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Teaching Nutrition

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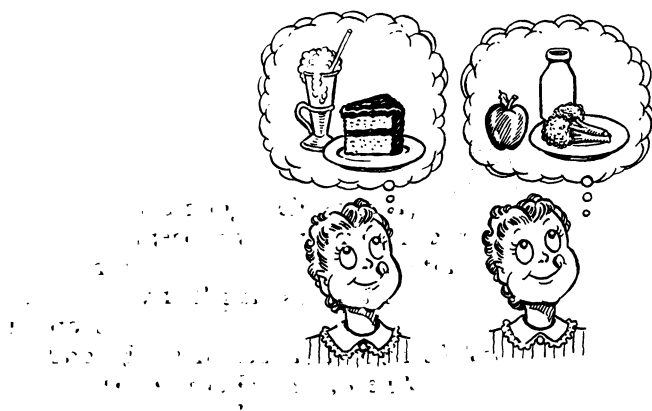
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Foreword

Teachers, public health workers, and lay leaders will find in this book a unique approach for the teaching of nutrition. It is an example of the melding that may come when leaders in subject matter and education join hands in a research attack on how to make nutrition live in the lives of people.

One of the basic needs for personal well-being is good nutrition. To be effective, nutrition education should begin at a very early age when children are formulating their everyday food habits. Since nutrition is a complex subject, simple nutrition facts gained at this time can be built upon at successive levels of maturity so that eventually pupils will arrive at over-all general nutrition concepts that are known as "generalizations."

Dr. Ercel Eppright, a nationally recognized leader in the field of human nutrition, Dr. Mattie Pattison, well known in home economics education circles, together with their student, Dr. Helen Barbour, now head of home economics at the New Mexico College of Agriculture and Mechanic Arts, have provided in this book (1) basic nutrition information reduced to its most understandable form and (2) educational procedures for introducing nutrition to different age groups. The approach recommended has been tested experimentally in a research program carried on over the past few years.

A strong case is made for the need of nutrition education in this country. Information on the prevailing lacks, as revealed from several studies, is clearly shown through figures and graphs. Indeed, one of the appeals of this book rests in its demonstration of the need for effective nutrition teaching.

The classification of important objectives for teaching nutrition and ways of organizing information will serve as guides to the teacher.

The further organization of generalizations is a most significant over-all contribution to nutrition education. Many of these generalizations were developed and tested by Dr. Barbour in her doctoral

study. They bring into focus the large fundamental concepts of nutrition around which isolated facts can be related so as to take on meaning.

It is generally agreed that no one method can be advocated as *the* method for nutrition education. The authors present many ways of approaching the subject, with enough illustrations of their use to enable teachers of nutrition to make the subject vital and interesting to people of different ages. Especially helpful are the suggestions that will guide students in arriving at their own generalizations.

In undertaking a nutrition education program, it is important to recognize at the outset that there are inherent problems. These are pointed out very clearly and should be a real help in identifying problems of importance in various situations.

The successful teacher also must recognize the differences in attitudes about food that exist among people of various groups and among individuals within each group. The authors help the teacher to recognize these differences. Perhaps one reason why nutrition education programs in the past have not been eminently successful lies in the fact that differences have been ignored.

Evaluation is essential throughout the nutrition program. It not only enables the teacher to recognize the progress students are making toward achievement of their goals, but also reveals the effectiveness of methods used. Various evaluation techniques are illustrated.

It is with considerable satisfaction that we see crystallized in this book a functional approach to nutrition education through a coordinated research program long envisioned. We feel confident that many will find it useful in planning programs for improved nutrition not only in our own country but elsewhere.

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Preface

A wide gap exists between the knowledge of nutrition and its application in everyday living. But nutrition *does* affect goals important to most people, and food practices *can* affect achievement of these goals.

In this book we have taken into consideration the special needs in nutrition education for (1) the simplification of complicated technical material and for (2) the motivation of people to consider their present food habits and to change them as needed. From the mass of information in nutrition we have attempted to sift the doubtful and controversial, and to organize the working facts or principles for effective use.

This primarily is a handbook for teaching. It should be especially useful to those who know the facts of nutrition but have little experience in how to make them function for others, and also may be used by those with little training in nutrition. The generalizations, as given, are designed primarily for use in popular nutrition education. They may, however, provide a useful supplement for technical courses given for teachers, public health workers, or others engaged in applied nutrition.

The nutrition information, set down in simple terms, is organized in Chapter 4 into generalizations and supporting facts. With the information thus selected and organized, the teacher—whatever the nature of her responsibility—may choose the subject matter appropriate to the individual or group being taught. The next step, then, is to consider methods of presentation. To assist in using the generalizations creatively and effectively, we have made an analysis of problems found in teaching nutrition, have discussed a variety of methods of teaching, and have suggested ways of evaluation.

The preliminary preparation of the generalizations was made by author Helen Barbour as a recipient of the Mary Swartz Rose Fellowship of the American Dietetic Association while she was studying at

Iowa State College. Dr. Gladys Everson, Dr. Marian Moore, Dr. Charlotte Roderuck, and Dr. Pearl Swanson assisted in selecting and revising the original set of generalizations.

In our studies of the need of nutrition education, and where emphasis should be placed, we have been guided largely by the results of investigations of several population groups in Iowa, made under the auspices of the Iowa Agricultural Experiment Station by members of two departments of the Home Economics Division of Iowa State College: Food and Nutrition, and Home Economics Education. Some of these studies were supported in part by a grant and other assistance from the General Mills Company, Incorporated, as a part of its nutrition education program.

Many people deserve our thanks for their assistance and encouragement during the preparation and publication of this book. To each of them individually, we express our grateful appreciation. We are especially indebted to Dr. Pearl Swanson, Assistant Director of the Iowa Agricultural Experiment Station, and Professor Florence Fallgatter, Head of Home Economics Education at Iowa State College.

We wish also to acknowledge the generosity of other authors and publishers in giving permission for meaningful quotations and charts.

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March, 1957

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Teaching Nutrition



CHAPTER ONE

Why Nutrition Education?

"Since the strongest root of happiness is health, I should like to see my children abundantly instructed in the knowledge and care of their bodies. . . . I should make education in health a required course in every year of schooling from kindergarten to Ph.D. I should want my children to learn as much about the structure and functioning, the care and healing, of their bodies, as can be taught in an hour a day for fifteen scholastic years. . . . And if the day should come when our dietitians will have at last made up their minds as to what they really know and believe, I should ask them to teach the principles of diet an hour in every school week for fifteen years, so that our people might make with some corporate intelligence the dietetic changes required by the passage from an outdoor and physical life to a mental and sedentary one. I would teach health and cleanliness first of all, and expect that all things else would be added unto them."

These are not the words of an overzealous nutritionist but of a philosopher, Will Durant, writing on the topic, "What Education Is of Most Worth?" (1).

Why should nutrition education be added to the school curriculum? Through the years, feeding children has been regarded as a prerogative, privilege, and responsibility of the home. Attempting to change the food habits of an individual has been regarded almost as an infringement on his personal rights. People are about as reluctant to report what they eat as to divulge their income.

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Moreover, the educational program is already overcrowded. Educators may rightfully ask why schools should assume this added responsibility. How can we justify making one more claim on the time and efforts of teachers by introducing another area to be covered in the curriculum?

Briefly, here are some of the reasons why personal and public welfare demand that children be taught the rudiments of nutrition. Good food selection should become second nature to them, and proper



One more claim on the time and efforts of teachers!

nutrition of their bodies a prime responsibility. Furthermore, the meaning of poor nutrition should be so imprinted in the minds of youth that, as citizens in a democracy, each will speak and work to eliminate wars, depressions, unfair trade practices, and other conditions which result in widespread hunger and suffering from poor nutrition.

NUTRITION IS THE CORNERSTONE OF HEALTH

Nutrition, according to Stare (2), is one of the most important single environmental factors affecting our personal well-being. This statement is also recognized as a basic philosophy of the World Health Organization, which includes doctors, sanitary engineers, public health workers, and nutritionists. Schools generally have accepted health education as a responsibility. If nutrition is a major factor in health, health education which neglects nutrition is only fulfilling part of its function.

Good food selection, the cornerstone of good nutrition, must be learned. Unfortunately, we have no automatic mechanisms to direct the choice of foods which build healthy bodies and which keep them running satisfactorily from day to day. It is true that our bodies have many reserves and safety devices, and can stand an infinite amount of abuse. Because of this very fact, many doubt the ultimate penalties of a poor diet. However, the numerous ailments that beset our middle-aged population in comparison with the few found among youth bear witness to the fact that ultimately a toll is taken. The extent to which poor food habits contribute to early aging is not known; undoubtedly it is one of the important factors.

NUTRITION IS A COMMUNITY CONCERN

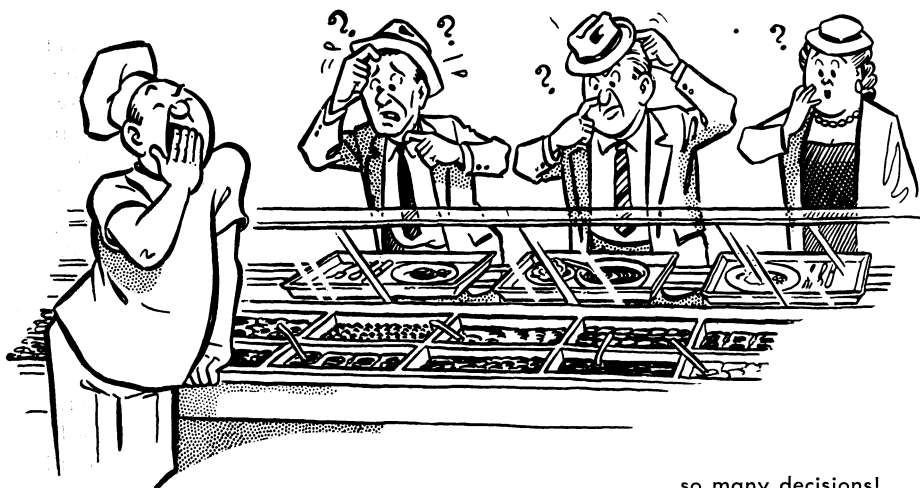
We cannot legislate or immunize against poor nutrition. Fortunately, many measures for the protection of health can and should be under the regulation of the law. Thus we can prevent the spread of disease by contaminated water, by milk from unhealthy cows, or by carriers of disease in our public eating places. Unfortunately, such protection is impossible against the insidious effects of a poor diet, which may be equally weakening. Education is our main bulwark against poor nutrition. Even with plenty of food, or plenty of money to buy food, the uninformed are likely to develop food habits incompatible with their health.

Poor nutrition has vast social and economic implications. The poorly nourished child is a focal point of infection. He is a laggard in his classes and often a problem in his community (3). Poor nutrition has been described as a cancer in society. In 1941, Thomas Parran, then Surgeon General of the United States, said, "Like an iceberg, nine-tenths of our malnutrition, and the most dangerous part, is under the surface" (4). Although it must be attacked along many fronts — economic, political, medical — education in nutrition must be the basis for the entire undertaking.

REQUIREMENTS CHANGE WITH AGE

Nutritional needs and food habits change with age. That is why nutrition education should continue from kindergarten through college. A failure to adjust one's food habits as one grows older is the basis of many of the health problems of middle age. The best way to develop good food habits and to have good nutrition at any one age is to have experienced them in the preceding age.

Food is a major commodity in the commercial world. We are surrounded with a multitude of situations in which choices of food must be made — choices which will affect health, money, and personal



satisfaction. Just as education helps us make decisions in every other field, it certainly should help us make wise choices concerning our use of food. In perhaps no other area of living is the individual called upon to make so many decisions or to make decisions so often. Do we not have a right to expect our education to help us in making these decisions?

AN IMPORTANT MEASURE IN CONSERVATION OF RESOURCES

The future points to unprecedented stress upon our educational resources. Schools will be called upon to scrutinize as never before all possible measures of economy. Industries have come to regard the nutrition of employees as a matter affecting their output. Consequently they make available to their employees nutritious meals at a minimum cost, midmorning and afternoon snacks, and even nutrition services designed to improve the home food supply. In a certain sense schools may come to regard the nutrition of the children in the same light. Efforts of teachers are wasted to an appreciable extent upon children who are hungry and poorly nourished. The maximum returns for our tax dollars in the schoolroom demand that the children be well nourished.

COOPERATION REQUIRED

Nutrition education is made necessary by our interdependence in obtaining our food supply. An informed public is needed to insure:

1. *Production* of the kinds, amounts, and quality of food needed for

the health of the people of our country and of other countries that depend on us for many foods.

2. *Trade practices* which will facilitate the distribution of nutritious foods from point of production to place of need.
3. *Methods of processing* which will enable us to receive food in a highly nutritious form.
4. *Protection against fraudulent trade practices* which may reduce the buying power of the food dollar or divert it to unprofitable, even harmful, channels.
5. *Food legislation* to encourage a safe and wholesome food supply.
6. *Minimum taxes* on food commodities vital to health.

We would have a different world in which to live if children were educated to accept their responsibilities in these matters as they are educated in matters such as safety and sanitation.

WHAT GOOD NUTRITION ACCOMPLISHES

First of all, food maintains life. Only 3 days of starvation are enough to produce profound chemical changes in the body. Man may live from 30 to 40 days without food, if not exposed to stresses such as severe cold, strenuous exercise, and emotional disturbances (5). But sooner or later, depending on the stresses and strains, death is the inevitable result of starvation. It is unbelievable, but true, that many people in the world today are dying of starvation.

When persons eat half of what they need, muscles waste away, body organs and systems change, and behavior and personality are profoundly altered (6,7). The individual becomes faint, giddy, less active, and finds it more difficult to keep warm in cold weather. Appearance changes. Skin may become dry, scaly, incrustated, gray; hair, dull and dry; eyes, dull and dead. Half-starved people, whatever their age, are old before their time.

Poorly nourished children are almost invariably stunted in growth. Well-nourished children are usually not, unless they are known to have some type of infection or a peculiar pattern of genes. Spies observed that infectious disease coincided with every instance of retarded growth when children were known to be free from evidence of nutritive failure (8). Spies also observed a tendency of children with nutritive failure (showing definite evidence or history of nutritional deficiency disease) to show retardation of growth most often in June, July, and August, the periods in which other symptoms of nutritive failure usually are most obvious.

Retarded growth or body size is one of the first evidences of poor nutrition. With the smaller body mass, the limited nutrient supply can more nearly serve the body needs. In this way, outright deficiency diseases are often avoided in times of war and famine. This has been observed time and again in the war-torn countries. Periods of

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temporary privation may be overcome (9). We are told that by 1948 there was little evidence of the retarded growth which occurred among the children of France during World War II. But the long-time effects have yet to be assessed in the total life cycle and in the next generation. It may be of interest that in wartime France, the maximum delay in growth was observed in the group of 13-year-old girls.

Sustains Life and Growth

During school years, boys and girls make large increases in body size. For example, in the Iowa studies, boys of age 16 were on the average 21 inches taller and 90 pounds heavier than boys of age 6. Correspondingly, girls of 16 and 6 differed in height by 17 inches and in weight by 77 pounds (10). Only through the food eaten, the water drunk, and the air breathed can the materials needed for the increased body substance be obtained.

We do not know at the present time the optimum or best rate of growth, nor do we know exactly the nutrient needs of childhood. It is therefore all the more important that children be provided with enough food energy and surpluses of nutrients so that their bodies can sort out and retain all that is needed for day-to-day functioning and storage for future needs.

A real shortage of any one nutrient will have a detrimental effect on growth. If all needs are met, the optimum rate of growth should be achieved, provided environmental conditions are not drastically unfavorable and conditions inherent within the body are normal. That is, the well-nourished person may be expected to have good health, to mature at the proper time, to withstand the stresses of environment, to enjoy an extended period described as the prime of life, and to fulfill successfully the biological functions of the body.

Makes a Difference in Body Size

Research has repeatedly shown that when we improve inadequate diets of children, growth is improved. Roberts (11) studied children in an institution who were regularly receiving one pint of milk daily in their diet. She added another pint to the diet of some of the children, and found that weight gains were much more evident among the children having the full quart of milk a day than among those who remained on the usual diet, although even the improved diet was below optimum.

Spies (12) studied the effects of poor diet on as many as 3,000 children over a period of 15 years. He recorded the effects on 600 children who had chronic nutritive failure. They were as much as 3 years behind their normal height and weight when compared with 2,000 children who were receiving good diets. The height of the boys

was especially affected by the lack of nourishment. By the time these boys and girls had reached maturity, they had stopped growing at a weight-height level 2 years behind their growth possibilities.

Spies also studied the reversal of growth failure by adding milk solids to the diet of the children. He paired off children similar in nutritive failure, and gave one member of each pair a supplement of varying amounts of milk solids over increasingly longer periods of time. The more milk the children used, within the limits of his study, the greater the increases in height, weight, physique, and speed of growth as shown on the Wetzel Grid (13), when compared with the records of the children not receiving the extra milk. Benefits of the added milk were also evident in the composition of the bones. Spies concluded that the retarding effect of prolonged nutritive failure is reversed promptly if the nutrients in the dietary supplement are supplied in sufficient amounts to overcome the accumulated deficiencies.

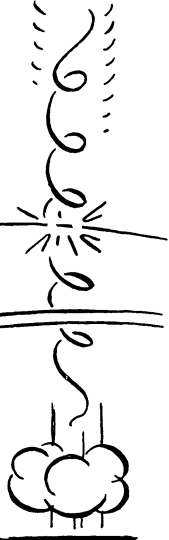
Blair (14) studied the diets of 150 children ranging in age from 2 to 14 years, and found that their food plans failed to meet the Recommended Dietary Allowances of the National Research Council (15) in all factors except vitamin A. These diets were particularly lacking in vitamin C and thiamine. Blair increased milk and other dairy products, eggs, whole grain cereals, and fruit juice in quantities which brought the children's diets up to, or in most cases well above, the Recommended Allowances.

Before she began supplementing their diets, the children as a group were making only 61 per cent of their expected gains in weight. In the one-year period of better nourishment, the percentage rose to 140 and continued high in the period after supplementation stopped. Gains in height followed a similar pattern. The percentage of children under average weight for height decreased, and

BOIN-N-NG!



... the well-nourished person may be expected to mature at the proper time.



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there was a definite shift of the group toward a more favorable weight-height status.

Children of Iowa surveyed in a mass study of diets and physical development were divided into two groups for study: those who had liberal amounts of all nutrients and those who did not. The children with the liberal diets tended to be slightly taller, heavier, and larger in leg girth than the children with the poorer diets (16). The two groups of children represented the upper and lower extremes in a fairly well-fed population. The diets of the second group on the average fell only slightly short of the Recommended Dietary Allowances. Some of the diets were low in only one single nutrient, yet these slight dietary differences apparently affected the physical development of the children.

One of the most important safeguards of health in adulthood is maintaining normal body size. Young adults who are too thin are susceptible to disease; middle-aged people who are overweight may face diseases of the heart and a shortened life span. Regulating the food intake to meet the energy needs is the secret to the regulation of body size. The multiplicity of factors which influence energy needs, however, may make it difficult to achieve this regulation, and control of appetite sometimes requires almost superhuman efforts. Good habits of eating and of exercise from early childhood will help.

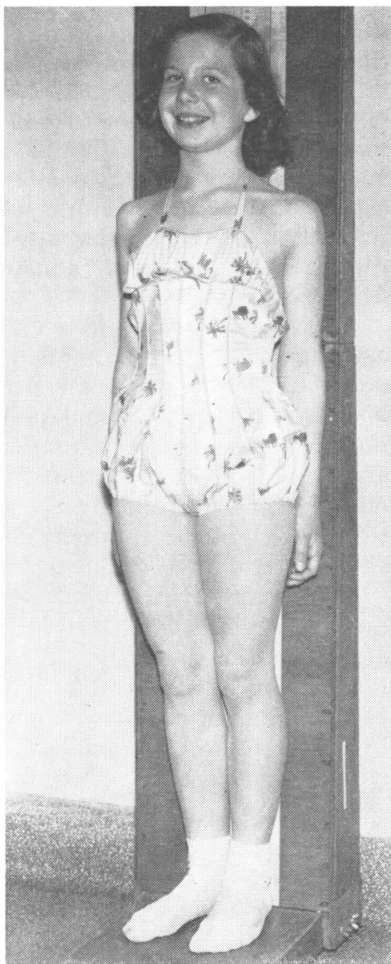


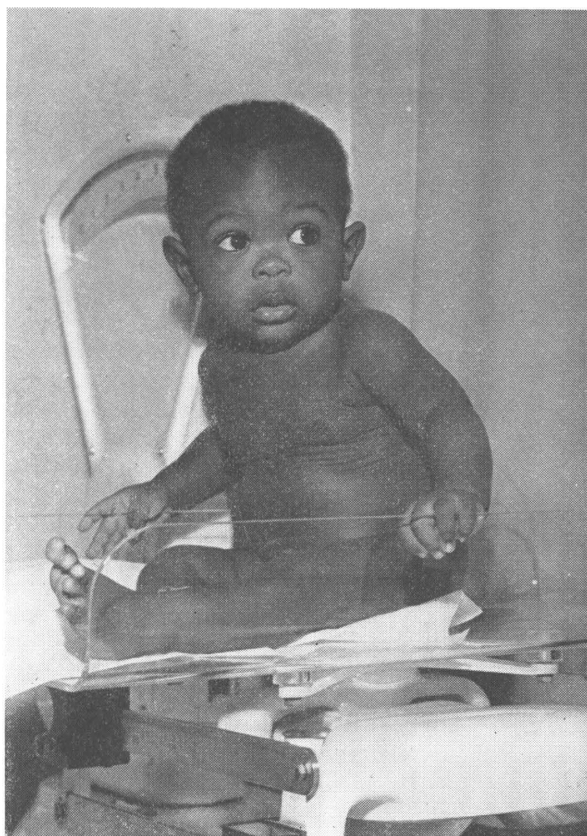
FIG. 1.1 — The marks of physical perfection include beautiful posture, soft glossy hair, radiant skin, and an abundance of energy.

Achieves a Higher Plane of Positive Health

There is a difference between the absence of illness and buoyant, radiant health. In our school population today there are many

FIG. 1.2 — In the very young child we have our best evidence of what can be accomplished by nutrition.

(From **1,000 Ideas for Better News Pictures**, Hugh Sidey and Rodney Fox, © Iowa State College Press, Ames, Iowa.)



children not seriously poor in physical development but who lack the marks of physical perfection which are such a joy to see. We look almost in vain to find the rosy-cheeked children with beautiful posture, soft glossy hair, radiant skin, and an abundance of energy. When nutrition is excellent we expect to find these characteristics. When we are accustomed to seeing children who are less than perfect, we forget these characteristics of perfection. It is much easier to find an infant or small child who is beautiful and well developed, probably because more special attention is given to all phases of health at this age, including good nutrition. In fact, in the very young child we have our best evidence of what nutrition can accomplish when it is carefully applied.

The difference between mediocre and excellent diets has been clearly shown in rat experiments. Through generations, Sherman (17) fed rats a diet which proved satisfactory for growth, reproduction, and maintenance of vital functions. When, in the diets of succeeding generations, he doubled the amount of milk, amazing improvements re-



Young men subjected to half-rations reached the point of exhaustion in about one-fourth the time . . .

sulted. The animals had greater vigor, better appearance, greater resistance to disease, and reached a higher plane of positive health. Nutrition obviously made the difference between acceptability and superiority in his colony of animals. As described by Hambidge (3) these were truly royal rats!

In 1930, the search for buoyant health for their school children led the people of Scotland to adopt the milk-in-school plan (18). The action was prompted by results of an experiment carried on with 20,000 elementary school children who were given additional milk for 7 months. Growth was 20 per cent better for children receiving the milk than for those not receiving it. The increased growth was accompanied by noticeable improvements in health, vigor, and mental alertness. The Scots concluded then that the measure would have a "powerful influence in improving the quality of the Scottish race."

Improves Ability to Work and Play

Ability to do work is directly associated with the food we eat. There is an Oriental proverb which aptly describes the malnourished:

It is better to walk than to run. It is better to sit than to walk. It is better to lie than to sit. It is better to sleep than to wake. It is better to die than to live.

Half-starved people lack endurance, have poor coordination, are weak, and are slow to react. Young men subjected to half-rations reached the point of exhaustion in about one-fourth the time taken by young men with enough food (19).

The urge to play is strong for children, and undernourished children may drive themselves beyond their powers. Poor muscular development and other conditions make the costs of activity high for such children.

Promotes Mental, Emotional, and Social Well-Being

What is the relationship of nutrition to these characteristics? There is probably no more difficult question to answer. Most of the answer must come from the realm of the subjective rather than the objective.

Spies (8) describes the personalities of children suffering from nutritive failure as apathetic. The same observation was made of the children in Newfoundland in 1944, when their diets were short in many essential nutrients (20).

Children in West Germany, after World War II, seemed to be emotionally unstable, listless, and unable to give sustained attention in school. Many were unable to stay awake or to pay attention throughout the entire period. They had difficulty memorizing facts.

These are examples of children in complicated social situations. The fault does not lie solely within the realm of nutrition. Nutrition is only one of many factors affecting the children. But, then, poor nutrition seldom exists as an isolated factor.

We do know that antisocial behavior characterizes children with empty stomachs, whatever the reason—whether it be disorganized homes, war or its aftermath, depressions, or disease.

The chances of survival of infants and children have been dramatically increased by medicine and science. Looking beyond survival, we see the challenge of abundant health. Every child has the right to the opportunity to achieve the maximum of which he is capable. Why should children be saved if they are not to be given these privileges? They cannot achieve their potential abilities with the fatigued minds and bodies which result from habitually poor diets.

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CHAPTER TWO

Diets and Nutrition

During the years 1945 to 1955 many studies were made of the nutrition of school children throughout the United States. Information came from the East and Northeast: Maine, Vermont, New York, Rhode Island, Connecticut, Pennsylvania, and Virginia; from the South: Louisiana, Texas, Florida, and Tennessee; the Midwest: Wisconsin, Nebraska, Kansas, Minnesota, Ohio, and Iowa; the Northwest: Oregon and Idaho. Most of the studies were made from children selected on a statistical sampling basis, and we can regard them as representative of the populations studied. Because of the far-flung distribution of the studies we may even regard the findings as fairly representative of conditions throughout the country.

We should remember, however, that averages may conceal many differences which exist among groups within any population. In any locality rural children may have diets different from those of urban children; children from large families different from small families; children from low income families different from moderate or high income families; Negro children different from white children.

The fact that families are known to have adequate food supplies does not justify the assumption that the children have a good diet. The Groton Township studies in New York (1) showed that of 77 families whose available food met the Recommended Dietary Allowances of the National Research Council (2), in only four did the diet of each

family member conform to these allowances. Other studies have shown that the mother and the adolescent girl are likely to have the poorest diets within a family group (3).

The over-all studies, however, do give us a starting point. Because of them we know more about the diets of children, how nearly these diets measure up to standards, and, to some extent, how the children themselves are reflecting the diets in their health.

In most of the investigations, dietary records of 3 to 7 days have been studied. Body measurements have been taken. In many instances blood samples have been analyzed for various constituents indicative of nutritional status, such as hemoglobin, vitamin A, carotene, vitamin C, and alkaline phosphatase. Often, medical and dental examinations have been included.

FOODS EATEN BY THE SCHOOL CHILDREN

Naturally, children eat about the same foods as their parents, and in about the same meal patterns. They eat some foods in plentiful amounts but have inadequate amounts of other foods. Vegetables as a group are probably the least popular with children.



Naturally, children eat about the same food as their parents . . .

Figure 2.1, a chart based on a unit of 10, shows how many Iowa boys and girls ate specified amounts of food classified according to certain groups for 6 out of 7 days during the week.

Most of the studies have revealed similar findings. Many children do not have the milk, the green and yellow vegetables, and the vitamin C-rich fruits and vegetables which are recommended for their daily consumption. We cannot overemphasize the importance of hav-

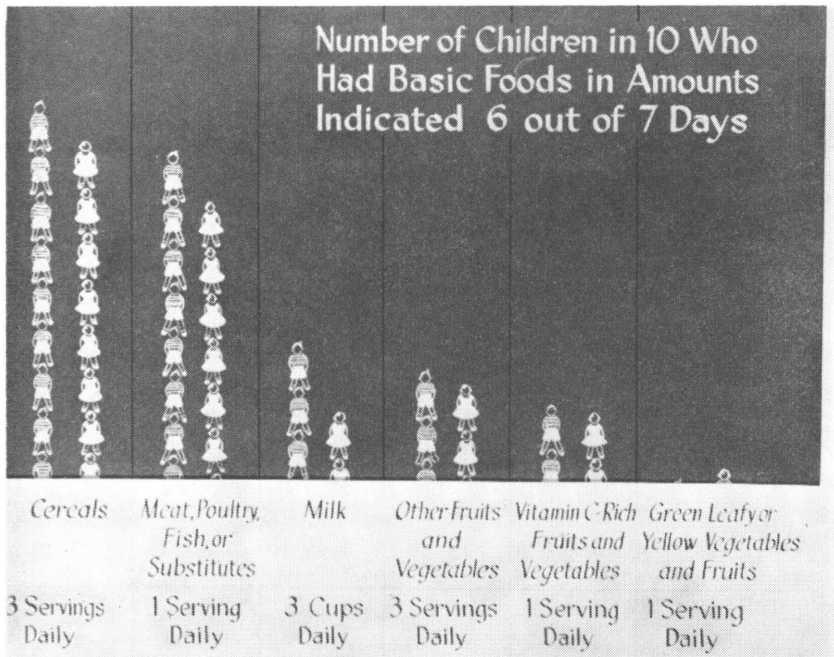


FIG. 2.1 — Consumption of classified foods by Iowa boys and girls.

ing these foods day after day. Some studies have shown that boys eat fewer fruits and vegetables than do girls, though generally their diets are better (4). They are likely to use more milk, cereals, and meats. As girls grow older they seem to use less of certain important foods, such as milk and eggs (5).

Differences by age and sex in the average daily consumption of certain types of foods by these Iowa children are shown in Figure 2.2.

Few of the children took vitamins or other nutrient supplements. The percentage decreased from about 15 to 20 per cent of the 6- to 8-year-olds to less than 5 per cent of the children in their late teens (6). Furthermore, studies in Idaho showed that very few children who took supplements needed the particular supplements they took (7). In general it is believed that children and adults may satisfy their nutrient needs through natural foods, but growing children in many parts of the country may need vitamin D from a supplementary source. During a large part of the year children live mostly "under cover" and do not benefit from the direct rays of the sun.

THE NUTRIENT SUPPLY

There are many different ways for obtaining a good diet, and the final test of the diet is in its nutrient content. Also, the needs of individuals vary. A good diet for one may not be satisfactory for another.

In the Iowa studies, average daily intakes of boys from 6 to 16 or 18 years showed that they usually had diets of higher food energy (calorie) and nutrient value as they grew older (8). The main exception was between the ages of 9 and 10, where there was not much difference in nutrient intake nor in body size.

Girls were different. In general, their intakes were larger each successive year from 6 to 12, but after age 12 the averages dropped even though the girls continued to grow. Some teen-age girls had diets of lower nutritive value than girls at age 9 or 10. Since for girls the age of 12 seems to be a turning point in development, food habits, and other interests, nutrition education for girls of this age should be carefully geared toward helping them to understand how nutrition

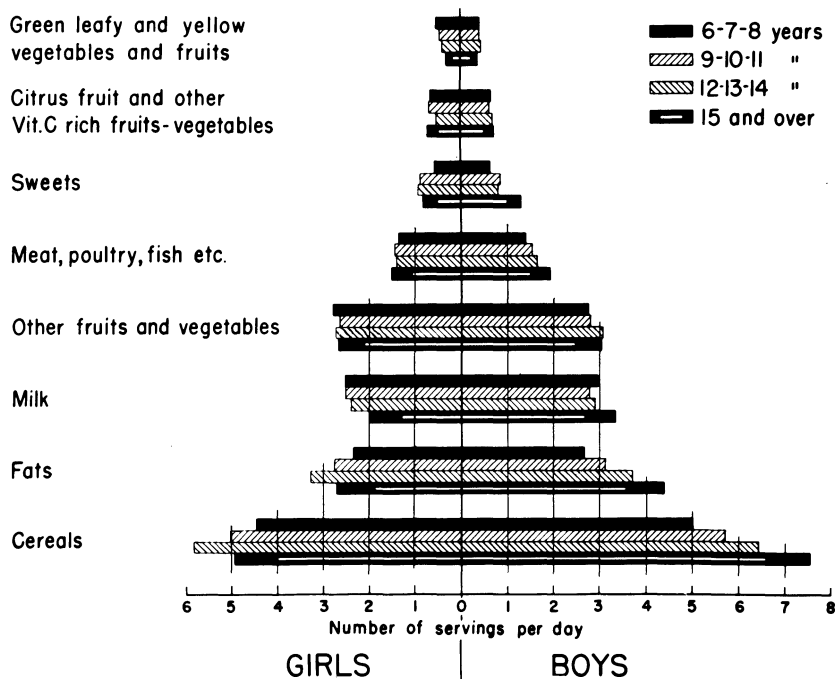
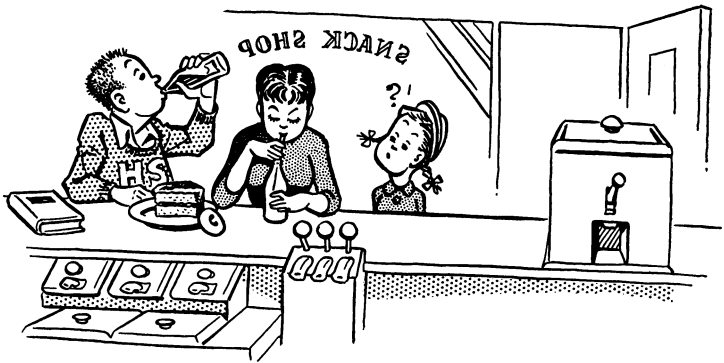


FIG. 2.2 — Use of food groups by Iowa school children.

Little sister is
aghast at the diet
of the teenagers.



is related to their present and future development and happiness. The stresses and strains of the second decade of life require a sound foundation of health, which depends greatly on a liberal supply of all nutrients. The need for concern about such nutrients as calcium, iron, and vitamin C in the diets of teen-age girls is shown in Figure

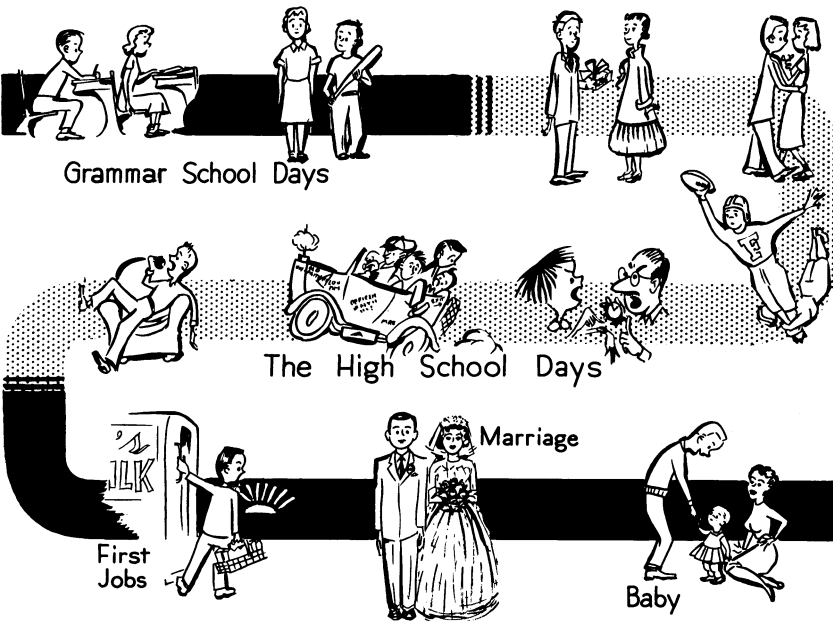


FIG. 2.3 — The second decade of life.

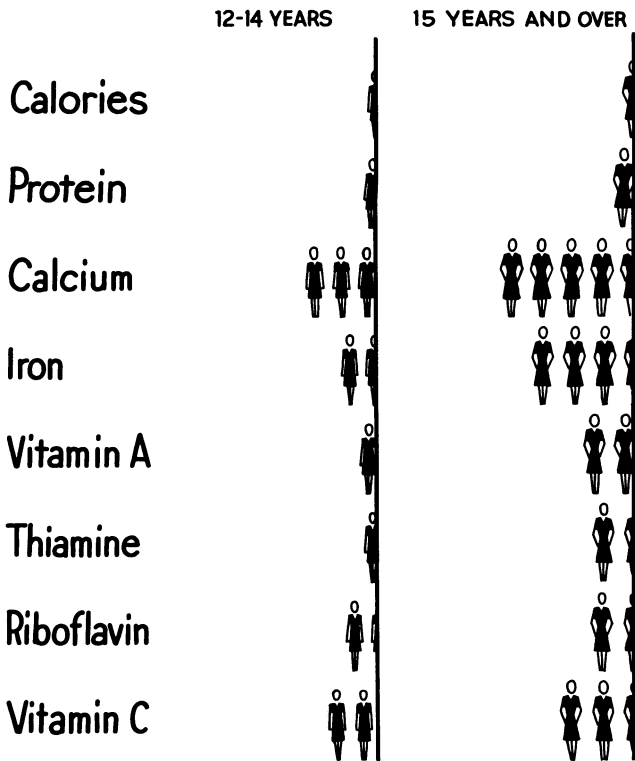


FIG. 2.4 — Number of teen-age girls in ten with diets deficient in specific nutrients.

2.4. Stearns (9) has said that good nutrition during childhood and adolescence is particularly important for girls, for the childbearing age begins in adolescence. Many girls marry at age 18 or 19, and many babies are born before their mothers are 20.

The Recommended Dietary Allowances (2) are our best guide for determining the adequacy of diets. The average daily intake by our boys and girls indicates that our child population as a whole has a reasonably good diet. But in the Iowa studies the averages are somewhat low in calcium for boys and girls, iron for girls, and in several nutrients for teen-age girls.

More important than the average daily intakes, perhaps, is the proportion of children whose diets are low according to our standards. A diet that is really below the needs of the child in any one essential nutrient or in food energy, is a poor one. For example, if the diet is sufficient except for calcium, the child will suffer and the diet must be considered inadequate or poor. Children undoubtedly differ in their basic requirements, so the selection of a level to be designated as

QUALITY OF DIETS OF 602 GIRLS



rating	% of girls
"GOOD"	13.5%
"FAIR"	46.3%
"POOR"	40.2%
total	100.0%

FIG. 2.5 — Diets of Iowa girls rated in three classes.

poor, or inadequate, is arbitrary. Many studies, including the Iowa study, have considered the diets in three classes:

Class 1. The food energy and nutrient value equal or exceed 100 per cent of the Recommended Dietary Allowances: diets rated as **good to excellent**.

Class 2. Some values are less than 100 per cent but none less than 67 per cent: diets rated as **fair to good**.

Class 3. At least one nutrient or the food energy value is 67 per cent, or less, of the Allowances: diets rated as **poor to fair**.

By this classification the diets of the Iowa children as observed in 1948-51 are rated as shown in Figures 2.5 and 2.6. The spectacular way

QUALITY OF DIETS OF 586 BOYS



rating	% of boys
"GOOD"	24.4%
"FAIR"	44.2%
"POOR"	31.4%
total	100.0%

FIG. 2.6 — Diets of Iowa boys rated in three classes.

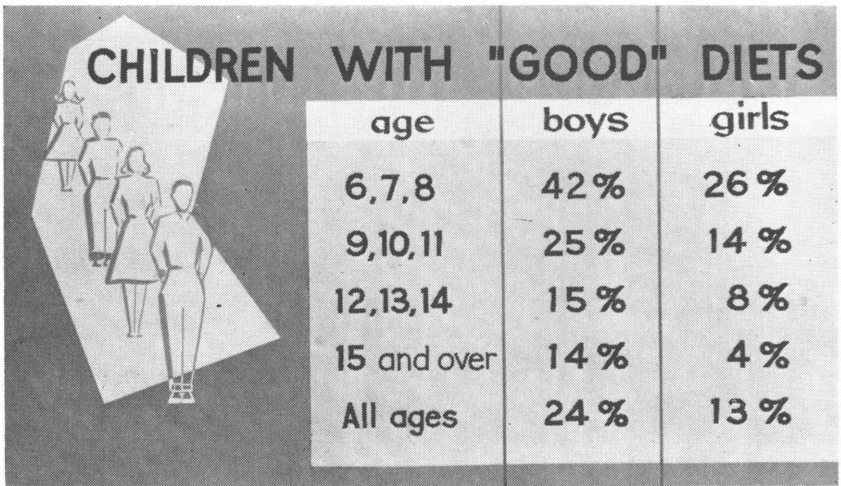


FIG. 2.7 — The percentage of "good" diets decreases spectacularly during the school years.

in which the percentage of "good" diets decreased during the school years is shown in Figure 2.7. At the same time the percentage of poor diets (those in Class 3) increased from younger to older age groups. There is certainly no more dramatic evidence than this, of our need for effective nutrition education and of our current failure in this area.

By other methods of study and classification the diets of a large number of children have been found to be similarly distributed. The General Mills study of 60,000 students in 38 states gave this approximate classification of their diets (10) : 33 per cent, good; 27 per cent, fair; 40 per cent, poor.

