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A STUDY OF THE INFLUENCE OF NUTRITION KNOWLEDGE <sup>1A</sup>  
ON THE FOOD SELECTION HABITS OF HIGH SCHOOL STUDENTS

ABSTRACT OF THESIS

by

SISTER MARY FRANCES O'CONNELL, A Study of the Influence of Nutrition Knowledge on the Food Selection Habits of High School Students (Thesis, State F. Ex.)  
Sister Mary Frances O'Connell

The purpose of this study was to determine if the food selection habits of the tenth and eleventh grade students would be

An abstract of a thesis submitted to the Faculty of the Consolidated University of North Carolina in partial fulfillment of the requirements for the degree of Master of Science in Home Economics.

A group of students in a preceding course in nutrition knowledge and on the subject of nutrition was taught an intensive course in nutrition. When the data were carefully analyzed they revealed that there was an improvement in the food selection habits of the individual students. It also showed that foods which were selected were those which were discussed, then prepared and eaten by the students during the laboratory period.

Greensboro

1943

#### ABSTRACT OF THESIS

SISTER MARY FRANCES O'CONNELL. A Study of the Influences of Nutrition Knowledge on the Food Selection Habits of High School Students. (Under the direction of Dr. Orrea F Pye.)

The purpose of this study was to determine if the food selection habits of the tenth and eleventh grade students would be influenced by a knowledge of nutrition.

A group of thirty-four secondary school pupils in a boarding school were tested on their nutrition knowledge and on their food selection habits. They were taught an intensive course in nutrition and then similarly retested. When the data were carefully analyzed they revealed that there was an improvement in the food selection habits of the individual students. It also showed that foods which were selected more frequently after the course in nutrition was given were those which were discussed, then prepared and eaten by the students during the laboratory period.



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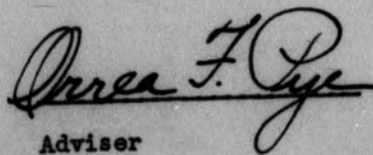
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of the Consolidated University of  
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degree of Master of Science.

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Approved by:

  
Adviser



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Some per cent of the total number that had been examined by the Service up to that time.

Further investigation shows that there was a decrease in health index directly proportional to the age of the man.

The incidence of disease and disqualifying defects in our own Selective Service experience has been found to be 14 per cent at 24 years of age compared with only 13 per cent at 21 years.

This increasing incidence of defects with age affords strong indication that they are much more largely to be attributed to manner of living than to inheritance, and that no doubt the cumulative effects of faulty eating, and the effects in later life of deficiencies in the

John B. Clark, "The Health Status of Manhood," *Annals of American Academy of Political and Social Science*, COLEP (January, 1943) 194.

## CHAPTER I

### INTRODUCTION

When the first draftees, representative of the manhood of the nation, were called for physical examinations at the opening of World War II, the appalling truth was revealed in figures for the first time, it was known that many of the rejections of World War I were due to health defects, but it was deemed highly improbable that the same condition existed now because of the many advances in science. Results of physical examinations proved the contrary.

John D. Black quotes General Hershey, in his report to the National Nutrition Conference for Defense, in May, 1941, as having ventured an estimate that perhaps one-third of the rejections are due either directly or indirectly to nutritional deficiencies; that is about fifteen per cent of the total number that had been examined by the Selective Service up to that time.<sup>1</sup>

Further investigation showed that there was a decrease in incidence directly proportional to the age of the men;

The incidence of disease and disqualifying defects in our own Selective Service experience has been found to be 36 per cent at 36 years of age contrasted with only 13 per cent at 21 years.

This increasing incidence of defects with age offers strong indication that they are much more largely to be attributed to manner of living than to inheritance, and that no doubt the cumulation effects of faulty eating, and the effects in later life of deficiencies in the

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<sup>1</sup> John D. Black, "The Social Millieu of Malnutrition," Annals of American Academy of Political and Social Science, CCXXV (January, 1943) 148.

diet in early years, are important phases of whatever the manner of living may have to do with defects.<sup>2</sup>

If this condition of "hidden hunger" is so widespread among draftees, it must be equally prevalent among the families that they represent, as indeed dietary surveys suggest it may be.

The National Nutrition Conference for Defense, called by President Franklin D. Roosevelt, May 26, 27 and 28, 1941, published as the third of its recommendations:

Recent dietary studies among large groups representative of the people of the United States, clinical studies among smaller groups, and the examination of men called up for military service shows clearly that poor diets and malnourishment are widespread in this country. While the conditions revealed offer no grounds for alarmist statements, they are serious enough to be a genuine cause of weakness in the present National Emergency and warrant national attention and concerted action. A widespread disease epidemic would receive such attention immediately. Malnourishment is more insidious and less immediately obvious in its effect, but it is not less harmful when all the results are considered.<sup>3</sup>

In an attempt to decipher the cause of this lamentable condition of starvation in a land of plenty, the Committee on Nutrition in Industry of the National Research Council reports:

The major causes of nutritional inadequacy in this country may be listed under four headings: poor food habits, poor commissary, economic factors and metabolic stress.<sup>4</sup>

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<sup>2</sup> Ibid., p. 147.

<sup>3</sup> United States Federal Security Agency, Proceedings of the National Nutrition Conference for Defence, (Washington, D.C.: United States Government Printing Office, 1942), 230.

<sup>4</sup> The Food and Nutrition of Industrial Workers in Wartime, First Report of the Committee on Nutrition in Industry of the National Research Council, (Washington, D.C.: National Research Council, 2101 Constitution Avenue, 1942), 9.



The trouble may lie in the fact that the science of nutrition is too new to have gained the foothold that we expect of it. Dr. Thomas Parran, Surgeon General of the United States, in an address before the delegates assembled at the National Nutrition Conference says:

The science of nutrition is about as young as the science of aviation. We do not know all the answers in either field. But as much, relatively, is known about what nourishes a human body as is known about what gets a heavy machine up in the air, and to its destination safe. The difference is that far less of the nutritional knowledge is put to work. <sup>5</sup>

Habits are acquired by repeated acts. Since they are learned, and not inborn, they can be altered by contrary acts. The psychologist, R.M. Dorcus says: "Habits are influential in determining modes of satisfaction." <sup>6</sup> He holds that the:

Selection of foods is determined (1) by their tastes, (2) because they meet a psychological need, and (3) by their novelty....It would seem that psychological need plays a subordinate role in diet selection. This is true because the effects of diet change are so slow and gradual that it is impossible for the animal to associate the diet choice with the gradual change in feeling that may be produced by diet. This fact is largely responsible for poor health conditions which are encountered in both animals and humans as a result of poor diet change. <sup>7</sup>

To explain conditions as she sees them Ivol Spafford says:

We have thought of ourselves as well-fed. The results of physical examination of men called for war ser-

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<sup>5</sup> Thomas Parran, "The Job Ahead", Proceedings of National Nutritional Conference for Defense, Federal Security Agency, (Washington: D.C.: Government Printing Office, 1942), 220.

<sup>6</sup> Roy M. Dorcus, "Food Habits; Their Origin and Control", Journal of the American Dietetic Association, XVIII (November, 1942), 739.

<sup>7</sup> Loc. cit.

vice prove that we are not. These diet deficiencies have arisen in some instances because we as individuals did not know enough; in others, because we did not care enough, and still in others because we did not have the resources to get the food we needed.<sup>8</sup>

The First Report of the Committee on Nutrition in Industry of the National Research Council brings to our attention that:

Nutrition is not the only factor in health and morals, but it is one of the most important factors....The improved health and morale which results when inadequate diets are brought up to adequate levels may be translated into greater working efficiency, fewer absences from work, and a decrease in the number of accidents. These and other possible benefits should speed production, the crying need of our country, and of our allies in the fight for freedom.<sup>9</sup>

The high school students of today will be the men and women of tomorrow. Their youth is in their favor regarding the change in habits acquired which would be a handicap in developing the citizens that their country hopes they will be. "The constant drip will wear away the stone; the constant imperfection of nutrition, though it be relatively slight, will wear away the body."<sup>10</sup> To have a stronger America, we must have stronger Americans, as was stressed at the National Nutrition Conference of 1941. A chain is as strong as its weakest link may be another way of saying that a country is as strong as its weakest citizen, for

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<sup>8</sup> Ivol Spafford, "Teaching Nutrition in Wartime", Practical Home Economics, XXI (January, 1943), 8.

<sup>9</sup> The Food and Nutrition of Industrial Workers in Wartime, op. cit., 1.

<sup>10</sup> Robert Mc Carrison, "The Nation's Larder in Wartime; Medical Aspects of the Use of Food," British Medical Journal, I (June 15, 1940), 984.

Wilkins writes, "That nutrition is synonymous with existence." <sup>11</sup>

Weighing these considerations, the writer was stimulated to undertake the study of determining if certain nutrition knowledges would affect the food selection habits of high school girls in a boarding school.

Answers to the following questions were sought:

1. Does a knowledge of nutrition affect the food selection habits of high school students?
2. Where should greater emphasis be placed in the nutrition program to strengthen the weaknesses?

The experimental method was selected by the writer to obtain the necessary information; using a pretest to determine knowledge background, followed by an intensive course in nutrition adapted to the need of the high school student, and then a re-testing of knowledge and application.

The present study was not meant to have universal application. Some of the evident limitations are that the number of cases used is relatively small; and finally that there were only twenty-four lecture and laboratory periods of nutrition instruction.

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<sup>11</sup> E.H. Wilkins, "Assessing the Nutrition of School Children," Lancet, CCXXXIII (November 27, 1939), 1265.



## CHAPTER II

### REVIEW OF THE LITERATURE

The child of today begins where the child of 10,000 years ago began; but while the latter had to learn only the simple things of his day, the child and youth of today must acquire, during the course of his twenty or twenty-five years of growth, the ability to perform the long series of complicated and often highly subtle activities which man has been discovering, inventing and accumulating during the past thousand generations. <sup>1</sup>

The youth of ten thousand years ago had to learn the unpublished laws of nutrition. There were foods which his forefathers had learned from experience were edible and should be eaten, and therefore, youth was taught in informal ways, the beliefs of his time. Knowledge of the new science of nutrition is essential to the youth of today if he is to be well fed.

