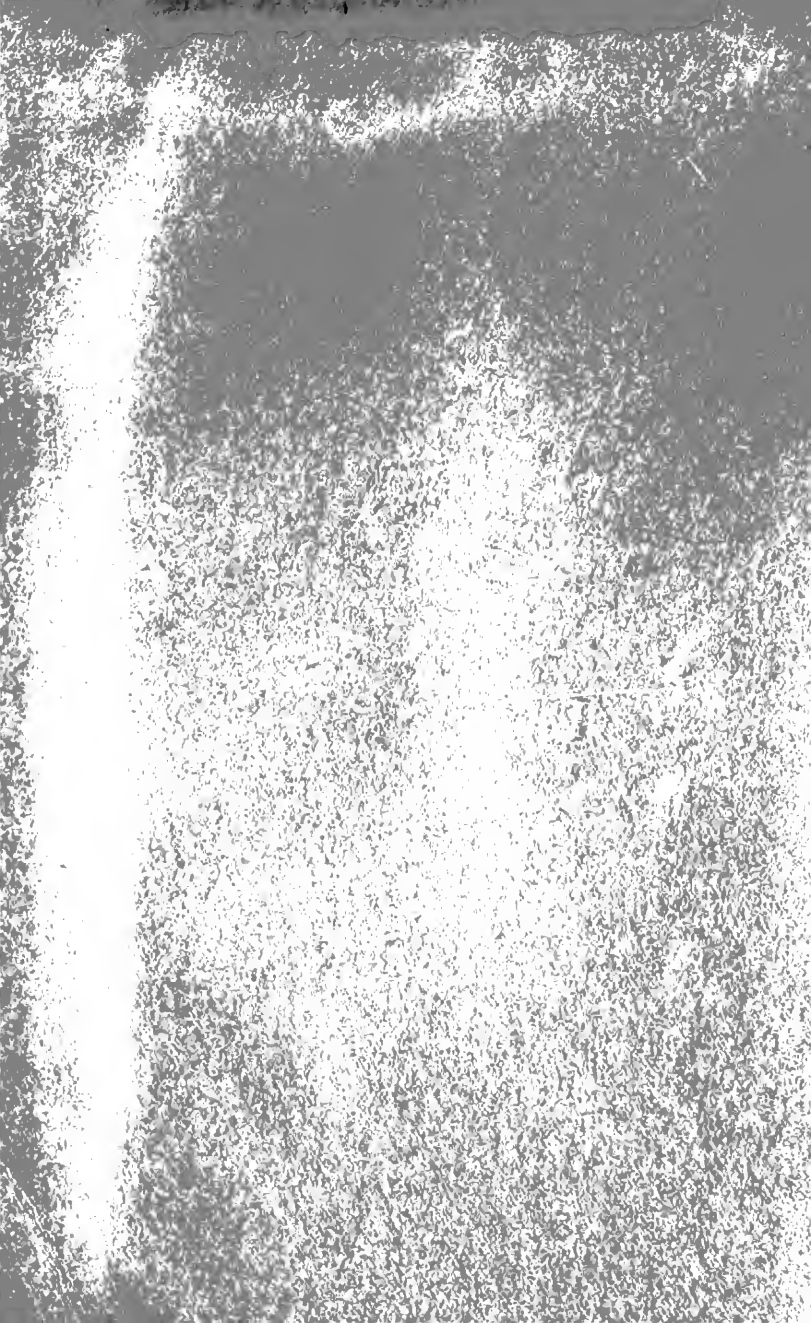
FOOD	CALORIES PER POUND	FOOD	CALORIES PER POUND
Almonds, shelled	2940	Cherries, fresh	337
Apples	214	Chestnuts (shelled)	1098
Apricots	247	Chicken (broilers)	289
Asparagus	100	Chocolate	2768
Bacon	2372	Cocoa	2258
Bananas	290	Cod, salt	361
Barley, pearl	1615	Corn, green	178
Beans, dried	1565	Corn meal	1620
baked	583	Cowpeas, dried	603
limas, dried	1586	Crackers, butter	1887
limas, fresh, shelled	557	cream	1938
string, fresh	176	graham	1905
Beef, chuck	797	soda	1875
corned	1230	water	1855
hind quarter	757	Cranberries	212
liver	537	Cream (18% fat)	883
loin	764	Cucumbers	68
Porterhouse steak	1076	Currants, fresh	259
ribs, lean	654	dried	1455
round, lean	649	Dandelion greens	277
rump, lean	796	Dates, dried	1416
sirloin steak	960	Doughnuts	1941
smoked	760	Egg plant	126
sweetbreads	799	Eggs	594
tenderloin	1290	Farina	1640
tongue	717	Figs, dried	1437
Beets, fresh	209	Flounder	110
Blackberries	262	Flour, rye	1590
Bluefish	206	entire wheat	1630
Brazil nuts	1591	graham	1628
Bread, Boston brown	1345	wheat	1608
graham	1189	Fowls	752
rolls	1268	Gelatin	1660
Vienna	1199	Grapes	328
white	1199	Grapefruit	172
whole wheat	1113	Haddock	160
Butter	3491	Halibut steak	457
Buttermilk	162	Ham, fresh	1030
Butternuts (shelled)	3065	smoked	1073
Cabbage, fresh	121	Herring, smoked	731
Carrots, fresh	158	Hominy	1609
Cauliflower	139	Honey	1481
Celery	68	Huckleberries	336
Cheese, American	1990	Kohl-rabi	140
cottage	499	Koumis	234
cream	1890	Lamb, breast	1058
Roquefort	1645	chops (broiled)	1614
Swiss	1945	fore quarter	1127