We are reminded of the statement so often made in the '40's that one-third of our people are well fed, one-third fairly well fed, and one-third poorly fed.

In the Iowa studies, calcium was the nutrient most often lacking. The number of school children in 10 with diets considerably lacking in calcium is shown in Figure 2.8.

The total calories in the average daily diets of these children were divided as follows among the three main dietary components: protein, 12 per cent; fat, 42 per cent; and carbohydrate, 46 per cent (see Fig. 2.9).

A similar distribution has been noted in diets generally. Since about 1910 the proportion of calories from fat in the so-called national

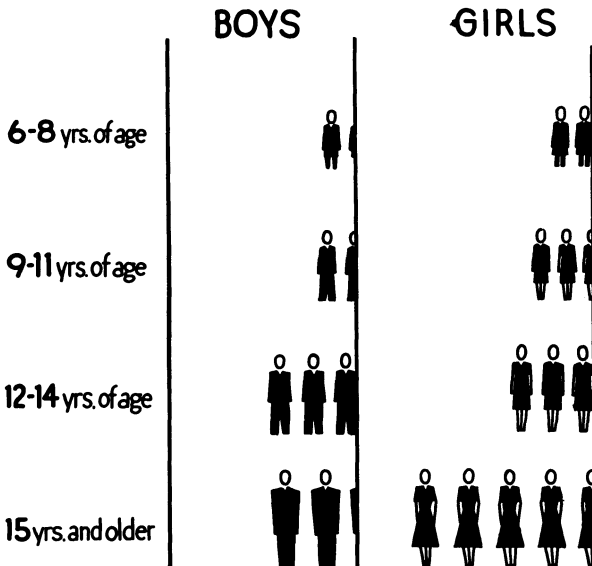


FIG. 2.8 — Number of Iowa school children in ten whose average daily diets were seriously lacking (see Class 3, page 21) in calcium.

diet (literally, food supply at the retail level) has apparently increased from about 30 to 40 per cent (11). Because of the possible relationship of high-fat or high-calorie diets to diseases of the heart and blood vessels, which are becoming alarmingly prevalent in the

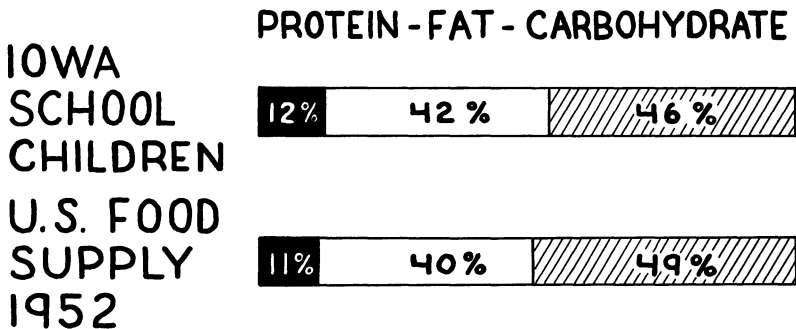


FIG. 2.9 — Percentage distribution of calories among the foodstuffs in the average daily diet.

United States, our children might benefit from becoming accustomed to diets somewhat lower in fat. This would probably best be accomplished by using less gravy, rich dressings, and fried foods. If children learn to like foods without these accessories, they can more easily and successfully make the dietary transitions involved in changes from active to sedentary living, and from young to middle and old age. This statement from a review on the subject of diet and life span is of interest (12) :

High dietary protein or carbohydrate apparently do not worsen the prospects as to longevity, provided no secondary deficiencies exist. A high level of dietary fat has, as a rule, adverse effects on the life span.

On the other hand, it is equally important to recognize that a certain amount of fat in the diet has many beneficial effects, not only physiologically but in adding satisfaction to the diet.

KINDS OF FOODS USED AND THE ADEQUACY OF DIETS

In the northeastern region of the United States the percentage of nutrients contributed by each of seven groups of foods was studied (13). In the order of importance of the foods, the major sources of calories and nutrients in the 7-day records of the 778 subjects were:

- Calories — bread, milk, meats
- Protein — meats, milk, bread
- Calcium — milk, bread
- Phosphorus — milk, meats, bread
- Iron — meats, bread, vegetables
- Vitamin A — vegetables, milk
- Thiamine — bread, meats, milk
- Riboflavin — milk, meats, bread
- Niacin — meats, bread
- Ascorbic Acid — citrus fruits, vegetables, potatoes

The major contributions of nutrients made by each food were:

- Bread — thiamine, niacin, iron, calories, protein
- Milk — calcium, riboflavin, phosphorus, protein
- Citrus fruits — ascorbic acid
- Meats — niacin, protein, iron, thiamine
- Irish potatoes — ascorbic acid
- Vegetables and tomatoes — vitamin A, ascorbic acid

Seven food groups (those listed above plus eggs) contributed a total of approximately 50 per cent of the calories, and between 55 and

70 per cent of the protein, calcium, phosphorus, iron, vitamin A, thiamine, niacin, and ascorbic acid ingested by the subjects.

The investigations showed a direct relationship between the percentage of some nutrients contributed by milk and citrus fruits and the adequacy of the diet as judged by the Recommended Dietary Allowances (2). The most common deficiency in the diet and the one of greatest magnitude was ascorbic acid; but other frequently occurring dietary deficiencies were in calcium, vitamin A, riboflavin. Citrus fruits would bring about the greatest improvements in ascorbic acid intake. However, these workers recommended as more practical for the people of this area, an increase in leafy green and yellow vegetables, plus home-grown tomatoes, as a means of improving vitamin A and iron intakes as well as vitamin C. Here we have an example of the way in which practical and theoretical considerations should be combined in our recommendations for improving diets. With the increased consumption of milk, many of the dietary deficiencies could be eliminated.

Children in Iowa, and probably those in other sections, obtain 40 to 48 per cent of their calories from cereal foods, sweet foods, and fats (5). It is important that these foods be as nutritious as possible. The ability to make good selections among these foods is an important skill to acquire in nutrition. These figures also emphasize the importance of enriching certain staple foods, as bread, flour, and table fat.

DIFFERENCES BETWEEN THE BEST AND POOREST DIETS

How do good diets differ from those at the other extreme? The answer to this question should indicate where emphasis must be placed in nutrition education. In the Iowa studies, boys with the best diets throughout the age groups averaged 4 cups of milk or more daily; those with the poorest, 2 to 3 cups. Girls with the best diets had 3 to 4 cups of milk daily and girls with the poorest, 2 cups (5). There were also large differences in the use of the vitamin-rich fruits and vegetables by the two groups. In fact, the greatest differences between children with the best and poorest diets were in the use of milk and the vitamin-rich fruits and vegetables. These same differences were also discovered in a study of Kansas and Ohio 9-, 10-, and 11-year-olds (14) and in another study of Connecticut children (15). We have evidence here that 3 to 4 cups of milk daily and five servings of fruits and vegetables, including one serving of the vitamin C-rich foods and one of the green leafy and yellow group, safeguard the adequacy of the diet, when children are likely to have liberal amounts of protein, energy-rich foods, and a source of vitamin D. Because of the high vitamin A value of the deep green and yellow vegetables and the ability of the

body to store the surplus amounts, some plans indicate the need for these foods as once every other day.

The use of meat substitutes and eggs was not very different for the two groups of children in the Iowa study, and no consistent relationship was noted between the fat-rich and sweet foods and the quality of the diet. However, girls of 15 years and older, with the best diets, used fewer desserts and sweets than those with the poorest diets. Children with the best diets generally ate more food than those with the poorest diets, and, as shown in Figure 2.10, the calories were distributed differently among the food groups.

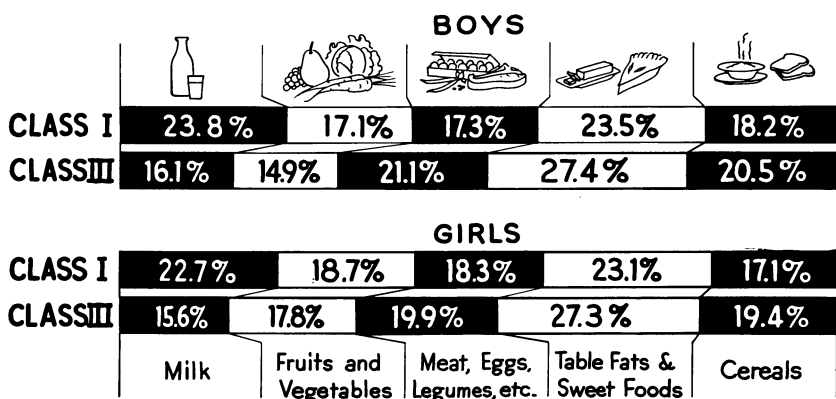


FIG. 2.10 — Percentage distribution of calories among food groups in average daily diets. Class I met all the allowances; Class III met only 67 per cent or less of the allowances.

THE DAILY FOOD PLAN

The "Basic Seven" (16) has been generally accepted as a guide in the choice of foods for good nutrition. Questioning students may wish to know whether it is reliable and practical. Moreover, teachers may be more convincing if they know that what they are teaching is valid. The information just summarized shows that children with good diets roughly follow such a plan. On the other hand, the children whose diets were the poorest deviated considerably from the plan, particularly in regard to their intake of milk, fruits, and vegetables. There may be many ways to obtain a good diet but under present conditions

of living, a plan simulating the Basic Seven seems to survive the test of experience.

The Agricultural Research Service of the United States Department of Agriculture has proposed the following revision of the daily food plan (17):

Milk group:

Children	3 to 4 cups
Teenagers	4 or more cups
Adults	2 or more cups
Pregnant women	4 or more cups
Nursing mothers	6 or more cups
Cheese and ice cream can replace part of the milk.	

Meat group: 2 or more servings —

Beef, veal, pork, lamb, poultry, fish, and eggs, with dry beans and peas and nuts as alternates

Vegetable-fruit group: 4 or more servings, including —

A dark-green or deep-yellow vegetable important for vitamin A — at least every other day

A citrus fruit or other vegetable important for vitamin C — daily

Other fruits and vegetables including potatoes

Bread-cereals group: 4 or more servings —

Bread or cereals — whole grain, enriched, restored

The minimum number of servings forms a foundation for a good diet. Other foods as fats, sugar, and unenriched cereals naturally will form a part of the day's diet, and may not need particular emphasis in educational programs.

Actually the new plan does not present a marked departure from the "Basic Seven" and is not contradictory to it. Through the condensation and greater specificity of amounts to be used, the new plan may afford a more effective teaching device than the "Basic Seven." Though in some respects it is more general than the old guide, it appears to give even more emphasis to the particular food groups that are most frequently lacking in the diets of our people. In the construction of the new plan the importance of each of the food groups to an adequate diet is clearly shown, and the need of the two specific types of fruits and vegetables is pointed out.

MEALS AND SNACKS

It is evident that children do not get all of their food in the conventional three meals a day. The following is the distribution of the

day's calories among meals and snacks of a statewide sample of children (18):

Breakfast	15 to 20 per cent
Noon meal	32 to 34 per cent
Evening meal	27 to 35 per cent
Snacks	15 to 17 per cent

The noon and evening meals were the best balanced so far as providing a fair proportion of all the nutrients as well as calories. Snacks

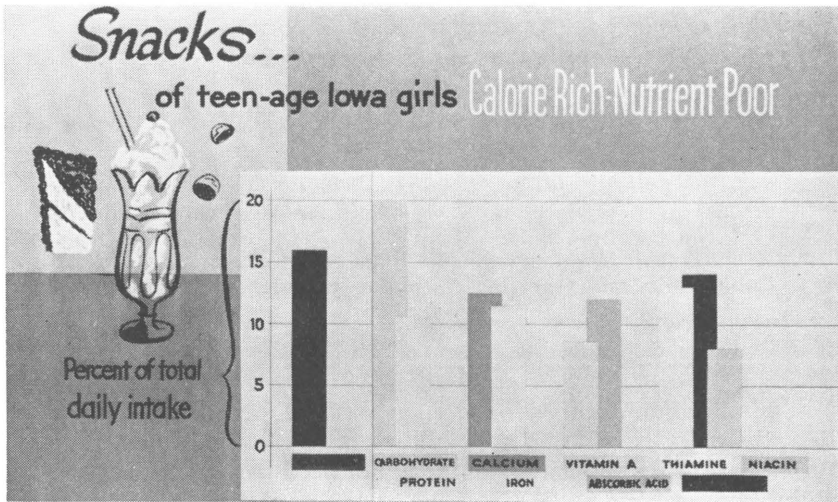


FIG. 2.11 — Percentage of total daily intake of nutrients furnished by snacks, for the teen-age girls.

were by far the poorest. They supplied calories chiefly from foods rich in carbohydrate. Since snacks represent a considerable portion of the day's food intake, and since they represent food which may be chosen independently by the child, nutrition education should focus sharply on this part of the child's diet. Little difference was found in the Iowa study between the distribution of food among the meals and snacks of the children with the best and poorest diets.

Breakfasts need improvement. They are likely to become poorer, especially for girls, as the children grow older (see Fig. 2.12). In the Iowa studies only one child in five who had a poor breakfast was able finally to have a good day's diet. Children who did not have a good source of vitamin C at breakfast usually did not get it at the other meals and hence did not have it for the day (18).

Studies in Connecticut (15) showed that, of the meals missed, 55 per cent were breakfasts, and that the average number of meals missed was highest in the 8th grade. Figure 2.12 shows the shortage of some important foods, as milk, eggs, and fruit in the breakfasts of rural girls. Teen-age girls may need to be taught that skipping breakfast is an ineffective way to try to control weight (19). In a study of school boys, young men and women, and elderly men, Dr. Kate Daum and her co-workers concluded that the omission of the morning meal is ineffective in reducing weight. Dr. Daum stated that breakfast should

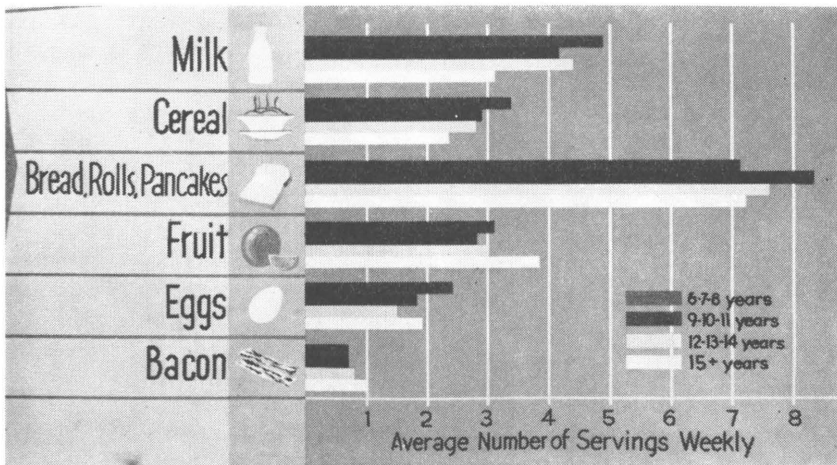


FIG. 2.12 — Use of some important foods in breakfasts of rural school girls.

contain not only one-fourth to one-third of the total calorie and protein allowances but also essential vitamins and minerals. There is little question that people perform better both physically and mentally when they have good breakfasts than when they have poor breakfasts or none at all.

THE NUTRITION STATUS OF THE CHILDREN

The final test of the quality of a diet is not in the calculated figures but in the children themselves. A good diet has been described by Leitch (20):

The diet of the people of most beautiful physique, most abounding energy, and least ill health is, at any given stage in our study of diet, the inspiration of and check on our theories of optimum diet.

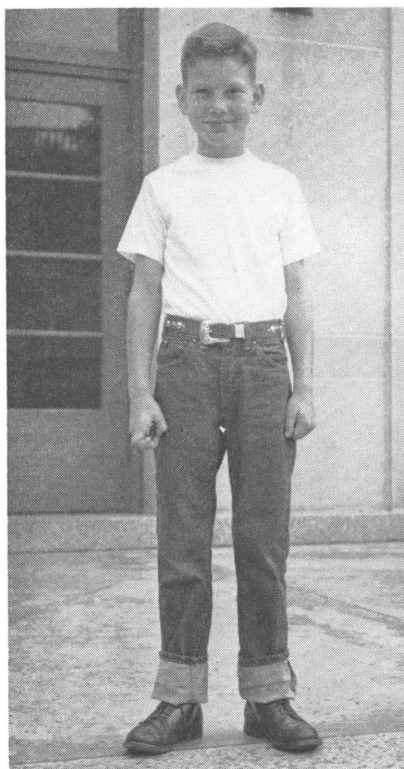


FIG. 2.13 — An example of good nutrition.



FIG. 2.14 — An example of poor nutrition.

The marks of good nutrition in the physique of a school child are clearly evident in Figure 2.13. We may expect well-nourished children like this to be alert in school and to have emotional stability and the other qualities which make for satisfactory personality development. The well-nourished child has good posture—head erect, chest up, shoulders flat, abdomen in. The skin is firm, healthy in color, and resilient. The bones are straight, joints are not noticeably enlarged, and the head is well shaped. The mucous membranes of the eyelids and mouth are reddish pink. Eyes are clear, alert in expression, have no circles beneath them, and make easy adjustments to changes in light intensity. Teeth are sound and free from discoloration. Hair is glossy, and muscles are well developed and firm. Skin has a good layer of fat beneath it.

The poorly nourished child stands in sharp contrast to the well-nourished one. He is apathetic, dull, easily fatigued. He is a liability in the school room. Fortunately in this country today we see few children so desolate as the child in Figure 2.14.

In most of the studies throughout the United States few children have been observed by doctors to have many of the outright, unmistakable symptoms of malnutrition, known as anatomical lesions. When these are observed the ravages of poor nutrition have gone a long way. The most frequent clinical conditions observed seem to be the changes in skin, gums, and tongue. In some places correlations have been made between some of these conditions and lack of certain nutrients. For example, there seems to be a relationship between gum changes and lack of vitamin C, and between some skin disorders and lack of vitamin A (21, 22, 23).

Body measurements are frequently used to determine how well children are developing. When taken at regular intervals, of perhaps 6 months, one can tell whether or not a child is growing at his usual rate. Of course, we expect certain periods when the rate will naturally slow down a bit, and other periods when it will speed up in a spurtlike fashion. Also, sudden accumulations of fat are not to be mistaken for real growth, which means increase of well-constituted body muscle and size of organs and bones. Moreover, we are concerned not only with the physical growth but with the chemical growth of children. By that we mean the accumulation of the substances which build the muscles, organs, and tissues. For example, children grow in calcium as surely as they do in height and weight, and growth in this respect



... eyes are clear, alert, and make easy adjustments to changes in light intensity.

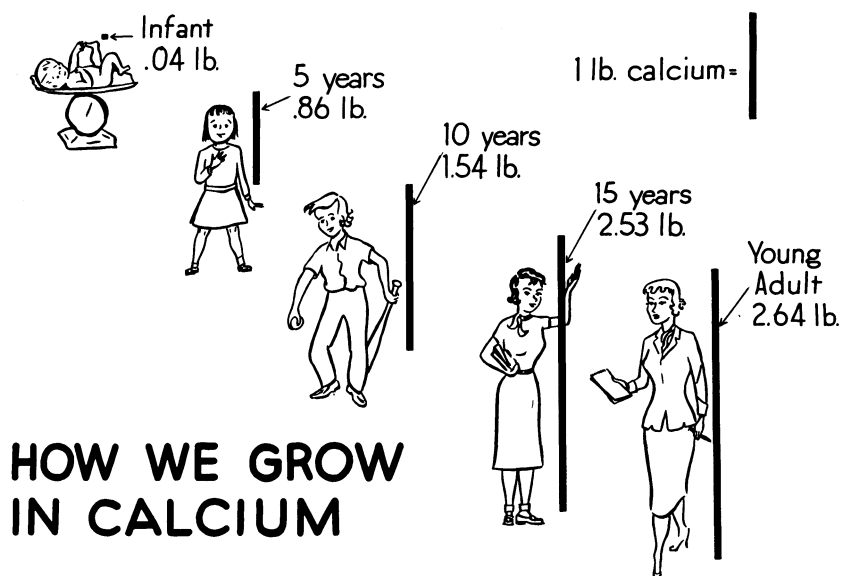


FIG. 2.15 — There is growth in calcium as surely as in height and weight.

may, in the long run, be the most important. This is really where nutrition comes in. It is through the foods children eat that these materials are supplied. The body is like a house (24). The finished structure may not resemble the materials of which it is built, but it can be no better than those materials.

Children can grow while things are going wrong. A striking example is the prevalence of dental caries among children who by stand-

FIG. 2.16 — The body is like a house. (From **Food for Life**, preface, VIII. R. W. Gerard. © University of Chicago Press, Illinois.)



ards of height and weight seem to be doing very well. Growth is a stress factor; nutrient needs are greatly increased by it. Compare, for example, the needs of the young boy (10 to 12 years) who requires 1.2 grams of calcium daily to his father's 0.8 gram or possibly less, and 70 grams of protein to his father's 65.

In the normal pattern, as children grow more slowly, the materials they obtain from food will go farther in their body building. Retardation greater than normal is an adjustment by the body to a poor diet. The first signs of growth retardation abnormal for a given age, therefore, become a danger signal. A faulty diet may be the cause. However, infections and emotional disturbances may also be factors.

In one study the percentage of children who were very heavy and obese was high among the teen-age girls (25). Diets of the heavy girls tended to be lower in caloric value than diets of the girls of medium physique. In fact, heavy teen-age girls had alarmingly poor diets. According to Martin (26):

Too much food, however nutritious it may be, leads to overweight. It is rare, however, for the normal child to take on excess weight if the diet is simple, wholesome and well provided with all the essential nutrients.

Although we do not know the optimum rate of growth, or body size, for children at specific ages, it seems probable that they will attain it if they have a liberal diet in a healthful, wholesome environment. Exercise is an important factor, and poorly nourished children may well disturb the balance between intake and output by inactivity.

A study of the body size of groups of children may call attention to conditions that should be scrutinized. Thus in Iowa, it appears that the school children in 1948-51 tended to be on the average heavier, though not taller, than children of the same ages about 10 to 12 years previous (27). Living conditions are changing. Few children today walk any distance to school; chores, if any, require little effort;

... chores, if any,
require little
effort.



hours are often shortened, with the result that the physical activity involved in vigorous play is reduced; viewing television often replaces a portion of the active play; and the availability and temptations of high-calorie snacks may tip the energy balance on the positive side.

Hundley has produced additional evidence that periodic measurements of children's height and weight detect favorable or unfavorable trends in their nutritional status under conditions considerably above the starvation level (28). In the Iowa study, among the reasonably well-fed children, aged 6 to 15, there was a perceptible difference in

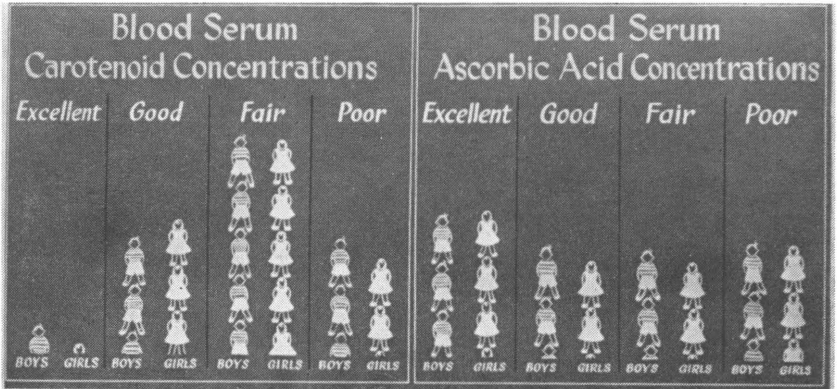


FIG. 2.17 — Number of children in ten with specified ratings in blood serum constituents.

the average body measurements of those with the best and the poorest diets (29).

The concentration of certain constituents of the blood may indicate the state of nutrition. The hemoglobin concentration is thought to be a good over-all index. This may be true because of the fact that a number of nutrients are involved in making hemoglobin. Few of the children in the Iowa study had concentrations of hemoglobin indicative of extremely poor nutrition. In some areas of the country higher percentages of children with low concentrations of this substance are to be found. Such children may need greater amounts of protein, iron, and the vitamins of the B complex.

The serum concentration of other constituents, as vitamin C and carotene, may indicate the degree of body saturation or stores, and may reflect the content of these substances in the diet. The serum levels of vitamin C confirm the dietary findings that many children have diets which are poor in vitamin C. The carotene concentrations

are likewise low, as might be expected in view of the scant use of green and yellow vegetables by large numbers of children throughout the country. More work is needed before the significance of the concentrations of these substances in the blood can be related to the health of the children.

The most general physical defect noted among children in the United States is dental caries. It is evident that this generation of children is susceptible to this affliction. There is no conclusive evidence as to what can be accomplished through nutrition for this immediate generation. There is, however, a good possibility that the caries-susceptible child may be protected by a nutritionally adequate diet (30). The enrichment of the diets of many children with the elements so often lacking in their diets — namely calcium, vitamin C, and vitamin D — might bring about great improvements even in this generation. These elements are definitely involved in the calcification process, which is basic to tooth development.

As we see, therefore, nutrition studies of school children suggest certain points of emphasis in nutrition education programs:

1. Diets of many children need improvement, particularly in regard to *calcium, iron, vitamins C, A, and D*.
2. A good daily food plan¹ for children of school age includes:
 - a. One quart of milk or the equivalent in other dairy products
 - b. One serving of carotene-rich vegetables and fruits (as certain dark green, leafy or yellow vegetables and yellow fruits) at least every other day
 - c. At least 1 serving daily of vitamin C-rich foods as citrus fruit, melon, raw cabbage, tomatoes, raw green vegetables
 - d. Two or more servings of other fruits and vegetables
 - e. Two or more servings of meat, eggs, or legumes
 - f. Four or more servings of bread, and cereals such as oatmeal, macaroni, rice
 - g. Fat and sweet foods as needed to meet the total energy needs and to make other foods palatable and interesting.
3. Children should be encouraged to like foods *without rich dressings and sauces*.
4. Among the meals, *breakfasts and snacks* are especially in need of improvement.
5. *Some groups of children* seem more likely than others to have poor diets, *i.e.*, girls more than boys; teen-age girls more than the younger; children from large families and low economic levels;

¹ A guide for identifying foods in these specific groups may be found in Appendix A, pages 173-75. Also see plan proposed by ARS-USDA on p. 27.

Negro more than white children; heavy girls more than those of medium weight.

6. *Continuous records of height and weight* may be helpful in detecting the onset of poor nutrition.
7. Efforts should be made to help school children to attain the *highest level of health of which they are capable*; for many this will involve, more than anything else, certain dietary improvements.

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CHAPTER THREE

Selecting Objectives and Organizing Information

Daily activities become so much a part of an individual that resistance to any change in routine can be expected. This is so with food particularly. Suggest to some people that food practices should be changed and they feel that their personal rights to freedom are being violated. Others will agree that some diets should be better, but they fail to evaluate their own food plan and make changes where needed. A feeling that what one eats is one's own responsibility may be among the reasons why efforts to improve food habits of the American people have been discouraging.

This feeling, however, also can be an asset to nutrition education. If you as a teacher believe this, you will make a more personal approach to your audience than is usually made. People will change food habits when they believe that good nutritional status will help them achieve their own important goals. You will not tell people what they should do. Rather you will teach in such a way that individuals decide to improve their food practices because they recognize the advantages of changing.

Of course, not all people desire the same things, but good nutritional status is an important asset when striving to reach a wide variety of goals. It can influence the way one looks and feels and acts and thus affects satisfactions from daily activities and the efficiency with which they are performed.

This approach is emphasized throughout the book. Beginning with

objectives, attention is focused on the individuals to be reached, the goals assumed to be important to them, and the attitudes and abilities necessary to achieve these goals through good nutrition. The same plan of organization is used for presenting information, and methods are suggested that will stimulate growth of students toward the objectives. This procedure is also suitable for self-education.

Whether you wish to reach an audience through published articles, a talk, or lessons for an organized group, the same three steps in preparation will be helpful. You will (1) select your objectives, (2) determine the information needed, and (3) plan methods of presentation to achieve your objectives.

OBJECTIVES FOR NUTRITION EDUCATION

As a result of nutrition education people should be able to:

1. Recognize how nutrition can affect:
 - a. Appearance through its influence upon complexion, fingernails, teeth, eyes, hair, posture, and body size.
 - b. Personality as shown by vigor and energy, self-confidence and poise, cheerfulness and cooperativeness, interest in others, emotional stability, and ambition.
 - c. Efficiency through its influence upon physical fitness, mental activity, and alertness.
 - d. Growth and development through its interplay with hereditary and environmental factors.
2. Attain good nutrition because they:
 - a. Provide the nutrients or chemical substances needed by the body for its functions.
 - b. Select foods which provide these nutrients in the amounts needed by the body.
 - c. Prepare the food so that it will furnish maximum nutrients.
 - d. Budget their money and use economy in buying foods when financial resources make it difficult to cover the cost of a good diet.
 - e. Maintain the body in a condition favorable for utilization of nutrients.
 - f. Distribute foods wisely in meals and snacks.
 - g. Make proper use of supplements when needed.
 - h. Accept some responsibility for enrichment of foods when in the interest of public health.
 - i. Establish good food habits which may be modified as needs and living conditions change.
 - j. Assume responsibility for their own nutrition.
 - k. Extend the variety of foods eaten and enjoyed.

3. Recognize the importance of continuously checking nutritional state by such means as:
 - a. Keeping a record of body measurements and interpreting data in terms of nutrition and physical progress.
 - b. Evaluating the daily intake of food nutrients.
 - c. Noting the characteristics which reflect the nutritional state.
4. Plan and prepare nutritious meals for families because they:
 - a. Know how to select and prepare suitable foods from available sources.
 - b. Know nutritional requirements of various age groups.
 - c. Recognize how such factors as customs, nationality, age, and religion influence food preferences and practices.
 - d. Can evaluate the worth of processed foods such as packaged mixes, frozen foods, ready-prepared meals.
5. Understand the significance of nutrition to the welfare of families, communities, and nations because they:
 - a. Know its effects on the mental and physical health of individuals.
 - b. Know its effects on relationships among people.
 - c. Know its relationships to world problems and conditions.

Objectives as comprehensive as these cannot be achieved by the efforts of one person alone or by one group of individuals in a community. But cooperation among the individuals concerned with nutrition education can be expected to bring best results when they plan programs to reach all family members at approximately the same time. The over-all objectives for all groups may be the same, but the methods will be keyed to the age, responsibilities, and interests of the immediate group.

Nutrition education is likely to be ineffective if an individual is reached during just one period in his lifetime. Information acquired at one period may not be that which is needed for solving problems later on. Furthermore, knowledge of nutrition is constantly increasing. Food technology has changed the availability of some foods, and in some instances nutritive value, also. The readiness of people to learn changes with age and responsibility. Thus there is good reason to plan nutrition education for all groups in a community.

Readiness to learn will be influenced by the ages, responsibilities, and experiences of members of a group. Thus, experiences need not be repeated when the same individual is taught nutrition at different periods of his life. The factors that influence readiness to learn are discussed in detail in Chapter Six.

When you have selected the objectives that are appropriate for the group you plan to teach, you will wish to assemble the facts that must be understood if the objectives are to be achieved. The facts pre-

sented in the following chapter are organized to facilitate such planning.

ORGANIZING INFORMATION

All persons having responsibility for nutrition education cannot be well-grounded in the science of nutrition, and many people who are highly trained in nutrition have given little thought to the way in which their information can best be taught. The nutritionist working with the educator forms an important team in education: the person trained in nutrition to discover and to present the facts, the educator to see that facts are presented to students in the form in which they can be understood and used. In Chapter Four an effort has been made to organize the practical knowledge in nutrition according to the objectives shown by research in education to be effective in motivating learning. The information is presented in the form of generalizations and statements of supporting facts.

Generalizations are not to be confused with generalities. Generalities interfere with genuine education and are often used by propagandists to encourage the acceptance of ideas without thinking. They result from generalizing from limited experience, from being blinded to some facts by prejudice, or by accepting half-truths as irrevocable facts.

In contrast, generalizations are specifics of broad application supported by facts. They show relationships among the ideas that belong together and are designed to encourage thinking on the part of the student. When accompanied by supporting or closely related facts they can help you in teaching the student to use his information to solve problems. Furthermore, they can help in the assimilation of new information and the development of ability on the part of the student to make valid generalizations for himself. At this stage the learning becomes activated to the point that it may influence behavior.

The ideas that an individual remembers from his experiences are likely to influence his behavior. If the ideas are false or based on incomplete data his response is likely to be undesirable. This is certainly true of food practices. For instance, the idea that milk is fattening is used as a generalization about milk to justify its almost complete omission from the diets of many adolescent girls and women. Their education is lacking unless they (a) know many facts about food and its effects upon body weight; (b) consider body weight in relation to their total health; (c) know how the nutrients in milk influence physical characteristics other than weight; and (d) organize information about the ways food can affect health.

Of the statements in Chapter Four, those designated by arabic numerals and capital letters are primarily generalizations. The sub-

headings with numbers in parentheses furnish supporting evidence or closely related facts. While the information may be useful to people who are not highly trained in nutrition, a sound education in nutrition will enable the educator to make the best use of the material presented. It is to be hoped that as nutrition finds its rightful place in health education, teachers generally will have good training in it.

The difficulty of making general statements in nutrition with a minimum of technical terms is recognized. In this compilation we have assumed that students will learn to call the common nutrients by name. They are briefly defined or described in Appendix C. Because of the widespread use of these terms it is important that people become familiar with them.

A further difficulty is presented by the fact that the field is new and much of the information is yet in a formative state. Practical application can scarcely await the elimination of all the uncertainties. Students should, however, be taught the importance of open-mindedness in nutrition and warned of the need of revising their information in the light of future discoveries.

We have attempted to select and formulate statements which conform to one or more of these tests:

1. Proof through reliable experimental evidence, derived under carefully controlled experiments and subsequently reaffirmed by other investigators.
2. Practical working hypotheses advanced by experienced research workers in nutrition.
3. Logical conclusions from knowledge in nutrition and related fields.
4. Scientific observations of populations and of species survival.

Information from animal experiments is accepted with qualifications when applied to human beings. But in an effort to bring together the useful and important information, this source cannot be disregarded.

Where results of experiments have not completely established the validity of a finding but at the same time have given a strong, positive indication, the generalizations or facts have been qualified by a term such as "there is some evidence." Such qualifications should not undermine the confidence of the educator in using the statements, but rather serve as a reminder of the need of open-mindedness and the maintenance of the research point of view.

This compilation of generalizations and facts is believed to be unique in several respects.

1. Facts have been brought together from widely scattered reports of nutrition research found in textbooks, bulletins, journal articles, and theses.

2. Facts have been stated with a minimum of technical terms so that they may be readily adapted when they are used by teachers, writers, dietitians, or others who are concerned with education below the professional level.
3. Facts have been organized to show how nutrition can influence the attainment of important goals, and thus the learning of them will be easy to motivate.
4. Facts have been organized under three broad generalizations that show (a) the influence of nutrition upon personal development; (b) how to attain good nutrition; and (c) how to evaluate the nutritional state of an individual.

Each generalization is followed by statements of fact which support it. Because a given fact may be necessary for understanding several generalizations, you will find some of them repeated several times. Thus each generalization and its supporting facts form a complete unit.

CHAPTER FOUR

Generalizations and Facts

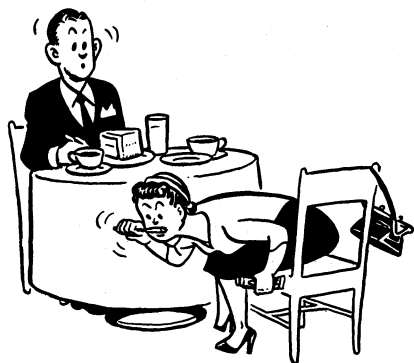
In this chapter, information considered important in practical nutrition education is presented under 18 major headings which may be described as generalizations. The statements from 1 through 4 relate to the ways in which nutrition may affect the individual and society; 5 through 15 present measures necessary to insure good nutrition; 16 through 18 tell how one may check his own nutrition. The subheadings as indicated by letters expand the main generalizations, and the statements of the next order are related facts.

The statements are not to be memorized by students, but to be used by the educator as a basis for learning experiences (see Chapter 5). They are planned to lead the student to an understanding of sound nutrition, to awaken him to the significance of nutrition as a force in his life, and to provide a base on which his knowledge can grow. Many statements are abstract and may be applied in a wide variety of situations. The effectiveness of their application challenges the ingenuity of the educator whether he is a teacher, a public health worker, or a columnist.

1. **Nutrition can affect how you look by its influence on the different parts of your body and the characteristics which relate to your personal appearance.**
 - A. Good nutrition plays an important part in producing an attractive skin.

- 1) The skin of a well-nourished person is usually smooth, slightly moist, and tinged with pink; that of a poorly nourished person is likely to be dull and lifeless.
 - 2) Inadequate amounts of vitamin A in the diet for long periods of time result in dry, scaly skin which is more susceptible to infection than normal skin.
 - 3) Too little of certain members of the vitamin B complex in the food supply may result in scaly, greasy, or crusty skin around the corners of the mouth and in the folds of the nose.
 - 4) When food has contained too little protein, minerals, and vitamins, the red blood cells do not have a normal amount of their red coloring matter, and the skin of the individual may be pale in color.
 - 5) For some people common foods, such as milk, eggs, strawberries, or wheat bread, may cause a skin rash known as allergy, and it becomes necessary to eliminate the offending foods or to become desensitized to them.
 - 6) Although the acne of adolescence may be unrelated to nutrition, a good all-around diet, together with cleanliness, may help to combat it.
- B. The teeth are complex parts of the body, subject to nutritional influences beginning at the time of their formation and continuing through the period of maturity.
- 1) An important measure in controlling tooth decay is to provide the building materials — protein, calcium, phosphorus, and vitamins A, C, and D — from the prenatal period until the last permanent teeth are fully developed.
 - 2) Whatever the cause of poor nutrition — whether poor diet, infection, or disease — nutritional deficiency during the formation of the teeth results in their imperfect development and predisposes them to decay.
 - 3) If nutritional deficiency is present when the permanent teeth are being formed, the permanent teeth often suffer injury more than do the temporary ones.
 - 4) There are some unknown factors which sometimes prevent sound formation of teeth even when all known tooth-building materials are present in the food supply and the teeth are kept clean by brushing and by rinsing the mouth.
 - 5) For reasons not understood, some nationalities as well as some families have developed either marked susceptibility or marked resistance to tooth decay.

- 6) A good diet from one generation to the next offers the hope that the people of the United States may eventually increase their resistance to tooth decay.
 - 7) One may be born with a tendency toward poor teeth but this tendency can be checked by good nutrition or further aggravated by poor nutrition.
 - 8) High carbohydrate foods which tend to stick to the teeth, as hard caramel candy, are likely to produce tooth decay in people who are susceptible to dental caries.
 - 9) One to 1.5 parts per million of fluorides in drinking water, when used by children whose teeth are in the formative stage, apparently help to protect the teeth against dental caries.
 - 10) A little more than 1.5 parts per million of fluorides in drinking water, when used by children whose teeth are in a formative stage, may produce defects in the enamel known as mottled enamel.
 - 11) Fractures in tooth enamel which may occur when one bites hard objects, or when one injures a tooth in a fall or blow, produce places where food particles and bacteria may lodge and start decay.
 - 12) Since acids formed by bacterial action on sweets lodged around the teeth may start decay by dissolving the calcium, it is well to cleanse the teeth thoroughly soon after eating foods of this type.
 - 13) Current experimental work suggests that acid fruit juices may have a greater erosive effect on tooth enamel than the same acid fruits eaten whole.
 - 14) Keeping the teeth clean is essential, but it will not replace the need for good food in the protection of the teeth from decay.
- C. The muscles, nerves, and mucous membranes of the eyes, and also the processes by which images are received, are sensitive to the nutrition of the individual.



It is well to cleanse the teeth thoroughly soon after eating . . .

The hair may become dull, dry, and difficult to manage.



- 1) Usually the eyes of the well-nourished, healthy person, with good habits of living, are bright and clear.
- 2) After very long and severe shortages of vitamin A, the covering of the eyeball and the mucous membrane around the eye may become dry and hard, and sometimes even blindness may result.
- 3) The ability to see in a dim light or to adapt quickly to marked change in the brightness of light depends in part on a good supply of vitamin A.
- 4) Itching, burning, and a grating sensation of the eyes when exposed to fairly bright light may be caused by too little riboflavin in the diet.
- 5) If there is severe lack of riboflavin, the blood vessels of the covering of the eyeball become enlarged or may burst, and the eye may be clouded by thickened tissue or be bloodshot.
- 6) Because of the sensitivity of the eye to general body conditions, poor nutrition may affect adversely the efficiency of this organ; in fact, the eye is often a sensitive indicator of the general state of nutrition.

D. Hair and nails are body tissues which reflect the state of nutrition.

- 1) When the food supply of protein, minerals, and vitamins is adequate, hair tends to be soft and lustrous.
- 2) When the food supply of protein, minerals, and vitamins is poor, the hair may become dull, dry, and harsh, and difficult to manage.
- 3) The universal relationship of excellent nutrition and care of animals to the fine quality of their coats leaves little doubt of the benefits which people may derive for their hair.
- 4) Though animal experiments have shown apparent relationships between dietary deficiency of specific nutrients and loss of hair and even loss of color in the fur,

there is no convincing evidence to support claims of such relationships for human beings.