"New knowledge makes continued learning important. Few people, however, practice all they know. This is as true of those who have studied nutrition as of others. Knowledge which does not influence behavior has no value." <sup>2</sup>

Representatives of various fields are endeavoring to point out how the need for knowledge and application of nutrition affects their fields. The educator states:

The first and fundamental goal of any comprehensive nutrition education program is that of arousing general

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<sup>1</sup> Franklin Bobbit, Curriculum Investigation, (Chicago: University of Chicago Press, 1926), 6.

<sup>2</sup> Ivol Spafford, "Teaching Nutrition in Wartime", Practical Home Economics, XXI (January, 1942), 10.

awareness of the effects of nutritional deficiencies upon individual health and national welfare, and of spreading an understanding of the methods by which improvements may be accomplished. As this understanding grows, it will motivate actions which will in turn increase the initial awareness of need.<sup>3</sup>

A newly organized nutrition committee of the Office of Education emphasizes that a nutrition program in any school consists of:

1. Education in foods and nutrition available to all age groups served by the schools. This instruction should provide for the study of appropriate foods and nutrition problems in elementary and junior and senior high schools as well as part-time pupils and adults in evening and day classes.

2. Participation by school officials in organized efforts to improve the nutrition in the community.

3. A program on both pre-service and in-service levels to prepare teachers not only for the solution of their own nutrition and food problems, but also for effective participation in joint school and community efforts for better nutrition among youths and adults.<sup>4</sup>

Administrator Paul V. McNutt, Director of Defense Health and Welfare Service states:

It is the aim of the National Nutrition Program to interpret the science of nutrition so that every man, woman and child in our country knows the simple essential facts about nutrition and can put this knowledge into practice.<sup>5</sup>

Dr. H.D. Kruse, F.A. P.H.A., Milbank Memorial Fund, New York City, has stated:

In the past the diet of persons at certain ages or periods regarded as critical has been of special concern.

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<sup>3</sup> Mary Jean Bowman and Arnold C. Anderson, "Nutrition Education Programs," Annals of American Academy of Political and Social Science, CCXXV (January, 1943), 150.

<sup>4</sup> Edna Gilbert, "What a Nutrition Program Means", Nation's Schools, XXXI (March, 1943), 48.

<sup>5</sup> Loc. cit.

Most energy in diet education has been focused and expanded on the expectant mother, nursing mother, infant and child. Actually proper nutrition is important at all ages. That utterance has been such a commonplace that its full import became much depreciated. Recent findings, however, have imparted to it such a newer and deeper meaning that nutrition of the adolescent, adult and senescent, no less than of persons at the other ages and periods which up to now have so largely preempted our concern, take on new importance. <sup>6</sup>

To summarize the findings, Ivor Spafford says that our teaching record, as it stands now, points clearly to the fact that we have taught too little nutrition too late. <sup>7</sup>

In the report of the National Research Council's Committee on Food Habits, Hazel Stiebling points out certain food habit patterns.

Food habits exist both as behavior patterns within the individual and as cultural patterns phenomena. They arise in response to hunger. They develop as accompaniments to pleasant sensory experiences--we try to repeat food contacts that we like, especially those whose taste, smell, texture and color may be satisfying, soothing and stimulating. They develop as a result of person-to-person influences; if there is a positive and friendly relationship between persons, then imitation, observation and suggestions tend to bring about similar habit patterns. They arise from influences that are essentially social in nature, such as education, propaganda, tradition and considerations of prestige.

A study bearing on the question of changing food habits was carried on in an experimental elementary school in New York City, known as the Speyer School. In the teaching of nutrition much time was de-

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<sup>6</sup> H.D. Kruse, "Nutritional Needs of American Youth", American Journal of Public Health and Nation's Health, XXX (March, 1943), 249.

<sup>7</sup> Spafford, op. cit., p. 9.

<sup>8</sup> Hazel Stiebling, "Report of National Research Council's Committee of Food Habits," Journal of Home Economics, XXXIII (September, 1941), 541.



voted to the problem of making whole wheat seem important to the children. Within two years a steady demand for whole wheat sandwiches had been created, whereas in the past the same lunches without the nutritional program had required seven years to accomplish the same end.<sup>9</sup> This study shows that with care and persistence, food habits which have been faulty can be altered successfully at the elementary level.

Conditions affecting the altering of food habits are pointed out from observation and study by Dr. Jolliffe:

Poor food habits may be either negative or positive. The negative poor food habits include non-consumption of adequate amounts of the protective foods. This is often due to failure to promote the taste for the protective foods during childhood, to local food customs, racial antipathies and economic restrictions. In many cases it is due to faulty social conditioning, as when the adolescent boy stops drinking milk as soon as he dons long trousers. The positive poor food habits include excessive use of candy, sweet carbonated beverages and alcohol.<sup>10</sup>

Throughout the literature, reference is made to the fact that a well conducted school lunchroom will influence food habits of children,<sup>11</sup> and will teach them the proper selection of food.<sup>12</sup>

That food habits are undergoing a favorable change is suggested in a report of Bernard de Voto's "Notes from a Wayside Inn":

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<sup>9</sup> Mary S. Rose, "Nutrition and the Health of the School Child," Journal of the American Dietetic Association, XV (February, 1939), 81.

<sup>10</sup> "The Food and Nutrition of Industrial Workers in Wartime," loc. cit., p. 10.

<sup>11</sup> Jean V. Latimer, "The School Lunch in Education," Hygeia, XVII (July, 1939), 665.

<sup>12</sup> Catherine Turner, "The School Lunch as a Means of Strengthening Home Economics Instruction." Unpublished Master's thesis, Woman's College of the University of North Carolina, 1941.

The tourist fares satisfactorily nearly everywhere, and can only conclude that there has been a corresponding improvement in private eating. Apparently this advance is not attributable to woman's magazines or the household columns of the daily press, for you do not find the fancy, structureless compositions that obsess them. The plugging of "domestic science" departments in high schools seems to have been the greatest leverage. <sup>13</sup>

However, there is need of much more work in the schools with accent on training of youth in proper dietary habits. <sup>14</sup>

In undertaking a study of the influence of knowledge on food habits, it must be understood that the persons concerned in the study have varied background habits and conceptions of what is "good for them." One end to be accomplished is to bring about an unlearning of nutritional fallacies.

Unfortunately, in the past, two doctrines, entirely inadequate and misleading in principle, have been disseminated. It has been taught that change to an optimum diet is all that a person needs for correction of his deficiency states. It was implied that conversion to a food diet would correct effects of previous errors promptly and completely. It is true that the diet should be corrected; for one thing, to supply the necessary basal level of all dietary essential; and for another, to form, restore, or inculcate proper dietary habits which will sustain the person in the future and prevent the recurrence of deficiency states once they are corrected. <sup>15</sup>

One means of solving the problem is stressed by Dr. Margaret H. Irwin, of the Department of Home Economics, University of Wisconsin:

Perhaps the most effective way to solve the nutrition problem is to build good food habits early in the life of

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<sup>13</sup> Bernard de Voto, "Notes from a Wayside Inn", Harper's, CLXXXI (September, 1940), 447.

<sup>14</sup> Kruse, loc. cit., p. 252.

<sup>15</sup> Kruse, loc. cit., p.251.

the individual. Adults show a certain apathy and resistance, but children are malleable. Mothers are more susceptible to the intrusion of knowledge about nutrition and more determined to apply it when they have young children to feed than at any other time in their lives. Perhaps by hitting here and hitting hard we can accomplish something of permanent value in building the health of the nation. If youngsters can be brought up eating what they should, they will, when the time comes for them to make their own choice, choose wisely. 16

Preventive medicine in the form of nearly training in proper good habits is gaining increased recognition.

Much of this preventive work takes the form of education on proper dietary habits. One of the outstanding effects of finding chronic malnutrition so prevalent is the impressive realization that diet education has an even greater importance than has previously been appreciated, that it must be extended to the utmost, and that it must be raised to new heights of effectiveness.

In view of our new insight into conditions and the greater significance to be attached to diet education, it would be wise to consider whether the program as conducted at present will satisfactorily fulfill its purpose. Our new conception of the problem may call for a new rational and design of action. 17

A prediction made by Col. R.A. Osmum of the Army Quartermaster Corps, is that the American eating habits will be changed by World War II, because the young American soldiers are acquiring new ideas of what is good for them;<sup>18</sup> a concrete application of John Dewey's

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<sup>16</sup> "Training in Good Food Habits," and Editorial, Journal of the American Dietetic Association, XVIII (April, 1942), 237.

<sup>17</sup> Kruse, loc. cit., p. 251.

<sup>18</sup> "America Will Change Diet," Science News Letter, XL(November 11, 1941), 277.



principle of learning: "Learn by doing."

Anna Bowes commenting on the results of a study made at the University of Pennsylvania on diet habits of different groups in relation to dental decay says:

For professional groups to know correct nutrition facts is one thing. For them to practice these facts is often more difficult. And teaching the results of nutrition research to lay groups in simple but convincing ways is most difficult of all. Yet until food habits of many people are actually changed, we can expect no direct results in terms of better health of the nation. <sup>19</sup>

From her contacts, Anna Bowes has observed that people are vitally interested in their own personal health. The questions on food asked by visitors at the recent World's Fair is used as a proof. Once they are fully aware of the superior value of one food over another or one eating pattern over another, the majority of people will earnestly try to follow the better way. But they must be convinced and shown how. <sup>20</sup>

To date very little seems to have been determined regarding the effect of knowledge on teaching of the food habits of high school students. Studies on elementary and college students likewise yielded negligible information.

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<sup>19</sup> Anna de Planter Bowes, "Sharing the Newer Knowledge of Nutrition," *Public Health Nursing*, XXXIII (November, 1941), 656.

<sup>20</sup> Ibid., p. 657.

A study of seven vocational schools in Kentucky was reported by Mildred Botto, with the conclusion that the home economics training had not significantly improved the food habits of the students. <sup>21</sup>

Another study undertaken by Mildred Lethridge Jones with eleventh and twelfth grade students showed that the students who had been enrolled in the home economics course selected more desirable foods than the non-home economics group, but the difference between the groups did not have significance. <sup>22</sup>

A study was made by Beck to determine the effectiveness of foods instruction in high school to stimulate good food practices, as indicated by the food planning and buying habits of fifty women who had graduated between 1917 and 1936. The findings indicated that the foods courses had probably improved the practices to some extent. <sup>23</sup>

"The Effect of High School Food Courses on the Food Habits of Girls of Montevallo, Alabama, High School," was studied by Glennie Nybeck. <sup>24</sup> The findings indicate that home economics had affected some of the food practices of the girls, but the difference between those

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<sup>21</sup> Mildred Botto, "The Effect of Home Economics Training Upon the Food Habits of High School Students," Unpublished Master's thesis, Iowa State College, 1932.