TABLE II.—*Continued*

FOOD	CALORIES PER POUND	FOOD	CALORIES PER POUND
Lamb, hind quarter	953	Plums, fresh	363
leg	876	Pork, chops, medium	1230
side	1015	fat, salt	3555
Lard, refined	4080	rib and shoulder	1298
Lemons	140	sausage	2030
Lettuce	72	tenderloin	875
Lobster	139	Potato chips	2598
Macaroni	1625	Potatoes, white	302
Macaroons	1922	sweet	447
Mackerel, fresh	356	Prunes, dried	1160
salt	1005	Pumpkins	60
Marmalade. orange	1548	Radishes	91
Milk, condensed, sweetened	1480	Raisins	1407
skimmed	167	Raspberries, red	247
whole	314	black	300
Molasses	1302	Rhubarb	63
Mushrooms	204	Rice	1591
Muskmelon	89	Salmon	642
Mutton, forequarter	1223	Sausages, bologna	1135
hind quarter	1197	farmer	2156
leg	718	Shad, whole	367
side	1512	roe	582
Oatmeal	1811	Shredded wheat	1660
Olives, green	995	Spinach, fresh	109
ripe	947	Squash, fresh	103
Onions, fresh	199	Strawberries	169
Oranges	169	Succotash, canned	444
Oysters, without shell	328	Sugar	1815
Parsnips	236	Tomatoes, fresh	104
Peaches, canned	213	canned	103
fresh	153	Tunny fish (tuna)	946
Peanuts, shelled	2490	Turkey	1042
Pears, fresh	256	Turnips	124
Peas, canned	252	Veal, breast	629
dried	1611	cutlets	670
green, shelled	252	forequarter	517
Peppers, green	109	hind quarter	534
Pies, apple	1233	side	539
custard	806	Walnuts, English (shelled)	3199
lemon	1156	black (shelled)	3011
mince	1300	Watermelon	57
squash	817	Wheat, cracked	1635
Pineapple, sliced, fresh	196	White fish	315
canned	695	Zwieback	1915

INDEX

Printed in the United States of America.



UNIVERSITY OF CALIFORNIA AT LOS ANGELES
THE UNIVERSITY LIBRARY
This book is **DUE** on the last date stamped below

APR 26 1938
NOV 8 1938
MAY 11 1939
JUL 28 1948

Form L-9–20*m*-8,'37

SOUTHERN REGIONAL LIBRARY FACILITY
A 000 503 907 8

TX
551
W66d
cop.1

...NICH...
...IFORNIA
...SALE