- 5) Good protein food, reinforced with minerals and vitamins efficiently used by the body, helps to form firm, well-shaped fingernails which can be groomed to attractiveness.
- E. Body size is a result of many factors such as diet, secretions of glands, inheritance, disease, and exercise.
- 1) The relationship of nutrition to body size is shown by the fact that increase in body weight in proportion to height is probably the best over-all index of nutrition during growth, since body weight represents the composite of all parts of the body — bones, organs, blood, muscles, and other tissues.
 - 2) Boys and girls need to understand that the growth spurts during adolescence (about 10 to 12 years for girls and about 12 to 14 years for boys) are natural and should be supported by a well-balanced, adequate diet.
 - 3) If the food intake exceeds the amount of food used by the body for exercise, maintenance, and growth there will be storage of the surplus and gain in body weight, due to the accumulation of body fat; conversely, if the food intake is less than the body needs there will be loss of weight.
 - 4) Surplus food fat, protein, and carbohydrate are transformed into body fat, which is then deposited about the organs, between the muscles, or in a layer of fatty tissue under the skin.
 - 5) Fat deposits serve as a reserve supply of body fuel to be drawn upon in case of temporary shortage of, or increased need for, fuel.
 - 6) Fat deposits serve to support and protect the organs and to prevent loss of heat from the body surface.
 - 7) Fat deposits under the skin help to soften the angles produced by the bones, and in proper amounts contribute to the attractiveness of the person.
 - 8) The human body adjusts itself to an inadequate amount of food by a decrease in body weight and perhaps in activity and, ultimately, by changes in the chemical processes of the cells.
 - 9) Children who are considerably below the average weight for their height and age may tire more easily and have less endurance than others, although these conditions

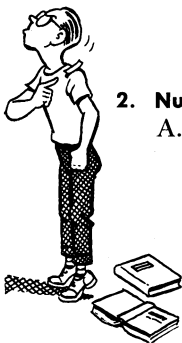
are sometimes masked by drives which lead to excessive activity.

- 10) That characteristics of body build are inherited is evident in the similarity of bone structure that is often seen among members of a family.
 - 11) The fact that family members often have similar eating habits may account for the tendency toward fatness or thinness sometimes observed in families.
 - 12) Rest influences body weight through its effect on conservation of energy.
 - 13) A safe program for reduction of relatively large amounts of body weight requires the supervision of a physician.
 - 14) The goal for which one should strive when reducing body weight is a small, steady loss per week with the maintenance of a good state of mental and physical efficiency throughout the reducing period.
 - 15) Because of readjustments of the body to a reducing diet, weight loss may not be immediately apparent; it is therefore important to allow sufficient time before becoming discouraged with the results of a reducing program.
 - 16) Excess weight is often accompanied by development of heart and circulatory diseases and diabetes in middle age.
 - 17) Because of the great difficulty in reducing and staying reduced, it is wise never to allow the accumulation of excess weight.
 - 18) Emotional disturbances such as sorrow, nervousness, irritability, anxiety, or lack of acceptance socially may increase or decrease the desire for food and thus affect body weight.
- F. Posture is in a large measure dependent on the tone of the muscles and the proper development of the bones, both of which are greatly influenced by nutrition.
- 1) A well-built and substantial framework together with good muscles provide the basis for a well-shaped body and good carriage.
 - 2) When children, including adolescents, receive too small a supply of protein, calcium, phosphorus, and vitamins C and D, there is danger that the growth of bones will be stunted or that the bones will be improperly shaped.
 - 3) Diets poor in calcium, phosphorus, and vitamin D are liable to cause narrow chests, small pelvic bones, knock-knees, and bowlegs.

- 4) Malformed bones resulting from poor food supply during childhood remain malformed throughout life.
 - 5) Malformation of the pelvis in childhood may cause difficult delivery for the mother at the time of childbirth and thus the nutrition of one generation affects the welfare of the next.
 - 6) When clothing, smoke, fog, window glass, or geographic location prevents direct rays of the sun from reaching the skin, vitamin D should be supplied to growing children and pregnant and lactating women through supplements such as cod-liver oil and vitamin D concentrates, or through vitamin D enriched milk. Since vitamin D supplements are very potent, and because excess can be harmful, they should be given in doses exactly as directed.
 - 7) Because protein is used for building bone, blood, and body tissues such as muscles, organs, skin, and hair, the protein needs are highest in periods of rapid growth.
 - 8) If children keep increasing in height when they have poor diets, they are likely to develop poor posture and malformations of the body.
 - 9) With well-formed bones, firm muscles, and normal pads of fat and connective tissue, the organs are held in their proper place and the disfiguring effect on posture of a protruding abdomen is avoided.
- G. Nutrition can help to produce the glow of good health which greatly enhances personal appearance.
- 1) The glow of good health is often more important to the beauty of an individual than the contours of the face or body.
 - 2) An alert, happy expression and relaxed, erect posture contribute to the sparkling good looks of a healthy, well-nourished boy or girl.
 - 3) Poor nutrition makes people look dull, lifeless, and prematurely old.

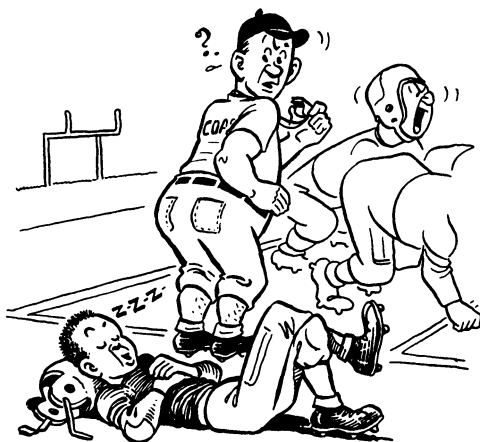
2. Nutrition can affect your personality, vigor, and ambition.

- A. Some personality traits known to be affected by the nutrition of the individual are cheerfulness and cooperativeness, self-confidence and poise, interest in others, and emotional stability.



- 1) Since good nutrition helps the body function properly, it also helps the individual to feel capable of meeting problems, and thus reduces tensions and frustrations.
 - 2) Hungry human beings think of little else than food or subjects closely related to it.
 - 3) People suffering from chronic dietary deficiencies become morose and unhappy and lose their sense of humor.
 - 4) When an individual is extremely hungry, he is likely to be irritable, restless, and lacking in self confidence and judgment; prolonged hunger often makes the individual lose his sense of right and wrong, consideration for others, ability to get along with people, and ambition.
 - 5) Good health helps people to enjoy and take part in activities with their friends; interest in being socially acceptable has been observed to decrease under conditions of poor nutrition.
 - 6) Thiamine has been called the "morale vitamin," because a body deficiency of this vitamin may cause personality characteristics such as fearfulness, apprehension, timidity, depression, irritability, quarrelsomeness, lack of co-operation, and loss of initiative.
 - 7) When families fall into the habit of disorganized meals and carelessness in eating, friction and unhappiness are the usual results; at least one good family meal a day will do much to preserve the unity of the family and promote the personality development of its members.
 - 8) Good nutrition is an important measure in helping to prevent antisocial behavior among teenagers.
 - 9) Lack of food is the basis of much of the unrest in the world today, as it has been throughout the history of mankind.
 - 10) A first step in world peace is the creation of conditions whereby people of the world can be assured of enough of the right kinds of food to eat.
- B. Vim and vigor are an outgrowth of the good health which comes as a result of good nutrition and freedom from disease.
- 1) There is a distinction between the hyperactivity of a nervous individual and the purposeful action of the normal, healthy person.
 - 2) Apathy is a general characteristic of poorly nourished people.
 - 3) There is no reason to believe that any benefits will be derived from excesses of nutrients after the body needs and stores of nutrients have been fully provided.

- 4) Vitamins will not contribute to the vim and vigor of an individual unless all of the other nutrients, such as protein, fat, and minerals, are supplied in adequate amounts.
- 5) Animal studies have indicated that raising the level of nutrition from "fairly good" to "excellent" increases adult vitality, length of life, and vigor of offspring.
- 6) Apparently the achievement and progress of nations which are well fed far exceed that of the poorly fed peoples of the world.



3. Nutrition can affect how you work by its influence on your physical and mental efficiency.

- A. Since physical efficiency requires good muscle and nerve co-ordination, it varies with the state of nutrition.
 - 1) Skipping breakfast has been shown to result in a decrease in maximum work rate and maximum work output in the late morning hours.
 - 2) Foods which help to develop sound muscles and steady nerves contribute to ability to develop athletic skills.
 - 3) Boys and girls engaging in strenuous exercise need more of the energy-rich foods such as sugars, fats, cereals, and breads than do less active people of the same age.

- 4) Beverages containing caffeine and alcohol may cover up fatigue and give a temporary feeling of well-being.
- 5) Good nutrition alone will not produce a winning athletic team, but eating good food in the right amount is an important aid to success in athletics.
- 6) Members of a winning team need an adequate diet every day, not on days of the game alone.
- 7) To fulfill its function, a training table encourages its members to maintain weight at the desired level and to eat, every day, the variety of foods which constitute a good diet — meat, milk, eggs, cheese, fruits, vegetables, and enriched or whole-grain cereals and breads.
- 8) With most training-table regimes, one problem is to prevent undesirable weight gain, which normally comes only from eating more food than is being expended to meet energy needs.
- 9) Permission to eat and enjoy foods to which they are accustomed aids in building morale in athletes.
- 10) Participants in some sports may need as much as 100 per cent more food energy than a sedentary person, depending on the sport and the degree of participation.
- 11) By checking weight daily, it is possible to tell if an athlete is getting enough to eat in relation to his energy expenditure.
- 12) The usual requirement of dietary protein for growth suffices for the young athlete since activity does not affect the amount of this substance needed.
- 13) It is not good to eat immediately before strenuous exercise, since it is undesirable to divert the blood supply from the digestive tract, where it is needed to aid in absorption and utilization of food.
- 14) After extreme exercise, athletes need at least an hour of rest and relaxation from tension of the game before eating a meal, in order that the meal may be enjoyed and the food well utilized.
- 15) Moderate use of fluids which are neither excessively hot nor cold is recommended before and after strenuous exercise.
- 16) A substantial meal 4 to 5 hours before a game is desirable so that the food may be digested and absorbed in advance of the vigorous exercise and so that the energy may be available for the game.

- 17) Even after prolonged exercise for as many as 4 to 5 hours, a normal body can usually furnish the required energy from its reserves so that supplements of sugar are not required.

B. Good nutrition creates conditions favorable to the maximum mental achievement of which the individual is capable.

- 1) Through good physical growth and development, favorable conditions are created for mental, emotional, and social development of the individual.
- 2) For individuals with poor nutrition, there is reason to believe that the mental alertness and general progress in studies can be improved by better nutrition.
- 3) Prolonged hunger and poor nutrition undermine the interest of the individual in mental pursuits such as reading and writing.
- 4) Forgetfulness and irresponsibility have been observed as characteristics of poorly nourished people.
- 5) Although no relationship of nutrition to intellectual capacity has been established, deterioration of the mind and nervous system characterizes many deficiency states.
- 6) There are no specific foods or nutrients which can be depended upon to increase the intellectual capacity.
- 7) Mental work, unless accompanied by considerable body tenseness, does not increase the energy needs of the body.

4. Nutrition can affect how you grow and develop through its interplay with hereditary influences, environmental conditions, and other factors related to the chemistry of the body.

A. Hereditary factors may set a limit, but within that limit nutrition can help the individual to attain his optimum growth and development.

- 1) Body size and build are influenced by heredity, but inherited tendencies can be upgraded by good nutrition; good nutrition through several generations has been observed to improve the stock.
- 2) Racial and family tendencies in body size may be altered through nutrition; a continued state of poor nutrition is not inherited.
- 3) That characteristics of body build are inherited is evident in the similarity of bone structure that is often seen among members of a family.
- 4) The fact that family members often have similar eating habits may account for the tendency toward fatness or

thinness sometimes observed in several family members.

- 5) One may be born with a tendency toward poor teeth, but it can be checked by good nutrition or further aggravated by poor nutrition.

B. Environmental factors exert a strong influence on health, but nutrition can help in the adjustment to many of the strains exerted by environment.



Nutrition can affect how you grow.

- 1) An extremely cold environment or insufficient protection from cold increases the body's need for fuel and food energy.
- 2) The layer of fat deposited under the skin, which helps to protect the body against heat loss when exposed to severe cold, reflects the adequacy of the caloric intake.
- 3) Under usual conditions of clothing and temperature, heat produced by chemical changes in the food eaten is sufficient to maintain normal body temperature.
- 4) Inadequate housing or insufficient clothing in severe weather or climates may increase the need for energy to maintain body temperature, and extra food will have to be used for this purpose.

- 5) Underweight children and semi-starved and thin old people, who do not have a good layer of fat under the skin, may have difficulty in maintaining body temperature and may need additional amounts of food to keep warm; if it is not provided, body tissue will be burned for this purpose.
- 6) Cold is an environmental factor which further aggravates the effects of poor nutrition in thin and ill-clothed people, especially children.
- 7) An extremely warm environment is likely to decrease the body's need for food energy because of possibly depressed body processes and lessened physical activity.
- 8) Good nutrition may help to fortify workers in industry against such hazards as exposure to moderate amounts of lead, TNT, and other chemicals.
- 9) Individuals who work at night or are deprived of exposure to sunshine may need to take a supplement containing vitamin D or to use vitamin D enriched milk.
- 10) When soil and water are known to be deficient in certain minerals, the ill effects may be offset by an automatic source of the substance, as iodides in salt.

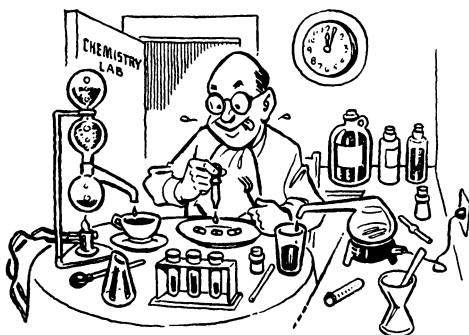
5. Good nutrition requires that the nutrients, or chemical substances, needed by the body for its functions be provided in ample amounts.

- A. The nutrient needs of individuals vary with age, sex, activity, climate, and state of nutrition, and are subject to individual differences due to hereditary and acquired conditions.
 - 1) The present knowledge concerning the amounts of various nutrients which should be allowed for the maintenance of good nutrition in healthy persons in the United States has been summarized in the Recommended Dietary Allowances of the National Research Council;¹ these figures include margins of safety and are selected to cover the expected individual variations (failure of an individual to attain them does not necessarily mean that he is poorly nourished).
 - 2) During the growth period the need for nutrients, such as calcium and protein, is high because the proportion of these nutrients in the body increases during that time.
 - 3) In a specific age group growing boys usually need more

¹National Research Council, *Recommended Dietary Allowances*, Publ. 302, Washington, D. C., 1953.

food than growing girls due to their greater activity, muscle mass, and usually larger size.

- 4) If a child is not fully developed or physically fit because of a long period of faulty eating, a liberal amount of nutrients will be necessary over a long period of time to bring the body to good condition.
- 5) The nutritional requirements during pregnancy and lactation are generally high and are most likely to be met if good food habits have been established in the teen ages or in the period before pregnancy.
- 6) The body need of some nutrients is greater for children than for adults, hence children cannot meet their needs simply by eating a fraction of the diets of adults.
- 7) A well-planned family meal may be adjusted to meet the varying needs of the different family members.



... the nutrients must be provided in ample amounts.

- 8) Meals which contain liberal amounts of protein-rich foods and vitamin-rich fruits and vegetables can be adjusted to meet the needs of each family member by varying the amounts of dairy products, other vegetables and fruits, cereals, fats, and sweet foods.
- B. Energy from food is used to do muscular work, to produce body heat, to support growth of the body, to maintain the functions of the vital organs.
- 1) Calories represent the energy available in food and the energy needs of the body, hence they are a useful guide

- in determining the amount of food needed by the individual.
- 2) Physical activity is the outstanding factor causing variability in calorie needs of people of similar size.
 - 3) A small increase in daily caloric intake may be allowed for people living where the average external temperature is below 50°F. (10°C.), and a small decrease where the average external temperature is above this amount.
 - 4) In order to keep from gaining weight during middle age, a small reduction in the daily caloric intake should be made for every decade beyond age 25 unless the exercise of the individual has increased.
 - 5) Weight and weight change indicate the adjustment of the calorie intake to the individual's needs.
 - 6) Food energy value depends on carbohydrate, fat, and protein content of the diet since these constituents release energy as they are broken down in the body cells.
 - 7) Sugars and starches are about the same after they are digested because digestive juices break the links between the units which make up sugar and starch as eaten.
 - 8) Since fats provide about twice as many calories as the same weight of carbohydrates or proteins, the calorie value of foods increases as the amount of fat in the foods increases.
 - 9) The calorie value of foods becomes less as the water and fiber content increase.
 - 10) With low calorie diets as those of small children, sick people, or people who are reducing, care must be taken that all foods are highly nutritious, so that enough of the essential nutrients will be supplied.
- C. Protein contains nitrogen in the form of amino acids which are used in the growth, functions, and maintenance of the body.
- 1) The total protein need of normal adults is influenced primarily by body size, not by activity.
 - 2) Because protein is used for building tissues such as muscle and bone, and for formation of the constituents of blood, the protein needs are highest in periods of rapid growth.
 - 3) Per pound of body weight, growing children and adolescents need from two to three times as much protein as do normal adults.

- 4) During pregnancy and lactation, women need about 40 per cent more protein than at other times.
 - 5) Because there is limited provision for storage of protein in the human body a liberal amount of this substance must be eaten daily.
 - 6) If people eat no protein, the tissues will slowly waste away even though plenty of carbohydrate and fat are available for fuel.
 - 7) In many parts of the world children are suffering from diets in which the protein content is low and primarily of vegetable origin.
 - 8) When the amount of protein in the diet is adequate, if approximately one-half comes from animal foods such as milk, cheese, meat, and eggs, all the amino acids needed for promoting growth are provided.
 - 9) Liberal amounts of protein in the diet are needed to aid in recovery from wounds, burns, and wasting illnesses.
- D. Many mineral substances are present in the body and serve important purposes; these minerals include compounds of calcium, phosphorus, chlorine, sulfur, sodium, potassium, magnesium, iron, copper, iodine, fluorine, manganese, zinc, and cobalt.
- 1) These substances cooperate with protein and the vitamins in such important body functions as building bone and teeth, producing the red blood cells for carrying oxygen to the tissues, and making secretions of the glands which control many body activities.
 - 2) When children and adolescents receive too small a supply of calcium and phosphorus, together with shortages in proteins and vitamins, especially C and D, there is danger that the growth of bones will be stunted or that the bones will be improperly shaped.
 - 3) According to present standards, calcium is one of the substances most frequently lacking in the diets of the people in the United States.
 - 4) If growing children and young people are to utilize calcium effectively, it is important that they receive vitamin D in amounts up to 400 International Units per day plus a liberal supply of phosphorus.
 - 5) The amount of calcium needed by the body varies with individuals, depending upon the supply which the body has previously received, upon individual differences in utilization, and upon other constituents of the diet.

- 6) A child whose diet has been poor in calcium for a long time needs more calcium, and substances related to its use in the body, than a child whose diet has been adequate in calcium.
 - 7) Hemoglobin, the iron-containing coloring material in red blood cells, has the ability to carry oxygen from the air to the body tissues where it helps in utilizing food nutrients to furnish heat and energy.
 - 8) The iron requirement is higher for rapidly growing boys and girls than for adults because red blood cells are required for the increasing volume of blood that is being manufactured during growth.
 - 9) Because the normal life of red blood cells is about 100 days, numerous substances including protein, iron, copper, and the vitamins of the B complex are needed continually to rebuild them.
 - 10) A remarkable example of the body's ability to conserve its resources is that a portion of the iron resulting from the normal destruction of red blood cells is stored in the liver and used over again in the manufacture of new red blood cells.
 - 11) When there are short-time dietary deficiencies of iron, the body needs will be met so far as possible by supplies which are stored in the liver, spleen, and bone marrow.
 - 12) Anemia may be caused by poor diet, by frequent donations of blood, by profuse menstrual losses, by loss of blood through injury and illness, or by excessive destruction of red blood cells as from infection.
 - 13) Adolescent girls frequently have diets with too little iron.
 - 14) The thyroid gland attempts to adjust to an insufficient supply of iodides by increasing in size; this condition results in one of various kinds of goiter, namely, simple goiter.
 - 15) Adolescent girls and pregnant women are more subject to simple goiter than are other people.
 - 16) Extensive evidence indicates that during tooth development a controlled intake of fluorides, such as is provided by drinking water containing about 1 part per million, results in substantial protection against dental caries.
- E. Vitamins are chemical substances, distinct from the main components of food (fat, protein, and carbohydrate), but necessary for the life processes.

- 1) Vitamins aid the body in making use of its building and maintenance materials, hence serious deficiency will result in widespread disorders.
- 2) Vitamins are concerned in the chemical processes involved in growth and thus are needed in liberal amounts by children and by women during reproduction.
- 3) The need for some vitamins varies with body size, food energy value of the diet, and state of nutrition of the individual.
- 4) With the proper selection of natural foods it is unnecessary for the normal healthy adult to take vitamin pills.
- 5) There is no evidence that amounts of vitamins beyond the maximum needed for the body functions and stores will result in added vigor and health.
- 6) Although some vitamins may be stored, many cannot and therefore should be supplied in the diet every day.
- 7) Since vitamins are present in foods in very small amounts, they may be lost in processing and preparing for eating unless correct methods are used.
- 8) Many vitamins dissolve in water and can be destroyed when exposed to light and oxygen, or when heated, especially in the presence of an alkali such as baking soda; these facts should be considered in order to conserve vitamins during food preparation.

6. Good nutrition is attained by selecting foods which provide the nutrients in amounts needed by the body.

- A. Food is one of the most important factors influencing health and well-being of the individual; it is a factor which the individual can control during most of his life.
- 1) The nutritional state of the individual depends largely on the selection of food and the ability of the body to utilize the nutrients contained in the food eaten.
 - 2) Education and training in the wise selection of food for health are important, since human beings are not known to have inherent impulses or drives to select the food they need.
 - 3) When people refuse to eat many foods, or for some reason cannot have a variety of foods, they are likely to fail to obtain some of the needed nutrients.
 - 4) There are many combinations of foods or patterns of eating by which people may obtain a good diet.
 - 5) A good type of diet for healthy people in the United



- States consists of meat, milk and other dairy products, fish, poultry, eggs, green and yellow vegetables, citrus fruits or other vitamin C-rich fruits and vegetables, whole-grain or enriched cereals and breads, and enough fats, sweets, and other fruits and vegetables to meet, but not exceed, the energy needs of the body.
- 6) There is much evidence that the people of the United States could improve their diets considerably if they increased their use of milk, green, leafy, and yellow vegetables, and vitamin C-rich foods such as citrus fruits, melons, tomatoes, and cabbage.
 - 7) Eating foods that one likes and enjoys increases one's feeling of well-being.
 - 8) People do not like to have food restrictions placed on them unless they know the reason and accept it.
- B. Milk and some products derived from it provide the main source of calcium in the diets of the people of this country, and in addition are an excellent source of protein and riboflavin.
- 1) The diets of children and growing youth, which include one quart or more of milk a day, are likely to be adequate in calcium, protein, and riboflavin.
 - 2) One quart of vitamin D milk usually contains the Recommended Dietary Allowance² of vitamin D for children of all ages and for pregnant and lactating women.

² *Ibid.*

- 3) Two to three dips, or about one and one-half cups, of ice cream provide as much calcium as one cup of whole milk.
- 4) A scant one-fourth cup of nonfat dry milk solids is equivalent to one cup of skim milk.
- 5) One cup of fresh, whole milk is approximately equivalent in nutrients to one-half cup of undiluted evaporated milk or a one-inch cube of cheddar cheese.
- 6) Milk is valuable whether used in a beverage or in prepared foods such as creamed or scalloped vegetables and cream soups.
- 7) Such desserts as ice cream, custard, bread pudding, cornstarch pudding, and custard, pumpkin, and cream pie contribute one-third to one-half cup of milk per serving to the diet, while cake and cookies contribute little or none.
- 8) Unless a conscious effort is made to use foods which have been prepared with liberal amounts of milk, it is difficult to obtain the recommended amount without using some milk as a beverage.
- 9) When skim milk is substituted for whole milk in order to reduce the calorie intake, it should be liberally supplemented with foods of high vitamin A value, as green and yellow vegetables, eggs, and liver.
- 10) Because of this high nutritive value of milk, it is one of the most important foods to include in a reducing diet or most other diets in which the total intake of food is small.
- 11) Like any other food, milk is not fattening unless taken in excess of the energy needs.
- 12) For habitual use, plain pasteurized milk is preferable to flavored milk.

C. Whole-grain or enriched breads and cereals are carbohydrate-rich foods which are at the same time economical sources of food energy, protein, iron, and vitamins of the B complex — riboflavin, niacin, and thiamine.

- 1) Cereal foods afford one of the cheapest sources of food energy.
- 2) Cereals and breads can usually be eaten in large amounts without digestive difficulty.
- 3) Because amino acids are unequally distributed among cereal foods, it is desirable to use a variety of cereals

along with some foods from animal sources, as meat, milk, and eggs.

- 4) When a single cereal food comprises the bulk of the diet, as it does with some nationalities and some economic groups, the nutritive value of the cereal largely determines the adequacy of the diet.
- 5) Dietary deficiency diseases, as beriberi and pellagra, are most prevalent where people are dependent on a single highly refined cereal.
- 6) Diets which contain large amounts of cereal foods are liable to be inadequate unless they are supplemented with foods rich in calcium, vitamin A, and vitamin C, and with some foods containing animal protein.
- 7) The nutritive value of a cereal food depends largely on the extent to which it has been milled, subjected to high temperatures, and enriched.

D. Meat, poultry, fish, eggs, and legumes are excellent sources of protein, iron, niacin, riboflavin, and thiamine.

- 1) One to three servings of foods of this group are usually found in the adequate diet.
- 2) For most adults, a daily diet which includes one pint of milk, one serving of meat, and one egg or a serving of legumes is likely to ensure an adequate supply of protein.
- 3) When it is necessary to make a substitution for meat as a source of protein, various combinations of milk, cheese, eggs, dried beans and peas, and peanuts may be used.
- 4) Although meats differ somewhat in their nutritive value, beef, pork, lamb, poultry, and fish are generally interchangeable in the diet.
- 5) Although the best proportion is not known, it seems desirable for some of the protein in one's diet to come from animal sources.
- 6) Edible organ meats such as heart, kidney, and liver are valued for their protein, mineral, and vitamin contribution to the diet.
- 7) When eggs are not desired in the daily food plan, a combination of milk, legumes, and green and yellow vegetables may be substituted.
- 8) The shape and color of the egg shell do not indicate the quality, grade, or nutritive value of the egg.

E. Vegetables and fruits add variety and nutritive value to the diet.

- 1) A good diet usually contains three to five servings of fruits and vegetables daily.
- 2) The yellow vegetables and fruits usually contain an abundance of certain yellow pigments, called carotenoids, which are partly converted into vitamin A in the human body; there are other yellow pigments which do not give rise to vitamin A, and a few yellow foods, as oranges and rutabagas, are not exceptional sources of this vitamin.
- 3) In some foods, as the green leafy vegetables, tomatoes, and prunes, other pigments conceal the yellow pigment, and these foods are valued as a potential source of vitamin A; green leafy vegetables are therefore classed with the yellow in daily food guides.
- 4) Citrus fruits, raw green vegetables, melons, tomatoes, and cabbage are good sources of vitamin C.
- 5) The importance of citrus and tomato juices as dietary sources of vitamin C has led the Council of Food and Nutrition to develop the following minimal criteria for the vitamin C content per 100 ml. (approx. one-half cup) of these foods: orange juice, 40 mg. for single-strength juice at the time of packing; grapefruit juice, 30 mg.; orange-grapefruit juice blend, 35 mg.; tomato juice, 17.5 mg.³
- 6) When potatoes are used frequently, they supply a substantial amount of vitamin C, though the amount actually obtained will vary with the method of preparation.
- 7) Other vegetables and fruits are needed to supplement the calories, minerals, and vitamins furnished by green and yellow vegetables, the vitamin C-rich fruits, and potatoes.
- 8) All fruits and vegetables except legumes furnish negligible amounts of protein; most are also poor in calcium.

F. Fat foods may be eaten as needed to complete the requirement for food energy, to provide specific nutrients, and to make one feel satisfied by the food eaten.

- 1) The fats found in milk and egg yolk are finely divided and easily digested.

³ Importance of Vitamin C in the Diet: Food Standards. Report of the Council on Foods and Nutrition. *Jour. Amer. Med. Assn.*, 160:1470 (Apr. 28, 1956).

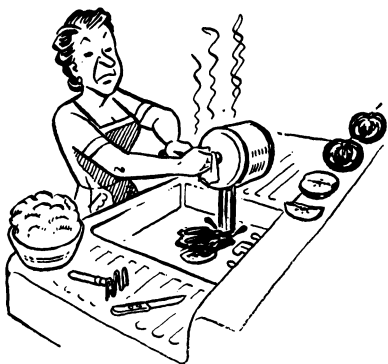
- 2) Liquid fats and those which melt at body temperature are somewhat more readily and completely digested than solid fats.
 - 3) Vitamin A, which is carried by fats in butter, cream, and egg yolks, and in very small amounts in meat fats, is lacking in unfortified, refined fats of vegetable origin.
 - 4) When oleomargarine is fortified with vitamin A, its vitamin A value is equal to the average concentration in butter.
 - 5) In a low-cost diet, when the expenditure for table fat is disproportionately high, the nutritive value of the diet suffers.
 - 6) Fish-liver oils or concentrates of vitamin D are given to children to supply vitamin D, since foods in their natural state contain it in negligible amounts.
 - 7) Fish-liver oils contain vitamin A and iodine, in addition to vitamin D, whereas many other vitamin-D preparations contain vitamin D only.
 - 8) Two or more tablespoons of butter or fortified margarine in the daily diet are a good source of food energy and of vitamin A.
 - 9) Although a certain amount of fat in the diet is desirable, the people of this country seem to be using a somewhat larger amount than is beneficial for their health.
 - 10) High fat diets are usually high in calories, and the continued use of such diets leads to obesity and possibly to diseases of the heart and blood vessels.
 - 11) As a safeguard to their later health, children should form the habit of eating very little rich sauces, gravy, salad dressing, and rich desserts.
 - 12) Fat foods are as completely and easily digested as are carbohydrate and protein-rich foods.
 - 13) Because fat foods are somewhat more slowly digested than others, they provide a "staying" quality to the diet.
- G. Sweets provide a concentrated source of food energy and are useful in adding needed calories to diets containing enough of the nutrients, in making other foods palatable, and in adding interest and satisfaction to meals.
- 1) Sucrose, or common table sugar, contributes only calories to the diet and when taken between meals in the form of candy or concentrated sweets, may diminish the appetite for the following meal, and when taken in

large amounts, may cause irritation in the digestive tract.

- 2) Candy and soft drinks furnish calories to the body, while milk, fruit, and fruit juices furnish calories plus nutrients needed for many body processes.
- 3) Very active adolescent boys and girls may need the extra calories furnished by desserts such as pudding, cake, and pie.
- 4) For children who have an abnormal craving of sweets, special effort should be made to see that they have liberal amounts of milk, meat, fruits, and vegetables.
- 5) With the correction of faulty diets, by increased use of milk, meat, fruits, and vegetables as needed, children have been observed to lose their abnormal craving of sweets.
- 6) Good dental hygiene is especially important for children after eating concentrated or sticky sweet foods, since acid substances formed by bacteria on the food residues adhering to the teeth may cause decay.
- 7) Because sugar can be quickly digested and absorbed, its food energy is quickly released to the body, but foods containing protein and fat provide food energy over a longer span of time.

H. Some substances when eaten or ingested create nutritional problems and difficulties.

- 1) Alcoholic beverages yield calories but few nutrients to the body, and if taken in large amounts may increase the needs for several nutrients; for a combination of reasons people addicted to alcohol are often poorly nourished.
- 2) Mineral oil dissolves the carotene of green and yellow vegetables and fruits, and if used along with these foods may interfere with the absorption of this substance and reduce its value as a source of vitamin A to the body.
- 3) Some foods, as spinach, contain oxalic acid which interferes with the use of calcium by the body; these foods, however, often contain several nutrients in large amounts and so should not be excluded from the diet.
- 4) Since raw egg white contains a substance which interferes with the use of one of the B vitamins by the body, it is best not to use raw egg white too frequently.



Nutrients such as vitamin C are easily lost or destroyed.

7. Good nutrition is promoted by handling and using foods so that they will furnish their maximum of the nutrients.

A. Nutrients such as vitamin C, which are soluble in water and changed by exposure to air, are easily lost or destroyed in food preparation.

- 1) The liquid in which vegetables are cooked contains valuable minerals and vitamins, and, if not served with the foods, may be used in soups, sauces, and gravies.
- 2) Fruits and vegetables, such as apples and potatoes, lose much of their vitamin C content when sieved or mashed, as contact with the oxygen of the air decreases their vitamin C content.
- 3) Appearance, quality, and nutritive value of vegetables and fruits are conserved by quick cooking in small quantities of water.
- 4) If fruits and vegetables are kept at room temperature after slicing or chopping, they may rapidly lose vitamins through exposure to oxygen in air and to light.
- 5) Keeping vegetables hot after they are cooked or reheating cooked vegetables causes loss of some color, flavor, and vitamins.

B. In cooking foods, the addition of an alkali, such as baking soda, increases the losses of some of the vitamins, especially vitamin C and thiamine.

- 1) Addition of soda may preserve color of green vegetables but may cause some loss of vitamin C, thiamine, and, to a lesser degree, riboflavin.
- 2) Small excesses of baking soda in quick breads, as biscuits and cornbread, may abolish the benefits of enrichment; specifically, when $\frac{1}{2}$ teaspoon soda was increased to $\frac{9}{10}$ teaspoon in a cornbread recipe requiring $1\frac{1}{2}$ cups sour

milk, about $\frac{1}{2}$ of the thiamine was lost in the final product.⁴

C. Exposure of foods to light has a harmful effect on some nutrients.

- 1) Riboflavin, which is liberally supplied by milk, is destroyed when milk is exposed to direct sunlight.
- 2) Storage in a dark place or opaque containers helps to retain the nutritive value of foods.

D. Since people eat foods that taste good to them, it is important that foods be prepared so as to be palatable.

- 1) When meat is cooked at a low, or moderately low, temperature there is less loss of the juices.
- 2) The cooking methods of meat will vary with the kind of meat; dry heat may be used for tender cuts, as steaks or roasts, and moist heat for the less tender cuts.
- 3) Tough cuts of meat can be tenderized by long cooking with moist heat at, or just below, boiling temperature; this produces chemical changes in the connective tissue.
- 4) When cheese is cooked at high temperature, it becomes tough and stringy; when heated gently, it softens to a creamy consistency and retains its original flavor.
- 5) Eggs will be most tender if cooked at relatively low temperatures; sizzling hot fat and boiling water will not result in well-cooked eggs.
- 6) Overheating fat in frying causes it to decompose and produce irritating substances.
- 7) Although the general rule for cooking vegetables is to cook in a covered pan, in the smallest amount of water possible, and for the shortest time possible, there are exceptions; green vegetables will become dull and brown if cooked in a covered pan, and most strongly-flavored vegetables, except cabbage, will be less palatable if not cooked in a fair amount of water.

E. Foods must be made safe for human consumption even though the nutritive value may be slightly impaired.

- 1) Pasteurization makes fresh milk safe for human consumption but does not improve its nutritive value or remove the necessity for sanitary practices in later handling.
- 2) Milk sold from an open can or container can seldom be considered safe and therefore cannot be considered economical at any price.

⁴ *Better Corn Meal and Grits*, Texas Agr. Exp. Sta., Tex. Agr. Ext. Serv., College Station, Texas, Misc. Publ. 127, May, 1955.

- 3) After frozen foods are defrosted, they require the same precautions in handling as do fresh foods.
 - 4) Frozen prepared foods, as creamed chicken, are not sterilized in processing, and hence should not be thawed and allowed to stand but should be cooked from the frozen state.
 - 5) Mixtures containing milk and eggs are an excellent medium for growth of bacteria and therefore should be cooked immediately or refrigerated.
 - 6) Because of the danger of ingesting trichinae, small organisms which are sometimes imbedded in the muscle fibers of pork, it is necessary to cook this meat thoroughly, although some of the thiamine may be destroyed.
 - 7) The acidity of foods helps to protect against losses of vitamin C in commercial canning; canned citrus juice and tomatoes remain an excellent source of vitamin C.
- F. Since the nutrients in foods are not usually distributed equally in all parts of the food, discarding portions of food may reduce its nutritive value.
- 1) Large amounts of the minerals and vitamins in vegetables often lie directly under the skin, so that vegetables cooked in the skin usually retain more food value than those cooked by other methods.
 - 2) Through refining grain, the nutritive value of flour and meal becomes impoverished.
 - 3) By discarding the outer green leaves of a head of lettuce, this food loses much of its value as a source of vitamin A and iron.
 - 4) Since the juice of acid fruits may be less nutritious and desirable as a food than the whole fruit, it is probably unwise to replace whole fruit entirely by juices.
 - 5) Fat from meat which is left as plate waste reduces the calorie value of meat.
 - 6) Amino acids and fat may be lost if drippings from meat are discarded.
- 8. Good nutrition may be furthered by low income families through wise and economical food budgeting and buying.**
- A. Enough money from the family budget should be allotted to food to ensure an adequate supply of the nutrients needed by all of the family members.
- 1) A good plan for budgeting the money to be spent for food will vary with the circumstances of the family, but care should be taken to allow enough money for milk and the vitamin-rich fruits and vegetables.

- 2) Poor nutrition is likely to become prevalent in periods of rising food costs unless people see the wisdom of allocating money for food even at the sacrifice of some immediate comforts which may reflect the family's standards of living to the public.
- 3) Through home food production food costs may be substantially reduced.
- 4) Education makes it possible for many people with low incomes to have diets adequate for good nutrition.



Home food production!

- B. Wise, economical food buying involves consideration of unit cost, amount of waste, nutrients supplied by the food, and time, energy, and further expense in preparing the food to serve.**
- 1) Protein foods are usually expensive; after the need for them is supplied, economy may be gained by using carbohydrate and fat foods to meet the energy needs.
 - 2) If a cut of meat contains much bone, connective tissue, or gristle, it may be expensive even though the price per pound is low.
 - 3) Fruits with thick skins or bruised spots, and vegetables with a large proportion of coarse outer leaves or shriveled skins may not be economical purchases because so much of them cannot be used for food.
 - 4) A careful study of the unit cost of fresh, dried, canned, and frozen fruits and vegetables may be necessary to

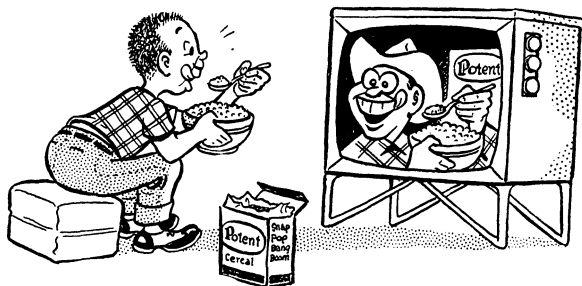
determine the most economical form in which to purchase the food.

- 5) Milk is an economical source of a number of nutrients; cream is expensive to buy in relation to the nutrients it furnishes.
- 6) Substitution of dried or evaporated milk for fresh milk is often economical, and is highly desirable if the sanitation of fresh milk is not safeguarded.
- 7) Good, low-cost diets may be obtained through the liberal use of cereal foods and legumes, supplemented with inexpensive forms of milk and cheap vitamin-rich vegetables such as cabbage, tomatoes, and carrots.

9. Good nutrition demands that one be able to discriminate between fact and fallacy in the vast amount of advertising and popular beliefs about the use of foods.

A. Sound information about the nutritive value of foods and the nutritional needs of the body provides the best basis for making intelligent choices of foods in spite of the mass of information and misinformation confronting the consumer.

- 1) There is no reason to believe that any combination of sanitary foods is harmful or poisonous, or that certain foods when used together have some unusual reaction on the body.
- 2) Foods lose their identity in the digestive tract and, although they provide many nutrients needed by any part of the body, they do not serve a special purpose, as for example, fish serving as a brain food.
- 3) Excesses of vitamins above those needed for the use and stores of the body will not be likely to yield special benefits in the form of extra energy, vim, or vigor.
- 4) Vitamin pills will be beneficial only to the person who



has a real deficiency, and most pills contain a number of vitamins which the person does not need in amounts greater than he receives in his usual diet.

- 5) Special diets, advertised to meet specific conditions, very often are seriously deficient in some of the nutrients and would be harmful if used over a period of time.
- 6) Claims regarding great nutritional benefits derived from using special types of cooking equipment are often misleading; furthermore, claims regarding "disastrous toxic effects" are unfounded.
- 7) Acid fruits and vegetables do not produce an acid condition of the body.
- 8) There are no foods or diets that can produce any spectacular benefits for arthritis, rheumatism, or cancer.
- 9) Money spent for "health foods" and "health aids" will usually be better spent for nutritious foods which contribute toward a good diet.
- 10) Although the individual should always be receptive to ideas regarding the use of food, food fads and sensational claims should be viewed critically.