<sup>22</sup> Mildred Lethridge Jones, "The Food Habits of 678 High School Pupils in Iowa", Unpublished Master's thesis, Iowa State College, 1934.

<sup>23</sup> E.S. Beck, "Effect of a High School Foods Course on Certain Food Practices of a Selected Group of Homemakers of Lanark, Illinois", Unpublished Master's thesis, Iowa State College, 1934.

<sup>24</sup> Glennie Izlar Nybeck, "Effect of High School Food Courses on the Food Habits of Girls of Montevallo, Alabama, High School, Unpublished Master's thesis, Iowa State College, 1940.

who had just completed one year, and those who had had no home economics and between those who had complete one year and those who had completed three years was not very great. <sup>25</sup>

Kurt Lewis reports a recent experiment in Iowa in which it was demonstrated how much more effectively food habits can be changed by the decision of the groups than by admonition and exhortation presented in lecture form. <sup>26</sup>

The findings reported by Mary Jean Bowman and Arnold C. Anderson state that:

The evidence is that until recently the schools generally have not utilized their opportunity to spread nutritional knowledge and arouse interest in better diets. Physiology and cooking have been taught since the late nineteenth century, but direct nutrition lessons seem to have been exceptional....The newer approaches, however, are limited for the most part to cities and high schools. And it is discouraging that studies testing carry-over of nutrition lessons into later behavior have produced mainly negative findings. <sup>27</sup>

There are a number of authorities who maintain that nutrition knowledge, if adapted to the needs and interests of the pupils will affect favorable changes in food habits:

The Sloan Foundation has made possible a well-organized study to test the effect of school instruction upon the economic welfare and the level of diet in the community. The preliminary evidence seems to support the conclusion that the school can bring about a very sharp rise in the diet habits in a large fraction of American

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Ibid.

26 Margaret Mead, op. cit., p. 141.

27 Mary Jean Bowman and Arnold C. Anderson, op. cit., p. 152.



communities. There are strong reasons for believing that even among the bottom third of the population the proper school instruction can greatly increase diet. As far as the rural communities and small towns are concerned, it may not be too much to say that the school could probably be the crucial factor in bringing about an adequate diet.<sup>28</sup>

An abstract from the New York Times Magazine carried very much the same idea, in the language of the people.

Yes, education can change human nature. A recent nutrition week campaign is said to have improved the eating habits of the people of Indiana 10 per cent; a fourteen year drive in the South in favor of green vegetables has cut the pellagra death rate to one-fourth of what it was; and a salad-shunning New Yorker discovers, to his amazement, that he has been consuming, and liking them, for almost a year now, all because his wife attended a food lecture.<sup>29</sup>

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<sup>28</sup> Harold F. Clark, "The Effect of Learning on Diet," School and Society, LV (January 31, 1943), 128.

<sup>29</sup> "Food Habits", Journal of American Dietetic Association, XVIII (October, 1942), 704.

## CHAPTER III

### PROCEDURE OF THE EXPERIMENT

This study was made in an effort to determine if nutrition knowledge would influence the food selection habits of high school students. Thirty-four tenth and eleventh grade pupils of a boarding school in Emmitsburg, Maryland were selected. The mean of the mental age of this group was 180.1,  $\pm$ 2.3 with a standard deviation of 13.3. The mental age was determined by the Otis Self-Administering Tests of Mental Ability, by Arthur S. Otis, Higher Examination : Form A, for high schools and colleges, published by the World Book Company, Yonkers-on-Hudson, New York.

The testing-teaching-testing method was selected as the most appropriate procedure.

The initial testing program. This consisted of two parts:

a) Testing the knowledge of nutrition.

The questions for this test were based on a "Foods for Defense" booklet compiled by the writer from various sources, as a guide for the course. This booklet was called "Foods for Defense" in keeping with the present nation-wide movement, "A Stronger America Through Stronger Americans".

b) Discovering the food selection habits of the students.

These habits were ascertained by having each of the students check a food selection check sheet on which the foods to be selected were alphabetically arranged in groups, with columns "A", "S", "N", "O" to indicate food preferences. If a food was eaten every time it was served, the check would be placed opposite the food in column "A"; if it was

eaten sometimes, depending upon some condition, a check was placed in column "S"; if it was a totally rejected food item, a check was placed in column "N"; if the student never had an opportunity to eat the food because it was never served, or was never permitted to eat it, this was indicated by a check in column "O".

The teaching program. This consisted partially of lectures, using the "Foods for Defense" booklet as a guide. The basic principles were first taught including a study of many food fads and fallacies; then the protective foods were studied in greater detail. One period was devoted to the study of the benefits that were derived from foods that were well-liked, by reference to the Food-Value Table in the booklet; then to benefits lost by rejection of foods which were disliked.

- Laboratory periods were used in connection with the lecture periods on the protective foods. Whenever possible, foods which were disliked by a number of the students were combined with foods that were particularly well liked. Printed or mimeographed recipes were given to a selected number of girls, who were responsible for the preparation of the foods for a definite day. These preparations were carried on as a demonstration lesson, for the other members of the class. These foods were served during the laboratory period, with comments on flavor, texture, and appearance.

Each student was responsible for contributing to a round-table discussion, to which the first fifteen minutes of each class period was devoted. The subject for the following class was announced before class dismissal. Pamphlets, books, articles and diverse forms of literature pertaining to the subject of the following class period were placed on a table in the laboratory, to which the group had access



at all times.

The re-testing program. At the end of the teaching period, the same test which was administered as a pretest was repeated to learn what gains had been made in nutrition knowledge. Likewise, the same check sheet was filled out again to find what influence the knowledge had had on the food selection habits.

Scoring. The knowledge test were scored with a possible total of 196 points. These scores were reduced to per cents and recorded on the personal data card which was drawn up for the purpose of recording information collected for each student. A sample card is included in the appendix.

The food selection check sheet was scored on a three-point system. When a nutritionally desirable food was always eaten, two points were given; when a food was sometimes eaten one point was given; when the foods were never eaten, or there has never been an opportunity to eat them, no credit was given. Foods on the check sheet which are nutritionally undesirable were scored 0 for eating "always"; 1 for eating "sometimes" and 2 for "never eating these foods." The highest possible score for this check sheet was 254. These scores were reduced to per cents and recorded on the personal data card.

Sample copies of the "Foods for Defense" booklet, the Otis Self-Administering Test of Mental Ability, food selection check sheet and the point systems of scoring may be found in the appendix.

Henry F. Garrett, *Statistics in Psychology and Education*, (New York: Macgraw-Hill, 1926), 191.

ibid., p. 192.

## CHAPTER IV

### PRESENTATION AND ANALYSIS OF DATA

Since this experiment attempted to find the influence of nutrition knowledge on the food selection habits of pupils it was necessary to determine by means of the coefficient of correlation the relationship existing between nutrition knowledge and food selection habits before the teaching procedure was begun, and after it had been completed; and to find if the differences between these coefficients of correlation were significant. In order to calculate the coefficient of correlation the Spearman Rank Differences method was used, since this method is the best suited to pupil populations numbering about forty or less. To find RHO, the formula employed was:<sup>1</sup>

$$RHO = 1 - \frac{6 \sum D^2}{N(N^2 - 1)}$$

By means of an interpretation table, RHO was converted into its corresponding "r".<sup>2</sup>

An examination of Table 1, appendix showing the coefficient of correlation for the initial nutrition knowledge test and the initial food selection check sheet reveals the procedure needed to secure RHO. For this, the individual pupil was given a number on her personal data card, the card on which was recorded the results of all her tests and check sheets.

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<sup>1</sup> Henry F. Garrett, Statistics in Psychology and Education, (New York: Longmans, Green and Company, 1926), 191.

<sup>2</sup> Ibid., p. 192.

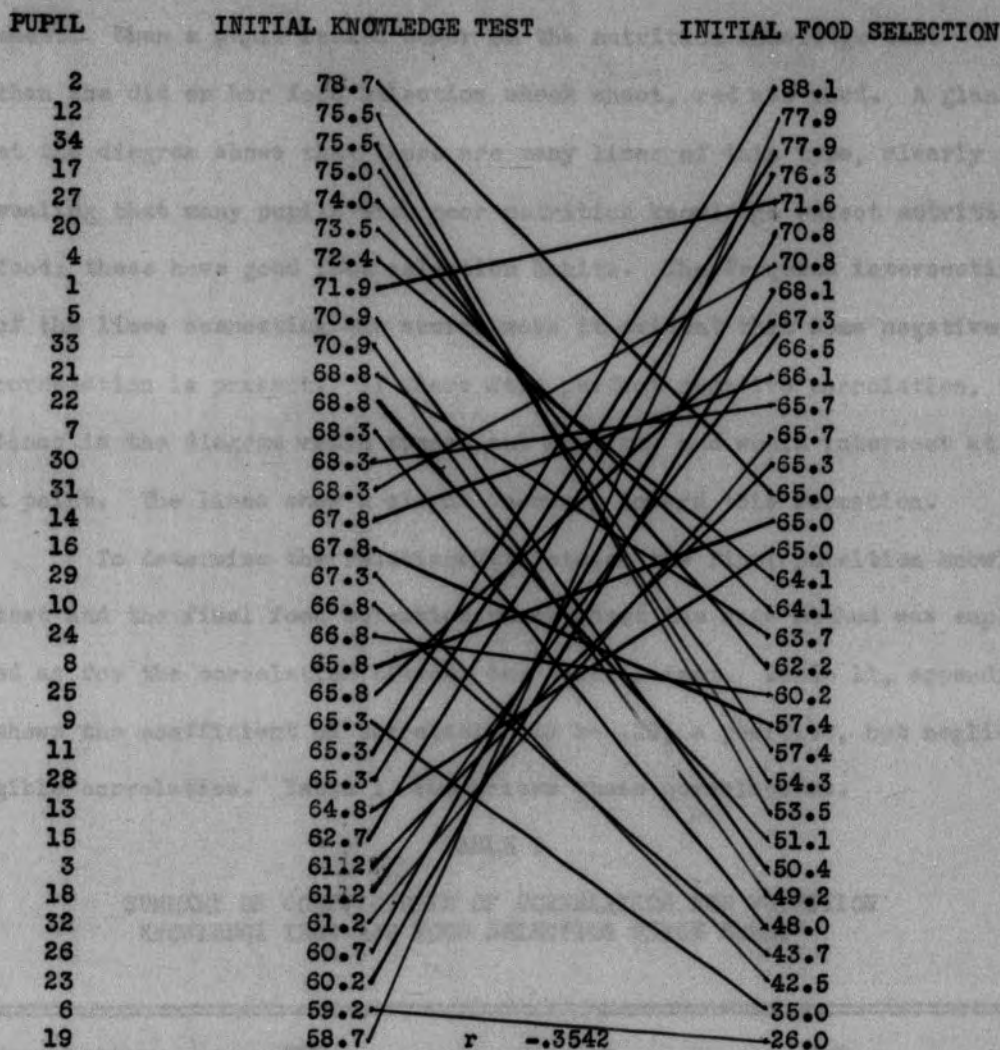
The number of each student was then listed in column 1 of Table 1, appendix, and her scores and her ranks were placed beside her number. Thus, pupil 1 who received a score of 72 on Test 1, of 72 on the food selection check sheet, was 27.5 in rank on Test 1, and 30.0 in rank on the check sheet. In the sixth column the difference between the ranks on each test was entered, and in the next column, each of these differences was squared. The correlation between the two tests was then computed by using the formula for RHO. For Table 1, appendix, its value was found to be  $-.34$  and its corresponding value of "r",  $-.3542$ . According to Rugg<sup>3</sup> this finding is interpreted as a low negative correlation. Similarly the coefficient of correlation was determined between the final nutrition knowledge test and the final food selection check sheet.

Figure 1 clearly illustrates the correlation of the initial knowledge test and the initial food selection check sheet. The scores of the pupils were placed from the highest to the lowest in rank, and recorded in the two columns of the diagram. Lines were then drawn connecting the scores of each individual. The slope of these lines indicates the displacement in position, and failure to correlate perfectly. In order to represent placement, different colors were used to draw these lines. Thus, when a pupil ranked a higher score on the nutrition knowledge test than she did on her food selection check sheet, green was used; for example; the pupil with a score of 72.4 on the nutrition knowledge test, scored 64.1 on her food selection check sheet. The line connecting these scores was drawn downward from her score in the nu-

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<sup>3</sup> H.O. Rugg, Statistical Methods Applied to Education (Boston: Houghton Mifflin Company, 1917), 26.





— Nutrition Knowledge Test lower than Food Selection Check Sheet

— Nutrition Knowledge Test higher than Food Selection Check Sheet

FIGURE I

ILLUSTRATING THE SIGNIFICANCE OF COEFFICIENT OF CORRELATION BETWEEN THE INITIAL NUTRITION KNOWLEDGE TEST AND THE INITIAL FOOD SELECTION CHECK SHEET

trition knowledge test to her score in the food selection check sheet. When a pupil ranked lower on the nutrition knowledge test than she did on her food selection check sheet, red was used. A glance at the diagram shows that there are many lines of this type, clearly revealing that many pupils with poor nutrition knowledge select nutritious food; these have good food selection habits. The frequent intersecting of the lines connecting the scores make it evident that some negative correlation is present. If there were perfect negative correlation, the lines in the diagram would spread out fanwise, and would intersect at a point. The lines show a slight tendency toward this formation.

To determine the relationship between the final nutrition knowledge test and the final food selection check sheet the same method was employed as for the correlation between the initial test. Table 11, appendix, shows the coefficient of correlation to be .19, a positive, but negligible correlation. Table 1 summarizes these correlations.

TABLE 1

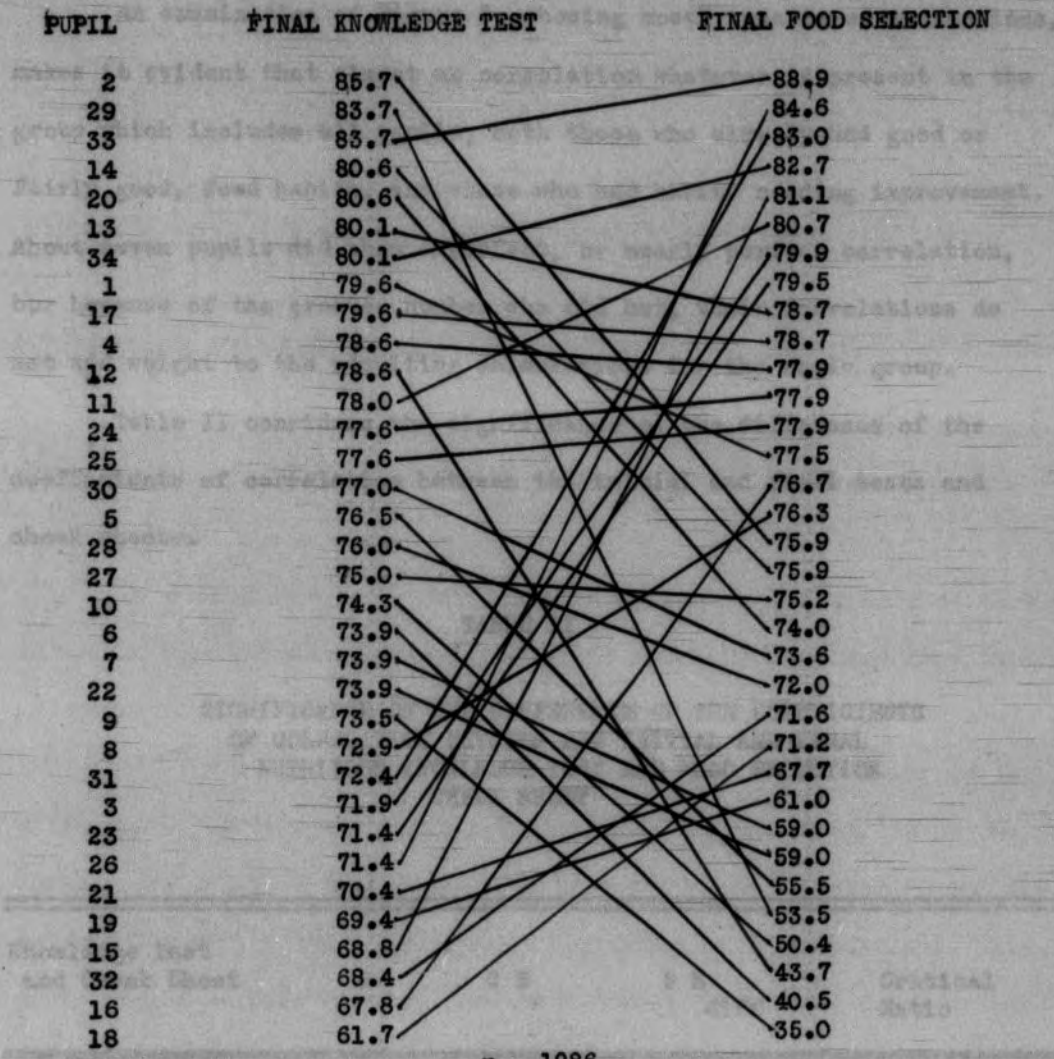
SUMMARY OF COEFFICIENTS OF CORRELATION FOR NUTRITION  
KNOWLEDGE TEST AND FOOD SELECTION CHECK SHEET

Correlation between	RHO		r		S E <sub>r</sub>	
	I	F	I	F	I	F
Knowledge Test and Check Sheet	-.34	.19	-.3542	.1986	±.15	±.16

I Correlation between initial nutrition knowledge test and check sheet.

F Correlation between final nutrition knowledge test and check sheet.

S E<sub>r</sub> Standard error of r.



r .1986

- Nutrition Knowledge Test lower than Food Selection Check Sheet
- Nutrition Knowledge Test higher than Food Selection Check Sheet

FIGURE 2

ILLUSTRATING THE SIGNIFICANCE OF COEFFICIENT OF CORRELATION BETWEEN THE FINAL KNOWLEDGE TEST AND THE FINAL FOOD SELECTION CHECK SHEET



An examination of Figure 2, showing mostly scattered connections, makes it evident that almost no correlation whatever is present in the group which includes all pupils, both those who already had good or fairly good, food habits, and those who had habits needing improvement. About seven pupils did show a perfect, or nearly perfect correlation, but because of the greater number who did not, their correlations do not add weight to the resulting calculations for the whole group.

Table II considers the significance of the difference of the coefficients of correlation between the initial and final tests and check sheets.

TABLE II

SIGNIFICANCE OF THE DIFFERENCE OF THE COEFFICIENTS  
OF CORRELATION BETWEEN THE INITIAL AND FINAL  
NUTRITION KNOWLEDGE TEST AND FOOD SELECTION  
CHECK SHEET

Knowledge Test and Check Sheet	r	S E r	S E diff	Critical Ratio
Final	.1986	± .16		
Initial	-.3542	± .15		
Difference	.5528		± .22	2.5

To determine the standard error of  $r$ , the following formulas were used:<sup>5</sup>

$$SE_N = \frac{1 - N^2}{\sqrt{N}}$$

To find the reliability of the difference;<sup>6</sup>

$$SE_{diff} = \sqrt{SE_{N_1}^2 + SE_{N_2}^2}$$

To find the critical ratio:

$$\frac{Diff}{SE_{diff}}$$

In the latter formula,  $D$  is the difference between the two coefficients of correlation and  $SE_{diff}$  is the standard error of the difference of the two correlations.

By calculation, the difference between the coefficients of correlation of the initial and final nutrition knowledge test and the food selection check sheet is .5528, and standard error of the difference, 1.22. This difference proves to be 2.5 times the standard error of the difference. It is seen in Table XIX in Tieg and Crawford<sup>8</sup> that the chances are 160 to 1 that there is a true difference in favor of the final results within the whole group. According to these educators this ratio should be well up toward three (although McCall uses 2.78) as the point in order to yield what is called "practical certainty" that the difference is real rather than due to chance factors of sampling for a given group.