10. Good nutrition is promoted by maintaining the body in a condition favorable for utilizing the nutrients.

A. Since infection may increase the need for certain nutrients, it may be a factor in bringing about a state of poor nutrition on an apparently good diet.

- 1) Well-nourished children are less likely than poorly nourished children to contract most infections.
- 2) Growth of children whose diets apparently have been good may be retarded by infection.
- 3) Nutritional deficiency, whether caused by poor diet, infection, or disease during the formation of the teeth, may result in their improper development and predispose them to decay.
- 4) Nutrient needs may be increased by illness at the same time that food intake and use are decreased.
- 5) Protein-rich foods furnish materials from which the body can build substances in the blood which help to guard against infection by disease organisms.
- 6) Large amounts of protein in the diet aid recovery from wounds, burns, broken bones, and wasting illnesses.

B. Emotional stability and relaxation aid in maintaining good nutrition.



Emotional disturbances often decrease the desire for food.

- 1) Emotional disturbances such as worry, sorrow, anger, and anxiety, often increase or decrease the desire for food and thus affect body weight and health.
 - 2) People sometimes try to compensate for lack of social acceptance by overeating and consequently they become overweight.
 - 3) Hyperactivity associated with nervous tension often results in chronic underweight.
 - 4) Adequate rest helps maintain body weight through its effect on conservation of energy.
 - 5) At least an hour of rest and relaxation is needed after extreme exercise and tension before a meal is eaten.
- C. The nutritional requirements of the undernourished person may be greater than those of a normal person of the same size.
- 1) A continued state of malnutrition reduces the ability of the body to utilize nutrients.
 - 2) The muscles of the digestive tract and the functioning of the digestive organs are impaired by poor nutrition.
 - 3) In certain kinds of nutritional deficiencies the appetite is markedly decreased.
- 11. Good nutrition is promoted by wise distribution of foods among meals and snacks.**
- A. The organization of the food of the day into meals and snacks is one of the most important steps in attaining good nutrition.
- 1) Although it has not been definitely proved, regularity in eating is probably an asset to the body's ability to use food.
 - 2) Breakfasts containing generous amounts of protein of good quality are more likely than others to maintain a feeling of satiety, alertness, and well-being throughout the morning and perhaps even into the afternoon.
 - 3) Skipping breakfast has been shown to result in a de-

crease in maximum work rate and in maximum work output in the late morning hours.

- 4) In an experiment with young women who had one pint of milk daily, protein utilization was improved when one cup of the milk was included in the breakfast meal.
 - 5) When these young women had no milk or other animal protein in a low-calorie noon meal, protein utilization was poor although they had one cup of milk at breakfast and one cup in the evening meal.
 - 6) A substantial proportion of some nutrients (especially protein furnished by animal foods) distributed through the meals of the day may be important to the efficient utilization of the nutrients.
 - 7) If one meal is missed during the day, careful planning will be required to furnish the nutrients needed by the body in the other two meals.
 - 8) Excessive hunger, brought about by missing meals, may lead to discomfort and indigestion because of overloading the stomach when meals are eaten.
 - 9) If enough time is allowed for meals, they are more likely to be enjoyed and less likely to be reduced in amount or missed altogether.
 - 10) Informality and freedom from physical discomfort or embarrassment increase the young person's pleasure from mealtime.
 - 11) If foods are prepared so that they can be carried to the living room, the porch, or the yard for occasional meals, they are often more enthusiastically accepted than when always served in the same room.
 - 12) If the necessary ingredients are available and the preparation of food is simple, children and young people often enjoy getting meals for themselves and their friends.
 - 13) Food which is well prepared and attractively served is likely to be consumed and enjoyed.
 - 14) Serving food to people is an expression of hospitality, friendliness, and good will toward them.
 - 15) Eating together informally can help to develop friendship.
- B. Snacks comprise an appreciable portion of the day's food for many people, and should be highly nutritious.
- 1) If snacks provide nutrients not liberally supplied in the three meals of the day, they can help in maintaining health.



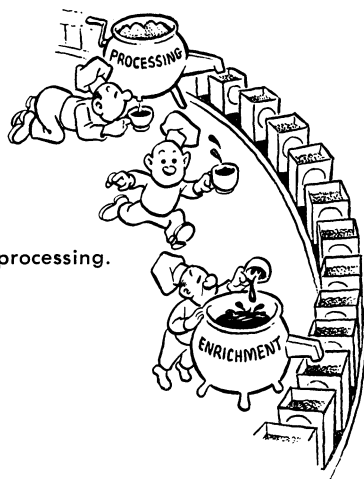
- 2) Snacks tend to be rich in carbohydrate and poor in most nutrients, hence they add little but calories to the diet.
- 3) If fruit and fruit juices, raw vegetable strips, simple sandwiches, and milk are available at regular snack hours, children may be less tempted to eat rich foods that may spoil their appetite for the next meal.
- 4) Well-chosen snacks not only give a sense of well-being but they supplement the day's meals so that total food intake fully meets the individual's requirements.
- 5) Suitable mid-morning and mid-afternoon snacks have been observed to increase the efficiency of many industrial workers.
- 6) Eating sweet foods will increase the blood-sugar level and may produce body conditions which diminish the desire to eat.

12. Good nutrition is promoted by supplementing foods as needed.

- A. Under normal conditions individuals may obtain the needed nutrients, except vitamin D, through natural foods.
- 1) Vitamin and mineral supplements should be taken under the supervision of a physician.
 - 2) Fish-liver oils or concentrates of vitamin D should be given to children and others known to need this substance since foods in their natural state do not contain vitamin D except in very limited amounts.
 - 3) When clothing, smoke, fog, window glass, or geographic location prevent direct rays of the sun from reaching the skin, vitamin D needs to be supplied to growing children and pregnant and lactating women through supplements like cod-liver oil and vitamin D concentrates, or through vitamin D milk.

- 4) Natural foods undoubtedly have some important, as yet unknown, factors which vitamin preparations may not contain unless they are concentrates of some naturally occurring substances such as liver, yeast, and cod-liver oil.
- 5) If large amounts of certain minerals or vitamins are taken, they may increase the need for others and so create deficiencies where none existed in the beginning.
- 6) Some vitamin preparations taken in excess of the prescribed dosage may be toxic to the body, and may result in danger to the health.
- 7) If milk cannot be taken, calcium compounds are usually prescribed by a physician as a supplement to the food intake.
- 8) If one has been ill or undernourished, vitamin preparations may be needed for a time to furnish the amounts required to hasten recovery.
- 9) When nonfat dry milk solids are added to ice creams, breads, cakes, and cookies, the calcium, protein, and vitamin content of these products is increased.
- 10) If the number of red blood cells is not normal, or if the red coloring matter of the blood is low, iron may be given in an easily utilized form, but must be accompanied by protein and vitamins which are as important as iron in blood building.

B. Enrichment and fortification of some foods are good measures when foods have been impoverished in processing and when diets of people are known to be generally lacking in the substances added.



Restoring nutrients lost in processing.

- 1) Enriched flour is white flour to which three B vitamins — thiamine, riboflavin, and niacin — and iron have been added in amounts approximately equal to those lost in milling.
- 2) Enriched flours, bread, and cereals improve diets without changing food habits since almost everyone eats these foods in some form every day.
- 3) Enriched bread is white bread, which contains specified amounts of iron, and the B vitamins — thiamine, riboflavin, and niacin.
- 4) Enriched flour and bread are especially effective in improving diets of low-income families, since these families usually eat large quantities of such foods.
- 5) One quart of vitamin D milk usually contains the Recommended Allowance of vitamin D for children of all ages and for pregnant and lactating women.
- 6) If iodized salt is used on the table and in food preparation, it will supply the body with enough iodine to prevent simple goiter.
- 7) When oleomargarine is fortified with vitamin A, its vitamin A value is equal to the average concentration in butter.
- 8) Approved enrichment is limited mainly to the restoration of nutrients lost in processing or to the addition of nutrients known to be lacking in the diets of the people of the United States.
- 9) Since citrus fruit juices and tomato juice are important sources of vitamin C, standards have been set for the vitamin C content of these juices; these standards are to be attained by care in selecting and processing the food used rather than by adding synthetic ascorbic acid.

13. Nutrition plays a special role in the prevention and treatment of some physiological conditions which are very prevalent.

A. Weight control may be achieved through proper adjustment of food intake to the body needs.

- 1) For good nutrition, reducing diets should include adequate amounts of meats, eggs, vegetables, fresh fruits, and skim or whole milk, but should limit fats, sugars, and breads and cereals.
- 2) To avoid feeling hungry when reducing one should eat liberal amounts of meat, eggs, and milk, and small amounts of fat foods.
- 3) If reducing diets do not furnish protein, minerals, and

Underweight people may need more than three meals per day.



vitamins needed for growth or maintenance, the body may be permanently damaged.

- 4) If the caloric level of a reducing diet is not sufficiently high, body tissue other than fat will be destroyed, and dietary protein will be used for calories and not for body tissue.
- 5) Meals recommended for people who need to gain weight include liberal use of fats, whole-grain or enriched cereals, sugars, meats, eggs, cheese and whole milk, and plenty of fruits and vegetables.
- 6) In order to obtain the amount of food needed to gain in weight, it may be necessary for underweight people to eat more than three meals per day and to take much rest.

B. Good intestinal hygiene depends on the maintenance of good muscle tone, a favorable type of bacteria in the intestinal tract (intestinal flora), regular time for elimination, and perhaps ability to relax from mental and emotional strain.

- 1) A generally good diet, with regular meals, contributes to the conditions which promote good elimination.
- 2) It is important to include fruits and vegetables in the daily diet not only because of their minerals and vitamins but also because of the roughage which helps in moving the intestinal contents along the digestive tract.
- 3) Although it is important that waste materials be regularly removed, the body is protected against toxic products formed by bacterial action on these residues, and

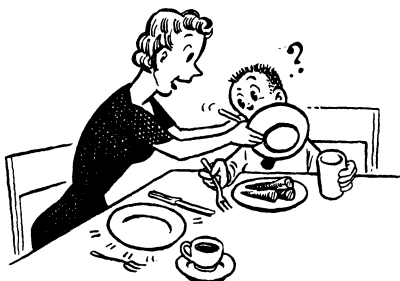
over-anxiety about elimination serves only to aggravate the situation.

- C. Although the exact relationship of nutrition to dental caries is not known, good nutrition may help to prevent dental caries, to check progressive decay, and to increase the resistance to dental decay in the next generation (see 1B).
- D. Liberal amounts of protein, iron, and the B vitamins help to maintain the hemoglobin and red blood cells of the blood at a high level, and thus to prevent anemia; it is especially important that adolescent girls take dietary precautions to prevent anemia (see 5C and D).
- E. The severe lack of certain nutrients, usually accompanied by other stresses and strains, will result in dietary deficiency diseases which, though rare in this country, are prevalent throughout the world; some of these conditions with the nutrient involved are: *scurvy*, vitamin C; *beriberi*, thiamine; *pellagra*, niacin; *xerophthalmia*, vitamin A; *endemic goiter*, iodine; *kwashiorkor*, the nutritional disorder affecting many children in the world today, animal protein.

14. Good nutrition is promoted by establishing good food habits and good attitudes toward food.

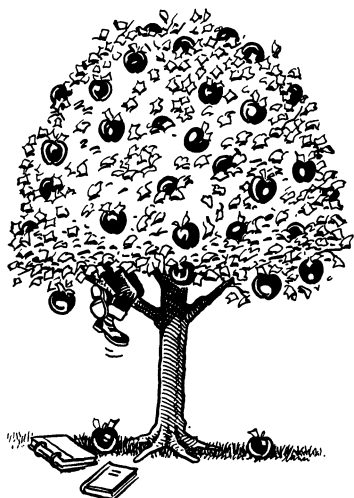
- A. Good food habits require that individuals be able to change the kinds and amounts of food they eat as they change in age, physiological state, and social or economic level.
 - 1) As individuals grow older and become more sedentary, they must curtail their calorie intake if they are to avoid overweight and its accompanying ills.
 - 2) If appetite and hunger have become geared to large amounts of food during periods of considerable activity, eating must be controlled when activity has been reduced.
 - 3) With increased incomes and access to good food, a person must be able to control his use of rich foods and social eating and drinking.
 - 4) When people have learned to like a variety of foods, they can more easily adjust their diet to meet changing conditions.
 - 5) Some knowledge of the nutritive value of foods is important in making dietary adjustments for changing conditions of life.
- B. The development of food habits is the result of many influences.
 - 1) When parents have some knowledge of nutrition and of the psychology of feeding children, they may do much to help their children form good food habits.

- 2) The example set by parents and teachers is a powerful force in forming good food habits.
- 3) The school lunch is one of the best means of showing children the essentials of a good meal.
- 4) Food habits often reflect the family's customs, nationality, and religious background.
- 5) Modern advertising influences the food habits of people directly through information about the product and indirectly through associations built up around it.
- 6) Food habits of people are sometimes revolutionized through new products on the market.
- 7) Social customs of groups to which one belongs are powerful factors in determining food habits.



The example set by parents . . .

- C. The development of good attitudes toward food is basic to the development of good food habits.
 - 1) If people can be made to realize the relationship of nutrition to the values they hold high, they will be interested in developing good food habits.
 - 2) The primary purpose of eating is to provide for the body needs.
 - 3) Although meals should be pleasant and eating enjoyable, pleasure should never become the primary purpose of eating.
- D. Continuously good food habits are conducive to the best state of nutrition.
 - 1) The past state of nutrition is an important factor in determining how the present diet is used by the body.
 - 2) If a child is not fully developed or physically fit because of a long period of faulty eating, a liberal amount of nutrients will be necessary over a long period of time to rebuild a good body condition.



... assuming responsibility for one's own nutrition!

- 3) The amount of calcium needed by the body varies with individuals, depending upon the supply which the body has previously received, upon individual differences in utilization, and upon other constituents in the diet.
- 4) A child who has had a diet poor in calcium for a long time needs more calcium and substances related to its use by the body than a child whose diet has been adequate in calcium.
- 5) If one meal is missed during the day, careful planning will be required to furnish the nutrients needed by the body in the other two meals.
- 6) The best way to ensure good nutrition during pregnancy and lactation, when the needs are extremely high, is to establish good food habits in childhood and to follow them consistently through the teen ages.

***15. Good nutrition is promoted by assuming responsibility for one's own nutrition.**

A. Many of the factors which influence nutrition are under the direct control of the individual.

- 1) From the variety of foods available the individual has the power to choose or reject, and thus to determine the nutritive value of his diet.
- 2) Regular hours for eating meals, plenty of outdoor exercise, freedom from hurry and worry, and a nutritious diet help to maintain a good appetite and improve a poor one.
- 3) People may help to avoid colds by having a consistently good diet and by observing good practices of sanitation, hygiene, and rest.

- 4) By choosing snacks which provide the nutrients not liberally supplied by the meals of the day, many people can improve their nutrition.
- 5) Eating a wholesome nutritious breakfast helps boys and girls to avoid feeling nervous, tired, and irritable before noon.
- 6) In the case of 12- to 14-year-old boys, the omission of breakfast has been found to exert a detrimental effect on their attitudes and scholastic attainments.
- 7) Adequate rest helps maintain body weight by conserving energy.
- 8) If one meal is missed during the day, careful planning will be required to furnish the nutrients needed by the body in the other two meals.
- 9) Skipping breakfast has been shown to decrease maximum work rate and maximum work output in the late morning hours.
- 10) By taking enough exercise, the danger of excessive intake of calories will be reduced.

B. For some factors which influence nutrition, the responsibility of the individual must be exercised through participation in community, state, and national affairs.

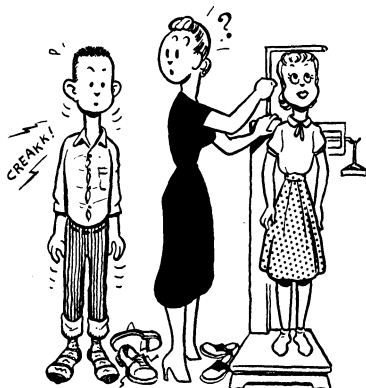
- 1) A sanitary food supply requires proper legislation and public opinion.
- 2) Sound decisions about fluoridation of a city water supply are likely to result from informed public opinion.
- 3) The enforced enrichment of processed foods, when in the interest of public health, requires action at the state and national level.
- 4) Maintaining a sound economy with a high rate of employment and reasonable prices on basic food commodities is important to good nutrition.
- 5) Conditions which facilitate distribution from point of production to point of need are essential for good nutrition.

16. A continuous check of nutritional state may be made by keeping a record of body measurements, notably height and weight.

A. Height-weight-age tables are helpful in evaluating the growth of children, but comparisons should also be made of the child's present state with his past over a period of time.

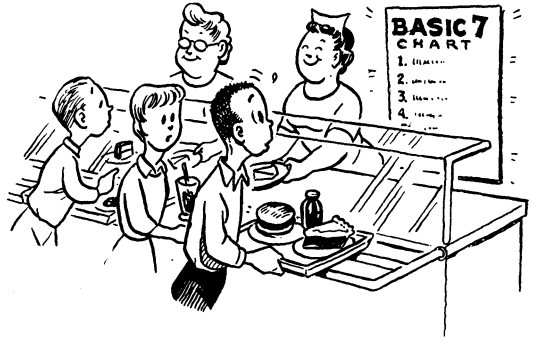
- 1) Ideal reference tables are based on measurements of children known to be in good nutritional state and to represent the population under study in environment and nationality background.

- 2) Children who deviate markedly from standards of body size may nevertheless be healthy if they are growing and have the other characteristics of good health.
- 3) Children who are considerably below the average weight for their height and age may tire more easily and have less endurance than others, although these conditions may be hidden by drives which lead the child to excessive activity.
- 4) One of the easily detectable signs of undernutrition is the failure of children to make expected weight gains; this can be observed by periodic, perhaps monthly or triennial, measurements of height and weight.
- 5) Growth is manifested in increase in chemical content of the tissues as well as body size, hence, body measurements are not the only means of assessing nutrition.
- 6) During the adolescent period normal boys and girls of the same age may differ by four or five years in their physical development.
- 7) Girls begin the adolescent spurt in growth about 2 years earlier than boys, but the growth spurt of boys, when it comes, is greater than that of girls.
- 8) Rapid growth in weight during adolescence begins in girls at approximately 10 to 12 years, and in boys at approximately 12 to 14 years; this rapid growth usually is greatest in the year before the establishment of the sexual function.
- 9) Increases in rate of weight gain of adolescent girls should not be ignored; they may be temporary, and may not indicate need for drastic reducing measures.



Periodic measurements of height and weight.

Continuous check of the diet . . .



B. Height-weight tables are useful guides for adults in maintaining proper weight.

- 1) The significance of deviations from standards should be interpreted in the light of the health and the body build of the individual.
- 2) Generally, deviations from standards of plus or minus 10 per cent suggest the need of nutritional readjustment.

C. In order to compare body measurements taken at different times, the procedures used should always be the same.

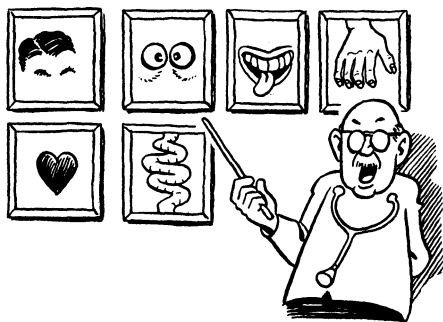
- 1) Heavy clothing and shoes should be removed before weighing.
- 2) Comparisons of weights are best if they have been taken at the same time each day.
- 3) Accurate measurement of height requires that the subject assume a standard posture and that the reading be made with the eye on the level of the figure indicated by use of a right angle marker placed on subject's head.

17. Since inadequacy of the diet is one of the first steps toward poor nutrition, a continuous check of the diet is an important measure in the maintenance of good nutrition.

A. If the amounts of food eaten during the day are known, the nutrient intake may be computed from tables of food composition.

- 1) These figures may be compared with standards to determine the relative adequacy of the diet.
- 2) Because of variations in foods and differences in needs of people, the evaluation may be somewhat inaccurate as applied to a single individual.
- 3) When records are kept over a period of time or for large numbers of people, a fairly accurate assessment of the adequacy of the diets may be made.

- B. When a well-kept record of the day's diet is inspected for the kinds and amounts of foods used, a rough estimate of the adequacy of the diet may be made.
- 1) Some training in recognizing sizes of servings is important to the accuracy of this method.
 - 2) In the use of this method it is important to learn the variety of foods included in the different groups and to know which foods are interchangeable.
 - 3) Various check lists of food plans have been developed for rating diets according to foods used; these are helpful but should be used with caution because there are many ways by which people may obtain good diets, and food plans are not infallible.
- C. Certain blood tests may reveal whether or not the intake of substances, as vitamin C and carotenoids, has been adequate.
- D. When an individual is unduly susceptible to such conditions as infection, fatigue, constipation, depression, and hyperirritability, he should investigate his diet and the habits of living which influence the utilization of food.
- E. The final test of the quality of the diet is in the people themselves, as stated by Leitch, "The diet of the people of most beautiful physique, most abounding energy, and least ill health is, at any given stage in our study of diet, the inspiration of and check on our theories of optimum diet."⁵
18. **Other criteria for judging the nutrition of the individual are based on the study of body composition, functioning of the various parts of the body, and outward clinical manifestations which can be judged by the physician.**



⁵ Leitch, I., and Aitken, F. C. Technique and interpretation of dietary surveys. Nutr. Abs. and Revs. 19, No. 3, pp. 507-25, 1950.

CHAPTER FIVE

Methods and Tools

The attitude of people toward health and food is difficult to understand. The public is health-minded. They are confident that certain constituents of food, the vitamins in particular, will promote health. In the minds of the public the words *vitamins* and *health* are probably synonymous. People spend millions of dollars for vitamins in the form of pills, when the same amount of money spent for vitamin-rich foods would be more likely to give them the health they seek.

Nevertheless, when we suggest to people that they eat more of certain foods because of their health-giving properties, we often meet resistance. In fact, people sometimes appear to take a strange delight in eating what is not good for them. While seeking health, they love their ailments and guard as an inalienable right the privilege of eating what they wish, regardless of the consequences to themselves and to society. They may actually fancy themselves as exceptions and take pride in the idea that they can defy the laws of nature.

Possibly the appeal either to health or to civic responsibility ignores the values that many people consider most important. Both health and civic responsibility are values that are generally approved and, therefore, people are likely to give lip service to them. Other values, such as independence, may be much more important in actually directing their own actions.

You may learn much about the problems involved in introducing

a food not commonly used from the story of the introduction of the potato to European diets. The establishment of the potato as a common food in Europe required more than 200 years. Reactions to it in the seventeenth century were very similar to our own resistance to the soybean in this enlightened age; it was considered fit only for animal food.

The potato was taken from America to Europe in the sixteenth century. It was widely used in American countries, just as today the soybean is one of the mainstays in the Orient. It was apparent that the potato could be of great value in alleviating the famines which invariably followed crop failures in Europe, as now it is recognized that the soybean can contribute much to our protein needs in times of meat scarcity or prohibitive prices.

Techniques to hasten the acceptance of the potato were many and varied, as were the tales concerning them. The London Royal Society advocated cultivation of the potato to prevent starvation in times of crop failure. This brought little success. German preachers delivered sermons on the "lowly tuber," with the result that a group of these men were called "potato preachers." These efforts also were ineffective. People believed that potatoes poisoned the ground and caused diarrhea; they preferred to starve rather than to run the risk of using them.

The prestige appeal was also tried. In France an effort was made to secure acceptance by way of royal approval. Potato blossoms were worn by Louis XVI in his lapel and by Marie Antoinette in her hair. These methods failed for the common people but the landed gentry grew potatoes in their gardens.

The "forbidden fruit technique," cleverly planned by a French apothecary, brought a measure of success. By way of suggesting the use of potatoes to the poorer people, he is reported to have proclaimed loudly in the streets that the pillaging of the barons' gardens for potatoes was a punishable offense. The story goes that the pillaging promptly began, and it was not long until the gardens of the poorer people contained potatoes.

Of the various procedures used for introducing the potato, group feeding was the most successful. Count Rumford, a military adviser to the Elector of Bavaria, devised the plan of making every soldier of the Elector's forces plant a patch of potatoes, care for it, and eat the potatoes. Since the duration of military service in those days was fairly long, the men had time to develop a taste for them. After the soldiers returned to their homes, potato crops appeared all over the country, and the people of Europe gained greater insurance against famine.

This technique of introducing new foods through mass feeding is

being followed in India in a project initiated by the Women's Food Council of India through the establishment of cafeterias. This project is designed, in part at least, to encourage the people to consume a variety of cereal foods.

Group feeding today offers one of the best opportunities to promote better food habits in the United States. An estimated 20 per cent of the meals are taken outside of the home. Public eating places, the school lunch, the college dining hall, and the army mess are focal points for the improvement of our food habits.

The results of educational programs in nutrition have not been proportional to the efforts expended. The field of nutrition has much to offer for the improvement of mankind. There is enough knowledge now available to produce a superior race of people if we will only put it into practice. Application, however, lags far behind the progress of the science.

At this point the evaluation of methods may be as important as accumulating knowledge. According to Stone (1), we need to "sharpen our tools." Writing on the subject of how to get the most out of health education tools, he said, in effect: First, know what you want to teach. Second, whom you wish to reach. Then, "Light a fire . . . build a bridge. . . get down to cases . . . ask for action." In other words, create an interest, and bridge the gap from interest to goal. Illustrate with actual cases. Don't leave your public saying, "So what!" Ask for action in clear, certain, definite terms.

Why haven't calls for action in nutrition education been successful in the past? Possibly one reason is that the action has been too difficult. People have been expected to change their food practices completely, even when such change is unnecessary. Adequate dietaries can be achieved, for many people, with only a few changes. True, these may be the ones that meet with the most resistance, but concentration on the foods most likely to be missing in dietaries may bring more satisfactory results than teaching has produced in the past.

EMPHASIS ON NEGLECTED FOODS

Nutrition education in the past has been too general, according to Pett (2). He stated that it has consisted of a "shotgun" or "blunderbuss" approach; that we have dealt too much in national averages and too little with individual situations. It is wrong to suppose that everyone must drink more milk, just because the national average needs to be increased. We need a new viewpoint, a new method of attack. This new method must be an individual approach based on a definite knowledge of conditions in homes and the community, and carried into effect by individuals in the community.

Ideally the approach described by Pett is based on nutritional appraisal of the specific group involved. This step will take the guesswork out of the problem to be faced. Although methods for nutritional appraisal are not as yet infallible, we have had in the last ten years an accumulation of information as described in Chapter Two. This information suggests the scope of the problems with school children and the points of emphasis for the general population. But every teacher should study his or her own group in order to ascertain their particular problems.

The Iowa studies have revealed that food groups most likely to be inadequately represented in children's diets are: milk and milk products, green and yellow vegetables, vitamin C-rich foods, and eggs. Since many diets would be satisfactory if these foods were adequately represented, probably the most effective teaching will aim to increase the acceptance and use of these neglected foods. The importance of the other food groups will be evident when meals are planned and evaluated.

METHODS TO DETERMINE THE FOOD PRACTICES OF STUDENTS

Several methods may be used to discover and evaluate the food practices of students. The 3- to 7-day record of all foods eaten gives some information. Methods of evaluation will depend on the maturity of the student and the use to be made of the information. Some ways suggested are to:

1. Calculate the nutritive value by the simple short method devised by Miriam Lowenberg *et al.* (3).
2. Use a score card, such as that shown in Appendix D, pages 188-92.
3. Examine the record qualitatively for the use of certain food groups in specified units: e.g., 3 cups milk daily; one serving meat, poultry, fish; one serving green and yellow vegetables. A simple classification of foods in groups is suggested in the daily food guide for school children shown on page 35. For identification of foods in groups, see Appendix A, pages 173-75.

Incomplete but valuable information may be secured by observing the selections of food by people in public eating places. School lunchroom selections of food prepared in various ways and plate waste will indicate which foods are well accepted among those served. This information can be particularly valuable if it is compared with data from check sheets that indicate the food likes and dislikes of students. Observations in eating places frequented by students will give similar information, especially about between-meal snacks.

Parents, too, may provide information regarding foods eaten by their children. But Rodewald (4) found that mothers' reports of



Study food habits with the idea of learning.

foods eaten agreed more closely with dietary records kept by their sons than by their daughters. The girls tended to report better dieteries than their mothers' reports indicated. It helps us to know from the parents what foods are served at home during the same period that the students report their dieteries. A food may be missing on a student's list because of refusal to eat it, or because it was not served to him. The first reason would call for different education than would the second one.

IMPORTANCE OF KNOWING FAMILY FOOD PRACTICES

Efforts to change food habits of people should be accompanied by certain precautions. Due respect must be given habits and customs that do not conform to our standards, if they have resulted in a healthy people. There are many gaps in our present-day knowledge of the constituents of the perfect diet. Studies of the food habits of any group of people should be approached with the idea of learning as well as reforming.

It is also important to remember that food habits are complex. Few foods are consumed as isolated units. Our diets are full of food combinations such as bread and butter; meat, potatoes and gravy; cake and ice cream; sugar and cream with coffee. The intake of any food is likely to influence the intake of other foods.

Dickins (5) has said, "... a given diet is an intricate, interrelated combination of foods in which an increase or decrease in the consumption of any one element not only affects the balance of the diet in terms of the contributions made by that particular food, but may also increase or decrease the consumption of related foods." Observations of the effects of a white corn meal shortage in the diets of Mississippi children illustrated her point. With the customary cornbread made of white meal, the children liked greens, buttermilk, beans, and peas. With biscuits they preferred such foods as sirup and gravy. Interestingly enough, with yellow corn meal, they preferred the foods desired

with biscuits, namely, sirup and gravy. The ultimate benefits derived from the substitution of yellow corn meal for white were therefore questionable.

Such dangers would be minimized if emphases of education were on the importance of nutritionally adequate diets rather than on conformity to standard rules for menu planning. If this emphasis were given to teaching, foreign dishes would not be treated as novelties to be featured only at Christmastime or for entertaining. Rather, people would be taught ways of using available foods in preparing such dishes for the enjoyment of family members who like foreign dishes or unusual combinations. Furthermore, national dishes that contain fruits, vegetables, eggs, and milk in abundance would be featured in exhibits, demonstrations, or articles as well as dishes made largely of cereal products and sugar.

Most teachers belong to the middle class and believe that they should teach their students the social and food practices which they were taught, even when most of their students come from homes where these practices are strange. Such a belief has led to frustration in many instances because teachers have found that even though students may seem interested in what is being taught, practices at home are not changed.

Results of an exploratory study in a Michigan school are worthy of consideration by teachers. When Hurt (6) studied the attitudes of some ninth-grade girls and their mothers, she found that teaching a unit, "Helping With the Family Meals," was most effective when keyed to customary practices of the families. Girls in three ninth-grade homemaking classes were from families ranked in the lower-middle or lower-class social groups and were taught by the same teacher. In one class the values and practices of middle-class families, usually found in textbooks, were emphasized. In a second class, both lower- and middle-class practices were taught. In a third group, teaching was keyed to lower-class values and practices and included only a few middle-class practices. More students in the second and third groups than in the first group seemed to like what they studied. They said that what they had learned was practical for their homes. The mothers of the students agreed with their daughters.

The results of Hurt's study are not surprising when you consider how much easier it was to understand what was being taught when the teaching agreed with home practices. Likewise, it was easier for the family members to accept the foods that were not completely unfamiliar to them. There is reason enough why many people are confused when they are introduced to unfamiliar foods, cooked in strange equipment, combined in an unfamiliar meal pattern, and served in a

manner that seems formal and strange. The family, too, may not appreciate attempts of the teacher to change practices that are as personal as those related to food. This is especially true when the most obvious basis for a proposed change is social custom.

NUTRITION EDUCATION MUST HAVE MEANING FOR STUDENTS

Students can interpret new experiences only in terms of their own past experiences, either actual or vicarious. This is another reason why modification of a family's customary dietary pattern is likely to be more effective than attempts to impose a new one. Communication and understanding are easier when students know the meanings of words used by the teacher. If she believes that meaningful experiences are important, she will be alert to provide experiences that result in common understanding of words.

One basis for misunderstanding may be the different interpretations of nutritional status. Nutrition education may have little meaning to people who are unaware of the characteristics of a well-nourished individual. Words are quite inadequate for describing a boy or girl with good nutritional status. At least a picture of a well-nourished person must be seen (as in Fig. 1.1, Chap. 1) if words describing him are to mean the same to both teacher and student. One teacher was able to make an impressive collection of pictures of people with either good or poor nutrition from newspapers, magazines, and photographs of friends and their families.

YOU CAN MOTIVATE CHANGES IN PRACTICES

Food practices do not change just because people have accurate, meaningful facts. Motivation to use their knowledge in daily living is necessary. The over-all objective of nutrition education is to establish food practices that are nutritionally sound. To accomplish this objective people must desire to make any necessary modification in their meals and snacks.

Learning is likely to be effective when the relationships between the food eaten and the goals important to students are recognized and accepted by them. Most adolescents have as goals: maintaining an attractive personal appearance, making friends, and having enough pep to participate in work or social activities. When nutrition education makes clear the relationship between these goals and the food an individual eats, people are likely to be motivated to learn how to achieve good nutritional status. In Chapter Four you noticed that facts of nutrition were organized so that they could be used to motivate learning. The usual interests and concerns of people were used as a basis for organizing the subject matter.

Not all people can be motivated to improve nutritional status by appealing to the same interests. Because the interests of adolescent boys may be different from those of girls, you will wish to appeal to them in different ways. For example, the knowledge that food can build big strong bodies may motivate a group of boys to eat enough of the important foods. But as a group, girls are not anxious to have large bodies. Unless the teacher points out that physical health also means beauty of skin, hair, nails, and so forth, the girls in her group probably will not be interested in changing their food practices. The generalizations in Chapter Four will help you motivate learning of girls and women as well as boys and men.

DESIRE FOR INDEPENDENCE AS MOTIVATION

Eating as one wishes may be a symbol of personal independence even in infancy. Sweeney (7) discussed the importance of capitalizing upon the desire of individuals for independence by helping them make free choices of food in a wise way. She wrote about the importance of:

... setting up situations in which responsible choice can replace either the slavish acceptance of a traditional diet or the equally slavish refusal to accept it in order to appear independent.

At what age should a boy or girl be expected to take responsibility for choice of food? The exact age varies somewhat with individuals but probably adults attempt to use authority long after this method is neither effective nor desirable with children. In fact, failure to teach children how to make decisions about a problem as vital as food may actually delay development of the ability to assume other responsibilities.

Some children prefer the security of doing what a so-called "authority" dictates. The wisdom of such a method of securing adequate food is questionable as preparation for living in a rapidly changing world. Blindly following rules for good nutrition may not provide adequate preparation for adjusting to advances in the science of nutrition and in food technology. The person without ability to make intelligent decisions about food may be helpless when faced with half-truths about new forms of food, sometimes presented in advertisements or in articles by unscrupulous or misinformed persons.

The goals of people change somewhat as they grow from childhood to adulthood and, therefore, education that has been effective at one time may not motivate a change in behavior at a later stage of development. As the goals of individuals or groups change, so will the problems they recognize as important to solve. The teacher who

can use some of these important problems as a basis for teaching is likely to be most satisfied with the results of her efforts.

When an individual desires to learn how to improve his nutrition, teaching is relatively simple. Then he is ready to learn the facts and to organize them so that the resulting generalizations can be applied when planning food for either himself or his family.

WAYS YOU CAN TEACH STUDENTS TO GENERALIZE

The amount of help that your class or audience will need in order to formulate generalizations will depend upon their intelligence and past experiences in generalizing. People of high intelligence seem able to generalize with little guidance but the majority of people must develop this ability.

The first step in teaching students to generalize is to plan situations in which the facts you wish to present can be pointed out. For example, if your class knows little about the characteristics of good nutritional status and you wish to guide them in generalizing, you will not depend upon words to describe these characteristics. You will present to your audience pictures that illustrate what you wish to show if actual people are not available (Fig. 5.1). The extent to which these illustrations should include people of different ages and body build will be determined by the generalizations that you expect your audience to formulate. If you are teaching boys and girls, you will probably limit your illustrations to children of comparable age with different body builds. An adult audience would probably be interested in all age groups especially if parents were included.

The next step in guiding people when formulating generalizations is to point out similarities and differences among the factors in a situation. When similarities and differences in the characteristics of the girls shown on the following page are evident to students, they have bases for drawing conclusions about the relation of nutrition to personal appearance. If time is taken for students to state conclusions in complete sentences, you can discover any mistaken ideas and reteach to correct them. Conclusions should be tentative because valid generalizations are not usually formulated from a single experience.

Additional experiences in discovering and organizing the same facts are necessary before students should be encouraged to accept their tentative generalizations. Observation of films and reading are examples of experiences that may be used to validate generalizations (see Appendix E). Guidance for these experiences will be much like that needed for the tentative generalizations.

Many experiences in applying these generalizations to real life situations will clarify them and develop ability to use them. Such ex-

CHARACTERISTICS OF GOOD NUTRITION

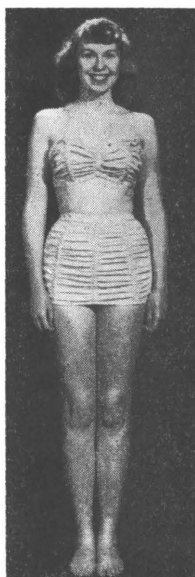


FIG. 5.1A

Shiny, luxuriant hair

Sparkling eyes

Well-formed teeth

Square shoulders

Straight spine

Alert posture

High vitality

Firm muscles

Proper weight for height and age

Straight legs

Well-arched feet

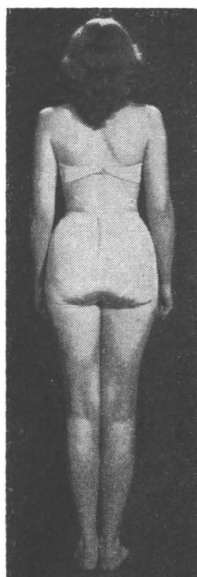


FIG. 5.1B

CHARACTERISTICS OF POOR NUTRITION

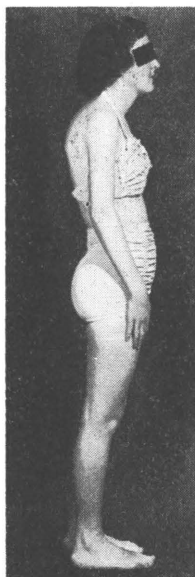


FIG. 5.1C

Dull hair

Narrow, round shoulders

Curved spine

Sagging, poor posture

Low vitality

Poor muscle tone

Underweight for height and age

Slightly knock-kneed

Flat feet

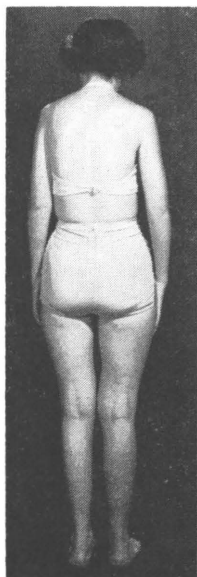


FIG. 5.1D

periences will prepare the students to use what they have learned whenever it is needed.

When teaching a class of seventh-grade boys and girls, Helen Barbour (8) used these steps to guide her students in generalizing. Her lesson plan for teaching the effects of food upon growth is reproduced to illustrate one way of teaching generalizations.

LESSON PLAN TO ILLUSTRATE DEVELOPMENT OF GENERALIZATIONS

Objectives:

When students have completed this lesson, they will be better able to:

1. Recognize how food affects growth of the body.
2. Attain good nutrition because they select foods which provide nutrients in amounts needed by their bodies.
3. Distribute foods wisely in meals and snacks.
4. Maintain the body in a condition favorable for utilization of nutrients.

Generalizations for Teacher Reference:

Generalizations 1E (1-13), page 48, and 5A (2-3), page 56, were used when planning.

Class Discussion:

1. What is normal growth ?
 - a. Inherited qualities — can they be changed? If so, how?
 - b. Individuality in rate of growth (rate of growth of girls vs. boys)
 - c. Environmental factors affecting growth rate (food, rest, sunshine, exercise, fresh air, worry and unhappiness, etc.)
 - d. Illness and infections (bad tonsils, poor teeth, rheumatic fever, etc.)
 - e. Height-weight-age tables — how are they used? What does it mean if you are not the weight the tables indicate for your age? (Use weight and height records of pupils.)
2. What influences your height, weight, and body build ?
 - a. Appetite
 - 1) Regular meals
 - 2) Kind of foods in the meals (satiety value)
 - a) Protein, fat, and sweets slow down hunger contractions
 - b) Fruits, vegetables, and cereals (without fat) leave the stomach quickly
 - 3) Snacks — if properly selected may not ruin appetite for the next meal

- 4) Exercise, fresh air, rest (enough to allow food eaten to be used well), and sleep help build good appetites
- b. Amount and kinds of food that help you gain weight
- c. Amount and kinds of food that help you lose weight
- d. Need for building materials in either a diet to gain or lose weight (milk, fruit and vegetables, meat, eggs, whole grain or enriched bread and cereals, butter or margarine)

Summary by Students:

You will be given 5 minutes to write sentences that tell what you have learned today. These questions will help you.