<sup>5</sup> Ernest W. Tieg, and Claude C. Crawford, Statistics for Teachers (Boston: Houghton Mifflin Company, 1930), 176.

<sup>6</sup> Ibid., p. 178.

<sup>7</sup> Loc. cit.

<sup>8</sup> Ibid., p. 137.

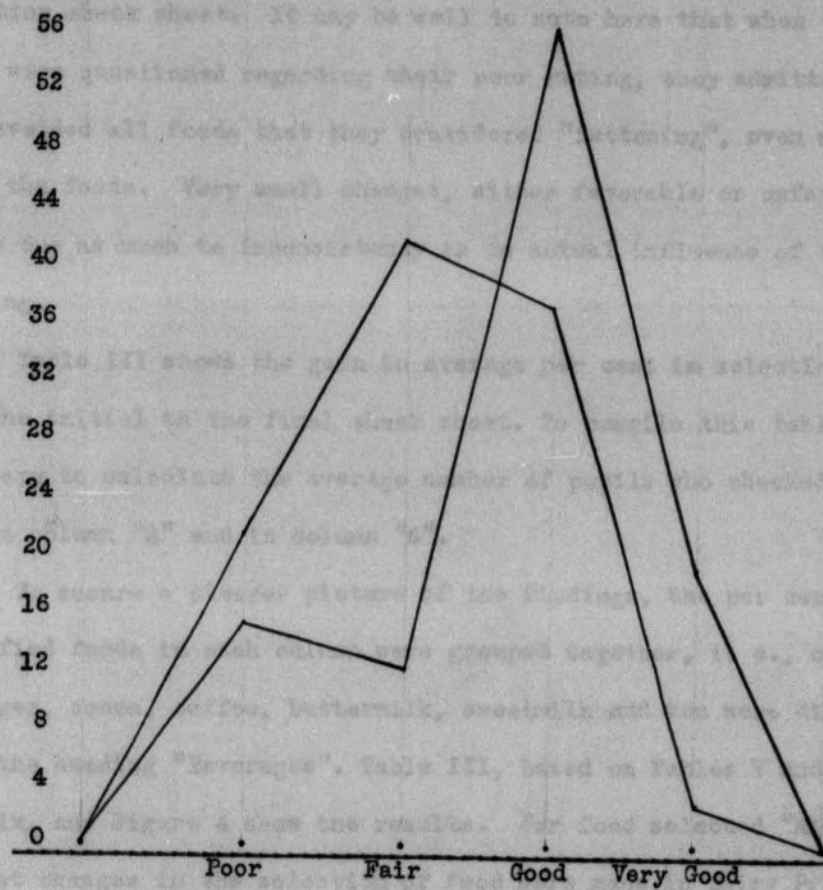
Although the difference in the coefficients of correlation between the initial and final nutrition knowledge tests and the food selection check sheets is low for significance, yet there was a gain in knowledge of nutrition and an improvement in individual pupil's food selection habits as shown in Table III appendix. Consideration of the group as a whole obscured certain facts pertinent to the problem. When account is taken of the individual pupils and their food selection habits rated as very good, good, fair and poor, certain improvements in individual food selection habits are apparent. One pupil was seen to be already selecting a very good diet before the teaching program was undertaken so that improvement was not possible for her; others were selecting a good diet so that only slight improvement was possible for them.

Analysis of Table IV appendix, shows that before the teaching program was begun, the food selection habits of the majority of tenth and eleventh grades were only fair. A summary of this table in Figure 3, alludes to the fact that 1 person or 2.9 per cent rated as very good; 12 or 35.3 per cent rated as good; 14 or 41.2 per cent rated as fair; and 7 or 20.6 per cent as poor. After the classes had been taught, the diets were improved to the extent of 6 or 17.7 per cent were rated as very good; 19 or 55.9 per cent were rated as good; 4 or 11.8 per cent were rated as fair and 5 or 14.7 per cent were still rated as poor.

	<u>INITIAL</u>	<u>FINAL</u>
Very Good	1 or 2.9%	6 or 17.7%
Good	12 or 35.3%	19 or 55.9%
Fair	14 or 41.2%	4 or 11.8%
Poor	7 or 20.6%	5 or 14.7%



Per Cent



— Rating of Food Selection Habits Prior to Course  
- - - Rating of Food Selection Habits Following Course

FIGURE 3

PER CENT OF STUDENTS WHO IMPROVED IN THE RATING  
IN FOOD SELECTION HABITS FROM THE INITIAL TO  
THE FINAL CHECK AS INFLUENCED BY THE  
TEACHING PROGRAM

Very great changes in some cases may be explained in that the individual gave herself an unusually low rating on the initial food selection check sheet. It may be well to note here that when the students were questioned regarding their poor rating, they admitted that they avoided all foods that they considered "fattening", even when they liked the foods. Very small changes, either favorable or unfavorable, may be due as much to inconsistency as to actual influence of the teaching.

Table III shows the gain in average per cent in selection of food from the initial to the final check sheet. To compile this table it was necessary to calculate the average number of pupils who checked each item in column "A" and in column "S".

To secure a clearer picture of the findings, the per cents of the classified foods in each column were grouped together, i. e., carbonated beverages, cocoa, coffee, buttermilk, sweetmilk and tea were discussed under the heading "Beverages". Table III, based on Tables V and VI in the appendix, and Figure 4 show the results. For food selected "Always," the greatest changes in the selection of food were made in Dairy Products, Breads, Meats and Vegetables. It is interesting to note that the foods marked Fruits, Miscellaneous and Soup all had a high average per cent on the initial test, hence these per cents would not be expected to show evident gains in the final analysis.

On the initial check sheet in the Column headed "Sometimes" the foods that were ranked high were Beverages, Breads and Dairy Products. In each case the per cent loss in the final check sheet; and the simultaneous increase in the check under "Always", shows an improvement in proper food selection habits. A review of the "Food" section of the "Foods for Defense" booklet will show that the foods which were finally

TABLE III

GAINS IN AVERAGE PER CENT IN SELECTION OF FOODS  
FROM INITIAL TO FINAL FOOD SELECTION  
CHECK SHEET

Foods Selected	Initial	Final	Gain
Beverages	29.3	48.3	19.0
Breads	54.3	77.9	25.6
Cereals	15.6	33.4	17.8
Dairy Products	50.7	76.7	26.0
Desserts	63.6	81.1	17.5
Fish	27.0	36.1	9.1
Fruit	63.3	78.0	14.7
Meat	52.2	74.5	22.3
Miscellaneous	66.6	74.8	8.2
Vegetables	35.9	54.0	18.1
Soup	63.0	81.3	17.3



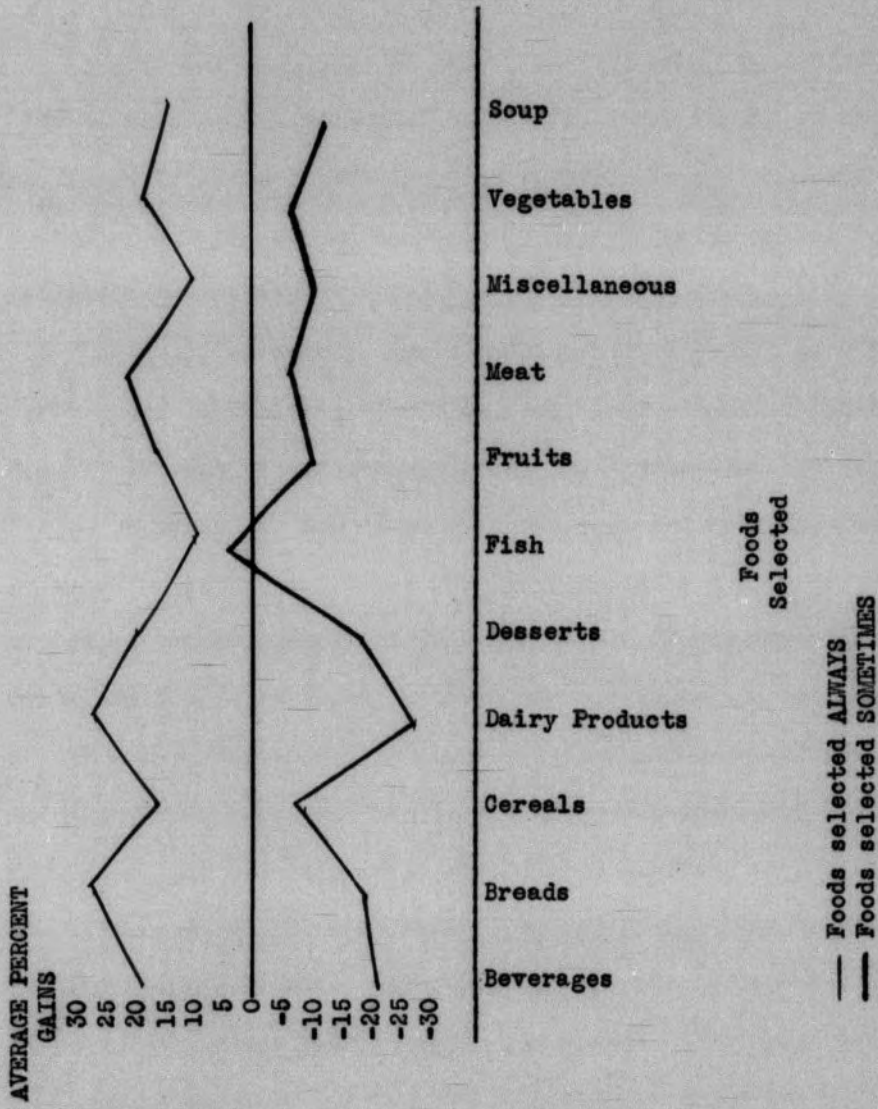


FIGURE 4

AVERAGE PERCENT GAINS OF FOOD SELECTED ALWAYS AND SOMETIMES

selected more often were those which were discussed, then prepared and eaten by the students in the laboratory periods.

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Does the knowledge of nutrition influence the food selection habits of high school students? Secondly, where should greater emphasis be placed in the nutrition program to strengthen and improve the food selection habits? In an endeavor to answer these questions, the writer undertook this study.