1. What influences the way you grow?
2. What affects your appetite, or lack of it?
3. What foods can help you to gain weight?
4. What foods should be reduced in amount to lose weight?
5. What foods do you need whether you are gaining or losing weight?
6. Why is underweight, or overweight, undesirable?

Students will need help in stating generalizations. In the lesson plan, questions that emphasized the ideas presented were suggested to guide students. In an earlier lesson students were encouraged to give reasons why new facts or ideas were important or interesting. Another suggestion was that sentences begin with "if," "because," or "when." Thus, they were encouraged to make complete sentences in their own words to express the ideas that they had gained.

Students of all ages have a tendency to form generalizations only partially supported by facts. Their statements may be strong, positive ones needing considerable qualification. This may be due to incomplete information or unquestioning acceptance of material presented either by the teacher or in references. You can teach students to be critical of their conclusions and thus to generalize more accurately.

Learning to apply generalizations is another aspect of thinking that is not easy. You are teaching nutrition with the hope that food practices of students will improve and so you will want to teach students to use the generalizations they have learned, when deciding what they will eat. Students in college as well as elementary grades often wish to discuss personal problems that might be solved by applying the generalizations they are learning. If you take time in class to encourage application, students may not know as many generalizations but those they do know will be more meaningful.

When helping students to learn facts and ideas and to generalize them, it is helpful to:

1. Present a few important ideas and stress these throughout the

class. Relate any details to the main ideas and facts which are to be emphasized.

2. Write important facts on the blackboard and draw attention to them from time to time during the class.
3. Use demonstrations, charts, graphs, films, and other visual aids whenever possible to point out facts, to illustrate how they are related, or to show situations in which they may be applied.
4. Summarize the important ideas. You may do the summarizing, or you may have students state generalizations if time permits.
5. Apply the generalizations to situations with which the student is familiar.
6. Ask questions which require the application of the generalizations in order to answer them.

The use of generalizations does not stand out as a method in itself but should be a part of all classroom experiences. Thus the methods described later in this chapter are not complete unless students learn to draw conclusions from their experiences and to state their conclusions as generalizations.

THE USE OF DISCUSSION-DECISION METHODS

What difference does it make whether you *tell* students to do thus-and-so or let them *decide* what to do themselves? Apparently there is a world of difference. Research shows that encouraging a group to decide upon certain goals will achieve better results in education than giving them a lecture.

To break down resistance to change in food habits, Lewin (9) developed a method which lies halfway between an individual and a mass approach. He suggested a group decision method, which is much more than merely group discussion. (In group discussion a free interchange of ideas takes place; the initiative lies with the group. No attempt is made to reach a decision. But a discussion-decision method leads to setting up definite goals of action either for the group as a whole or for each individual in the group.)

The first experiment by Lewin and Willerman (10) compared the group decision method with a request method, in attempting to increase the consumption of whole-wheat bread as compared with white bread in eight cooperative dormitories for men at the State University of Iowa. Each *request group* was asked to change its consumption of whole-wheat bread the same amount as the amount which had been voluntarily chosen by a *decision group* with which it was paired.

Reaction to the proposal of participating in the experiment, eagerness of the students to reach their goal, and even their relative preference for whole-wheat bread depended upon the degree to which the

decision was made by a majority. The *decision groups*, that set their goals at 66 per cent to 90 per cent increase in consumption of whole-wheat bread, reached their goals, whereas the *request groups* paired with them did not.

Radke and Klisurich (11), encouraged by the success of Lewin's studies, carried out two experiments designed to compare effectiveness of lecture versus discussion-decision techniques. The degree of change and the permanence of the new behavior were considered.

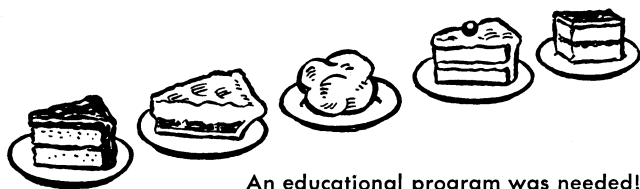
Their first experiment dealt with infant feeding. Half of the mothers of newborn babies in the maternity ward of a hospital received individual instruction from the dietitian, and were given a printed schedule to follow in feeding their babies at home. The other half of the mothers met with the dietitian in groups of six. In the meetings, which took as much time as the individual conferences, the dietitian played the role of both expert and leader. The problem of getting mothers to follow instructions given at the hospital was discussed, and the new mothers were asked to suggest better methods of accomplishing this. The discussion gave the mothers a chance to exchange ideas and ask questions.

The leader summarized the discussion, gave her own instructions, and then inquired about their willingness to carry out dietary instructions. The group decided to follow the instructions of the dietitian.

The dietitian made telephone calls 2 and 4 weeks after the group meetings to check the performance of the mothers. How well directions had been followed was estimated by the amount of orange juice and cod-liver oil given the babies, because these amounts had been carefully specified. In the *decision group*, 75 per cent of the mothers were giving orange juice in correct amounts at 2 weeks, and 100 per cent after 4 weeks. After *individual instruction*, 44 per cent were giving orange juice at 2 weeks, and 88 per cent at 4 weeks. In the *decision group*, 44 per cent were giving the correct amount of cod-liver oil after 2 weeks, and 88 per cent after 4 weeks. Among the mothers receiving the *individual instruction*, 18 per cent were giving cod-liver oil after 2 weeks and 53 per cent after 4 weeks. Apparently the 2- and 4-week checkups served as a stimulus for improvement in the following of directions. At both 2 and 4 weeks the decision group had done better than the group receiving individual instruction.

A second experiment conducted by Radke and Klisurich (11) involved a comparison of lecture and discussion-decision methods in increasing milk consumption of homemakers of low-income level. The results of this experiment also showed the success of the discussion-decision method.

Radke and Caso (12) applied the discussion-decision technique in a study undertaken at the request of the Student Council of the Weeks



An educational program was needed!

Junior High School, Newton, Massachusetts. The Council asked the Nutrition Center, a community agency supported by the City Health Department, the Community Chest, and the local Red Cross Chapter, to assist in a survey of the lunches selected by the students in the school cafeteria. The desirability of an educational program to follow the survey became evident. As a result, a study was made to test the effectiveness of lecture and discussion-decision methods for influencing the students to improve their school lunch habits.

Approximately 850 sixth-, seventh-, and eighth-grade students participated. Twelve homerooms were assigned to lecture, and twelve to discussion-decision treatment. Eight nutritionists served as group leaders, each having an equal number of lectures and discussion-decision meetings. Each group met for approximately half an hour either before or after lunch.

In the lecture groups, the nutritionist held discussion from the group to a minimum. She presented facts on nutrition and related them to the food habits of the students in the school cafeteria.

Students in the discussion-decision group were encouraged by their leader to contribute ideas. They were led to feel that they were responsible for helping themselves to overcome obstacles in the way of a good diet. Though a goal for personal action was suggested by the leader, the group in each case accepted it and gave some kind of voluntary, unsolicited group expression of commitment. The nutritionist suggested that the commitment be voted upon, with a show of hands. The decision was that each person would include foods from three basic-food groups in his lunch each day. Each person had evidence that the others were "going along" on the decision.

All the students filled out questionnaires about the lunches eaten at school; one questionnaire preceded the meeting and four were given afterward. Through the questionnaires the percentage of students who chose an adequate lunch was determined.

At each testing, the *lecture* and *discussion-decision* groups were compared with a *control group* which had had no nutrition teaching. The three groups did not differ materially on the first questionnaire in the percentage of students reporting adequate lunches. Therefore

it was possible to assume the groups to be roughly equivalent. Each later test showed an increase in the number of students in both the *lecture and discussion-decision groups* choosing adequate lunches as compared with the *control group*. The improvement was maintained or further increased by the *discussion-decision group* on Questionnaires 4 and 5. However, the *lecture group* fell to the level of the *control group*. These results indicate that motivation for eating a balanced lunch was set up by both the *lecture* and *discussion-decision* methods. The *lecture* had only a temporary effect in improving school lunches. Students in the *discussion-decision group* made a more stable improvement.

The discussion-decision technique may be effective partly because it permits the group member to define his own goals in relation to the question discussed as well as to receive support from the knowledge that fellow group members are faced with problems closely akin to his own.

Discussion is one way to stimulate students' thinking but sometimes it is difficult to guide unless there is a situation on which to focus attention. You and your students can observe and consider a situation together when it is presented in a *film, field trip, role playing, in a case study, or on radio or television*. Each of these methods is discussed in detail.

USING FILMS IN TEACHING NUTRITION

Films can be valuable aids to you in teaching nutrition. They effectively provide students with a common vicarious experience. It is difficult to duplicate the lifelike situations portrayed in a film by any other method. Time and space can be telescoped so that students view either the effects of time or situations that cannot be seen in person. For example, in *Fundamentals of Diet* (13) the growth of plants and animals, that requires months in nature, is shown in a matter of seconds in the film. In another film, *For Health and Happiness* (14), many children of different body types are shown. A comparable group of children would be difficult to observe in most communities because they would not be assembled in one place and might not be dressed so that the characteristics of good nutritional status would be evident.

Movies are most often seen for entertainment, and therefore films are eagerly anticipated by students. In this receptive frame of mind, people can be interested and informed. Films used for education should be informative, but not ponderously dull, lest you spoil anticipation for future ones.

Students may not understand the point even when they are interested by the film. Only when their observation is directed can you

be sure that students will remember the ideas for which the film was shown.

Because good films are made for more than one educational situation, and would not be as useful if oversimplified, you should guide your particular class to their own understanding of the film. Ask questions to focus attention on the aspects of the situation the students should observe, and thus you will simplify the film for them.

Furthermore, by emphasizing some aspects of a film and ignoring others, you can use the same film for different sequences of learning. The questions that you give to students before they view a film will tend to influence what they see and hear and what they discuss following the film. You may use a certain film differently if your objectives for showing the film are different.

Your Questions Are Important

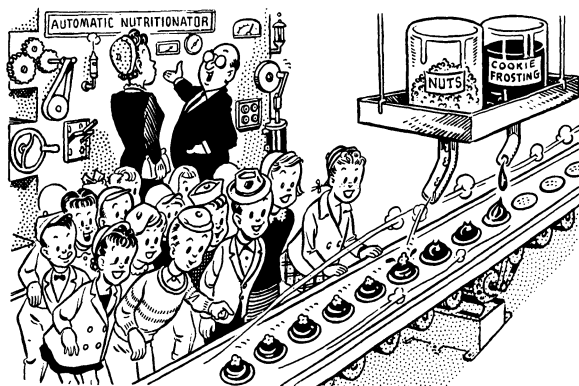
Questions should reflect your knowledge of what will motivate the students. Students learn what they believe will help them to achieve their goals. Knowing this, you can use questions to point out how the abilities, attitudes, knowledge, or practices presented in the film will influence the attainment of goals important to your students. An illustration of how teachers in one school used nutrition films can be found in Appendix E, pages 194–98.

In 1949, a workshop group at the University of Tennessee (15) proposed a plan for formulating questions to guide observation and discussion of educational films. This plan was used when the lesson plans in Appendix E were made. It has been useful when planning discussions of different types of films with different age groups. It includes six steps in formulating questions:

1. Question No. 1 calls for information clearly presented in the film.
2. Question No. 2 calls for an examination of ideas in other situations.
3. Question No. 3 encourages drawing inferences, identifying cause and effect relationships, or expressing own ideas.
4. Question No. 4 asks for examination of these ideas as they apply to present-day life or in the light of authority.
5. Question No. 5 asks students to formulate generalizations of their own, based on data from the film, from experience, and from opinions of authorities.
6. Question No. 6 asks students to illustrate the meaning of generalizations; to apply these ideas in everyday practice.

FIELD TRIPS

Much as films may serve to provide students with a common experience about food, field trips may be arranged to increase understanding and knowledge related to processing and distributing food.



Look at the trip through the children's eyes.

You may wish to arrange a visit to a food processing plant or wholesale firm. Call the person in charge and tell him exactly what you want your students to know after they have made their tour. If you will visit the plant first, you will be better able to decide what the trip should include. Avoid unpleasant experiences for your children. Look at the trip through their eyes. For instance, young children from the city may be unfavorably impressed by a visit to a dairy farm and therefore may drink less milk for a while, simply because they do not like the barn odors. Limits in time must also be considered, so talk over with your host the particular places and procedures the students will want to see. It goes without saying that you will arrange a definite time and day for the field trip in advance.

The class should know beforehand what to look for during the trip. You and your class can discuss points of interest together and select the most important highlights of the planned tour. The host will spend more time explaining certain procedures if he knows the students are interested, as evidenced by their questions to him.

It is well to keep groups small enough so that questions and explanations can be understood en route. It is better to ask questions of the teacher or the person acting as a guide than of individual workers at the plant. To interrupt workers may cause accidents or delay in the process being carried out.

Field trips, if properly planned in advance, may create much interest and help the student gain knowledge and understanding which can be obtained in no other way. Real-life situations help to give meaning to words used in the classroom.

Good public relations may be established through contacts with men and women who are active in businesses related to food and nutrition. Invite the host to visit your classroom before or after the tour. This is often appreciated and sometimes accepted. Then you can

interpret food and nutrition information and activities at school to these people in the community who might not otherwise learn about them.

Following the field trip it is profitable to have a class discussion of what has been seen and to point out principles and generalizations which are related to the experiences of the field trip.

ROLE-PLAYING IN GROUP DISCUSSION

Role-playing is another method of getting a situation before a group for discussion. For the actors, role-playing may be a moving experience; for the spectators, a concrete situation is portrayed that can be discussed objectively.

Role-playing is the spontaneous acting out of a situation by two or more members of a group. The situation portrays an experience of common concern and one that will further group discussion.

Assuming that the majority of boys and girls in a group do not consistently eat breakfast, the leader may use role-playing to start discussion, instead of a film as suggested earlier. The method would not be named but could be introduced naturally by suggesting that some members act out an early-morning scene in a home.

Group members can set the stage by naming the people in the cast and describing the situation. They can decide what kind of person each actor is to portray but will not tell him how to act. The situation should be described sufficiently to make the problem clear. Spontaneous reactions to the situation as it develops are necessary if roles are to be portrayed realistically.

Role-playing is not presenting a skit. The players may be given a short time to decide how the scene will open but they should not plan beyond this point. Under-planning by either the group or players is better than over-planning.

When the roles develop spontaneously, real emotions tend to be

Invite the host to visit your classroom . . .



expressed and attitudes revealed. When a boy assumes the role of a parent, he is more likely to understand the feelings of his father as he responds to behavior of a boy his own age.

Persons are most likely to be comfortable in roles in which they feel at home. For this reason asking for volunteers is probably the best practice. If individuals do not volunteer, group members can suggest someone for each role. When there is an unfavorable role, the leader may wish to assign it to someone who has enough status in the group to feel secure.

You will be responsible for deciding when the scene should be cut. As soon as the problem is clearly defined, you should stop the acting. There is a tendency to let the scene go on too long. When this happens, the players may have difficulty in carrying on, and the audience may become restless.

While discussing the situation portrayed, suggestions may be made for improving it. When this is done you may wish to have the scene replayed. This may be done by the same players, if they accept suggestions for making a new approach to the problem. If they cannot make changes naturally, new players may be selected to replay the original scene or one that may follow it.

If you use role-playing, you will have to "think on your feet" because you will not know exactly what will happen. You cannot formulate your questions as specifically ahead of time as you can with films. But your students may respond better because the situation is real to them.

Preparation of the audience for observation is desirable and can be made when the actors are out of the room. Questions can call attention to the way the situation is handled by each player or to the way the problem is solved. These questions should help to prepare the group for the discussion to follow.

The discussion should lead either to some conclusions or recognition of need for more study of a problem. Your questions will help the group evaluate the situation. You may ask questions that will help the group state generalizations similar to those in Chapter Four. This is most likely to happen if role-playing is used near the end of a lesson, when students have had enough experience to draw conclusions. The situation presented in role-playing may be used to introduce a lesson, in which case you may ask questions to help students decide what additional experiences they need.

CASE PROBLEMS IN GROUP DISCUSSION

One reason why films are effective in teaching is that situations are presented so that many factors influencing the actions of people are seen. Stories or case problems can serve the same purpose in teaching

and they have the advantage of being available when needed. In teaching nutrition, cases should provide such pertinent facts as individual and family customs and resources, nutritional state, and food practices of individuals about whom the group will be concerned.

Case problems can be used when introducing nutrition teaching to show the complexity of decisions regarding food, or you may wish to use a case problem when summarizing. Often a story can bring together previous learning that should have resulted from considering various factors separately.

Because there may be emotional blocks when people try to solve their own problems related to food, case problems can be a means of learning to arrive at decisions objectively. If problems are too personal, prejudices may interfere with thinking so that individuals are either not able or not willing to consider all possibilities when seeking a solution to a problem.

For example, girls who do not eat breakfast on school days may be willing to consider what Joan should do, even though they are on the defensive when considering their own situation. Joan is a ninth-grade girl who is slightly overweight. She is popular with her classmates. However, she is often irritable and listless in the late morning and early afternoon. She is always well groomed and attractively dressed. Her mother prepares a breakfast of tomato juice, cereal, and coffee or milk and urges her children to eat it. Joan says that she has time for only a cup of coffee and that eating breakfast makes her sick.

When discussing this case, a teacher might ask such questions as:

1. Is Joan wise to go to school without breakfast?
 - a. Is skipping breakfast a good way to reduce weight?
 - b. Is there any relationship between going without breakfast and feelings of fatigue or irritation?
2. What might Joan have for breakfast that would be more appealing to her than tomato juice and cereal?
3. What reasons might a girl have for going without breakfast, other than reducing calories?

The case of Joan would be useful only with a group of girls in which there were several who did not eat breakfast. Case situations should present problems that are recognized as important to the group. Thus the problems are real enough to be interesting, and the learning is likely to be applied. When preparing for leading a discussion of this case problem you will find helpful the generalizations in Chapter Four.

USE OF RADIO AND TELEVISION

Radio and television programs may be sources of case studies that are interesting to students. Family situations are a popular type of

program and may provide opportunities for you to capitalize on the current interests of the group.

When programs are given by a competent staff, the information is likely to be both reliable and up to date. For this reason you, as teachers, may find that the effort needed to locate and listen to educational broadcasts is well spent because you will gain knowledge yourselves, or you may be able to arrange for members of a group to get first-hand information from them.

Undoubtedly, advertisements on radio and television influence the food practices of people. Many commercials are cleverly presented; persons responsible for them know how to appeal to emotions as well as to reason. In fact, some discourage the use of reason!

Older students and adults can be encouraged to evaluate the appeals made to them. Such evaluations require applying facts of motivation as well as recognizing the various ways in which advertisers make their appeal.

When students have opportunities to give a radio or television program, they are likely to be strongly motivated to learn what is needed to do a good job. If you have enough advance notice to allow students to plan and prepare a program, they will be motivated to learn how to organize and present needed facts, to develop needed skills, and to cooperate in a group project.

Students will probably be interested in making careful preparation when they know that they will reach a large audience and will have no opportunities to correct mistakes or to make additional explanations if ideas are not clear. Time limitations, too, encourage detailed planning.

ANALYSIS OF PROPAGANDA

Means of communication today make it possible for information about food and its uses to confront the public at every turn. Newspapers and magazines make numerous claims for food products and use glamorous colored advertisements to encourage their purchase and use. Television screens are filled with clever quips and gimmicks to draw attention to special qualities of products. Sometimes the first tune a young child learns to sing is a jingle used to advertise a food product. Radio also contributes its share of claims and information about certain items of food.

It becomes urgent that the people receive help in how to evaluate these claims made by the food industry. To do this the following criteria may prove useful to the teacher of food and nutrition.

1. Where was the claim made? Newspaper, radio, television, magazine, billboard, etc.?
2. Was it made by a "self-interested" party?

3. Was any scientific source of the information mentioned?
4. Did the statements seem sensational or extravagant?
5. Are there any experiments, or other type of reliable evidence, to support the claim?
6. Are the statements misleading or in the category of half-truths?
7. What questions do the claims or statements raise in your mind?

Information coming from experiment station bulletins, United States Department of Agriculture pamphlets, county home demonstration agents, or from staff members of recognized colleges and universities can be accepted as sound information. Statements which conform to the policies of the Council on Food and Nutrition of the American Medical Association and the Food and Nutrition Board of the National Research Council are considered valid.

A newspaper or magazine article is only as good as the person who wrote the article. If the author is not known, information should be checked to verify its accuracy.

Clever advertising sometimes appeals to the public when the principle or generalization involved is not sound. People, both young and old, need help in evaluating the advertising schemes related to food and nutrition.

Frequently a food industry presents an appetite-appealing piece of propaganda in magazines, radio, or television which increases the sale of their product immensely. However, the information given about the product may not be of great importance in regard to nutrient or economic value.

Another way in which food advertising can mislead the consumer is to tell only a part of the function of the food product. No false claims are made, but only a fraction of the possible facts is given.

Teachers can help students and adults evaluate advertising propaganda if they give them reliable sources of information, and ways to judge the worth of seals or other evidence of approval, and develop their judgment in the applications of facts and generalizations related to food and nutrition. The development of a critical attitude toward the acceptance of any claims related to food practices is urgent.

ANIMAL FEEDING EXPERIMENTS

Often experiences with concrete things are needed to give meaning to the abstract ideas expressed in nutrition generalizations. Animal feeding experiments and preparation of food at school are two such experiences. When these are student projects, students not only learn about nutrition but also they learn to take responsibility and to work together.

Animal feeding experiments can show living evidence that foods work together to promote growth and health. The "Basic Seven"

Food Guide (see pages 173-75) is considered a practical plan to simplify nutrition and make it feasible in application. Yet many times students do not see the importance of the "Basic Seven" until they are shown what makes it work and what is behind it.

Those who are trained in nutrition know well that the "Basic Seven" Food Guide works because of the supplementation among the essential nutrients in these basic foods. Thus the group of foods containing meat, poultry, and fish provides a good protein base for the daily diet; the milk ensures an adequate supply of calcium; the group of foods containing citrus fruits, melons, and raw green vegetables supplies a large amount of vitamin C; and the green and yellow vegetables afford large amounts of carotene which is at least partially utilized by the body as vitamin A. Properly supplemented with other vegetables and fruits, cereals, fats, and sweets, the resulting diet will likely be adequate in food energy and the needed nutrients.

For a majority of students seeing is believing, and relatively simple feeding experiments with weanling-age rats can be used to demonstrate supplementary relations between two basic foods. Feeding experiments can be arranged in a series which increases in complexity as the interests and abilities of adults and children permit.

Students like projects in which they can participate. When they plan the diets, feed and care for the animals, and keep records of their growth, the results are remembered longer. They also learn as they tell others about the experiments.

Animal feeding experiments may be projects in which several classes participate. Younger pupils may learn only basic health rules or may simply watch animals grow week by week. Older students may make wider applications from their observations. Teamwork and a cooperative spirit are developed through participation of several different classes. The entire project becomes important in the eyes of the children.

You may wish to plan a rat-feeding experiment to demonstrate the need for foods that are missing in the diets of your students.¹ Such an experiment was part of teaching in several schools in Iowa. All rats were fed a basic diet consisting of navy beans, potatoes, rolled oats, white flour, sugar, salt, butter, and lard.

When meat is added to this diet, you will see that a bread, meat, potato, and dessert diet is represented. This is the type of diet eaten most of the time by many students. The second rat was fed the same diet with milk and eggs added.

¹ For directions for preparing the diets and caring for the rats see Appendix F, pages 199-202.

The diet of the third rat was the same as the second except that green lettuce, spinach leaf, or carrot was added. This third diet contains all of the essential food nutrients except vitamin C. This nutrient is not essential in the diets of rats because they can make vitamin C in their bodies if their diet is adequate in other respects. When explaining why this nutrient is not needed in the diet by rats, you will have an opportunity to emphasize the fact that nutritional needs of rats are similar to those of human beings in many respects.

Foods used to supplement the basic diet are served separately. The meat (lean hamburger) may be fed in marble-sized balls once every other day. The milk (dried) should be fed in servings of one tablespoon every day. The egg should be hard cooked and mashed immediately while hot. One egg will make about three feedings. A rat will eat about one-third of a carrot or a 2-inch square of lettuce in two days.

If you guide students' observations, you can help them formulate generalizations such as: Nutrition can affect the way you look and act. You can call attention to the appearance and actions of the rats, and then again point out that nutrients are as important to boys and girls as to rats.

To call attention to the characteristics of each rat you might ask such questions as:

1. Which rat has gained the most?
2. Which rat has the nicest fur?
3. Which rat has the brightest eyes?
4. Which rat is best looking now?
5. Which rat is the friendliest?
6. Which rat seems to be the healthiest?
7. Which kind of posture does each rat have? (A healthy rat keeps its body close to the floor when walking; a sick one may be hunched or stiff.)
8. What made one rat healthier than the others?
9. What foods should we eat every day?

You will find that this experiment is interesting to adults as well as children. Reports of the experiment are a means of reaching parents with nutrition education. Adults may be invited to school, or a parent-teacher program can provide an opportunity to hear students tell about the experiment. The rats will illustrate results, but growth charts help to interpret them. A display of foods eaten by each rat will emphasize the importance of milk, eggs, and green and yellow vegetables.

Another way to reach parents and other adults would be to exhibit animals from an experiment, or pictures of them, in a local store

window with the sign "Food Made the Difference." This method will probably not teach as much about the experiment as does the demonstration with reports, but it may reach more people.

Rat-feeding experiments have been found useful in teaching students of various ages. When the same students are taught with rat-feeding experiments in more than one grade, you will wish to vary the experiment. A plan used by Booher (16) is suggested.

Dr. Booher has devised three successive series of experiments with eighteen weanling, male albino rats grouped so that the combined weight of the six animals, composing each of three groups, was comparable. The purposes of these studies and the data for each group are shown in the following experiments:

EXPERIMENT A. To develop the generalization: *breakfast cereals and milk are supplementary foods.*

Group 1. Unrestricted amounts of a finely ground mixture of equal weights of 19 breakfast foods (whole grain, enriched, or restored).

Group 2. Unrestricted amounts of homogenized vitamin D milk.

Group 3. Unrestricted amounts of both the finely ground cereal mixture and homogenized vitamin D milk.

EXPERIMENT B. To develop the generalization: *sugar and pure starch are inadequate supplements for milk.*

Group 1. Unrestricted amounts of a finely ground mixture of equal weights of 20 breakfast cereals combined with milk in the proportion of 1 ounce of mixed cereals to 4 fluid ounces of fresh whole milk.

Group 2. Unrestricted amounts of cane sugar and milk in the proportions of 1 ounce of sugar to 4 fluid ounces of whole milk.

Group 3. Unrestricted amounts of cornstarch and powdered whole milk combined in the proportions of 1 ounce of starch to 0.5 ounce of powdered milk mixed with water.

Group 4. The same diet as Group 3 with cornstarch replaced by the mixture of 20 breakfast cereals.

EXPERIMENT C. To develop generalizations similar to 6 C (6), page 64.

Following the same technical details as in Experiments A and B, diets consisting of a mixture of equal weights of 33 breakfast cereals combined with six different proportions of fresh whole milk were fed to six groups of weanling-age rats over a six-weeks period. The objective was to determine, within practical limits, the proportion of average breakfast cereal to milk representing the best nutritive combination of these two foods. The proportions of mixed breakfast

cereals to milk ranged from 1 ounce of cereal per fluid ounce of milk to one ounce of cereal for approximately 30 fluid ounces of milk.

Some deductions from an experiment such as the one conducted by Dr. Booher can be drawn by observing:

1. The relative value of a given combination of basic foods in promoting over-all growth and development as compared with any food alone.
2. The effects of replacing one of the two basic foods in the combination selected by food products which contribute only accidental traces of essential food value or none at all.
3. The degree to which nutrients in two basic foods supplement each other when the proportions in which the foods are combined and eaten are changed.

White rats are good experimental animals because they are small, clean, easily handled, and easily cared for. They respond to different foods much as do people. Compared with human beings, white rats have a short life span. Their growth rate is 30 times faster than human growth, which makes the effect of diet quickly apparent. Most children like animals, and the laboratory rat cages soon become a center of interest for children and adults. Ordinarily, rat-feeding experiments require 7 to 8 weeks to be carried to a satisfactory conclusion.

The "Basic Seven" food groups least adaptable for demonstrating supplementary relationships by use of the rat are those of citrus fruits and tomatoes and of butter and fortified margarine because the essential nutrients in them are limited to vitamin C and vitamin A. Deficiencies of vitamin A do not develop quickly because this vitamin is stored in the liver and the supply is often not depleted for many weeks. Basic foods most adaptable to showing the supplementary relations are combinations of milk and milk products with breads, flours, and cereals of whole grain, enriched, or restored types.

It is important that students understand the purpose of a rat-feeding experiment. If the initial planning for the project is one in which you and each member of your class assume a share of responsibility, there will be more enjoyment and profit for the group. You should impress on your students that rats are a part of a scientific study and should not be considered pets. If your experiment is to be effective, you will constantly point out the similarity between the needs of the animals and the students for the foods used in the experiment.

It stimulates interest to have each rat named. The progress of each animal can then be recorded on a large wall chart on which age, sex, diet, and starting weight should be indicated. See Appendix F, pages 199–202, for detailed suggestions for care and feeding of rats.

As the experiment progresses, students will need guidance in their observations of animal weight and growth, disposition, fur, skin, tail, eyes, ears, nose, breathing, red blood, facial expression, and general appearance of well-being. Encourage students to think of other signs of good or poor nutrition and list them. Characteristics to note in well-nourished and poorly nourished rats can be found in Appendix F, pages 199–202.

At the end of an allotted time in the experiment, change the menus of the rats. The poorly nourished rats should be fed the diet of the well-nourished animal so that students can see that food makes a difference also in rebuilding bodies. Students usually feel sympathetic toward the poorly nourished rats and will be happy to see them grow bigger and stronger.

It may be desirable to feed the healthiest rat the poor diet, so pupils can recognize the need for a continued good diet. Do not let rats become so undernourished that there is risk of their dying. Probably a class demonstration should always have at least two rats on a given diet. In that way individual differences may be demonstrated. Two rats may be kept in one cage and distinguished from each other by ear marks.

When the experiment is completed, the rats should be disposed of quietly without ceremony. It is unwise to give them to children to take home. They can be killed painlessly by placing them in a small can with one teaspoon chloroform or ether on absorbent cotton. Keep the can tightly covered for 10 or 15 minutes. The rats may be given to the janitor for disposal. Other animals, such as the chicken, guinea pig, or hamster may be used for nutrition demonstrations.

PREPARATION OF FOOD AT SCHOOL

Preparation of food is a method of teaching which may help the students to change their attitudes about some foods, and it also provides opportunities to apply generalizations of nutrition. For instance, you can increase the acceptance of vegetables, fruits, eggs, and milk dishes by having the students prepare and eat them.

Rejection of many foods seems to be due to hesitancy to try the new. Studies of the popularity of foods show that often a food is disliked by people even though they have never tasted it. This is more often the case than when people have tasted and disliked the food. We need a spirit of adventure and curiosity in relation to food.

The classroom teacher can encourage this spirit of adventure by guiding the preparation of foods in several different ways and setting the stage so that students will taste each form. If you allow the reactions to each food to be freely expressed, you can show ways to

modify flavor or texture so that the food is acceptable. If this approach is made, each individual can feel that he is making an independent choice rather than following rules made by an authority.

The teacher should present a food as being both pleasurable and nutritious. Even though our choices of food are made independently, they are not made wholly on the basis of pleasure in eating. *Every* food has something to offer. When a food is prepared, its role in a well-balanced diet should be presented in a manner the age group will understand.

If Jane says that she will eat but a few foods in each group, you can point out what this means in terms of values which she considers most important. If Jane chooses to continue questionable food practices after you are certain that she understands the facts, the decision is her responsibility, not yours.

PLANNING MENUS FOR THE SCHOOL LUNCH

Have you thought of arranging for students to help plan the menu for the school lunch? Often we talk about food and let the students prepare food in the classroom, but we forget the other real-life situations in which they can help.

Planning menus for the school lunch can be used as a means of changing attitudes of students toward foods. When food preferences are different, students must learn how to make a group decision. This may mean that no one gets his first choice and that some foods on the menu may actually be disliked by a few students. Group pressures may be great enough to result in acceptance of foods by all class members if, at the beginning of the project, everyone agrees to support the decision of the majority.

When students are expected to solve real problems, they are likely to be fair about considering all important factors. In addition to considering differences in food preferences, the person who plans the school lunch menu is faced with the problem of providing at least one-third of the necessary nutrients for a day within limitations of money, time, and equipment. Students who puzzle through the many facts involved in solving these problems are more likely to cooperate by eating the foods actually served to them than are students who are merely told that such planning is difficult.

If this project includes checking plate waste by older students, they may become more aware of dangers to themselves in disliking foods important for good nutrition. Differences in food preferences make group feeding difficult. Limited budgets of both time and money prevent catering to personal tastes, so that meals away from home may be quite inadequate.

Furthermore, the menus planned later by the lunchroom manager may be more acceptable because she, too, can learn more about food preferences from the menus planned by students. The school lunch managers who cooperated in a study in Iowa (17) seemed pleased to be considered a part of the educational team. All of them were willing to describe limitations in each situation to the students and to serve the menus planned by the various classes.

As students plan menus, they learn how to apply the facts and principles of nutrition. Furthermore, facts have more meaning as they are used. Meaningful facts are more easily remembered than abstract ones not related to experience.

MAKING AND USING POSTERS

Making nutrition posters and pictograms for the school lunchroom may be an excellent means for correlating the teaching of nutrition and art. A good poster conveys an important message in an interesting and artistic manner. In the process of selecting ideas for posters, students can be encouraged to study nutrition and to formulate generalizations that can be understood by all of the people they wish to reach.

In the process of organizing ideas so that they can be used for a poster, generalizations must often be simplified and reduced in length. When this is done, one must really know nutrition facts in order to make short, accurate statements. Thus, knowledge may be increased. Furthermore, in an effort to show others *why* good nutrition is important, the student may convince himself.

"Being part of a poster" may create interest too. Have you ever used students as figures in a living poster or graph? One teacher wanted to show her class what proportion of them had good, fair, and poor diets so she asked members of the class to make a poster. First she had 10 girls stand up. Then she divided the girls into three groups to show the per cent of the class whose diets were poor, fair, or good. Four girls in one group represented the 40 per cent of the class whose diets were poor, and four more girls represented the 40 per cent whose diets were fair. The remaining two girls represented the 20 per cent who had good diets. This is a simple dramatic way to make percentages from food surveys meaningful. Of course, you might have to use some imagination if the per cents were different and you needed a fraction of a girl to represent a classification.

A living poster may be more interesting than a traditional one. It can be seen by everyone in an auditorium when many graphic materials cannot. Furthermore you may feel that you haven't time to make illustrative material of desirable standard and so you may pass

up opportunities to make nutrition education interesting and meaningful. A living poster takes more imagination than time.

Children may have fun with pictograms, which they may make for themselves if they have the information. The pictograms on page 21, showing some results from the Iowa study, suggest an exercise of this type.

ILLUSTRATED TALKS

Students learn while preparing demonstrations and talks, just as while making posters. If ideas for the talks are selected from many sources, students must learn facts and generalizations and evaluate ways of applying them. The generalizations in Chapter Four may be very helpful in organizing such presentations either by the students or the teachers. Talks are likely to be satisfactory if such criteria as the following are used to evaluate them.

1. Will the group hearing the talk think the facts selected are important?
2. Will they be able to use these facts as presented?
3. Do the illustrations project the idea clearly to the viewer?
4. Does the summary emphasize a few important generalizations and show ways to apply them?

There are many opportunities for giving such talks or demonstrations to (a) one's own classmates, (b) groups of younger children, (c) parents, and (d) other adult groups. With such audiences, students recognize the importance of organizing their ideas so that each lesson is appropriate for each age group. This will improve their acquaintance with nutrition facts, and strengthen their desire to learn more.

USING PROBLEM-SOLVING TECHNIQUES

Problem-solving capitalizes on the desire of students for independence and can be effective learning if skillfully guided. This technique is probably most successful when used as part of other methods, such as planning for the school lunch or discussing case situations.

Through solving the problems, the students do not learn by rote but come closer to the situations they meet every day, in which choices are necessary and decisions must be made. Since choices must be made as a part of everyday living, learning to use a good method for making decisions is an important aspect of all education.

Students may use the following steps in the process of solving problems related to food: (a) propose possible solutions to the problem (you may wish to add solutions to their list); (b) assemble

facts regarding the consequences of each proposal; (c) consider the resources available for solving the problem; (d) decide what values would be furthered by each solution; (e) make individual or group decisions in terms of the values considered most important by those making the decision.

Making decisions by this form of reasoning is likely to result in better nutrition for more people because it is not blind obedience to dictatorial leadership. This form of education permits individual differences in food requirements, possible changes in food facts, food availability, and individual preferences.

For instance, the young man who knows nothing about the need for vitamin A, but who is told that carrots are good for him because they contain vitamin A, is not likely to be impressed unless he already likes carrots. But if he is asked to locate a rich source of vitamin A which will give him good vision under all conditions of light, he may independently find out that carrots have high vitamin A value and be proud of his discovery. He will probably be much more impressed with this yellow vegetable because he solved this specific problem. When this method of education is used, it weakens the resistance to changing food practices.

USING LITERATURE EFFECTIVELY

Many interesting bulletins and books are available to the schools and adult groups for nutrition education. They are written for different age groups, with appropriate vocabularies. The concerns of different groups are anticipated. These books cannot replace the teacher, however, no matter how well written they may be. The teacher must guide the use of literature if reading is to be most effective.

Reading as part of nutrition education cannot be routine if it is to be valuable. Reading must be done for a purpose which the students recognize and accept. A reading assignment should be made only after students know why they are to read. During preparation for reading, the teacher can make sure that her objectives and those of her students are consistent, even if they are not identical.

Often students are expected to read for information. Information for what? To repeat facts to the teacher or to help the students think for themselves? If the teacher simply assigns pages in a book to be read, students can do little but guess what the teacher will ask them in recitation. On the other hand, if the students read when they need information, they not only know what to look for, but they have a reason to remember what they read.

Facts acquire meaning with use. If the students can see the usefulness of a fact, they learn it more easily. If no immediate use is evident, the fact is likely to be forgotten soon. For example, foods classified in each of the "Basic Seven" groups are difficult to learn when mere memorization is expected. However, when we use the "Basic Seven" classification as a tool for planning menus and evaluating food plans, the facts themselves are more easily learned.

Sometimes students read for the story that is told and not primarily for nutrition facts. The story may describe a situation that is suitable for group discussion because it is similar to one which they might encounter. It may have enough detail to make intelligent discussion possible. When this is true, the story can be used as a case situation.

WAYS TO WORK WITH PARENTS

Because most of our food preferences are formed at home, the influence of our parents and other family members has been greater than that of anyone else in forming our food habits. This means that nutrition education with children may be ineffective unless we work with the parents of those we teach.

Personal contact is probably most effective, because talking over problems can be enlightening to everyone. We may be impatient with failure of parents to apply facts of nutrition until we are aware of the complexity of some of their problems. When two of the authors talked to a group of parents and suggested that children would benefit as much from well-planned menus as did pigs from well-planned rations, one father reminded us that hogs ate what was served to them while children were not so docile.

Establishing desirable food habits or changing undesirable ones is not simple. Many factors may influence a child's acceptance of food. If you recognize the difficulties of parents, they will be more receptive of your teaching for several reasons: (a) You will not put them on the defensive by implying that they could do better if they really cared. (b) You will be sure that ways to increase acceptance of foods are taught along with the importance of the food. (c) You will plan with parents for ways that teaching at school can supplement learning at home.

Meeting parents in a group is usually more feasible than individual conferences and may actually be more effective. In a group you can show how nutrition can affect the way children look, act, and feel, and you can review ways to achieve good nutrition.

From the first meeting with parents, you will be most successful if you can establish a "togetherness." Both you and the parents are

interested in the growth of the children. Together you can identify difficulties in establishing good health habits and together you can solve problems.

The steps in problem-solving can be used effectively with parents if the problems are real and clearly defined. In the process of solving a problem you will have opportunities to present pertinent facts and to show how alternate solutions will affect the welfare of children.

Parents can be informed by letters or printed material, but some dangers accompany this method of communication. The parents may misunderstand your motives in sending material home or they may not interpret the facts correctly.

Some parents may not be reached in any other way simply because they do not come to meetings or because you haven't time to visit them. If children are old enough to plan ways to get information to their parents, they may also interpret it so that it will be used effectively.

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CHAPTER SIX

Problems in Nutrition Education

The problem of improving food habits is complicated and imperfectly understood. Actually food habits are constantly changing. For example, the per capita consumption of citrus fruits, milk, and eggs changed greatly between 1935 and 1953 (1). The consumption of fresh citrus fruits decreased from 48.5 to 42.7 pounds but at the same time consumption of frozen juices was almost nine times as great and of canned juices more than three times. The consumption of fluid milk and cream increased from 330 to 350 pounds. We ate almost twice as much ice cream. Egg consumption increased from 296 to 400 per capita.

Deliberate attempts to change food habits, however, often meet with strong resistance. This may be why we have tried to improve the American diet when people were not looking, so to speak. That is, we have improved the nutritive value of certain common foods so that some nutrients will be automatically supplied. A food that is eaten at almost every meal and in relatively large quantities is an important food. When breads and other cereals were enriched with vitamins and iron without changing their desired characteristics, diets were improved with little conscious cooperation from the average consumer. Other similar ways by which the supply of nutrients has been automatically reinforced include the enrichment of oleomargarine with vitamin A, of salt with iodine, and of milk with vitamin D.

The school lunch program has been another direct effort to im-

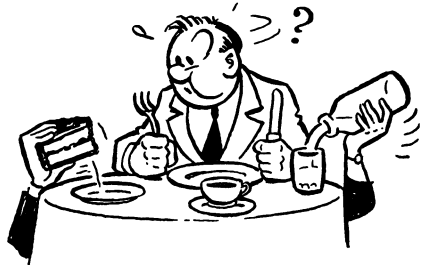
prove diets of one population group. This program has been supported by the Congress of the United States, school administrators, school boards, and parent organizations. Through the school-lunch plan, meals containing at least one-third of the Daily Allowance of nutrients recommended by the National Research Council (2) for children have been offered to them. The only cooperation expected of the child and his parents has been that the food be paid for, if possible, and that the pupil eat the food served to him. If the parents are unable to pay, the lunch is frequently made available to the child without cost.

Enrichment and school lunch programs have improved our nutrition with relatively little responsibility on the part of the individual. The main hope for further improvement lies in effective educational programs. We cannot expect to make fundamental changes in food habits until we have educational programs that awaken individuals to an active, intelligent concern for their own nutritional status. Of course, neither enrichment nor the school lunch program is available in all communities, and they can only be extended when public opinion is aroused. Education aimed to bring about these changes can parallel education designed to improve food habits of individuals. Both types of program are needed.

In spite of the hours of teaching nutrition in our schools, diets of many school children have fallen far short of recommendations of the National Research Council. Many schools are expected to teach nutrition in all grades as part of the health, hygiene, or general science courses. Home economics courses emphasize nutrition. Certainly there is interest among school administrators and teachers. Some time in the school schedule has been allowed. In the school curriculum countless opportunities exist for teaching nutrition but we are not getting satisfactory results. Perhaps it is because we are using ineffective ways of teaching; perhaps it is because we aren't reaching the parents who control what is served at home and who influence attitudes toward food.

We can teach much more effectively if we know more about our students' personal goals, attitudes, and beliefs about foods. Then we

... attempts to improve the diet
when people were not looking!



can apply the principles of motivation in our teaching. We can observe good timing so that children are taught when they are ready to learn. If we consider home and community influences when we make recommendations, we will know whether the foods we recommend are available and whether the children know what the foods look and taste like. The problem of teaching nutrition is complex, but a poor job will be worth nothing.

SOME PROBLEMS IN STUDYING HUMAN NUTRITION

Normally you cannot subject human beings to diets suspected of being poor; therefore it is a real problem to show scientifically the effects of diets of different nutritive quality on human beings. Even if human beings were willing to submit to the controlled diets required of subjects in nutrition research over long periods of time, such research would not always be feasible. The life span of men and women is many times greater than that of the rat, one of the most frequently used experimental animals. Thus the effects of nutritional deficiencies in the human being may appear so slowly that they are not easily identified. This situation makes identification or control of influences on health from generation to generation extremely difficult.

Cause and Effect Relationship Not Always Apparent

The effects of dietary deficiencies may be so interwoven with those of other adverse conditions that it is impossible to point to any single causative factor. Poor nutrition may be closely related to tooth decay, for instance, but there may be many contributing causes, such as lack of dental hygiene, inherited tendency toward poor teeth, and accidents to the teeth. Other defects such as poor posture and degenerative diseases may have a close relation to nutrition, but may have other causes, also. With the human being nutrition belongs to a complex of which the parts are almost inseparable.

FACTORS RELATED TO HEALTH

Many teachers have been puzzled by the child whose diet is poor but who looks healthier than some of his classmates who seem to follow good dietary practices. There are many reasons why the effects of poor diet may not be evident. Human beings can adjust to temporary stresses, such as a poor diet, and thus results are delayed. This ability to adjust differs from one person to the next. Then, too, the needs of individuals vary to a certain extent. What may be a poor diet for some individuals may be adequate for others.

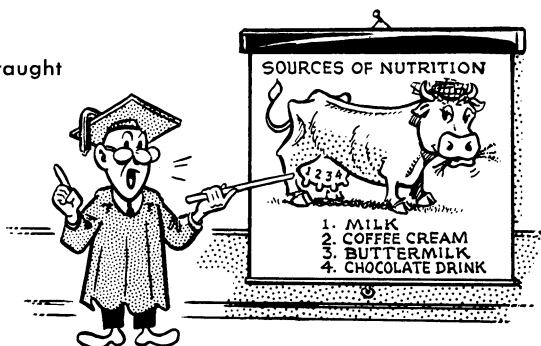
Individuals may not get the full value of nutrients in their food if they have infections, are fatigued, or have not eaten well in the

past. When writing about the effects of poor nourishment upon utilization of nutrients, Dr. Stearns said (3):

It appears, therefore, that inadequate nutrition during any considerable part of childhood results in decreased efficiency of the gastro-intestinal tract. Absorption of substances difficult to absorb normally, as calcium, is affected to much greater extent than is absorption of nitrogenous substances. Six months or more may elapse before utilization of a good diet becomes efficient. The implication of this poor utilization of calcium on studies of nutrition and diet in relation to dental caries in adolescence is obvious.

At some ages the effects of a poor diet may be more drastic than at other ages. During early childhood, when growth is slower, dietary shortages may leave less serious marks than later on when the stresses and strains of adolescence plus spurts of growth make nutritional needs especially large. If previous diets have been inadequate the ability of the adolescent to utilize the nutrients eaten may be retarded.

Much can be taught



Dr. Stearns attributes this condition to such strains as those caused by variations in amounts of body hormones from day to day, rapid growth of the body, and unstable emotions.

Emotional disturbances, whether happy or unhappy, may interfere with the utilization of nutrients. Teachers are aware of some emotional experiences of their students but others may be hidden and thus go undetected as a reason for poor utilization of food. We are built "all in one piece;" mental health will affect physical health, and for most people the reverse is also true.

GAPS IN INFORMATION

Nutrition research is a living, growing science. Although we now know what primarily causes deficiency diseases such as scurvy, rickets, and endemic goiter, we look forward to the day when we can identify the role of nutrition in the failure to achieve buoyant good health.

This lack of all the desirable nutrition information need not deter our educational efforts. There is much that can be taught now.

It has been said that there is enough knowledge available in nutrition to produce a superior race of people, if we only put it into practice. It will be wise for you to help your students to think and to form desirable attitudes as well as to learn certain facts and generalizations. Attitudes and ways of thinking can prepare students to evaluate, organize, and use new facts when they are available. Nutrition cannot be taught once for all time because it is a developing subject. But this is an advantage. A subject taught in the framework of research increases the student's ability to think, and discourages blind dependence upon rules.

Because we do not have research facts that show all the relationships between diet and good health for human beings, we must depend upon animal and even plant experiments. As educators, we must find ways of *convincing people that there is a solid relationship between good health and good nutrition*. The child may accept the fact that if a white rabbit needs lettuce so does he, but his father may be more skeptical. The exact findings of animal experimentation may not always apply to man, but the general relationship between nutrition and well-being is always present.

Experiments with rats, pets, and farm animals have shown conclusively that when their diets have been liberally supplied with all the needed nutrients these living creatures have developed into superior individuals. They are more beautiful and perform their biological functions better. They have more of the vigorous adult years or the "prime of life." The onset of old age is delayed. Finally, these well-fed animals have more and healthier offspring through several generations. As every farmer and 4-H boy and girl knows, good nutrition is basic to the production of prize-winning livestock.

HOME AND COMMUNITY INFLUENCES

In 1953 a committee of the American Dietetic Association investigated the false beliefs and information about food held by the people of the United States. Misinformation was in circulation regarding the connection of food to health and disease, regarding the caloric value of foods, and many other things, including methods of cooking and preservation of food.

These misbeliefs must be dispelled by facts presented in an objective way so that wise decisions about food can be made. Facts must be accepted emotionally, deep down, if they are to be used. Merely stating the facts to children, and most adults, will have little effect unless the traditional beliefs, cultural patterns, and superstitions are examined in view of the facts, and people are encouraged to think critically about their information. If the nutrition teacher, an out-

sider, attempts to impose completely new patterns, the students are likely to defend emotionally their traditions and cultural patterns, rather than to evaluate them.

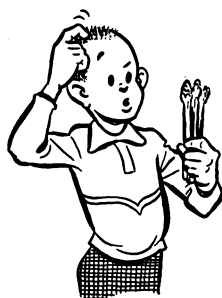
For that matter, there may be nothing wrong with some of the cultural, traditional, and religious food patterns. The only sound criterion for judging the desirability of a family food practice is its effect upon either the health or the resources of the family. Failure to recognize the worth of cultural patterns may result in raising unnecessary barriers to the achievement of an adequate diet. Individual foods or combinations of them may seem undesirable to the teacher who has accepted for herself a "traditional American" dietary pattern. But personal preference is an unsound basis for encouraging change, even though practices advocated in books support the teacher. It must be remembered that there are many ways to obtain a good diet.

A teacher of nutrition is most likely to improve diets in a community if she knows not only what modifications are desirable but also those which are acceptable and possible. Acceptability depends in part upon family food practices and experience with a food. Some evidence presented in the following chapter supports the belief that failure to accept many foods is more the result of never having tasted them than of dislike for them. If tasting unfamiliar foods were encouraged as an adventure in eating rather than because the foods are "healthful," more cooperation might be secured. The youngster or immature adult advised to eat a food because "it is good for him" may rebel because he likes to feel independent.

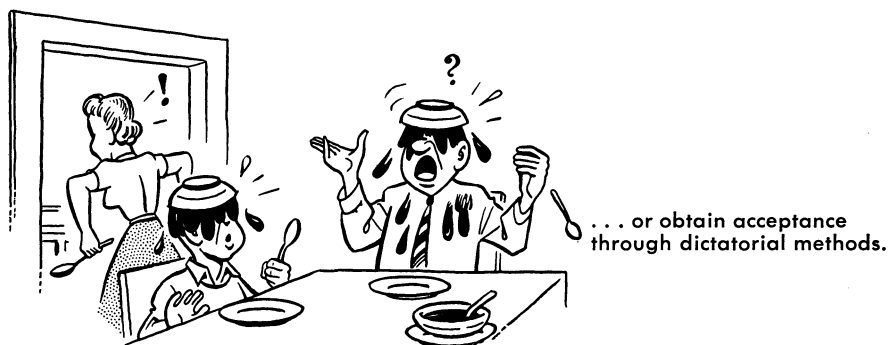
AVAILABILITY OF FOODS IN HOMES AND THE COMMUNITY

The child depends upon the food set before him for most of his growth-giving nutrients. His own selection of food is limited chiefly to snacks. If his parents do not provide an adequate diet for him, there is very little the community can do about it. The school lunch may provide its share of the nutrients needed daily, but this may not overcome deficiencies in the home diet. It would seem most logical, then, to work with the parents in order to impress upon them the importance of nutritionally better diets.

Home food production and the cost of food affect its availability. In some parts of the country there are seasonal variations in the supply of fresh fruits and vegetables of good quality at prices homemakers are willing to pay. However, there usually is some form of



What is it?



fresh fruits and vegetables available all year round now, thanks to our fine food distribution system. Moreover, the market contains a huge variety of canned and frozen fruits and vegetables that are often less expensive than the fresh. If the homemaker is willing to try new forms of familiar foods, she can feed her family well all year at reasonable prices.

Sometimes other forms of the food are not as well liked as the fresh product. Tomatoes are an example. When fresh tomatoes are plentiful, many people have an important source of vitamin A and ascorbic acid, but canned tomatoes are often refused as a substitute. The homemaker has a choice of three procedures: prepare the canned tomatoes in an acceptable, attractive form; find a substitute, such as oranges, to serve when fresh tomatoes are not available; or attempt to obtain the acceptance of the food through dictatorial methods.

Some parents do not realize the importance of the nutritional adequacy of their children's meals. Possibly they are not aware of the differences among foods, or they do not know or place enough importance upon the relationship of good food to health. Convincing these parents of the role of good nutrition in health will be a big step toward improvement. If they are convinced, most of them will use the time, money, and skill it takes to provide food every day according to an adequate plan. Often parents are vitally concerned about the child's food as an infant and toddler, but when the child reaches middle childhood (about 10 to 11 years), their interest dwindles and they seem to think that nature will take care of his needs.

When parents no longer closely supervise the diets of their children, there is special need for nutrition education at school. Even though a child will be dependent upon parents for adequate meals at home, he will usually have opportunities to choose snacks. Furthermore,

he may be freer than formerly to choose what he wishes to eat of the foods served to him in meals. The child must be highly motivated if he is to assume responsibility for what he eats.

GOALS OF INDIVIDUALS CHANGE

Because goals of individuals change as persons grow older, motivation to change food practices must change, too. Knowing the usual goals of an age group will help you to recognize the goals of your students, whether they are school children or adults. Despite their individual differences, persons within an age group tend to be alike in many respects.

The individual's idea of the best way to achieve a goal may be unwise even though the goal itself is desirable. For example, the goal of Jane, 16, may be to reduce her weight. She wants to lose weight to win approval of her age mates, or because she will better accept her own physique. However, she may believe that skipping breakfast is an effective way to reach her goal. In the Iowa Breakfast Studies (4) this concept was found to be a false one. Data from this research showed that people who omitted breakfast consumed as many calories as did those who ate breakfast, and at the same time, they were measurably more fatigued before noon.

There is a predictable sequence of learning which society expects of an individual. Usual characteristics of groups from middle childhood to later maturity are discussed here.

No breakfast — no pep!



Middle Childhood

Children from 6 to 8 years old¹ gain many new physical skills. They like to be good at games. Each child wants to have a sense of accomplishment. He collects such things as animals, rocks, marbles; acquires such skills as reading, swimming, talking; learns such facts as the locations of state capitals. His growth in height and weight is usually slow and steady.

This is the age when students are eager to learn new facts if they are understandable. The facts must be concrete rather than abstract; they must relate to foods rather than terms that are relatively abstract such as protein, carbohydrate, or vitamins. The foods talked about in a classification such as the "Basic Seven" must be those that students have an opportunity to see, handle, and taste. Thus, what you teach will have meaning to your students.

Late Childhood

During this period (about 9 to 11 years) growth is very uneven. Many girls begin the growth spurt but only a few boys do. Children become over-obedient to gangs of their own sex and less obedient to adults. Organized games requiring skill are important to them. They begin to learn the sex roles that society expects of them. Growth is rapid. Girls are usually taller and heavier than boys. Posture may be poor, awkwardness is prevalent.

This is the age when students are likely to be interested in the ways that food can affect their growth and development. Boys will be interested in growing muscular and tall, but girls may be afraid that food will make them taller or larger than they want to be. You will want to assure girls, in particular, that heredity limits the height of a person but that food can help them reach their own optimum heights. Girls will be interested in having straight well-formed bones, also.

Skill in games is important to both boys and girls. You expect them to be interested in such generalizations as, "Foods which help to develop sound muscles and steady nerves contribute to ability to develop athletic skills," and "Members of a winning team need an adequate diet every day, not on days of the game alone." (See 3A (2) and (6), pages 52 and 53.)

Adolescence

The tasks of adjusting to a changing body may be more difficult during this period (about 12 to 18 years) than it has been earlier be-

¹ Chronological ages for these developmental ages are not exact because there may be as much as two years' variation in physical maturity within a chronological age group of the same sex. As a group, girls develop about two years earlier than boys during adolescence.



cause now the sex organs develop and adult sex characteristics appear. Girls and boys must learn to accept their bodies as well as a socially approved masculine or feminine role.

Girls may be taller than many of the boys in a group because nearly all girls have reached their adult height by 16 while most boys will continue growing until 18. Associated with body changes are such interests as the opposite sex and personal adornment.

Both sexes are concerned about being normal and may be worried about acne, obesity, and other physical characteristics which they consider undesirable.

Most of the generalizations suggested in Chapter Four can be developed with a group of adolescents. Actually, the concerns of young people were used as the framework for organizing these generalizations.

Young Adults

Because of the many changes in their lives, most young adults are likely to be receptive to education that will help them in the solution of personal problems. Their problems are many and varied. During this period most young people select a mate, learn to live with a marriage partner, start a family, rear children, use resources to provide a home, and become adjusted to an occupation.

Difficulties that arise in meeting these new situations are often related to providing food for one's self or family and establishing food

habits that will contribute to health of the family. Young people who believe that the knowledge of nutrition helps in solving problems will be ready to learn more about nutrition and the management of resources so that the food served to the family is satisfying.

Later Maturity

This period in the life cycle is sometimes referred to as the "empty-nest" stage. Children are grown and have left home, so the family is smaller. The mother is no longer as active in the home as she was when the family made many demands upon her time and energy. Eating habits tend to be fixed but at the same time there is a tendency to choose foods that require little preparation.

The health of individuals varies widely but both men and women are affected by physiological changes. Because loss of teeth may interfere with mastication, softer foods are chosen. Digestion may be impaired, so that some foods cannot be eaten with comfort. Metabolism appears to diminish. Exercise also may decrease, and the net result is that many persons tend to gain weight in the middle years.

There are many problems among this aging group which nutrition education can help solve. But the best way to begin is through establishing good food habits and attitudes during childhood and to learn, beforehand, the changes which should be made as one passes from one stage of development to the next.

DIFFERENCES WITHIN EACH AGE GROUP

The above discussion of different age groups indicates that individuals within each group have similar "developmental tasks."

Every teacher is aware of differences in the ability of people to achieve their developmental tasks. These differences in ability may be due in part to differences in interest but they may also be influenced by such characteristics as emotional or social adjustment, intelligence, social and physical skills, physical make-up, and personal or family resources.

DIFFERENCES IN VALUE PATTERNS

A very potent force in motivation is the relative importance of values to an individual. A value is an ultimate goal that determines what more immediate goals shall be. For example, if friendships were a value, the goal of a boy in middle childhood might lead him to behave in a manner approved by a gang he wished to join. If a more important value of this boy were family life, he would probably behave in a manner approved by his parents whether or not a group of his age mates approved.

Research by Hawkes (5) indicated that value patterns varied for

individuals within a group of elementary-grade students studied. Girls had a composite pattern of values that differed greatly from the boys considered as a group. Here are the values he tested: recognition, personal improvement, physical freedom, power and control, privacy, family life, friendship, excitement and recreation, comfort and relaxation, beauty.

DiVesta (6) compared the value patterns of adolescent boys found in a corrective institution to another group of boys considered well adjusted. He found the groups to differ somewhat in values of greatest importance to them. The groups differed more in their concept of ways to achieve their goals and values than in the values themselves. The boys in the corrective institution used means that were not socially approved.

Each one of us is constantly making choices to achieve ultimately the state of affairs, or set of values for which we are willing to use our resources. Values usually form slowly as a result of satisfying emotional experiences. They may be changed after analyzing behavior and reflecting on its consequences.

Sometimes we make a choice which conflicts with one of our goals. Although we consider the goal very important, we either do not know or disregard the fact that our choice conflicts with this goal. An example is seen in the child who wishes to be strong and healthy. When green vegetables he dislikes are served, he refuses them. He may not really believe that he needs these vegetables frequently in order to continue in good health. But at any rate he is unwilling to overcome his dislike for them in the form served, and the larger goal is thwarted.

Educators usually assume that health is an important value for everyone and therefore can be used as a basis for motivation. This assumption is supported by the fact that many people say they desire health. The real test of the importance of *health*, as a motivator, is whether or not other values will be sacrificed in order to achieve it. For instance, the satisfaction that Sue gets from eating sweets may seem too important at the moment to sacrifice for the value of maintaining normal weight. As long as she recognizes that normal weight and nutritious food contribute to good health, but at the same time continues to eat unwisely, we must assume that she considers the enjoyment from eating sweets more important than health.

Health for health's sake may be rather dull unless the teacher points out its relationship to other important values. When friendship with other people is a value, health can become a real motivating power if it is recognized that through good health you can better enjoy your friends. An attractive appearance, a peppy personality, ability to enjoy sports, or skill at work will attract friends. Good

health will help in the attainment of these qualities. If you see and believe this relationship, the importance of health is increased and will motivate you to do something to promote good health.

There are times, however, when the value of friendship may conflict with the value of good health. We may go to too many club meetings, attend too many late parties, or work too hard, in order to gain the approval of our friends. Another example is the popular custom of drinking carbonated beverages. Even if John prefers milk or orange juice, when a carbonated beverage is popular with his "gang," he will likely choose it. The leader is likely to be imitated, whether or not his actions are supported by the facts of nutrition.

In other words, individuals differ both in the values that they consider most important and in the means which they believe to be most efficient for achieving their important values. Therefore motivation of all students is dependent upon showing how nutritional status is related to the many goals of an age group.

It is likely that behavior can be changed most readily by evaluating the means of achieving a value rather than by attempting to change the value itself. Changing values is difficult and usually requires a long period of time, but concepts of ways to achieve values may be changed by securing accurate facts and using problem-solving techniques. For example, Mary Jane ranks prestige high in her scheme of values, and has, as a goal, an attractive appearance. She may have heard her mother say that "milk is fattening" and so she begins to drink less milk in order to be more slender. If Mary Jane is given accurate information showing that milk is not necessarily fattening, and that its use is very important to her in achieving an attractive appearance, she will be encouraged to discover and try other ways of reducing her caloric intake that will not be detrimental to her appearance.

A child's desire for independence can either further or hinder nutrition education. As he grows, the responsibility for wise selection of food should fall more and more on his own shoulders. As he himself wishes independence, he should be given more opportunity to develop it. Hand-in-hand with responsibility, for decisions should go careful teaching, so that the child knows the relationships between what he eats and achievement of his own goals.

A desire for independence may hinder nutrition education when the child takes the responsibility for his food selection before he is ready for it. If he doesn't know nutrition facts, but still asserts that what he eats is his own business, he may make foolish selections. The teacher can agree that it is *his* own business but that it is *her* business to teach him both the nutrition facts and how to form generalizations so that he can use them in the solution of personal problems.

You will be able to motivate the students as long as you understand their interests. In defining these interests you may think about the influences of the developmental age of the student, the values he considers most important, and his concepts of the best way to achieve these values.

READINESS TO LEARN

Readiness of a student to accept the learning planned for him depends in part upon his past experiences. Words and activities can be interpreted only in terms of past experiences. Since experiences with foods are likely to be closely associated with the customs and practices of the family, readiness may also be influenced by feelings of loyalty to the family. Words will have the same meaning for a student and his teacher only when they represent similar experiences. For example, a student may be as confused when he tries to visualize the unfamiliar vegetable, broccoli, as he is when he tries to formulate the concept of differences among food groups. The teacher who knows *when* students need experiences that will give meaning to words and *how to* provide these experiences, will increase the readiness of her students to learn about nutrition.

Although it has not been proved, it seems likely that boys and girls who live in families where they are served three well-balanced meals a day are more ready to learn about nutrition than are children who live in families with poor food practices. When the school reinforces learning at home, children may be expected to have less conflict in accepting teaching at school. There should be no reason for a feeling of disloyalty to the family when evaluation of meals served at home indicates that they are inadequate.

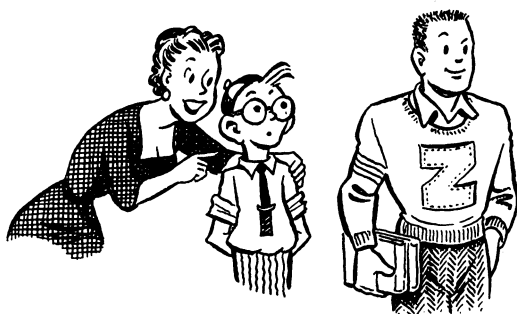
However, there may be the child who is not ready emotionally to accept and use nutrition facts until he has learned that he can appreciate members of his family even though he does not always agree with them. For example, if father ridicules the idea of eating some of the green and yellow vegetables, he may influence the actions of his child. The child's acceptance of these vegetables is difficult even when their nutritive value is known to him. The teacher who helps students resolve conflicts when teachings at home do not agree with those at school increases readiness of students to learn.

The period when students are ready for any aspect of nutrition teaching depends, also, upon their mental development. During late childhood pupils begin to grasp the notion that changes may be brought about by conditions that cannot be observed directly. But scientific interest can be more fully developed during early adolescence. If students are expected to do a kind of thinking for which they are not ready, thoughts of others may be memorized without

understanding. When this happens, it may be difficult to motivate learning at the appropriate time later, because the students may think that the material has been learned.

TRANSFER OF LEARNING

One means of evaluating the effectiveness of your teaching is to observe the carry-over of learning to other situations. The value of teaching nutrition in school is limited unless students are better able to improve their food practices wherever they may be. Development of this ability partly depends upon ability to generalize facts and to use these generalizations when making decisions about choice of food.



You know how to motivate students . . .

Both motivation and transfer of learning may be most effective if students generalize important facts in such a way that relationships among foods eaten, nutrition, and goals of students are evident. Such an organization of facts is presented in Chapter Four. Of course, if learning is to be most effective, the situations in which students are making food choices must be identified and used to illustrate ways to apply the generalizations.

When you teach so that the food practices of students are improved, you use all of your abilities as a teacher. You know which home and community influences support what you teach and which ones interfere with the changes that you suggest. You know when students need experiences with food so that what you teach has meaning for them. You know how to motivate students to eat adequate meals regularly because you know what is likely to be important to them and can show them how good nutrition will help them reach their goals.

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CHAPTER SEVEN

Attitudes Toward Food and Eating

Teaching nutrition will be more effective than it now is when we are able to recognize the many factors that influence attitudes toward food and food habits. One of the most frustrating experiences in nutrition education is the extent to which people allow preferences for foods to determine what they eat, and their reluctance to modify food practices in light of knowledge of nutrition. Our acceptance of food is a complex form of behavior determined by our sense organs, by the chemical conditions within our bodies, and by the psyche. Since our present psychological reactions to food result from the whole gamut of our life experiences, a simplified explanation of them is impossible. On the other hand, certain observations have been made of the behavior of individuals and of groups, which may be helpful to educators.

INDIVIDUAL DIFFERENCES

We do not know conclusively how greatly our choice of food is determined by our physical and chemical make-up, but facts have been discovered which reveal interesting variations among individuals. One great advantage of the use of a daily food plan such as the "Basic Seven" (1) is that it permits a wide choice of foods within each of the basic groups.

Some of us are keen-sensed; others, dull (2). There is a wide variation in the sensory response to the same food. Some people may not

enjoy good food as much as others because their taste sense is dull. This condition may account for many poor eaters, as it may also account for the popularity of strong seasonings, pickles, and other food accessories, designed to shock the taste buds.

Individual variations in the sense of taste have also been stressed by Williams (3) who summarized several studies on this subject. In one instance, the taste thresholds of 47 individuals to 17 substances were noted. Wide variations were observed. For one individual, saccharine was only 32 times as sweet as sugar; for another it was 2,000 times as sweet. For one subject, quinine was 256 times as bitter as cascara; for another, quinine was only half as bitter as cascara. One person could not tell the difference between the taste of quinine and hydrochloric acid. One substance (phenyl thiocarbamide) which was given in moderately concentrated solution to 6,377 people, (Blakeslee, as cited by Williams) was pronounced tasteless by 21.3 per cent, bitter by 65.4 per cent, sour by 5.4 per cent, salty by 4.8 per cent, and sweet by 2.1 per cent. The remaining one per cent could not be fitted into any category, since, according to them, the substance was described as "astringent," "like lemon," "like rhubarb," "like cranberries," or "like vinegar."

Furthermore, the same foods may taste different to the same person on different days. The taste threshold varies from time to time. Williams suggests that this variation appears to respond to changes in internal physiology. Williams also calls attention to the phenomenon of "psychological conditioning," which is responsible for some children noting the taste of castor oil or cod liver oil in orange juice because these substances have been given to them together.

If people differ so much in their taste of food, perhaps we should be wary of setting rigid taste standards, and more tolerant than we are

... a wide variation in
sensory response!



toward people whose reaction to a food differs from ours. The acceptance of many foods may be improved if the seasoning is mild and people are allowed to add seasonings as desired. If we hold to rigid standards for flavor or texture we may defeat our purpose of increasing the consumption of important foods.

FATIGUE OF SENSE ORGANS AS A FACTOR IN FOOD ACCEPTANCE

Food loses much of its interest when we cease to register perceptions of it. The ease with which sense organs are fatigued or dulled may be as important as variations in the sensation itself. The continuous sniffing of bread from 1 to 4 minutes is sufficient for some



When children dawdle with their food . . .

people to lose their perception of the odor (2). Here again, people differ in the rate of responses. When children dawdle with their food, the practice of requiring them to sit with the plate of food under their noses for an interminable period of time seems ill advised. A revival of interest in the food is improbable, and unpleasant associations with it may result in a permanent dislike for it.

Interest in food may be sustained by protecting the sense organs against fatigue. Alternating strongly flavored foods, such as meat, with mild ones, such as bread and potatoes, is effective in prolonging the enjoyment of eating. When strongly flavored foods are not accepted, the contrast with milder ones may change the picture.

In a study of the acceptability of foods served in the school lunch in a west Texas school, cabbage slaw was the least popular salad. Its acceptability was increased by adding milder substances, especially

apples. When students are expected to eat such foods as strong vegetables, suitable accompaniments of mild flavor can reduce fatigue of the sense organs.

INFLUENCE OF TEXTURE UPON ENJOYMENT OF FOOD

The extreme sensitivity to textural differences is another factor to be considered in the acceptance of foods. From early times people have desired smooth food. Renner points out that "pestle and mortar" was an ever-present piece of equipment of ancient times. Today many gadgets have been devised to produce textural improvements, such as the meat chopper, the electric mixer, and the electric blender. Manufacturers spend large amounts of money to produce foods with smooth, creamy textures.

Undesirable reactions to food are often brought about either by unpleasant particles left between the teeth or by scratchy sensations produced by slight roughness in the food. The skins of some foods may be actually unpleasant to some people. If objectionable textures of some foods are modified, aversions may be overcome and the range of food acceptance widened. For example, some people refuse celery, not because of its flavor but because of the "strings." When these are removed, it becomes an acceptable food.

PHYSIOLOGICAL CHANGES WITH AGE AS FACTORS IN FOOD ACCEPTANCE

The physiological changes in the taste buds as we grow older affect our choice of foods. Our knowledge of these changes with aging is meager, but it has been pointed out that there is a gradual disappearance of taste buds throughout life. According to Laird and Breen (4), taste buds, abundant in early childhood inside the cheeks and in the throat, disappear during adolescence until chiefly those of the tongue remain. In adulthood little change takes place until later years, when there is a decline both in structure and function of the buds. These physiological changes may help to explain changes in attitudes toward food as the individual passes from childhood to old age. The child may, indeed, have taste sensations very different from those experienced by older people with the same food. The experimental work of Laird and Breen indicates that the youthful disappearance of taste buds from the cheeks and throat is completed by the twelfth year.

In late adulthood, there is a noticeable shifting from the preference for sweet tastes to "tart, fruity" tastes. Women indicated their preferences for tart flavors even more than men, although as both groups grew older they desired fewer sweet foods. Laird and Breen comment, "Age apparently becomes sour in taste, if not in disposition."

CHEMICAL STATE OF BODY AS A FACTOR IN FOOD ACCEPTANCE

The extent to which the urge to eat or the selection of specific foods is influenced by the chemical state of the body is not known. The most basic drive for food is hunger. The pang of hunger has been thought to be caused by the contractions of the empty stomach. These, in turn, may be started by the level of various substances in the blood. Glucose, the primary fuel of the body, has been studied in this connection. The difference between the concentrations of glucose in the venous and arterial blood may trigger the hunger sensations (5).

Hunger and appetite are not the same. To satisfy the appetite is to be more selective than to satisfy hunger. In nutrition education, it is probably more important to understand the factors that influence appetite than hunger. Starved or semi-starved people generally appear interested in any kind of food. Filling the stomach is of major importance. In fact, under these circumstances, substances commonly disgusting or nutritionally valueless often satisfy. The main urge of the hungry person is to eat food which will make his stomach feel comfortable whether it is nourishing or not.

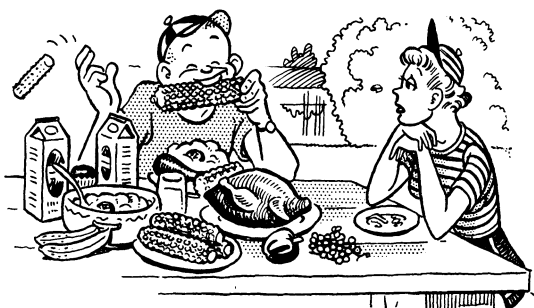
Research with rats has shown that the appetite can be astonishingly accurate in selecting the food most needed. Richter (6,7) and his associates found that rats subjected to conditions which profoundly disturbed their metabolic process showed a marked ability to select the substances needed. The well-known craving of cattle for salt may drive them to the salt licks. Chickens are said to supply the need for calcium by eating the shells of eggs (8).

This relationship has not been established with human beings although there are some evidences of drives which have seemed to originate from body needs. Richter has stated that children with low blood calcium have been known to eat the plaster off their nursery walls in an apparent attempt to make up for their deficiency. Macy (9) has observed that some children whose dietaries were poor had an abnormal craving for sweets. But fortunately, as their diets were adjusted to meet body needs, they voluntarily reduced their sugar consumption. However, more often than not, appetite appears to lead human beings in erroneous ways. We crave sweets, pie, cake, or rich main dishes which in most cases we do not need.

EMOTIONS AND EATING

The psychological aspects of food acceptance represent an area in which much information is needed. Graubard (10) has said, "Food lies more in the realm of psychology than in the sphere of biology or even in economics." According to him, the establishment of sound food habits implies some knowledge of the psychology of eating, of the

past record of man's attitude toward food, and of the social factors influencing the choice of food. He adds, "Repeating nutritional truths without regard to these forces is like singing of spring in the dark of a winter storm and expecting flowers to blossom forth on the spot." Bruch (11) has pointed out that the feeding situation is the first interpersonal experience, and she also uses Bettelheim's expression in speaking of food as "the great socializer," which often serves as the first line of contact for the child with someone in the new environment. It is not surprising, therefore, that an infinite variety of "nonnutritional uses" of food develops. She further states that any type of



Joe enjoys his food!

emotional problem may be expressed or acted out through overeating: demand for love and affection, defiance, helpless submission, or self-contempt (11). Interestingly enough, for the same reasons food may be rejected.

Keeping the proper perspective on food and eating is vital to health and happiness. Although eating should be a pleasurable experience, care should be exercised in the use of food as a reward or punishment, or as a means of cementing friendships, particularly with young children.

In order to understand the food practices of an individual, one must understand what food means to him. To Bill, food at the "training table" will make him into a successful athlete. Lois may eat, or not eat, to have a beautiful figure. To Mary, the food she eats, or does not eat, may symbolize personal independence. Sue may obey authority and eat the food she is expected to eat. Joe may eat simply because he enjoys it. John may follow his gang in order to have a feeling of belonging. Jim may enjoy new experiences with food but Ruth may feel more secure when eating the food to which she is accustomed.

INFLUENCE OF OTHER PEOPLE UPON ACCEPTANCE OF FOOD

Many individuals would rather depend upon their group in making food choices than to be independent. Foods may taste better when they are eaten with friends. "Belonging" gives more satisfaction than eating an adequate diet to most children (and even to some adults). Studies of the influence of others upon what an individual eats have revealed this.

Working with a group of nursery school children, McCarthy (12) observed that 35 per cent of their aversions could be traced to food dislikes in the family. The nursery school youngsters more often had food dislikes identical with those of their sisters and brothers instead of those of their parents.

Dunker (13) noted a considerable tendency for nursery school children in London past the age of about three years to follow others in their selection of foods in a test situation with six different foods. The young child followed the example of the older child more often than the reverse. The tendency was pronounced when a high degree of friendship existed between the two children being observed. Imitation of adults in the selection of food by the children was not marked.

Teachers are in a unique position to influence children's food practices when a free choice can be made. If you identify leaders of a group of children and get them to try "new" foods in the classroom or the school lunchroom, many other children may do likewise.

FOOD PREFERENCES AMONG SCHOOL CHILDREN

As part of a study of nutrition education in Iowa, Adams (14) discovered which foods students in one school district (*a*) liked and would always eat, (*b*) would eat but did not enjoy, (*c*) disliked and would not eat, and (*d*) had not tasted. The data were collected by a questionnaire adapted to Iowans by Adams from a comprehensive list of foods used by Irene and Calvin Hall (15). Common methods of preparation were listed for each food.

Vegetables

Thirteen of the 31 vegetables listed in the questionnaire were accepted in some form by at least 75 per cent of students in the study; seven were accepted by more than 90 per cent of the group. The seven most acceptable vegetables were potatoes, carrots, lettuce, cabbage, peas, tomatoes, and celery. With the exception of potatoes and peas, all of these were much more acceptable raw than cooked. The other six vegetables accepted by 75 per cent or more of the group studied were corn, string beans, radishes, cucumbers, onions, and sweet potatoes.

Unfamiliarity was given more often than dislike as a reason for

rejecting the 18 least acceptable vegetables. More students had not tasted 14 of the 18 vegetables than had tasted and disliked them. On the other hand, more students had tasted and disliked peppers, spinach, asparagus, and beets than had refused to taste them. Age level made no difference in the acceptance or rejection of vegetables.

It would seem that one way to increase acceptance of vegetables would be to plan education so that students would have opportunities to taste unfamiliar vegetables and would be encouraged to eat them. In the lower grades students might prepare, serve, and eat some of these vegetables in order to extend their experiences. A plan for introducing these vegetables through the school lunch might increase acceptance if students participated in making the plan and were willing to taste those with which they were unfamiliar.

When young people begin to eat meals away from home where others will not cater to their preferences and aversions as their mothers may have done, the disadvantages of liking only one or two vegetables will be more evident. If children could know the nutritive contributions of the different kinds of vegetables, they might be more willing to try them.

Fruits

The acceptance of fruit by the 168 students in the study was much higher than the acceptance of vegetables. Every fruit except gooseberries was accepted by 75 per cent or more of the students. Apparently children in this study were willing to eat fruit if it was available.

When eating where others will not cater to preferences and aversions, the disadvantages of liking only one or two vegetables will be more evident.



Meats, Poultry, Fish

Pork, beef, poultry, miscellaneous meats, fresh fish, and canned salmon would be eaten by more than 75 per cent of the students in the study. More students said that they had not tasted lamb and veal than had tasted and disliked them.

Only three of the organ meats listed in the questionnaire would be eaten by 50 per cent of the students. Liver was the most acceptable. About half of the students had never tasted brains and more than half of them had never tasted sweetbreads or kidney.

The miscellaneous meats listed were frankfurters, luncheon meats, minced ham, and bologna. All of these were well accepted. The percentage of students who liked these meats increased with their age level.

Apparently then, acceptance of meat was not a problem. Cost might influence the amount of meat served by families with low food budgets, but the children liked the relatively inexpensive miscellaneous meats.

Dairy Foods

Cheese, cream, and available forms of milk were included in the category of dairy products. Eighty-eight per cent or more of the students indicated that they accepted fresh whole pasteurized milk and fresh whole raw milk, chocolate milk, and American cheese. Five per cent or less of these students said that they had tasted these dairy products but would not eat them.

Other dairy foods such as cottage cheese, cheese spreads, whipping cream, skim milk, and buttermilk were accepted by fewer children. These foods were unfamiliar to a larger proportion of the group.

Inadequate amounts of milk in the diets of only 12 per cent of the students in this study were due to dislike for it. Possibly milk was not available to some children, either because of its cost or because other beverages were preferred in family meals or snacks.

Eggs

Eighty-seven per cent of the students would eat eggs in some form. Fried, hard- or soft-cooked, deviled, and scrambled eggs were most popular. Creamed eggs, omelet, and baked eggs were accepted by less than 60 per cent of the group. Three times as many children reported they had never tasted eggs prepared in these three ways as reported that they would not eat them.

Bread and Cereal Products

Bread and cereals were well accepted by the students in this study, with the exception of soy bread, cooked whole-wheat cereal, corn-meal mush, and fried mush. All prepared cereals listed in the questionnaire were popular with 83 per cent or more of the children. They did not

care for cooked cereal, except for oatmeal, which 80 per cent of the children said they would eat. A total of 70 per cent of the children said they would eat rice. Noodles, macaroni, and spaghetti were acceptable to more than 75 per cent of the students when served either creamed, with cheese, or combined with tomatoes.

Desserts

Desserts were popular with students in the study by Adams, as might be expected. Only three children did not like ice cream and chocolate cake, and all had tasted these foods. All of the group liked white cake and sugar cookies. Generally, puddings were more popular than



Desserts were popular!

custard. Ninety-three per cent of the group would eat gelatin desserts, butterscotch and chocolate pudding. Only 78 per cent would eat baked custard and only 79 per cent custard pie.