A group of thirty-four secondary school pupils were tested on their nutrition knowledge, and on their food selection habits. They were taught a course in nutrition, and at its conclusion, similarly retested.

In answer to the first question proposed, namely, does a knowledge of nutrition influence the food selection habits of high school students, the data revealed that before the "Food for Defense" course was given the relationship between the nutrition knowledge and the kinds of nutritious foods selected by the entire group was negative. After the course was given and the entire group had increased its nutrition knowledge, this relationship shifted from negative to positive. When the difference of the coefficients of correlation was tested, the result was almost significant. However, an analysis of data for the individual student, shows that a number did improve their food selection habits to a marked degree.

In answer to the second question, where should greater emphasis be placed in the nutrition program to strengthen and improve the food selection habits, the data revealed that foods which were discussed more frequently after the course in nutrition was given were those which were

## CHAPTER V

### SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Does the knowledge of nutrition influence the food selection habits of high school students? Secondly, where should greater emphasis be placed in the nutrition program to strengthen weaknesses in food selection habits? In an endeavor to answer these questions, the writer undertook this study.

A group of thirty-four secondary school pupils were tested on their nutrition knowledge, and on their food selection habits. They were taught a course in nutrition, and at its completion, similarly retested.

In answer to the first question proposed, namely, does a knowledge of nutrition influence the food selection habits of high school students, the data revealed that before the "Foods for Defense" course was given the relationship between the nutrition knowledge and the kinds of nutritious foods selected by the entire group was negative. After the course was given and the entire group had increased its nutrition knowledge, this relationship shifted from negative to positive. When the difference of the coefficients of correlation was tested, the result was almost significant. Moreover, an analysis of data for the individual student, shows that a number did improve their food selection habits to a marked degree.

In answer to the second question, where should greater emphasis be placed in the nutrition program to strengthen weaknesses in food selection habits, the data revealed that foods which were selected more frequently after the course in nutrition was given were those which were



discussed then prepared and eaten by the students in the laboratory period. From this conclusion it is obvious that wherever weaknesses in food selection habits occur greater emphasis should be placed upon actual preparation of the food by the student, followed by a discussion of the benefits derived therefrom.

From these considerations, the writer recommends the following:

1. When a course of this type as discussed in this study, is given to secondary school pupils, that stress be placed upon preparation of protective foods in the laboratory. Pupils' changes in food selection habits tended to center around those foods which were prepared in the laboratory.

2. Since a marked change had taken place in the food selection habits of the pupils during the limited time of this experiment, the author feels that the results would have shown statistical significance for the group had the course been conducted over a longer period of time. In view of this fact, it is recommended that a course in nutrition be extended over a longer period of time than was devoted to it in this study.

3. This experiment should be carried out with students of a different grade level, or with adults, who would be more concerned about their health and proper food selection habits than tenth and eleventh grade students who tend to select foods more for vanity's sake than for health's sake.

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TABLE 1

DEGREE OF CORRELATION FOR INITIAL  
NUTRITION LEVELS TEST AND THE  
INITIAL FEED SELECTION  
TEST RESULT

Number Number	Score in Test 1	Score in Test 2	Score in Test 3	Score in Test 4	Difference in Test	Difference Squared
1	73	72	57.5	30.0	2.5	6.2
2	79	68	54.0	19.0	10.0	100.0
3	81	66	7.5	18.5	11.0	121.0
4	70	64	57.5	18.0	12.5	156.2
5	71	35	28.5	7.5	18.5	342.2
6	80	28	1.5	1.0	9.5	90.2
7	78	48	20.0	9.0	14.0	196.0
8	69	30	15.5	15.0	6.0	36.0
9	66	40	10.5	7.0	8.5	72.2
10	67	41	15.0	4.0	12.0	144.0
11	68	66	10.5	26.0	28.5	812.2
12	76	64	9.0	27.0	28.0	784.0
13	68	68	10.5	17.5	7.0	49.0
14	68	66	20.0	23.0	3.0	9.0
15	63	76	8.0	37.0	29.0	841.0
16	68	57	20.0	21.5	1.5	2.2
17	75	67	31.0	17.5	13.5	182.2
18	61	67	7.5	35.0	27.5	756.2
19	69	74	7.5	32.5	25.0	625.0
20	64	64	29.5	15.5	14.0	196.0
21	39	64	14.0	16.5	2.5	6.2
22	69	61	23.0	8.0	15.0	225.0
23	66	66	7.0	21.0	14.0	196.0
24	67	60	14.0	13.0	1.0	1.0
25	69	67	13.5	25.5	12.0	144.0
26	61	71	3.2	23.5	20.3	412.0
27	74	62	23.5	14.5	9.0	81.0
28	65	78	16.5	37.5	21.0	441.0
29	67	43	13.0	7.5	5.5	30.2
30	68	68	20.0	28.0	8.0	64.0
31	69	71	30.0	16.5	13.5	182.2
32	61	68	8.5	25.5	17.0	289.0
33	71	48	23.5	7.0	16.5	272.2
34	72	64	11.5	1.5	10.0	100.0

APPENDIX A

N = 34

Sum of differences squared = 8000.2

RMS = .34

r = -.3552

TABLE I  
 COEFFICIENT OF CORRELATION FOR INITIAL  
 NUTRITION KNOWLEDGE TEST AND THE  
 INITIAL FOOD SELECTION  
 CHECK SHEET

Student Number	Score in Test I	Score in Check S	Rank in Test I	Rank in Check S	Difference in Rank	Difference Squared
1	72	72	27.5	30.0	2.5	6.2
2	79	65	34.0	19.5	14.5	210.2
3	61	65	5.5	19.5	14.0	196.0
4	72	64	27.5	16.0	11.5	132.3
5	71	50	25.5	7.0	18.5	342.2
6	60	26	1.5	1.0	0.5	0.2
7	68	48	20.0	5.0	15.0	225.0
8	66	65	13.5	19.5	6.0	36.0
9	65	35	10.5	2.0	8.5	72.2
10	67	44	16.0	4.0	12.0	144.0
11	65	88	10.5	34.0	23.5	552.2
12	76	54	32.5	9.5	23.0	529.0
13	65	65	10.5	19.5	9.0	81.0
14	68	66	20.0	23.0	3.0	9.0
15	63	76	8.0	31.0	23.0	529.0
16	68	57	20.0	11.5	8.5	72.2
17	75	57	31.0	11.5	19.5	380.2
18	61	67	5.5	25.5	20.0	400.0
19	59	78	1.5	32.5	31.0	961.0
20	74	64	29.5	16.0	13.5	182.2
21	69	64	24.0	16.0	8.0	64.0
22	69	51	23.0	8.0	15.0	225.0
23	60	68	3.0	27.0	24.0	576.0
24	67	60	16.0	13.0	3.0	9.0
25	66	67	13.5	25.5	12.0	144.0
26	61	71	5.5	28.5	23.0	529.0
27	74	62	29.5	14.5	15.0	225.0
28	65	78	10.5	32.5	22.0	484.0
29	67	43	16.0	3.0	13.0	169.0
30	68	66	30.0	23.0	7.0	49.0
31	68	71	20.0	28.5	8.5	72.2
32	61	66	5.5	23.0	17.5	306.2
33	71	49	25.5	6.0	19.5	380.2
34	76	54	32.5	9.5	23.0	529.0

N 34

Sum of differences squared 8806.8

RHO -.34

r -.3542

TABLE II

COEFFICIENT OF CORRELATION FOR FINAL NUTRITION KNOWLEDGE  
TEST AND FINAL FOOD SELECTION CHECK SHEET

Student Number	Score in Test F	Score in Check S	Rank in Test F	Rank in Check	Difference in Rank	Difference Squared
1	80	78	27.5	22.5	5.0	25.0
2	86	76	34.0	18.0	16.0	256.0
3	72	78	10.5	22.5	12.0	144.0
4	79	80	24.5	27.5	3.0	9.0
5	77	56	19.0	6.0	13.0	169.0
6	74	41	14.0	2.0	12.0	144.0
7	74	59	14.0	7.5	6.5	42.0
8	73	76	12.0	18.0	6.0	36.0
9	74	35	14.0	1.0	13.0	169.0
10	74	50	14.0	4.0	10.0	100.0
11	78	81	22.0	29.6	7.5	56.2
12	79	44	24.5	3.0	21.5	462.2
13	80	79	27.5	25.5	2.0	4.0
14	81	76	30.5	18.0	12.5	156.2
15	69	81	5.5	29.5	24.5	600.2
16	68	77	2.5	20.0	17.5	306.2
17	80	79	27.5	25.5	2.0	4.0
18	62	71	1.0	11.0	10.0	100.0
19	69	61	5.5	9.0	3.5	12.2
20	81	74	30.5	14.5	16.0	256.0
21	70	68	7.0	10.0	3.0	9.0
22	74	59	14.0	7.5	6.5	42.2
23	71	80	8.5	27.5	19.0	361.0
24	78	78	22.0	22.5	0.5	0.2
25	78	78	22.0	22.5	0.5	0.2
26	71	85	8.5	33.0	24.5	600.2
27	75	75	17.0	16.0	1.0	1.0
28	76	72	18.0	18.5	5.5	30.2
29	84	54	32.5	5.0	25.5	650.0
30	77	73	20.5	14.5	5.5	30.2
31	72	83	10.5	31.5	21.0	441.0
32	68	72	2.5	12.5	10.0	100.0
33	84	89	32.5	34.0	1.5	2.2
34	80	83	27.5	31.5	4.0	16.0

N 34  
Sum of differences squared 5335.0  
RHO .19  
r .1986



TABLE III

PER CENT GAINS AND LOSSES IN NUTRITION KNOWLEDGE  
TEST AND FOOD SELECTION CHECK SHEET

Per Cent	Knowledge Test		Check Sheet	
	Gain	Loss	Gain	Loss
39			1	
36				
33				
30				
27			1	
24				
21			1	
18			2	
15	3		1	1
12	3		6	
9	7		8	1
6	10		4	2
3	7		5	
0	4		1	