Summary

Varying numbers of foods from the different food groups were accepted by the boys and girls in Adams' study; no food group was completely rejected. Some green or yellow vegetables were eaten, if served raw or in another acceptable form. Generally, fruits were well liked. Meats were popular. Fresh whole milk was readily accepted. Eggs, in some form, were eaten by a large majority of the students. Most of the bread and cereals were well accepted. Desserts were popular.

ACCEPTANCE OF FLAVORS AND TEXTURES

Irving (16) studied the acceptance of foods by students in five schools drawn at random to represent independent and consolidated

school districts of Iowa. She wanted to discover whether there were differences either among grade levels or between sexes in the acceptance or rejection of four food groups: (1) foods rich in vitamin C, (2) green and yellow vegetables, (3) milk and milk products, (4) eggs. These food groups are the ones most likely to be inadequately represented in the diets of school children.

The popularity poll among the four food groups resulted in the following percentages of children accepting them: eggs, 90 per cent; foods rich in vitamin C, 89 per cent; green and yellow vegetables, 87 per cent; and milk and milk products, 80 per cent.

When differences between acceptances of each of the four food groups by boys and girls were analyzed, it was found that a larger proportion of boys than of girls accepted milk and milk products, and contrary to some of the other studies, more boys accepted green and yellow vegetables.

Another purpose of Irving's study was to discover whether there were differences among grades or between sexes in the acceptance or rejection of foods because of certain flavors or textures. A jury of four faculty members from the Food and Nutrition Department of Iowa State College was asked to classify a large list of common foods according to flavor as (1) mild, (2) strong, (3) highly seasoned, (4) sweet, or (5) sour, and according to texture as (1) soft, (2) firm, or (3) crisp.

In this same study sweet foods were liked best and strongly flavored foods, such as turnips, spinach, broccoli, and Brussels sprouts, were liked least. Strongly flavored foods were accepted more by the boys than the girls in the study. Mild-flavored foods were more popular with the girls than with the boys.

More older (grades 9 and 10) than younger (grades 5, 6, 7, 8) children in the study said they would eat strong or mild foods. The youngest children (grades 3 and 4) would eat both firm and soft foods, but dislikes for soft foods were found in grades 5 and 6, and for firm foods in grades 7 and 8. The students did not differ in their acceptance of sour or crisp foods.

Possibly children's diets could be improved if preferences for certain flavors and textures were considered. Most foods can be modified in flavor by seasoning and combining with other foods; textures can be modified by processing if raw foods are not acceptable. Actually children often prefer raw to cooked vegetables and fruits.

Since preferences for flavors and textures change as some children grow, it would seem wise to avoid trying to force the acceptance of disliked foods at any one time. When resistance to eating a food is built up, the food may be rejected later even when its texture or flavor has become acceptable.

SEX DIFFERENCES IN FOOD ACCEPTANCE

In another study, women were found to be familiar with more foods than were men, but also they had more food dislikes. This was reported by Hall and Hall (15), who made an analysis of food acceptance among 693 students (215 men and 478 women) in Western universities. A check list of 150 foods was used.

In 1943, Wallen (17) prepared a list of 143 foods which was presented to 308 women and 237 men. Considerable uniformity existed in the foods disliked; for a small proportion of items, however, there were reliable differences. In most cases where sex differences occurred, a larger proportion of females than of males disliked the food. The investigator suggested that these differences may be associated with

Women had more food dislikes.



social pressures operating in the early years of life. Little boys are expected to refrain from tears, stand discomfort "like a man," and refuse to shrink from new experiences. Little girls' reactions, on the other hand, are viewed with a more permissive attitude; the tendency to discourage timidity is less pronounced.

Wallen found that internal organs are highly unpopular as food, and foods conspicuously disliked by all groups were buttermilk, Limburger cheese, and pigs' feet. Foods for which few people had aversions were orangeade, lettuce, grapes, pears, and plums.

Combining age and sex, McCluney (18) studied the food likes and dislikes of 250 persons in a Texas community. Her subjects were grouped as follows: 25 males and 25 females from fifth grade, eighth grade, high school, college, and adults. In each group except the eighth grade, the dislikes of the females exceeded those of the males. The eighth grade children, both boys and girls, had a conspicuously large number of food dislikes. This observation is of interest in connection with the previously mentioned change in taste buds at the age of twelve, and the marked decrease in nutrient intake of girls of this age, as noted by Eppright *et al.* (19). At all ages only a small proportion of the foods was merely accepted; foods were either liked or disliked.

Although the list was composed of 175 fairly common foods, a surprisingly large percentage was unfamiliar. Foods unknown to the

largest number of subjects were found among the green and yellow vegetables and the meats. This and other studies suggest that with many people, the range of familiarity with foods is limited.

PREFERENCES OF IOWA PEOPLE OF TWO AGE GROUPS

A study was made of the food habits and preferences of two groups of Iowa people, the 17- to 19- and the 46- to 58-year-old men and women (20). The information, obtained through personal interviews, consisted of daily menus and answers to a questionnaire designed to determine the degree of preference for food items and groups.

Food preferences and practices were found to be closely related. Preferred menus, *i.e.*, menus given as those desired if there were no restrictions of any kind, did not differ markedly from the actual. In general the backbone of the diet was meat, bread, potatoes, dessert, and beverage other than milk, and this is the plan which people prefer.

Differences in attitudes toward food were noted with age, sex, place of residence, and probably with national origin. Milk was preferred and used by many more of the younger than of the older people. Eggs were more highly favored by older than younger people. Women favored vegetables and fruits and used them more frequently than men. In the groups studied, food dislikes were more prominent among older men and younger women. Zest for food seemed greater for people of the open country than elsewhere. Attitudes toward foods varied somewhat with nationality. Scandinavians, in particular, differed from other groups in their preferences for many food items, and furthermore, showed signs of adhering to customs and habits of their ancestors.

Foods that provided variety to the diet and foods that were considered healthful were more frequently among the less popular than among the well-liked foods. Older people more than the younger people thought of the health aspects of food; younger people more frequently mentioned flavor as a reason for liking a food. The qualities most frequently mentioned in connection with well-liked foods referred to flavor ("tastes good") and satiety value (expressed as "satisfying and filling"). Odor was mentioned as an unfavorable quality of food but seldom as a favorable one. Color and texture were infrequently mentioned as reasons for preference.

Meat as a class of food was very popular; 96 per cent of these Iowans had meat in their daily menus. More people, however, would like meat at all meals than had it. Chicken was probably the best-liked meat by the two age groups of Iowans, with certain cuts of beef

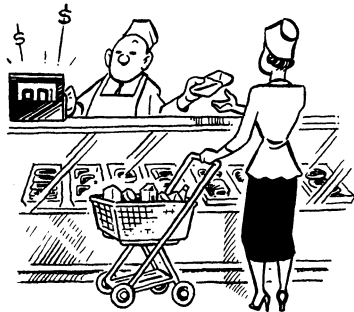
next, and pork liked least of the three. Lamb was rated as well liked by less than 10 per cent and was actually disliked by about one-half. Organ meats were highly unpopular, and fish well liked by only about one-third of the respondents. Turkey was less well-liked than chicken particularly in some nationality groups. Cut of meat made a difference in preference. Beefsteak was more popular than roast, and stew less popular than groundbeef.

Eggs were more highly favored than milk but less well liked than meat. They were used more frequently at breakfast than at other meals. More people would like them at breakfast than had them. They were more likely to appear at the evening meals of people in the open country than in urban places. As the size of the group eating together increased, the use of eggs in the evening meal tended to decrease. The use of legumes as a substitute for meat and eggs was apparently accompanied by a loss in appetite appeal.

Green and yellow vegetables as a class were well represented on only 43 per cent of the daily menus. Half of the people considered them very good and only 2 per cent disliked the group as a whole. Attitudes varied widely with the different vegetables in this class. Mild-flavored ones seemed more acceptable than strong-flavored ones, such as peppers, turnip greens, and broccoli. These vegetables, when served, were usually an accompaniment of the main meal of the day. Sixty-one per cent of these Iowans had three servings a day of other vegetables. Sweet corn and Irish potatoes were best liked by most people. Irish, or white, potatoes were much more popular than sweet potatoes.

The food group consisting of citrus fruits, tomatoes, melons, and raw cabbage was included to the extent of one serving a day in the meals of 53 per cent of these Iowans. More than half of the people consider these foods very good. Salads, which appeared in only about

More people would like meat
... than had it!



25 per cent of actual noon and evening meals, were listed more frequently in the preferred than in the actual meals. Fruits and vegetables were regarded as a health-giving group of foods and were liked because of their flavor. With fruits in general, however, the nonacid and dried were less popular than others.

Only 28 per cent of the people used 2 cups or more of milk per day. Use of milk in prepared foods was also very limited. As a beverage it was used least often at breakfast and with about equal frequency at noon and evening meals. The most conspicuous difference observed in this study was between the two age groups in their use of milk; 58 per cent of the younger but only 20 per cent of the older subjects had the commonly accepted standard of 2 cups a day. The preference for milk was not great; in fact, if people represented in this study could have just what they wanted, few would have more milk. Few people, however, actually disliked it. The chief characteristic mentioned by the respondents was that it is a healthful food. One of the problems involved in education for use of milk is that it is age-linked, since people usually think of it as food for the young. Furthermore, it is often thought to be fattening.

In contrast to milk, butter was one of the most highly favored foods. Cheese was rated lower than milk in appetite appeal, and was used by no more than 10 per cent of the people at the noon or evening meals.

As observed in the Iowa studies, the attitudes of children toward food are much like those of their elders. This study of Iowa older youth and adults therefore suggests important considerations in efforts to change the food habits of children.

OTHER STUDIES ON ATTITUDES TOWARD FOOD

Some groups of food seem less popular than others the country over. Young and her associates studied food dislikes among 645 homemakers in Rochester and Syracuse, New York (21). Here, as in Iowa, by far the most frequently disliked group of foods was vegetables. Twenty-six to 30 per cent of the families had dislikes in this group. Next was the group of meats described as non-beef, followed by organ meats and fish or sea food. The principal disliked vegetables were much the same as noted in Iowa; and in the order of expressed dislikes were turnips, squash, spinach, and cabbage; cauliflower, sauerkraut, and eggplant; parsnips and Brussels sprouts; broccoli, carrots, and asparagus.

These authors point out that, in this study, nutritionally important foods as milk, beef, citrus fruits, and many vegetables were not disliked by a single family. They question the significance of

food dislikes as a factor related to the adequacy of the intakes of most individuals. Again it was noted that people are generally unable to verbalize their reasons for food dislikes.

That food dislikes do enter into the family diet was shown in a Virginia study in which one-third of the urban families and two-thirds of the rural families reported foods not served because they were not liked. In this study too, vegetables were the foods most mentioned as disliked.

Increasing the popularity of vegetables would seem to be one of the very important measures for improving the diets of the people of this country.

GOOD NUTRITION MAY REQUIRE FEW CHANGES

There are many dietary patterns that can result in adequate nutrition. The milk-meat-vegetables-salad-dessert pattern popular in upper-middle class American homes is only one way to secure an adequate diet. Why should we impose this pattern on others? The goal of nutrition education is to have meals which contain all essential nutrients in desirable amounts. If you would teach the student to identify the weaknesses in his home food pattern and to modify them until meals are nutritionally adequate, you would probably have better results and greater satisfaction to both the student and the teacher. Barriers to change would thus be lowered.

Contradictions characterize the psychological reactions to food. Monotony in food is a frequent cause for discontent. "Something different" has a strong appeal. Ventures in eating new dishes are welcomed—even sought. Yet, in general, people are reluctant to change their accustomed ways of eating, particularly when it comes to mainstays of the diet, such as bread, meat, and potatoes. This principle has been variously expressed: "That to which we are accustomed seems natural, while the strange seems unnatural and undesirable." "We like what we eat, rather than eat what we like." An old German proverb states, "What the peasant does not know, he does not eat."

G.I. Joe, it was stated, did not go in for new taste sensations. Thus the fellow from Mississippi complained that it was a pretty sorry meal when you didn't get rice or grits along with your potatoes. The young man from Tennessee wanted to know just how you could get along without some sort of hot bread to stick to your ribs, and the gripe of the North Carolinian was that he had never yet tasted vegetables which were not cooked with a ham hock or salt pork and he wasn't going to start now. Probably in most instances the men finally became accustomed to the Army food. In many cases they have actually preferred the new foods to their previous diet. It would seem then

that a liking of more foods could result from trying new foods until they become familiar.

PEOPLE CAN EAT FOR PLEASURE AS WELL AS FOR GOOD NUTRITION

Possibly when educators and parents have tried to be scientific about nutrition, they have taken the zest out of eating. One's reaction to trying a new food is likely to be different depending upon whether the appeal is to eat something because it is "good for you" or because it is "good to eat."

Much more needs to be known about why people like and eat certain foods and do not eat others. There is some information about rejected foods, but reasons for rejections have not been determined adequately. Not having tasted a food seems to be responsible for failure to eat it at least as often as actual dislike for it.



... they have taken the zest out of eating.

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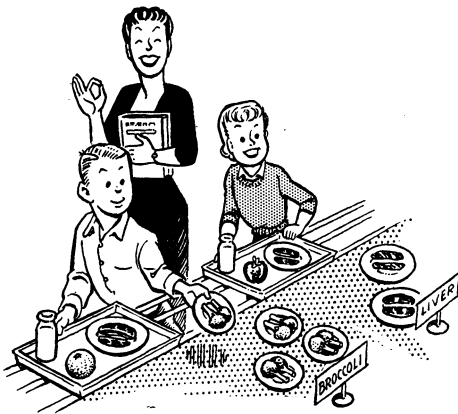
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CHAPTER EIGHT

Evaluation

Effective evaluation serves both teacher and student in any learning situation. By means of evaluation the teacher notes the success of the teaching and the learning difficulties of students; the student is motivated by knowledge of his progress toward educational goals. Evaluation is a necessary step in making nutrition work.

An important purpose of evaluation is to determine the effectiveness of teaching methods for achieving objectives. For this pur-



... the teacher notes the success of the teaching.

pose your first step is to determine your objectives and state them so that the behavior you expect of students as a result of teaching is evident. For example, one of your objectives may be: To attain good nutrition because students select foods which provide nutrients in the amounts needed by the body. (Objective suggested in Chapter 3.) This objective is stated in terms of the behavior you expect of students. However, in this situation behavior is very complex; you will be unable to identify difficulties of students in achieving the objective unless it is further analyzed.

Your second step, then, is to restate this objective in terms of behavior that is specific enough to help you bring to light the difficulties of students. There are at least three aspects of learning which may be useful in organizing and selecting the types of behavior to be included in the evaluation of an objective in nutrition education. These are as follows: (1) acquisition of important information and judgment of dependable sources; (2) development of effective methods of thinking; (3) development of attitudes and values which will lead to self-motivation in selection of food for good nutrition.

As a dynamic approach to the problem of evaluating success in teaching for any objective in nutrition, the teacher will do well to list in these three categories the behavior which should result from the teaching. For the objective stated above, namely, the achievement of good nutrition through the proper selection of food, the following is such a list:

1. Acquisition of important information and appraisal of dependable sources
 - a. Recall facts related to the nutrients needed daily.
 - b. Recall facts concerning kinds and amounts of foods needed to ensure an adequate supply of these nutrients.
 - c. Recognize half-truths, incomplete facts, misinformation, or superstitions concerning a food or foods.
 - d. Have some criteria by which to evaluate sources of information.
2. Development of effective methods of thinking
 - a. Formulate reasonable generalizations from specific facts as shown by ability to:
 - 1) Interpret and use data from research related to nutritional needs of persons of different ages, states of health, and activities.



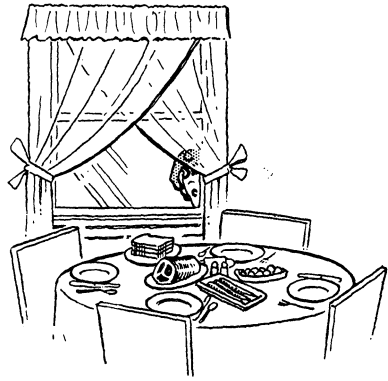
- 2) Recognize or formulate sound generalizations related to nutritional needs and ways to satisfy them.
 - b. Solve problems as shown by ability to:
 - 1) Make good decisions when selecting food.
 - 2) Analyze a problem relative to the choice of foods.
 - 3) Determine alternate courses of action and the values to be attained through each alternative.
 - c. Apply generalizations when making decisions.
3. Development of attitudes and values
- a. Be willing to try new foods.
 - b. Accept responsibility for own food practices.
 - c. Tend to be critical of information about nutritive value of foods until sources have been evaluated.
 - d. Maintain an open-minded attitude toward information about food.
 - e. Believe that food selection is essential to good nutrition, and good nutrition to health, and health to happiness.

Whatever the objective you choose, this first step of listing the behavior expected as a result of teaching in broad categories, such as the three described, will lead logically to the third step in the evaluation process.

The third step is to identify situations in which you might find students behaving in each of the ways suggested in the analysis of the objective. A paper and pencil test, check sheet, score card, rating scale, and progress chart represent commonly used instruments that are set up for evaluating the acquisition of information. But there are many other situations in which the dynamics of nutrition education may be tested. Some of these situations will be in the school, where you can observe behavior in the classroom, in the cafeteria, at school parties, or near dispensing machines. Other observations might be in homes or such places in the community as eating places or ball games. If nutrition education is to be effective it must work in these places.

The fourth step is to select and try the most promising methods for evaluating each of the objectives, paper and pencil tests as well as less formal methods. You will wish enough evidence about the progress of your students to draw some conclusions. This ideal is not always achieved, but use of all feasible methods of evaluation will yield more complete evidence than you could hope to get from one type of evaluation. In other words, a good evaluation program will employ devices to test the acquisition of knowledge, the development of effective methods of thinking, the development of attitudes, and identification of values which will lead to the con-

Other observations
might be in homes!



tinued motivation to attain good nutrition through the proper selection of food.

EVALUATION OF ACQUISITION OF FACTS

Whether or not students can recall the facts which you gave them the opportunity to learn is probably the easiest growth to evaluate. You can identify the facts that you consider most important, and from among them select those to use in the test. Paper and pencil tests are usually used for this evaluation. Examples are given of matching, true-false, and problem-type items.

All of these are short-answer types of test items. When you use this type of item rather than an essay type you can obtain responses to more items in a given length of time because students can answer them more quickly. Another advantage is that you can score the items more quickly and more objectively. You can more easily ascertain the relative ratings of the students in a group, or of one group with other groups.

If you wish to know how well students can recall reasons for the Basic Seven classification of foods, you may use *matching items* in a test such as this:

Select a food (or foods) in the right-hand column that is (or are) a good source of protein and place the number of that food in the first blank. Fill each succeeding blank by selecting the food (or foods) that is (or are) a good source of the nutrient, and place the number in the appropriate blank.

- _____ A good source of protein
- _____ A good source of vitamin A
- _____ A good source of calcium
- _____ A good source of iron
- _____ A good source of vitamin C

1. Beef
2. Oranges
3. Cabbage
4. Cauliflower
5. Bread
6. Butter
7. Milk
8. Eggs

As an illustration of the *true-false test*, items are taken from an unpublished test prepared by Barrick (1) as one means of evaluating methods used for teaching freshman college women. Students were instructed to read each statement carefully and then indicate their beliefs as follows:

T = True; you agree with the statement.

D = Doubtful; you doubt the truth of the statement.

F = False; you disagree with the statement.

U = Uncertain; you are very uncertain whether the statement is true or false.

Here are some of the statements:

Vitamin pills should be taken by people who dislike many foods. —

Products made from milk have the same nutritive value. —

Canned pineapple is a good source of vitamin C. —

A reducing diet should consist largely of fruits and vegetables. —

In the same test are items that express half-truths. This kind of an item is different from one that is completely wrong or right. Examples of these items are:

An easy way to reduce is by taking exercises. —

Poor nutrition is often one of the underlying causes of juvenile delinquency. —

Milk is a perfect food. —

A safe way to reduce is to eat small portions of everything served. —

If you add a response, P, to the four above, you can use the last four items to determine whether or not students detect half-truths. A new response might read P = Partly true; you believe that the statement is partly true.

Students who mark the last four items P thus will be answering correctly because the statements are neither true nor false. Opportunity to make this response helps the most discerning students because they are most likely to detect half-truths.

Another kind of true-false item in Barrick's test identified the knowledge of students about certain superstitions. Three statements illustrate this kind of item:

Sugar diabetes is caused by eating too much candy. —

Food should be removed from a tin can immediately after opening or it will be unfit for use. —

A food allergy is an intense dislike for a food. —

When scoring a test including these three kinds of true-false statements, you will obtain more specific or exact information about the difficulties of students by three separate scores than a single score. With a score for each type of error, you and the students will be aware of their misconceptions.

The *problem-type question* may be used to check the accuracy of information. It has the advantage of presenting facts about a

situation so that there is less likelihood of misunderstanding the statement to which reaction is requested. This type of item was selected from another test used by Barrick (1). The directions for this test were:

On the following pages you will find described a series of situations involving nutrition problems. Read each one carefully and check (x) the answer or answers on the answer sheet. After selecting the best answers, read the entire list of reasons and check on the answer sheet those that explain why your answers are the best ones.

One item in the test read:

Marge Macley is allergic to tomatoes in any form. Several fruits are served at the dorm for breakfast, so she can avoid tomato juice. Since the meals at the dorm are planned to meet daily requirements for good nutrition, it is important that she choose the right fruits. If she eats plenty of green and yellow vegetables, which of these could she select that will be good substitutes for the tomatoes?

- | | |
|---------------|--------------------|
| a. Grapefruit | c. Oranges |
| b. Prunes | d. Pineapple juice |

Check the reasons why the fruits you checked above are good substitutes for tomatoes.

1. Grapefruit, like tomatoes, is high in vitamin B.
2. Grapefruit contains a large amount of vitamin C.
3. Prunes supply roughage.
4. Prunes are high in iron.
5. Oranges are a citrus fruit and so will substitute for tomatoes.
6. Pineapple is a citrus fruit.
7. Pineapple is an important source of vitamin C.

Any type of *essay writing* expected of students can be examined for accuracy of information. The essay type of evaluation has advantages and disadvantages. One advantage is that students may not be aware that the accuracy of their information is being tested. In other words, in an essay examination the student's ability to call up spontaneous information has an opportunity for expression. Disadvantages are that (1) only a small sample of information is used by the student, and (2) the time used by the teacher in discovering



and pointing out errors of students may be greater than that required for constructing and scoring a short-answer type of test.

Knowledge of dependable sources of information is not simply a recall of information. To achieve this objective students must know sound criteria for judging the source of information and be able to use these criteria when accepting or rejecting information that they read or hear.

The criteria suggested on page 108 can be the basis for tests similar to the ones suggested for recall of facts. Before testing ability to use these criteria, you will wish to know whether or not the criteria are known and accepted by students.

Tests of ability to *use* the criteria may be similar to those on page 161, where ways for evaluating ability to apply generalizations are discussed. Actually, criteria are generalizations that indicate the importance attached to certain characteristics of a product.

Steps to follow in constructing such a test are:

1. Present excerpts from 2 articles to your students, giving complete information of authorship and publication.
2. Have students select the article considered most reliable, with reasons for their selection.
3. Select student statements of reasons which:
 - a. support each article and are good criteria.
 - b. are not sound criteria for determining reliability of the article.
 - c. are not relevant to the problem.

EVALUATION OF DEVELOPMENT OF EFFECTIVE METHODS OF THINKING

Ability To Interpret Data

The ability to interpret data is one aspect of ability to think that is often one of the objectives of a teacher of nutrition. The effectiveness of many visual materials is limited unless students are able to interpret for themselves what they see. For example, ability to identify similarities and differences in characteristics of well-nourished and poorly nourished individuals requires a different level of ability from the ability to memorize these characteristics as they are pointed out by the teacher.

If you have used the pictures of the two teen-age girls on page 96 to teach students to identify important differences in physical characteristics of well-nourished and poorly nourished individuals, you can use the pictures of the two boys on page 30 as a new situation to test the ability of your students to distinguish differences between them. The first time or two the pictures are used as a testing situation you can ask such questions as: Which of the two boys seems to be the more healthy? Give reasons for your answer. The reasons

given by each student may be classified in several ways: (1) characteristics of good health shown by the boy chosen as the more healthy, (2) characteristics of this boy that do not indicate his state of health, (3) characteristics of good health that are not evident in the picture of the boy. This procedure will reveal whether or not students can identify accurately the characteristics of good health as shown in the picture.

When constructing a short-answer test item you will wish, among statements of reasons to which students can react, some of each type that apply to each boy. Since statements in the language of students are not likely to be obviously wrong or right, the answers you receive from them can be selected from each of the three classifications suggested in the previous paragraph.

When interpreting data from such a test you will discover students who (1) recognize all of the characteristics that apply to the picture of the boy chosen; (2) are unable to distinguish between characteristics that apply to the problem and those that do not; (3) know the characteristics of a healthy person but do not restrict their answers to the problem of nutrition.

Tests similar to those using the pictures of the two boys can be based on data such as are found in graphs, tables of food composition, pictograms similar to those in Chapter 3, charts such as those which show growth curves of rats on different diets. In each case, a student's responses will indicate whether he (1) can accurately show relationships among the data, (2) can see all of the relationships in the data, and (3) does not go beyond the data presented and thus over-generalize.

At the end of a lesson, you can test informally the ability of students to interpret data if you ask them to write in complete sentences what they have learned during the lesson. Thus you will know which of your students can state generalizations that are complete and accurate.

Ability To Apply Generalizations

Ability to apply generalizations of nutrition when making decisions is different from ability to generalize. A short-answer type of item for this evaluation presents a situation in which a person is required to make a decision. Two or more alternatives are offered, from which the student must choose one. After making a choice he checks facts or generalizations that are reasons for his answer. Among the reasons are untrue statements and true statements that do not explain the choice made. If several such items are included in a test, you will have some evidence of a student's ability to apply generalizations accurately.

The two items which follow were selected from a bulletin prepared by Chadderdon, Brown, Downing, and Kelly for the Iowa State Department of Education (2).

I

Mary's mother has joined a Red Cross class that is studying good foods for the family. She has brought home with her a list of meals about which she is to make certain decisions. Mary is quite excited to think that her mother is studying some of the same questions that she has been discussing in her Home Economics class. Mary has decided to answer the questions and compare with her mother's answers.

If a growing girl has the following foods for breakfast and dinner:

Breakfast:

Sweet roll
Cocoa

Dinner:

Meat loaf	Bread-butter
Creamed potatoes	Cookies
Buttered peas	Milk

which one of these four lunches would be best to complete her meals for the day:

A

Potato salad
Rice pudding
Milk

B

Peanut butter sandwich
Pea and cheese salad
Cornstarch pudding
Lemonade

C

Tomato lettuce salad
Minced meat sandwich
Fresh fruit — Sugar cookie
Milk

D

Sliced ham
Cheese sandwich
Milk

Put an x on your answer sheet in front of the letter of the menu which you think is best.

Put an x on your answer sheet in front of the numbers of the reasons why your choice is the best:

1. She should have one full serving of meat or fish daily.
2. One serving of potatoes should be eaten daily.
3. Peanut butter sandwiches are very good for lunch.
4. She needs a quart of milk a day, and milk for lunch helps her get the amount she needs.
5. She should eat some fruit each day.
6. One serving of cheese can take the place of meat for the day.
7. Rice pudding gives strength to work well
8. One serving of sweets each day gives heat and strength.

II

Grace Brown, a friend of Mary's, does not eat breakfast because she says she is not hungry in the mornings. She walks ten blocks to school and doesn't want to carry a lunch, so she buys a hamburger or candy bar at noon and hurries out on the playground to play baseball. By three o'clock she is too tired to work her arithmetic problems. Mary tells her that in order to get all of the foods she needs each day to keep her healthy and physically fit she must eat three meals a day. Grace laughed at Mary but has agreed to try it, with Mary's help. Which daily menu, A or B, is better for Grace?

A

Breakfast:
 Cream of wheat
 Nut muffins
 Applesauce
 Cocoa

Lunch:
 Mashed potatoes
 Green string beans
 (buttered)
 Whole wheat bread
 Chocolate cake
 Milk

Dinner:
 Macaroni and cheese
 White bread — butter
 Buttered cabbage
 Potato salad
 Cream pie
 Cocoa

B

Breakfast:
 Orange juice
 Oatmeal
 Whole wheat toast
 Milk

Lunch:
 Vegetable soup
 Crackers
 Baked apple
 Cookie
 Milk

Dinner:
 Creamed eggs
 Baked potatoes
 Head lettuce salad
 Whole wheat bread —
 butter
 Canned peach sauce
 Milk

Mark on your answer sheet the one that you think is the better of the two to give Grace the foods she needs for the day.

Mark on your answer sheet the reasons why you think your choice is the better of the two:

1. The meals contain two servings of whole-wheat cereal.
2. The meals contain a citrus fruit which should be eaten every day.
3. The dinner contains cocoa which is hot and gives her some milk.
4. Buttered cabbage gives one of the kinds of vegetables needed daily.
5. The meals contain a quart of milk which she needs every day.
6. Eggs make our bodies grow and should be eaten at least 3 or 4 times a week.
7. Cheese takes the place of the meat and builds muscles.
8. Cake and pie give sugar and fat which our bodies need for heat and strength.

Another way to evaluate ability to apply generalizations is to judge the work of students when they prepare exhibits and posters. You can observe the importance of the generalizations they select to illustrate the appropriateness of the illustrations and the accuracy of captions. If you do not wish to have students prepare exhibits or posters, they can evaluate those prepared by others. Your questions can direct them to use their knowledge of generalizations as bases for their evaluations. If you require complete sentences when students make these evaluations, you can judge ability to apply generalizations.

The foods that individuals eat are one indication of ability to apply generalizations of nutrition. Food records kept for 3 to 7 days provide more reliable data than do occasional observations of

food practices in public places. Seven-day records taken at intervals throughout the year probably give the best over-all picture of food consumption, but such records are not feasible in many situations. Directions for keeping and scoring 3-day food records are given in Appendix D, pages 187 to 193.

Data from food records must be interpreted cautiously because several factors may be influencing the kind and amount of food eaten. Students may know the generalizations and how to apply them, but may not actually practice good nutrition because (a) appropriate food is not available to them; (b) they do not believe that what they eat will make a difference in their health; (c) satisfactions other than health may be of major importance to them.

EVALUATION OF DEVELOPMENT OF ATTITUDES AND VALUES

Attitudes about food may have greater influence on food consumption of individuals than facts they can recall about nutrition. Food preferences seem to be related to willingness to try new foods. Studies of food preferences of different groups of people were reported in Chapter 7. You can study the food likes and dislikes of your students by asking them to check a questionnaire similar to the one used by Adams (3). Directions for checking the questionnaire and the first item are given below.

This is not one of the usual types of examinations, because all answers are the right answers. They will not affect your class grade. The following pages contain a list of foods commonly served in the Middle West. Many of the usual methods of preparation are included.

Directions for taking the test: The space numbered but left blank is for you to fill in with a method of preparation that you like, if that method is not listed. Be certain to place a check in the proper place after this item.

Please read carefully and place a check for each item in the appropriate column to the right. Do not omit any item.

Foods	I like it and always eat it when it is offered	I will eat it, but do not enjoy it	I dislike it and will not eat it	I have not tasted it
Vegetables				
1. Asparagus				
a. Kind				
1) Fresh	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) Frozen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) Canned	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Method of preparation				
1) Buttered	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) Creamed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) On toast	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) Cooked, in salad	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) _____	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Systematic observations of individuals in situations where their choices seem to depend upon willingness to try new foods is another way to evaluate this objective. For example, responses of individuals to invitations to eat foods prepared in a demonstration or by class members will reveal attitudes toward food. Another situation for such observations is afforded when a group plans for foods to be prepared. A group of mothers requested a demonstration of ways to prepare green and yellow vegetables. This request indicated that they were willing to try to increase the acceptance of this group of foods by their families.

Anecdotal records of your observations will give data for evaluation that are more reliable than casual observations. Often an accumulation of incidents will reveal changes in attitudes that are not evident in one or two observations. Such records require time to keep, and are not necessary for everyone. They are most valuable for the student whose attitude seems to need changing.

Probably the most difficult attitude to change is that food does not really make a difference in the way one looks, feels, and acts. Evaluation of students in this respect is difficult too. Barbour interviewed students to discover what they believed were the functions of different foods. One question that she asked, with the student responses, illustrates this method of determining their beliefs about food.

Question: Does kind of food eaten affect the way you look?

Answer: Yes.

Reasons given:

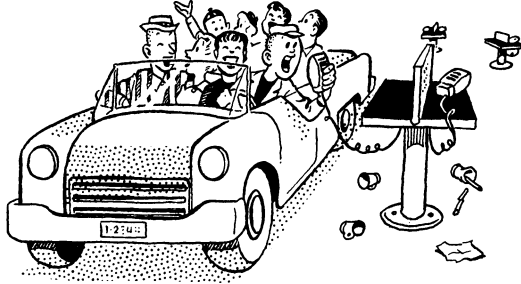
1. Eating right foods makes you look better.
2. Have nicer teeth.
3. Sweets make pimples on your face.
4. Kind of food affects complexion.
5. Kind of food affects hands and fingernails.
6. Chocolate and rich foods cause pimples.
7. Not enough food makes you look thin.
8. Some foods give color to your face.
9. Carrots make eyes look well.
10. Make a face when you eat sour or strong foods.
11. Too much fat and starches make you fat.
12. Some foods make hair glossier.
13. Kind of food affects posture.
14. Plenty of proteins fill you out, otherwise you are skinny.
15. Not enough carrots make eyes dull and sore.

Satisfactions from the enjoyment of food or from belonging to a group may be more important to your students than health. To discover the values that her students associated with food, Nichol (5)

prepared and gave a values test to a group of boys. An item from her test illustrates one type of values test:

Read the following situation carefully and decide how you would act in a similar situation.

Jim is 15 years old and in the 10th grade. His best friends go to a restaurant for lunch where the food is rather carelessly prepared and served but where the boys have a lot of fun. About the only kind of lunch they can get is a sandwich, cake or cookies, and a beverage. Jim doesn't often



go with his friends and they cannot understand why he doesn't go with them. Jim enjoys the fun at the restaurant but he doesn't like the food. He thinks he should have more vegetables and fruit and salads to stay healthy. He can get these at the school cafeteria and he likes the food there much better, although the cost is slightly higher. Jim's parents think he is wise to go to the cafeteria.

Check *each* of the following statements to show how each reason would influence your decision in this situation:

VG if you think it is a very good reason and would greatly influence your decision.

G if you think it is a good reason and might influence your decision.

U if you are uncertain whether it would influence your decision.

P if you think it is a poor reason and would seldom influence you.

VP if you think it is a very poor reason and would never influence you.

	VG	G	U	P	VP
1. It is foolish to save money and have a poor lunch.	—	—	—	—	—
2. Jim should consider whether he enjoys his lunch or not.	—	—	—	—	—
3. Jim should do what he wants to — it wouldn't make any difference to his being well liked by his friends.	—	—	—	—	—
4. If Jim is healthy, he doesn't have to worry about what he eats.	—	—	—	—	—
5. Jim should take the advice of his parents.	—	—	—	—	—
6. Jim should save as much as he can on his lunch if he needs money for other things.	—	—	—	—	—

7. Health is one of the most important considerations when choosing food.
8. Jim will lose his popularity with the group if he doesn't go with them.
9. It is important for Jim to enjoy his lunch.
10. Jim is old enough to make up his own mind and his parents should not try to influence him.

VG	G	U	P	VP
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—

When you are evaluating willingness to try new foods, you may also discover how well students will accept responsibility for their own food practices. Whenever free choices can be made, responsibility must be accepted. Whether or not students recognize this fact is not easy to determine. Essays which contain free expression of ideas may be most fruitful in revealing attitudes toward personal responsibility. Interviews with students or their parents are helpful, too.

Interest in keeping personal records of growth up to and through adolescence indicates acceptance of responsibility for one's own health. Records of weight kept after growth is completed indicate the same attitude. These records will be especially revealing if growth charts and other records are kept at the same time. One kind of record may be of foods eaten. When the relationship between these two records is recognized, students show satisfactory understanding of this aspect of nutrition.

STUDENT EVALUATION OF TEACHING

Student evaluation of what they have learned from a lesson, unit, or nutrition program may give some data that are not obtained in any other way. If you ask what was the most important thing learned today, you will discover the emphasis which was recognized by students.

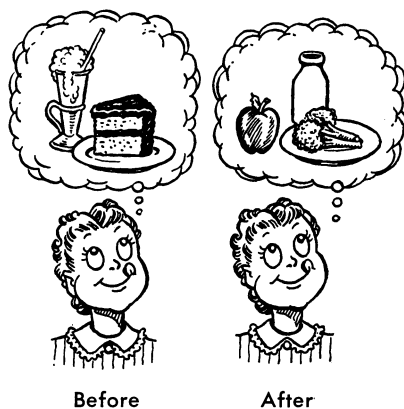
To obtain student appraisal of your methods, you can ask such questions as: What is the strongest thing about these lessons? What is the weakest thing about them? What suggestions have you for improvement?



Interpretation is very difficult when opinions of students are used for evaluation. Their opinions must be examined in terms of your objectives, and not always accepted exactly as given. For example, if one of your objectives is to teach students to think, those students who wish you to tell them the answers to their questions may criticize your teaching. When you study their criticisms, you must decide which ones indicate a need to revise your methods and which reflect resistance to your requirement that students think for themselves.

EVALUATION AS A MEANS OF IMPROVING TEACHING

Up to this point evaluation has been discussed as revealing what students have attained in relation to objectives. This is an important



function of evaluation if you wish to discover the difficulties of students, and to motivate them to change by making them aware of failure to achieve the objectives of the nutrition program. Such evaluation is only the beginning if you wish to evaluate the effectiveness of your teaching in terms of student growth, or to use knowledge of progress as a means of motivating students. When evaluation is to serve these two purposes, you must determine the status of students before and after teaching. Whether or not evaluation is effective for motivation depends upon how you use it.

If you wish to interpret data from evaluation and use them as a basis for modifying teaching methods, you may find it advisable to note the success of your teaching before the nutrition unit is completed. Thus you will know whether or not students are progressing satisfactorily for the time spent and for their maturity.

Where progress is not so great as you believe is desirable, you will see that students have different learning experiences.

When evaluation is considered an integral and necessary part of every learning situation, your teaching is likely to be most successful. When data concerning the growth of students are incomplete, your judgment may not be sound. The methods you use to evaluate the growth of students will influence what they learn. For these reasons a variety of techniques and devices have been suggested for noting the growth of students toward different objectives.

The purposes of this chapter have been to illustrate: (1) statement of objectives in terms of student behavior; (2) selection of methods of evaluation that will reveal the kind of behavior indicated as desirable by the objectives; (3) devices that have been found useful; (4) some interpretations possible when certain methods are used. There has been no attempt to discuss ways that the validity or reliability of tests can be determined.

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APPENDIX A

Guide for Identifying Foods in Food Groups and Defining Servings

THE SEVEN BASIC FOODS GROUPS

1. Dairy products

The standard serving of fluid whole milk is 8 ounces or one-half pint or 1 cup. The approximate equivalents of 1 serving of whole milk in terms of other dairy products and appropriate supplements are:

Whole milk (dry)	.....4 tablespoons
Evaporated milk	.....½ cup
Condensed milk	.....⅓ cup ¹
Skim or nonfat milk (fluid)	....1 cup plus 1 serving (slightly less than 2 teaspoons) of butter or fortified margarine ²
Buttermilk (made from skim milk)	..... See skim or nonfat fluid milk
Nonfat milk solids (dried skim milk)	.....4 tablespoons plus supplements suggested for fluid skim milk
Cheddar cheese	.....1 ounce (approximately 1-inch cube) ³
Cottage cheese	.....1 cup plus 1 serving of butter or fortified margarine ⁴

¹ Has extra calories equivalent to about 3 tablespoons of sugar.
² Green and yellow vegetables may replace the fat as a supplement in low-calorie diets.
³ Slightly low in calories, thiamine, riboflavin, and calcium, as compared with one cup of fluid milk.
⁴ One serving is usually not more than ½ cup. To be made approximately equivalent to 1 cup of milk, this amount should be supplemented with one large serving of table fat plus one serving of green leafy vegetable, as turnip greens.

Butter	..... 1 serving (about $\frac{1}{2}$ tablespoon) plus 1 cup of fluid skim milk or its equivalent
Cream (light)	..... 2 to 4 tablespoons plus $\frac{3}{4}$ cup of fluid skim milk
Cream (heavy)	..... 1 tablespoon plus 1 cup of fluid skim milk
Yogurt	..... variable; approx. $\frac{2}{3}$ cup if made from concentrated milk or with milk solids added

Include in total milk intake the approximate amounts of milk furnished by foods prepared with it, as:

Ice cream	Cream pie
Pudding	Cereal with milk
Cream soup	Cocoa

Allow about one-half cup of milk per serving from foods of these types.

2. Green, leafy, or yellow vegetables and yellow fruits

Foods included in this group contain the equivalent of at least 1,000 I.U. of vitamin A per 100 grams or per $\frac{1}{2}$ cup as prepared for serving.

Dandelion greens	Collards	Cantaloupe
Spinach	Winter squash	Water cress
Carrots	Beet greens	Broccoli
Chard	Kale	Tomatoes
Sweet potatoes	Pumpkin	Mustard greens
Turnip greens	Apricots	

3. Vitamin C-rich fruits and vegetables

Foods included in this group contain at least 25 milligrams of vitamin C (ascorbic acid) in servings of about $\frac{1}{2}$ cup.