TABLE IV  
 INDIVIDUAL PER CENT RESULTS AND RATING OF INITIAL AND FINAL  
 FOOD SELECTION CHECK SHEET

Pupil Number	Initial		Final	
	Per Cent	Rating	Per Cent	Rating
1	72	G	78	G
2	65	F	76	G
3	65	F	78	G
4	64	F	80	G
5	50	P	56	F
6	26	P	40	P
7	48	P	59	F
8	65	F	76	G
9	35	P	35	P
10	44	P	50	P
11	88	V.G	81	V.G
12	54	F	44	P
13	65	F	79	G
14	66	G	76	G
15	76	G	81	V.G
16	57	F	77	G
17	57	F	79	G
18	67	G	71	G
19	78	G	61	F
20	64	F	74	G
21	64	F	68	G
22	51	F	59	F
23	68	G	80	G
24	60	F	78	G
25	67	G	78	G
26	71	G	85	V.G
27	62	F	75	G
28	78	G	72	G
29	43	P	54	F
30	66	G	64	G
31	71	G	83	V.G
32	66	G	72	G
33	49	P	89	V.G
34	54	F	83	V.G

V.G - Very Good Food Selection Habits, over 81%  
 G - Good Food Selection Habits, between 66% and 80%  
 F - Fair Food Selection Habits, between 51% and 65%  
 P - Poor Food Selection Habits, between 0% and 50%

TABLE V  
PER CENTS OBTAINED FROM FINAL FOOD SELECTION CHECK SHEET  
(continued)

FOOD	A	S	N	O	FOOD	A	S	N	O
<u>Meat</u>					<u>Vegetables</u>				
<u>Beef and Veal</u>					Asparagus	56	29	15	
Brains	6	21	32	41	Beans				
Hamburger	82	15	3		Lima	65	27	9	
Hot Dog	65	32	3		Kidney	24	32	29	15
Kidney	12	18	59	12	Navy	18	38	15	29
Heart	6	32	41	12	Soy	18	9	18	56
Liver	32	21	47		String	53	38	9	
Roast	68	32			Beets	41	41	18	
Steak	88	12			Broccoli	27	21	47	6
Stew	50	47	3		Brussels Sprouts	24	41	29	6
Sweetbreads	21	24	12	44	Cabbage	35	50	15	
Tongue	15	15	59	12	Carrots	65	27	9	
					Cauliflower	24	27	50	
					Celery	71	27	3	
<u>Mutton and Lamb</u>					Corn	77	18	6	
Chops	76	15	9		Eggplant	12	38	47	3
Roast	70	21	9		Endive	6	27	12	56
Stew	32	56	12		Kale	27	38	29	6
					Lettuce	65	35		
<u>Fork</u>					Mushrooms	24	21	53	3
Bacon	65	27	9		Okra	3	12	18	68
Chops	85	12	3		Onions	53	29	18	
Ham	71	29			Parsnips	3	38	53	6
Roast	74	24	3		Peas	59	32	9	
Pudding	12	26	15	47	Peppers	21	38	41	
Sausage	47	44	9		Pimentoes	21	32	38	9
					Potatoes, Irish	77	24		
<u>Poultry Products</u>					Potatoes, Sweet	77	24		
Chicken	91	9			Rhubarb	29	24	44	
Duck	47	32	18	3	Romaine	6		15	79
Eggs	47	44	9		Squash	9	24	65	3
Turkey	88	9	3		Spinach	47	35	18	
					Sauerkraut	59	18	18	6
<u>Miscellaneous</u>					Tomatoes	85	15		
Nuts	74	27			Turnips	3	32	65	
Candy	86	15			Turnip Greens		15	65	21
Jellies	59	41			Water Cress	9	26	29	35
Pickled Products	50	44	6						
Preserves	65	32	3		<u>Soup</u>				
					Clear Broth	65	21	12	3
					Cream	47	29	24	
					Vegetable	77	18	6	



TABLE V

## PER CENTS OBTAINED FROM INITIAL FOOD SELECTION CHECK SHEETS

FOOD	A	S	N	D	FOOD	A	S	N	O
<u>Beverages</u>					<u>Fish</u>				
Carbonated	56	41			Canned fish	44	47	89	
Cocoa	35	62	3		Clams	15	24	47	15
Coffee	27	41	32		Crabs	41	26	26	7
Buttermilk	3	18	62	18	Lobsters	18	15	44	24
Sweet Milk	50	38	12		Fresh Fish	38	41	21	
Tea	24	74	3		Salted Fish	18	26	50	6
					Smoked Fish	12	29	44	15
					Oysters	29	21	44	6
<u>Breads</u>					<u>Fruit</u>				
<u>Hot Bread</u>					Apples	74	26		
Biscuits	50	50			Apricots	44	41	15	
Corn Bread	35	41	21	3	Bananas	85	15		
Muffins	56	44			<u>Berries</u>				
Rolls	71	29			Blue berries	56	38	3	3
Waffles	77	21		2	Black berries	65	32	3	
White Bread	65	26	9		Raspberries	56	41	3	
Whole Wheat	32	50	18		Cantaloupe	71	18	12	
					Cherries	74	24	2	
<u>Cereals</u>					Cranberries	44	44	12	
Cream of Wheat	18	44	35	3	Dates	47	35	15	3
Cornmeal mush	3	6	53	38	Figs	27	44	27	3
Oatmeal	21	47	32		Grapefruit	56	29	15	
Shredded Wheat	15	62	21	3	Grapes	71	27	3	
Prepared Cereals	21	71	9		Oranges	77	21	3	
					Pineapple	82	12	6	
<u>Dairy Products</u>					Pears	65	29	6	
Butter	79	18	3		Peaches	65	35		
Cheese	38	51	9		Plums	65	32	3	
Cream	35	53	12		Raisins	41	44	15	
					Strawberries	79	21		
<u>Desserts</u>					Watermelon	85	9	6	
Cake	82	18							
Custard	41	53	6						
Frozen Sherbet	56	35	9						
Gelatin	44	47	9						
Ice Cream	88	12							
Puddings	65	35							
Pies	74	26							

TABLE VI

## PER CENTS OBTAINED FROM FINAL FOOD SELECTION CHECK SHEET

FOOD	A	S	N	O	A	S	N	O
<u>Beverages:</u>					<u>Fish:</u>			
Carbonated beverages	62	38			Canned fish	50	38	12
Cocoa	59	41			Clams	15	44	32 9
Coffee	38	32	29		Craws	56	18	24 3
Buttermilk	15	12	62	12	Lobsters	21	35	32 12
Sweet Milk	71	24	6		Fresh Fish	56	32	12
Tea	38	56	3	3	Salted Fish	35	27	35 3
					Smoked Fish	27	38	27 9
					Oysters	29	29	38 3
<u>Breads:</u>					<u>Fruits:</u>			
<u>Hot Bread</u>					Apples	82	18	
Biscuits	83	15			Apricots	71	21	9
Corn bread	62	24	12	3	Bananas	91	6	3
Muffins	82	18			<u>Berries:</u>			
Rolls	88	12			Blue Berries	74	21	6
Waffles	91	3	6		Black Berries	79	18	3
White Bread	82	18			Raspberries	79	21	
Whole wheat	56	32	9	2	Cantaloupe	74	18	9
					Cherries	91	9	
<u>Cereals:</u>					Cranberries	65	29	6
Cream of Wheat	29	44	27		Dates	71	21	6 3
Cornmeal Mush	18	27	50	6	Figs	47	35	15 3
Oatmeal	35	41	27		Grapefruit	65	29	6
Shredded Wheat	38	32	27	3	Grapes	85	15	
Prepared Cereals	47	47	6		Orange	85	12	3
					Pineapple	88	12	
<u>Dairy Products:</u>					Pears	85	15	
Butter	97	3			Peaches	85	15	
Cheese	68	21	6		Plums	79	21	
Cream	65	21	15		Raisins	65	26	
					Strawberries	88	12	
<u>Desserts:</u>					Watermelon	88	3	9
Cake	88	6	6					
Custard	74	21	6					
Frozen Sherbert	68	26	6					
Gelatin	71	23	6					
Ice Cream	94	6						
Puddings	82	15	3					
Pies	91	9						

TABLE VI

PER CENTS OBTAINED FROM FINAL FOOD SELECTION CHECK SHEET  
(continued)

FOOD	A	S	N	O	FOOD	A	S	N	O
<u>Meat:</u>					<u>Vegetables:</u>				
<u>Beef and Veal</u>					Asparagus	71	18	12	
Brains	9				Beans				
Hamburger	88	12			Lima	65	29	6	
Hot Dog	71	29			Kidney	50	32	18	
Kidney	41	27	26	6	Navy	47	37	12	9
Heart	35	38	24	3	Soy	15	21	18	47
Liver	59	18	24		String	82	18	9	
Roast	91	9			Beets	68	27	6	
Steak	97	3			Broccoli	47	27	26	
Stew	82	15	3		Brussel sprout	50	24	27	
Sweetbreads	24	27	21	29	Cabbage	62	32	6	
Tongue	21	32	44	3	Carrots	68	27	6	
<u>Mutton and Lamb</u>					Cauliflower	41	29	29	
Chops	85	15			Celery	91	6	3	
Roast	85	9	3	3	Corn	88	12		
Stew	65	32	3		Eggplant	32	24	41	3
<u>Pork</u>					Endive	24	21	29	27
Bacon	79	18	3		Kale	44	24	32	
Chops	88	12			Lettuce	82	18		
Ham	94	6			Mushrooms	41	41	18	
Roast	91	18			Okra	12	15	35	38
Pudding	50	24	18	9	Onions	77	15	9	
Sausage	71	21	9		Parsnips	32	27	41	
<u>Poultry Products</u>					Peas	91	9		
Chicken	100				Peppers	56	18	27	
Duck	59	21	15	6	Pimentoes	38	32	29	
Eggs	68	24	9		Potatoes, Irish	91	9		
Turkey	91	6	3		Potatoes	91	3	6	
<u>Miscellaneous:</u>					Rhubarb	47	27	24	3
Nuts	91	6	2		Romaine	15	12	29	44
Candy	82	18			Squash	24	38	35	3
Jellies	76	27	3		spinach	50	15	6	
Pickled Products	53	41	6		Sauerkraut	65	21	15	
Preserves	77	24			Tomatoes	94	6		
					Turnips	47	29	24	
					Turnip Greens	18	18	38	27
					Water Cress	27	27	32	15
					<u>Soup:</u>				
					Clear Broth	85	6	9	
					Cream	68	15	18	
					Vegetable	91	6	3	



OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

HIGHER ESTIMATION FORM A

For High Schools and Colleges

And this part Do not do this you do

Do not ever discuss this test in any way, and do not allow it to be done for you. Fill these blanks with your name and address, and with dates.