Oranges	Lemons	Honeydew melon
Orange juice	Lemon juice	Cooked greens
Grapefruit	Cantaloupe	Broccoli
Grapefruit juice	Strawberries	Cauliflower
Tangerines	Green peppers	Brussels sprouts
Tangerine juice	Tomatoes	Cabbage

4. Other fruits and vegetables

This group includes fruits and vegetables not in Groups 2 and 3. Although they are not rich sources of the nutrients planned for in the daily diet, they are helpful in supplying the total amount of vitamins and minerals needed. Some of the most frequently used are:

Potatoes ²	Snap beans ¹	Rhubarb
Corn	Asparagus ¹	Raspberries ²
Beets	Apples	Cherries ¹
Peas ¹	Bananas	Blackberries ²
Lettuce (head)	Pears	Prunes ¹
Onions	Peaches ¹	Pineapple
Turnips ²	Plums	Raisins

¹ These provide a substantial amount of vitamin A (in the form of carotene), but not in sufficient amounts to permit classification in Group 2.

² These provide vitamin C, but not in sufficient amount to permit classification in Group 3.

5. Protein-rich foods

Foods which provide 15 to 20 grams of protein in a 3- to 4-ounce serving are included in this group.

Beef steak, roast, hamburger	Chicken
Veal	Turkey
Pork chops or roast	Fish
Lamb chops or roast	Game
Organ meats, as liver and heart	

Foods which require 2 or 3 servings to be approximately equivalent to one serving of meat are listed below.

Eggs
 Milk
 Cottage cheese ($\frac{1}{4}$ cup)
 Cheddar cheese (1 ounce or 1-inch square)
 Legumes, as navy or lima beans, dried peas, peanuts, and peanut butter

6. Bread and cereals

Foods included in this group are:

Bread	Macaroni	Popcorn
Biscuit	Noodles	Doughnut
Muffin	Rice	Sweet roll
Bun	Spaghetti	Cooky
Pancake	Vermicelli	Crackers
Waffle	All breakfast foods	Plain cake

7. Fat and sweet foods

Butter	Nuts	Jelly
Cream	Bacon	Candy
Oleomargarine	Salt pork	Sweet desserts not mainly
Salad dressing	Sugar	milk, eggs, fruit
Gravy	Sirup	

APPENDIX B

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APPENDIX C

Explanation of Terms in Generalizations

- Acne vulgaris** — a simple uncomplicated condition resulting in a raised eruption on the skin due to inflammation, with accumulation of secretion, of the oil-secreting or sebaceous glands.
- Allergy, food**¹ — hypersensitiveness to a substance in food which is ordinarily harmless in similar amounts for the majority of persons.
- Amino acids** — the nitrogen-containing acids obtained when protein materials are broken down chemically. The differences between proteins are largely a matter of the number, the kind, and the arrangement of such amino acids within the protein substances.
- Amino acids, essential**² — amino acids which need to be included in the diet, i.e., which either cannot be synthesized in the body or not at a rate sufficient to meet the need.
- Anemia** — a reduction in the amount of hemoglobin in the blood or in the number of red corpuscles of the blood.
- Appetite**³ — the inclination or desire to eat; distinguished from hunger as the drive to eat.
- Ascorbic acid** — (see Vitamin C.)
- Ash**⁴ — the total mineral matter residue after ignition of a food; always either neutral or alkaline, since acid in excess of that which can be neutralized is volatilized.
- Bacterial action** — changes produced by one-celled microorganisms such as those involved in fermentation, synthesis of vitamins, soil fertilization, decay of organic matter, and many diseases.

¹ Dorothea Turner. *Handbook of diet therapy*. 2nd ed. University of Chicago Press, Chicago, p. 123, 1952.

² *Ibid.*, p. 123.

³ H. C. Sherman and Caroline Lanford. *Essentials of nutrition*. 2nd ed. The Macmillan Co., New York, p. 418, 1944.

⁴ Turner, *op cit.*, p. 124.

- Calorie**⁵ (large or kilocalorie) — the unit used to express food energy; the amount of heat required to raise the temperature of one kilogram of water one degree Centigrade.
- Carbohydrates** — a large group of chemical substances containing carbon, hydrogen, and oxygen; forms commonly seen are starch and various kinds of sugar.
- Carotene**⁶ — provitamin A. A yellow-red plant pigment occurring in several forms; B-carotene is the most abundant form in common green leafy and yellow vegetables.
- Cellulose** — a constituent of the cell walls of plants forming the basis for vegetable fiber; chemically, a carbohydrate having about the same percentage composition as starch.
- Congenital** — existing at birth, referring to certain mental or physical traits, peculiarities, or diseases.
- Connective tissue** — (see Tissue.)
- Dental caries** — the progressive decay of tooth structures.
- Emotional disturbances** — an interruption of ability to resist forces which tend to arouse strong feelings; a disturbed mental state resulting in agitation and confusion.
- Emotional stability** — ability to resist forces which tend to arouse strong feelings or disturbed mental states.
- Environment** — the conditions and influences under which one lives. Everything that conditions the life process except the hereditary or genetic factors.
- Fats** — the name given to a group of chemical substances composed of the same three elements as carbohydrates, namely, carbon, hydrogen, and oxygen, but in different proportions; fats constitute a much more concentrated form of food energy. Fats have an oily texture and are not soluble in water.
- Fermentative** — relating to chemical change that takes place in an organic substance caused by certain fungi, bacteria, and enzymes, and is accompanied by evolution of gases often evidenced by hissing and bubbling.
- Flour, enriched**⁷ — white flour enhanced in thiamine, riboflavin, niacin, and iron value by changing the milling process to retain these constituents or by addition of the chemicals to white flour. The minimum levels specified in the standards of identity promulgated under the Food, Drug and Cosmetic Act are: thiamine, 2.0 mg.; riboflavin, 1.2 mg.; niacin, 16 mg.; and iron, 13 mg. per pound. Certain levels of vitamin D and calcium are permitted as optional ingredients. States which require enrichment of white flour have generally been guided by the federal legislation.
- Food**⁸ — any substance which may be used to yield energy; to build or renew body tissue; or to regulate body processes and internal conditions, so as to maintain a right internal environment for life.
- Food energy value** — refers to the carbohydrate, fat, and protein content of the diet, since these constituents release energy as they are broken down in the cells of the body; commonly expressed as calories, since heat is a measurable by-product of the energy released when the carbohydrate, fat, and protein are broken down.
- Food, fortified**⁹ — a food to which a vitamin or other dietary essential has been added in such an amount as to make the total content of the dietary essential larger than that contained in any natural (unprocessed) food of its class, for example, vitamin D milk and fortified margarine.
- Food, utilization of** — refers to the process by which ingested food is digested, absorbed, distributed, and assimilated by the cells of the body.
- Fortified margarine** — (see Margarine.)

⁵ *Ibid.*, p. 124.

⁶ *Ibid.*, p. 125.

⁷ *Ibid.*, p. 128.

⁸ H. C. Sherman. *The chemistry of food and nutrition*. 8th ed. The Macmillan Co., New York, p. 7, 1952.

⁹ Turner, *op. cit.*, p. 128.

Goiter, simple¹⁰ — enlargement of the thyroid gland, caused by an absolute or relative deficiency of iodine.

Hemoglobin — the red coloring matter of the blood found in the red blood cells; contains iron and is capable of uniting loosely with oxygen.

Heredity — the tendency of any living thing to reproduce the characteristics of its ancestors.

Hunger — a strong desire for food.

Ingestion — the introduction of food or drink into the stomach.

International Unit — a unit of measure established by a committee appointed by the Health Organization of the League of Nations, used for expressing the content of vitamins in foods and other materials; usually dropped when vitamin values can be conveniently expressed in weight but now used mainly for vitamins A and D. The recommended allowance for vitamin D for infants and children, including adolescents, and for women during pregnancy and lactation, is 400 International Units per day.

Iodized salt — (see Salt.)

Lactation — the period following childbirth during which milk is produced by the mammary glands of the breasts.

Lactic acid — a three-carbon organic acid formed as an intermediary in carbohydrate metabolism; produced by certain kinds of bacteria when acting on food residues, particularly milk.

Malnutrition¹¹ — a condition of the body resulting from an inadequate supply or impaired utilization of one or more of the essential food constituents.

Margarine, fortified¹² — margarine with vitamin A added. The margarine on the market in the United States is fortified with 15,000 I.U. of vitamin A per pound.

Membrane, mucous — tissue lining the passages which lead into and out of the body and which secrete a clear viscid substance; examples are the digestive, respiratory, and urinary tracts.

Mental activity — the functional activity of the mind.

Metabolism¹³ — a general term to designate all chemical changes which occur to substances within the body after absorption. These changes include constructive (anabolic) and destructive (catabolic) processes.

Metabolism, intermediary¹⁴ — the transfers and chemical changes undergone by nutrients after digestion and absorption.

Milk, vitamin D — milk processed or produced to provide vitamin D; may be produced by three different methods:

- 1) "fortified" milk, which is now more generally distributed than the other types, is that to which a vitamin D concentrate has been added;
- 2) "metabolized" milk is produced by feeding the cows irradiated yeast; and
- 3) "irradiated" milk has been exposed directly to ultraviolet rays.

The standard amount used for fortification is 400 I.U. of vitamin D per quart of fresh or reconstituted milk.

Minerals¹⁵ — "inorganic elements." The following are known to be present in body tissues; calcium, cobalt, chlorine, copper, fluorine, iodine, iron, magnesium, manganese, phosphorus, potassium, sodium, sulfur, and zinc. These constituents, obtained from food, aid in the regulation of acid-base balance of body fluids and of osmotic pressure, in addition to the specific function of individual elements in the body. Some minerals are present in the body largely in organic combination, as iron in hemoglobin, and iodine in thy-

¹⁰ Turner, *op. cit.*, p. 128.

¹¹ *Ibid.*, p. 129.

¹² *Ibid.*, p. 128.

¹³ *Ibid.*, p. 129.

¹⁴ H. C. Sherman and Caroline Lanford. *Essentials of nutrition*. 2nd ed. The Macmillan Co., New York, p. 421, 1944.

¹⁵ Turner, *op. cit.*, p. 129.

roxine; others occur in the body in inorganic form, as calcium salts in bone, sodium and chlorine as sodium chloride. The terms "minerals" and "inorganic elements" do not imply that the elements occur in inorganic form in food or body tissue.

Neuromuscular tremor—a trembling or shaking produced by nerve stimulation of contractile tissues of the body by which movements of the various organs and parts are affected.

Niacin, or nicotinic acid—a water-soluble heat-stable member of the vitamin B complex; needed for the use of the nutrients by the tissues. The anti-pellagric factor.

Nutrient¹⁶—a substance which takes part in any of the three ways by which food nourishes the body. Some nutrients function in more than one of these ways.

Nutrition¹⁷—the combination of processes by which the living organism receives and utilizes the materials necessary for the maintenance of its functions and for the growth and renewal of its components.

Nutrition, normal¹⁸—a condition of the body resulting from the efficient utilization of sufficient amounts of the essential nutrients provided in the food intake.

Nutritional status¹⁹—the condition of the body resulting from the utilization of the essential nutrients available to the body. Nutritional status may be good, fair, or poor, depending not only on the intake of dietary essentials but on the relative need and the body's ability to utilize them.

Physiological—relating to the normal vital processes of animal and vegetable organisms.

Precursor²⁰—a substance which is converted into another. For example, the carotenes are precursors of vitamin A.

Proteins²¹—nitrogenous compounds which yield amino acids on hydrolysis; essential constituents of all living cells, and the most abundant of the organic compounds in the body.

Protein, complete—one which contains all of the essential amino acids, i.e., those which must be supplied preformed in food.

Protein, incomplete—one which is completely lacking in one or more of the essential amino acids which must be supplied preformed in food.

Protein, supplementary effect²²—the ability of one protein to supply amino acids in which another protein is deficient, so that from the mixture of the proteins an adequate intake of amino acids is secured.

Provitamin²³—a substance which may be converted into a vitamin; thus, the carotenes are provitamins A.

Riboflavin, or vitamin B₂—vitamin of the B complex; soluble in water, not easily destroyed by heat but destroyed by visible light; a yellow pigment having a green fluorescence and essential for utilization of nutrients in the tissues.

Salt, iodized²⁴—table salt (sodium chloride) to which has been added one part per 10,000 of iodine as potassium iodide.

Starvation—long-continued unsatisfied hunger; the condition of suffering or dying from lack of food.

Thiamine, or vitamin B₁—vitamin of the B complex; soluble in water, destroyed by heat, essential for growth and the use of carbohydrate in the body.

Thyroid gland—a ductless gland lying in front of the upper part of the windpipe; furnishes an internal secretion which influences the rate of metabolism.

¹⁶ Sherman and Lanford, *op. cit.*, p. 15.

¹⁷ Turner, *op. cit.*, p. 129.

¹⁸ *Ibid.*, p. 130.

¹⁹ *Ibid.*, p. 130.

²⁰ Sherman and Lanford, *op. cit.*, p. 423.

²¹ Turner, *op. cit.*, p. 130.

²² *Ibid.*, p. 130.

²³ Sherman and Lanford, *op. cit.*, p. 423.

²⁴ Turner, *op. cit.*, p. 131.

- Tissue**—a collection of cells or derivatives of cells, forming a definite structure. Examples are *adipose* or *fatty tissue*, a structure consisting chiefly of fat droplets; *muscle tissue*, composed chiefly of long, thin fibers or muscle cells embedded in a thin, delicate connective-tissue membrane.
- Tissue, connective**²⁵—a tissue holding together and in place other, usually more active tissues, as, for example, muscle fibers or the cells of the glands.
- Tonus (tone)**²⁶—a sustained state of partial activity such as exists in varying degrees in live muscles at all times.
- Utilization of food**—(see Food.)
- Vitamins**²⁷—substances that are: *a*) distributed in foodstuffs in relatively minute quantities; *b*) distinct from the main components of food (i.e., proteins, carbohydrates, fats, mineral salts, water), *c*) needed for the normal nutrition of the animal organism, and *d*) the absence of any one of which causes a corresponding specific deficiency disease. At present about 20 vitamins are known; at least eight of them are known to be needed by man, or are of undoubted clinical significance.
- Vitamin A value**²⁸—the combined potency of a food or diet, represented by its content of vitamin A, carotene, and other plant precursors (of vitamin A).
- Vitamin B complex**²⁹—as originally used, this term referred to the water-soluble vitamins occurring in yeast, liver, meats, and whole-grain cereals, but some of the newer B complex vitamins, for example, folic acid and vitamin B₁₂, do not correspond to this distribution; includes a number of factors which have been identified, isolated, and synthesized, viz., thiamine, riboflavin, nicotinic acid, vitamin B₆, pantothenic acid, biotin, folic acid, inositol, and choline; vitamin B₁₂, which has been crystallized . . . and others which have been only partially demonstrated or unidentified.
- Vitamin C**—a water-soluble vitamin easily destroyed by exposure to the oxygen of the air; a white crystalline solid with a sour taste; concerned specifically with the maintenance of cement-like substances which hold cells together throughout the body; deficiencies are manifest in ruptured blood vessels, loose teeth, and poorly calcified bones.
- Vitamin D**—designates a group of fat-soluble factors which help to utilize calcium and phosphorus.
- Vitamin D milk**—(see Milk.)
- Vitamins, fat-soluble**³⁰—vitamins A, D, E, and K, which are extractable from foods with fat solvents.
- Vitamins, water-soluble**³¹—members of the B complex and vitamin C which can be extracted from foods with water as a solvent.

²⁵ Sherman and Lanford, *op. cit.*, pp. 419-20.

²⁶ *Ibid.*, p. 424.

²⁷ Leslie Harris. *Vitamins: A digest of current knowledge*. J. & A. Churchill Limited, London, p. 2, 1951.

²⁸ Turner, *op. cit.*, p. 132.

²⁹ *Ibid.*, p. 132.

³⁰ *Ibid.*, p. 133.

³¹ *Ibid.*, p. 133.

APPENDIX D

Method of Scoring Dietaries¹

DIRECTIONS FOR SCORING THE PUPIL FOOD RECORD

The score on a pupil's diet suggests the adequacy of the diet. Scores, however, are not infallible. The teacher should be constantly aware that she is evaluating the pupil's diet and not his *nutritional status*. For this reason caution should be exercised in referring to diets as "adequate" or "inadequate" since degrees of adequacy can be determined only by detailed clinical examination of the pupil, involving laboratory analysis. The improvement of pupil diets, however, is a sound and practical procedure and one in which teachers, parents, and pupils can participate. Dietary evaluation offers a useful method available to lay people for stimulating dietary improvement. Such evaluation not only indicates the strengths and weaknesses of the pupils' eating habits, but serves as an objective record against which change in these habits can be measured at subsequent intervals.

The directions which follow may appear overwhelming at first glance. They are written in minute detail, however, for the convenience of teachers who are entirely unfamiliar with this type of procedure. Tabulating the servings from the pupil's record onto the score sheet requires three to four minutes; scoring requires much less time than this, once the routine is established. Older pupils can be directed into doing their own tabulation; however, there is a distinct advantage to the teacher in making the tabulations herself for in so doing she is becoming better acquainted with the eating practices of her various pupils. If pupils do their own tabulating, the teacher should go over each record carefully.

¹ Reproduced by permission. Copyright General Mills, Inc., 1947.

The division of the standard into nine food groups is a modification of the "Basic Seven" which facilitates scoring and results in a more accurate evaluation.

Although the maximum score of 3 for each group is the same, there has been no effort to equalize the nutritive values of the nine groups. The concept here is very important; no diet is considered good unless it contains a high percentage of the recommended allowances of all food nutrients. These can be supplied by meeting the standards described on the score sheet, including the substitutions explained in the directions for scoring.

Directions for Tabulating the Number of Servings From the Pupil Food Record Onto the Score Sheet

1. Open the Pupil Food Record to the Sunday morning breakfast and look at the first food the pupil has listed.
2. Familiarize yourself with the amount of that food that is considered an *average serving* (See left-hand column on Score Sheet). Study these amounts carefully.
3. Estimate the number of servings, or proportion of a serving, represented by the first food on the list.
4. Tabulate this amount opposite the proper food group in the adjoining column labeled "number of servings." Then go on to the next food in the list. For example, study the illustrations in Figures 1 and 2.

Fig. 1. These are the Foods I Ate and Drank on Sunday

At *BREAKFAST* (name foods and give amounts, such as one egg):

1. Milk ½ glass 5. _____
2. Cooked cereal 1 cup 6. _____
3. Egg 1 7. _____
4. Toast 1 slice 8. _____

The foods listed in the above record would be tabulated opposite the food groups as shown in Fig. 2.

Fig. 2. SCORE SHEET FOR THREE-DAY FOOD RECORD

Food Groups	Number of Servings	Rating				Pupil Score	Parent Score
		0	1	2	3		
5. Milk and milk products, fluid, evaporated, dried milk, or cheese Average serving: 1 c. fluid milk or 1 cu. in. cheese	½	none	three serv.	six serv.	nine serv.	5.	
7. Eggs (or egg custard) Average serving: 1 egg	1	none	one serv.	two serv.	three serv.	7.	
8. Bread, flour, cereals—whole grain or enriched Average serving: 1 sl. bread, ½ c. cooked cereal, 1 c. prepared cereal, 1 griddle cake or waffle	///	none	three serv.	six serv.	nine serv.	8.	

5. Continue tabulating from breakfast, to midmorning lunch, to noon, etc. Do not skip from meal to meal over the three-day record searching out numbers of servings for any one group of foods. *To do so is likely to result in omissions and confusion.*
6. Foods that do not belong to any of the nine food groups are not tabulated. These will include such foods as pickles, popcorn, candy, soft

drinks, coffee, and the like, as well as cakes, cookies, ice cream, puddings, pies, and other desserts. Even though many of these desserts include various amounts of basic foods, it is the essence of good nutrition to provide first for the inclusion of basic foods as such rather than as so-called luxury foods.

7. After completing tabulation for pupil's three-day food record, examine Parent Survey Form.

Directions for Tabulating the Foods From the Parent Survey Form That the Pupil Had Opportunity To Eat, but Failed To Eat

1. Look at the first food the parent has listed. Find the food group on the score sheet to which this food belongs.
2. Tabulate *each serving* from Parent Survey Form with an "0" in the "Number of Servings" column opposite the proper food group. See Fig. 3. These "0's" represent the servings of foods that the child could have eaten, but failed to eat.
3. Continue tabulating each food in turn.
4. Foods that do not belong to any of the nine groups are not tabulated. (See item 6 above.)

Fig. 3. SCORE SHEET FOR THREE-DAY FOOD RECORD

Food Groups	Number of Servings	Rating				Pupil Score	Parent Score
		0	1	2	3		
1. Green and yellow vegetables—some raw, some cooked or canned Average serving considered: $\frac{3}{4}$ c. cooked or 1 c. raw	// 00	none	one serv.	two serv.	three serv.	1.	

To Obtain Pupil Score on Three-Day Food Record

1. Study the four ratings possible under the column labeled "Rating." See Fig. 4. Note that the highest rating any food group can receive is 3, regardless of the number of extra servings. Tabulations showing no servings at all for the three days rate "zero" in each food group. The number of tabulations worth a rating of "1," "2," or "3," however, varies in different groups. For instance, *one* serving of Green and Yellow Vegetables (Group 1) rates "1," whereas *two* servings of Other Vegetables and Fruits (Group 4) rate "1" and *three* servings of Groups 5, 8, and 9 rate "1." *Master this element of rating before proceeding.*
2. Begin with Group 1. Count the number of tabulations from the pupil record in the "Number of Servings" column. (Ignore at this stage tabulations of "0's" from Parent Survey Form.) In Fig. 4 there are 5 servings tabulated for Group 1.
3. Calculate (by inspection) the rating this number of servings would receive for Group 1. Five servings in Group 1 would receive the full rating of 3, with two extra servings to spare. Extra servings are discussed later.
4. Place this rating in the column labeled "Pupil Score" opposite Group 1. See Fig. 4.
5. Do the same for Group 2.

NOTE: Dietary standards intended for popular use are set up in terms of definite foods or food groups; yet it is commonly understood that our

recommended allowances of food nutrients can be derived from a *variety* of sources. This score sheet makes possible several substitutions from one food group to another. This is a distinct advantage. The greater accuracy in classifying diets, when these substitutions are provided for, more than compensates for the increased difficulty in scoring.

6. More than three servings in Group 1 or 2 can be counted as servings for Other Vegetables and Fruits, Group 4, if this group has less than the recommended number of servings, six, for a full rating. This is shown with an arrow leading down to Group 4 with the number of extra servings marked at the end of the arrow. See Fig. 4. Green and yellow vegetables are particularly important for vitamin A value and the Citrus Fruit Group for ascorbic acid content. Extra servings from these two groups can substitute for servings of "other fruits and vegetables," but extra servings of "other fruits and vegetables" cannot take the place of servings from Groups 1 or 2.
7. If Group 3, Potatoes, has fewer than three servings tabulated, look at the tabulations in Groups 8 and 2. If there are more than nine servings of cereal foods tabulated in Group 8 *and* at least three servings tabulated in Group 2, the extra servings of cereal foods can substitute for potatoes, serving for serving. Cereal foods — enriched, restored, or whole grain — Group 8, are valued for at least three of the B vitamins and iron. Foods from Group 2 are valued for their ascorbic acid content. Potatoes are not valuable sources of the protective nutrients in cereal foods, but, like the foods in Group 2, they do carry ascorbic acid. Unless there are three servings tabulated for Group 2, do not make this substitution.
8. Observe that Groups 5, 8, and 9 require three, six, and nine servings to rate "1," "2," or "3" respectively. In these groups, tabulations of four or five servings rate only "1" and tabulations of seven or eight servings rate only "2."
9. If Group 9, Butter or Fortified Margarine, has fewer than nine servings tabulated, look back to the tabulations for Milk, Group 5. Milk is especially important for calcium, protein, riboflavin (a B vitamin) and vitamin A. Of these nutrients in milk, butter or fortified margarine is valuable only as a source of vitamin A. Because of the higher vitamin A content of milk, one extra serving of milk can count as *three* servings of butter or fortified margarine. Note in Fig. 4 that milk has eight servings tabulated. Since there are more than six servings (deserving a rating of "2") but fewer than nine servings (which would deserve a rating of "3"), these two extra servings of milk can substitute for six servings in the butter group; otherwise the contributions to the diet of the servings of milk beyond the "2" rating, but not equal to the "3" rating, would be denied in the over-all score.
10. Extra servings in Group 6 can substitute, serving for serving, for Eggs, Group 7, provided there are at least three servings in Group 5. Meat can substitute for eggs except for higher vitamin A value of eggs. If this value is taken care of through at least three servings of milk, the substitution is nutritionally safe. If Group 5 does not show at least three servings tabulated, do not make this substitution.

SCORE SHEET FOR THREE-DAY FOOD RECORD

**Based on recommended allowances for elementary school children (1).
(See Supplementary Directions for Scoring Food Records.)**

Pupil Record No. _____ Name _____ Grade _____ Date _____

School _____ Classification of diet*: Good Fair Poor (Circle one)

Food Groups (2)	Number of Servings	Rating				Pupil Score	Parent Score
		0	1	2	3		
1. Green and yellow vegetables—some raw, some cooked or canned Average serving considered (3): $\frac{1}{2}$ c. cooked or 1 c. raw		none	one serv.	two serv.	three serv.	1.	
2. Oranges, tomatoes, grapefruit, raw cabbage, or salad greens Average serving: 1 orange, $\frac{1}{2}$ grapefruit, 1 tomato, 1 c. raw greens, $\frac{1}{2}$ c. cooked tomato, $\frac{1}{2}$ c. juice		none	one serv.	two serv.	three serv.	2.	
3. Potatoes Average serving: $\frac{1}{2}$ c. cooked		none	one serv.	two serv.	three serv.	3.	
4. Other vegetables and fruits, raw, dried, cooked, or canned Average serving: $\frac{1}{2}$ c. cooked		none	two serv.	four serv.	six serv.	4.	
5. Milk and milk products, fluid, evaporated, dried milk, or cheese Average serving: 1 c. fluid milk or 1 cu. in. cheese		none	three serv.	six serv.	nine serv.	5.	
6. Meat, fish, poultry, dried beans or peas, nuts, or peanut butter Average serving: 2 or 3 oz. meat, 4 tbs. peanut butter, 4-8 nuts, $\frac{1}{2}$ c. cooked beans or peas		none	one serv.	two serv.	three serv.	6.	
7. Eggs (or egg custard) Average serving: 1 egg		none	one serv.	two serv.	three serv.	7.	
8. Bread, flour, cereals—whole grain or enriched Average serving: 1 sl. bread, $\frac{1}{2}$ c. cooked cereal, 1 c. prepared cereal, 1 griddle cake or waffle		none	three serv.	six serv.	nine serv.	8.	
9. Butter or fortified margarine Average serving: 1 teaspoon		none	three serv.	six serv.	nine serv.	9.	
Total Score							

* To classify total score:

1. If score on milk (Group 5) is 0, the diet is considered **POOR**, regardless of total score.
 2. If total score is 22 or above, *and score on milk is 2 or 3*, the diet is considered **GOOD**.
 3. If total is between 19 and 21 inclusive, and the score on milk is at least 1, the diet is considered **FAIR**.
 4. A score of 18 or below is considered **POOR**.
- (1) For children 7 to 9 years of age, a score of *good* gives above 80% of the recommended daily allowances; *fair*, 61% to 80%; and *poor*, 60% or below, as recommended by the Food and Nutrition Board, National Research Council, Washington, D. C., September, 1945.
- (2) Food groups and recommended number of daily servings adapted from *Nutrition Education in the Elementary School*, Federal Security Agency, U. S. Office of Education, in cooperation with U. S. Department of Agriculture, August, 1943, p. 4.

- (3) Amounts considered as average servings adapted from *Menu-Planning Guide for School Lunches*, W.F.A., NFC-10, Revised, September, 1944, pp. 2-3, and "Food Composition Table for Short Method of Dietary Analysis," Donelson, Eva G., and Leichsenring, Jane M., *Jour. Amer. Diet. Assn.*, 18:429-39, 1942. (Revised March 1, 1945.)

This score sheet and accompanying Food Survey Forms developed by Willa Vaughn Tinsley, graduate student in Home Economics Education, under the direction of Clara Brown Arny and Jane M. Leichsenring, University of Minnesota.

APPENDIX E

Lesson Plans for Using Six Nutrition Films

TITLE: *Something You Didn't Eat*¹

Before showing the film, give each student the score for his dietary. A perfect total score is 27, with each food group scoring 3. A score of less than 3 shows which groups of food the student did not eat in sufficient quantity. Reference will be made to individual scores in the questions following the showing of the film.

Ideas Developed in the Film

This film is a Walt Disney cartoon that illustrates in several ways the consequences of having inadequate quantities of certain groups of foods. It shows some early discoveries of the importance of (a) citrus fruits as cures for scurvy and (b) whole grains as cures for beri-beri. The results of poor diets for modern men and women are shown in an amusing manner, as are ways of securing adequate diets.

Questions To Answer When Viewing the Film

1. Why did men in the film become ill?
2. What foods cured the men who were ill?
3. How did the man and woman in the film show that their diets were inadequate?

Questions for Discussion After Viewing the Film

1. Why do we need food from each group in our diets every day?
2. Look at average scores for the diets of the students in our class.

¹ Published by Motion Picture Service, USDA, Washington, D. C.

- a. For which food groups is our rating *good*?
 - b. For which food groups do we rate *fair*?
 - c. For which food groups do we rate *poor*?
 - d. How does your individual score compare with the class score? (A score of 1 for a food group is *poor*; 2 is *fair*; 3 is *good*.)
3. What may happen if we do not have the foods for which we rated *poor* and *fair* in our diets?

TITLE: *Fundamentals of Diet*¹

Ideas Developed in the Film

The introduction shows how young animals secure their first food. Rat-feeding experiments show what happens to animals that do not have sufficient quantities of protein, minerals, or vitamins A and D in their diets.

Questions To Answer When Viewing the Film

1. Why were white rats used for the feeding experiments?
2. What happened to the rat that did not get enough (a) protein, (b) minerals. (c) vitamin D, (d) vitamin A?

Questions for Discussion After Viewing the Film

1. Why did the rats need certain foods in their diets every day? To answer this question recall what happened to the rats and guinea pigs.
 - a. Why did the eyes of one rat become red and sore? What could he have eaten to help prevent this?
 - b. Why was one guinea pig larger and stronger than the other?
2. How are our needs similar to those of white rats? How are the nutritional needs of rats different from ours? (They grow 30 times as fast.)
3. Show a Basic Seven chart. Why are foods divided into these seven groups? What may happen if we do not eat some foods from each of these groups?
4. During the year when there is little sunlight we need foods that are rich in vitamin D. Which group of foods is the best source of vitamin D? (See *A Nutrition Guide*,² pages 3 and 9, for discussion of vitamin D.)
5. Study the report of the food for which our class rated *fair* or *poor*. Which foods did we learn about today?

TITLE: *More Life in Living*³

Ideas Developed in the Film

This film shows the effects of good and poor diets on general health, weight, and personality. The relationship between health and ability to participate in active sports is emphasized.

Questions To Answer When Viewing the Film

1. What did the boy who couldn't make the team eat?
2. What should he have eaten?
3. Why were these foods recommended?

¹ Published by Encyclopedia Britannica Films, Inc., Wilmette, Ill.

² *A Nutrition Guide*, Dept. Pub. Serv., General Mills, Inc., Minneapolis 1, Minn.

³ Published by Dept. Program Serv., National Dairy Council, 111 N. Canal St., Chicago 6, Ill.

4. Notice the different types of people in the film and try to remember what each of them ordered in the restaurant.

Questions for Discussion After Viewing the Film

1. Did the foods eaten by the people in the film seem to be related to the way the people looked or acted?
 - a. The fat girl?
 - b. The nervous woman?
 - c. The boy who couldn't make the team?
 - d. The family?
2. What foods should you eat each day if you want to be attractive?
 - a. To have good teeth?
 - b. To have good posture?
 - c. To have pep?
3. What foods should you eat sparingly if you are fatter than you want to be? (For older pupils.)
4. What foods should you eat if you want to gain weight?
5. What foods should be eaten by all of us *every day*, regardless of our weight? (This question is intended to emphasize the importance of milk and cheese; eggs, meat; green or yellow vegetables; tomatoes, raw cabbage, oranges, or grapefruit.)

TITLE: For Health and Happiness¹**Ideas Developed in the Film**

This film shows healthy children from infancy through adolescence, with emphasis upon individual differences. It also emphasizes the relationship between a good diet and attractive personal appearance or ability to participate in activities. Characteristics of healthy bone structure, lung or chest capacity, muscular parts of the body, and good coordination are pointed out. (Teacher should tell students that small children are filmed with little or no clothing to better show the signs of a well-developed healthy body.)

Questions To Answer When Viewing the Film

1. How were the healthy boys and girls alike (a) in appearance? (b) in their abilities and pleasure in sports and play?
2. What foods did each of them eat every day?

Questions for Discussion After Viewing the Film

1. Describe a healthy baby.
2. How did the healthy babies and healthy boys and girls differ in appearance? How were they alike?
3. Point out on a basic food chart the foods they ate every day.
4. For which of these food groups were you rated *good* for your three-day record? Which foods do you need in larger quantities?
5. Do you believe that the foods you eat influence the amount of fun that you have?

¹ Published by Motion Picture Service, USDA, Washington, D.C.

TITLE: *Whenever You Eat*¹**Ideas Developed in the Film**

This film shows attractive high school boys and girls who are ambitious to succeed in such occupations as engineering, music, nursing, aviation, home-making, and landscape architecture. Farming is not one of the occupations shown but many of the abilities emphasized are needed in farming. Some characteristics needed for each of these occupations are given and related to good health.

Menus for one day without milk, cheese, or butter are shown. A chart of food nutrients shows how these three meals fail to provide as much of each nutrient as is needed. When milk, cheese, and butter are added, more than the needed amounts of some nutrients are provided.

Questions To Answer When Viewing the Film

1. What skills that were shown in the film are needed by farmers?
2. How does the lunch served at our school differ from the one shown in the film?
3. How do milk, cheese, and butter improve the three meals that are shown in the film?

Questions for Discussion After Viewing the Film

1. What work do you want to do when you finish school? How will your health influence success in the occupation you have chosen?
2. How did your three-day dietary fail to meet the standard recommended? How might lack of these foods affect your appearance, coordination, pep, and energy?
3. Using the school lunch menu for today, plan the other meals for the day. Check your menus against the nine food groups as given on the *Score Sheet for Three-Day Food Record*.² (The score sheet should not be given to pupils. The foods as listed in the left-hand column can be studied either on a wall chart or from a list on the board.)
4. When are we old enough to accept responsibility for our own health?

TITLE: *What Makes Us Grow*³**Ideas Developed in the Film**

This film was made during World War II and emphasizes the importance to our country of the health of every one of us. The importance of each type of food in our meals is pointed out.

Questions To Answer When Viewing the Film

1. How do the two foods for which our class scored lowest differ in nutrients from other foods?
2. Why should each one of us include these foods in his diet every day?

¹ Published by Dept. Program Serv., National Dairy Council, 111 N. Canal St., Chicago 6, Ill.

² See Appendix D, p. 192.

³ Published by National Film Board of Canada, 1270 Avenue of the Americas, New York 20, N.Y.

Questions for Discussion After Viewing the Film

Place on the board the classification of food groups for which our class rated *good*, *fair*, or *poor*, given in the right-hand space of each summary sheet, and also the average score for each food group.

Check with students on their reports of use of butter or margarine. Each student should eat 3 teaspoonfuls a day, either as a spread or on vegetables. (We suspect that all butter consumption is not reported.)

1. Why are each of the food groups for which we rated *fair* or *poor* important in our diets?

Research has shown that eggs are important as a separate group from meat, poultry, and fish because the protein is particularly well utilized and the yolks of eggs provide vitamins that are not always found in meat, poultry, and fish. The yolk of the egg has been called "an over-sized vitamin pill."

2. What foods are classified under each of these food groups? (See Appendix A, page 173.)
3. How many of these foods do you eat every time they are served to you?
4. Are you refusing, at home or at school, most of the foods from a particular group?
5. As a class, which of these foods might we agree always to try to eat when they are served to us?

APPENDIX F

Care, Feeding, and Characteristics of Rats

GENERAL INSTRUCTIONS

Keeping records

If possible, secure white rats of weanling age (28 days). Be sure that cages are ready when rats arrive. Before the experiment begins, record each rat's age, weight, sex, and the diet you have planned for each one. Put this information on a label on each cage.

At the beginning of the experiment, establish a certain time to record information. It may be daily, two or three times a week, or weekly. Records should be made *at least* once a week.

Once a week discuss and analyze these records with students. After a week or two, students should be able to predict future progress or regression of rats. Stress the importance of keeping accurate figures.

Graphs are the easiest way to illustrate the weight and growth of rats. It is important to keep records so that students may see the relationship between food and growth.

Younger students will understand weight in terms of ounces and pounds. Older students may use grams as weight measurement.

Handling Rats

Rats respond to gentle handling. To pick up a rat, extend hand slowly toward rat's head. Hold it by placing thumb and forefinger under the rat's chin.

Poorly nourished rats are more irritable and may snap at fingers. It is wise to handle them with gloves. Explain to students that quick movements or pushing objects into cages may frighten the rats.

Set up a schedule with students so that there is a rotating plan for weighing rats, feeding rats, cleaning cages, and other details.

Feeding Rats

The main purpose of using white rats is to show the effects of diets of different natural foods which are commonly used in human dietaries. The experiments are planned to illustrate the importance of good food selection as shown by growth and external appearance.

This experiment includes three diets of natural foods which give striking results in growth and appearance of animals. The three diets are used to illustrate:

1. Effects on growing animals of diets completely lacking in milk and eggs, and inadequate in fruits and vegetables (Diet 1).
2. Effects of feeding the inadequate Diet 1 plus milk only (Diet 2).
3. Effects of feeding a fully adequate diet (Diet 3).

PERCENTAGE COMPOSITION OF 3 EXPERIMENTAL DIETS

Ingredients	Diet 1 (all foods dried) Inadequate	Diet 2 (all foods dried) Inadequate plus milk	Diet 3 (all foods dried except last 3) Adequate
	%	%	%
Meat	15	15	15
Beans (navy)	4	4	4
Potatoes (white)	10	10	10
Rolled oats	5	5	5
White flour	25	20	12
Butter	5	5	5
Lard	10	10	6
Sugar	20	10	5
Apples	5	5	5
Salt	1	1	1
Dried whole milk	0	15	15
Eggs	0	0	5
Lettuce	0	0	3
Carrots	0	0	4
Tomatoes	0	0	5
Total	100	100	100

Permit the rats on all 3 diets to eat as much as they desire. Be sure that they have plenty of food and water *at all times*. Give fresh food and water daily, except for week ends (see Week-end Care, page 201). Remove foods not consumed.

Weighing Rats

Use balance gram scale if possible. Otherwise, use a small scale which records ounces. Check scale before weighing. Weigh container which is to hold rat. Then put rat into weighed container. Weigh container with rat in it. Subtract weight of container from total weight to obtain weight of rat.

Daily Cleaning of Cages

Each day, change newspaper in bottom pan of cages. Check, too, to be sure food containers are clean.

Weekly Cleaning of Cages

Wash cages weekly (CLEAN ONLY ONE CAGE AT A TIME — TO PREVENT MIX-UP)

1. First put rat into coffee can and cover with screen or other material which admits air.
2. Clean cage, base, and cover in soap and water with mild disinfectant. Scrub with brush. Be sure food and water containers are clean. Rinse thoroughly.
3. Clean cupboard or other area which holds supplies for rats. Check to see that all needed supplies, cleaning equipment, and foods are available.

Handling Cages in Classroom

1. Keep cages in a place that will be good for the rats. They need light and air. Keep cages away from drafts. Keep rats away from *direct* light, in a quiet place, so they will not become nervous and excited.
2. Keep rats in a place where they can be observed but not where they will draw attention away from other studies.
3. Keep cages in a place where they will not be knocked over.
4. Be sure that rats are always returned to the proper cage. In the beginning, the rats will be about the same size and weight. It may be hard to tell them apart. Each cage will have an identifying card. When cleaning cages, remove only one rat at a time.

Week-end Care

Arrange with the janitor to find a place in the building which will be warm enough for the rats. They should have a temperature of about 70 to 80 degrees Fahrenheit. (Rats should be in a place where there is no danger of their being fed or handled by other people.) Just before the rats are placed in their week-end location, check to be sure each rat has plenty of food and water and is properly covered. Enough food should be provided so that some remains uneaten the following Monday morning.

Early Monday morning, return the rats in their cages to the classroom. Clean the cages.

Characteristics To Note in Rats

Well-Nourished Rat:

Smooth, glossy coat
Bright pink eyes
Pink nose, feet, tail
Smooth tail, free from roughness
Quick, alert movements
Easily handled, good-natured
Clean, tidy habits

Poorly Nourished Rat:

Shaggy, dull, possibly thin coat
Crusty, speckled eyelids
Rough, dry, scaly ears, feet, tail
Humped posture
Pinched face
Nervous, irritable, restless
Susceptible to "sniffles"

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