Name \_\_\_\_\_ Age \_\_\_\_\_

Birthdate \_\_\_\_\_ Date \_\_\_\_\_

School or College \_\_\_\_\_ City \_\_\_\_\_

This is a test to see how well you can think. It contains questions of different kinds. There is a score marked directly on each question. Some are very simple and some are very hard.

Which one of the two words below tells what an apple is? Flower, Fruit, Vegetable, Fruit

The right answer is "fruit" as you should have drawn a line under the word "fruit" and put a mark in the parentheses. This is the way you are to answer the questions.

APPENDIX B

Try this simple number problem. Do not write the answer. Just draw a line under it and then put the number in the parentheses.

Which one of the five words below means the opposite of "width"? Depth, Length, Breadth, Height, Area

The answer, of course, is "depth" as you should have drawn a line under the word "depth" and put a mark in the parentheses. Try this one.

What is the opposite word to each of the words below? Heat, Cold, Light, Dark, Loud, Quiet, Fast, Slow, High, Low, Up, Down, Forward, Backward, Right, Left

The answer, of course, is "cold" as you should have drawn a line under the word "cold" and put a mark in the parentheses. Try this one.

At this point you have answered all the questions.

The answer to each question is given below, nothing to underline, so that you can see the answers. If the answer to any question is a number or a letter, put the number or letter in the parentheses below and draw a line under it. Make other words like printed records.

The test contains 75 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the first hour. Do your best. Try to get as many right as possible. Do not try to guess or test if you make mistakes. Do not spend much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

Do not turn this page until you are told to begin.

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# OTIS SELF-ADMINISTERING TESTS OF MENTAL ABILITY

By ARTHUR S. OTIS

Formerly Development Specialist with Advisory Board, General Staff, United States War Department

7.

## HIGHER EXAMINATION: FORM A

20

For High Schools and Colleges

Score.....

*Read this page. Do what it tells you to do.*

*Do not open this paper, or turn it over, until you are told to do so. Fill these blanks, giving your name, age, birthday, etc. Write plainly.*

Name..... Age last birthday..... years  
First name, initial, and last name

Birthday..... Class..... Date..... 19.....  
Month Day

School or College..... City.....

This is a test to see how well you can think. It contains questions of different kinds. Here is a sample question already answered correctly. Notice how the question is answered:

Which one of the five words below tells what an apple is?

1 flower, 2 tree, 3 vegetable, 4 fruit, 5 animal.....( 4 )

The right answer, of course, is "fruit"; so the word "fruit" is underlined. And the word "fruit" is No. 4; so a figure 4 is placed in the parentheses at the end of the dotted line. This is the way you are to answer the questions.

Try this sample question yourself. Do not write the answer; just draw a line under it and then put its number in the parentheses:

Which one of the five words below means the opposite of north?

1 pole, 2 equator, 3 south, 4 east, 5 west.....( )

The answer, of course, is "south"; so you should have drawn a line under the word "south" and put a figure 3 in the parentheses. Try this one:

A foot is to a man and a paw is to a cat the same as a hoof is to a — what?

1 dog, 2 horse, 3 shoe, 4 blacksmith, 5 saddle.....( )

The answer, of course, is "horse"; so you should have drawn a line under the word "horse" and put a figure 2 in the parentheses. Try this one:

At four cents each, how many cents will 6 pencils cost?.....( )

The answer, of course, is 24, and there is nothing to underline; so just put the 24 in the parentheses. If the answer to any question is a number or a letter, put the number or letter in the parentheses without underlining anything. Make all letters like printed capitals.

The test contains 75 questions. You are not expected to be able to answer all of them, but do the best you can. You will be allowed half an hour after the examiner tells you to begin. Try to get as many right as possible. Be careful not to go so fast that you make mistakes. Do not spend too much time on any one question. No questions about the test will be answered by the examiner after the test begins. Lay your pencil down.

*Do not turn this page until you are told to begin.*

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27. The opposite of awkward is (?)  
 1 strong, 2 pretty, 3 short, 4 graceful, 5 swift. ( )
28. A mother is always (?) than her daughter.  
 1 wiser, 2 taller, 3 stouter, 4 older, 5 more wrinkled. ( )
29. Which one of the six statements below tells the meaning of the following proverb? "The burnt child dreads the fire."  
 1. Frivolity flourishes when authority is absent.  
 2. Unhappy experiences teach us to be careful.  
 3. A thing must be tried before we know its value.  
 4. A meal is judged by the dessert.  
 5. Small animals never play in the presence of large ones.  
 6. Children suffer more from heat than grown people. ( )
30. Which statement above explains this proverb? "When the cat is away, the mice will play." ( )
31. Which statement above explains this proverb? "The proof of the pudding is in the eating." ( )
32. If the settlement of a difference is made by mutual concession, it is called a (?)  
 1 promise, 2 compromise, 3 injunction, 4 coercion, 5 restoration. ( )
33. What is related to disease as carefulness is to accident?  
 1 doctor, 2 surgery, 3 medicine, 4 hospital, 5 sanitation. ( )
34. Of the five things below, four are alike in a certain way. Which is the one not like these four?  
 1 smuggle, 2 steal, 3 bribe, 4 cheat, 5 sell. ( )
35. If 10 boxes full of apples weigh 400 pounds, and each box when empty weighs 4 pounds, how many pounds do all the apples weigh? ( )
36. The opposite of hope is (?)  
 1 faith, 2 misery, 3 sorrow, 4 despair, 5 hate. ( )
37. If all the odd-numbered letters in the alphabet were crossed out, what would be the tenth letter not crossed out? Print it. *Do not mark the alphabet.*  
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z. ( )
38. What letter in the word SUPERFLUOUS is the same number in the word (counting from the beginning) as it is in the alphabet? Print it. ( )
39. What people say about a person constitutes his (?)  
 1 character, 2 gossip, 3 reputation, 4 disposition, 5 personality. ( )
40. If  $2\frac{1}{2}$  yards of cloth cost 30 cents, how many cents will 10 yards cost? ( )
41. If the words below were arranged to make a good sentence, with what letter would the second word of the sentence begin? Make it like a printed capital.  
 same means big large the as. ( )
42. If the first two statements following are true, the third is (?) George is older than Frank. James is older than George. Frank is younger than James.  
 1 true, 2 false, 3 not certain. ( )
43. Suppose the first and second letters in the word CONSTITUTIONAL were interchanged, also the third and fourth letters, the fifth and sixth, etc. Print the letter that would then be the twelfth letter counting to the right. ( )
44. One number is wrong in the following series. What should that number be?  
 0 1 3 6 10 15 21 28 34. ( )
45. If  $4\frac{1}{2}$  yards of cloth cost 90 cents, how many cents will  $2\frac{1}{2}$  yards cost? ( )
46. A man's influence in a community should depend upon his (?)  
 1 wealth, 2 dignity, 3 wisdom, 4 ambition, 5 political power. ( )
47. What is related to few as ordinary is to exceptional?  
 1 none, 2 some, 3 many, 4 less, 5 more. ( )
48. The opposite of treacherous is (?)  
 1 friendly, 2 brave, 3 wise, 4 cowardly, 5 loyal. ( )
49. Which one of the five words below is most unlike the other four?  
 1 good, 2 large, 3 red, 4 walk, 5 thick. ( )
50. If the first two statements following are true, the third is (?) Some of Brown's friends are Baptists. Some of Brown's friends are dentists. Some of Brown's friends are Baptist dentists.  
 1 true, 2 false, 3 not certain. ( )
51. How many of the following words can be made from the letters in the word LARGEST, using any letter any number of times?  
 great, stagger, grasses, trestle, struggle, rattle, garage, strangle. ( )
52. The statement that the moon is made of green cheese is (?)  
 1 absurd, 2 misleading, 3 improbable, 4 unfair, 5 wicked. ( )



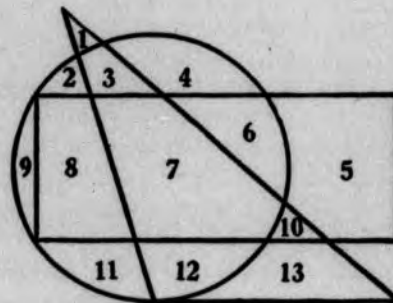
B:

## EXAMINATION BEGINS HERE:

1. The opposite of hate is (?)  
1 enemy, 2 fear, 3 love, 4 friend, 5 joy..... ( )
2. If 3 pencils cost 5 cents, how many pencils can be bought for 50 cents?..... ( )
3. A bird does not always have (?)  
1 wings, 2 eyes, 3 feet, 4 a nest, 5 a bill..... ( )
4. The opposite of honor is (?)  
1 glory, 2 disgrace, 3 cowardice, 4 fear, 5 defeat..... ( )
5. A fox most resembles a (?)  
1 wolf, 2 goat, 3 pig, 4 tiger, 5 cat..... ( )
6. Quiet is related to sound in the same way that darkness is related to (?)  
1 a cellar, 2 sunlight, 3 noise, 4 stillness, 5 loud..... ( )
7. A party consisted of a man and his wife, his two sons and their wives, and four children in each son's family. How many were there in the party?..... ( )
8. A tree always has (?)  
1 leaves, 2 fruit, 3 buds, 4 roots, 5 a shadow..... ( )
9. The opposite of economical is (?)  
1 cheap, 2 stingy, 3 extravagant, 4 value, 5 rich..... ( )
10. Silver is more costly than iron because it is (?)  
1 heavier, 2 scarcer, 3 whiter, 4 harder, 5 prettier..... ( )
11. Which one of the six statements below tells the meaning of the following proverb? "The early bird catches the worm."  
  1. Don't do the impossible.
  2. Weeping is bad for the eyes.
  3. Don't worry over troubles before they come.
  4. Early birds like worms best.
  5. Prompt persons often secure advantages over tardy ones.
  6. It is foolish to fret about things we can't help.
12. Which statement above tells the meaning of this proverb? "Don't cry over spilt milk."..... ( )
13. Which statement above explains this proverb? "Don't cross a bridge till you get to it."..... ( )
14. An electric light is related to a candle as an automobile is to (?)  
1 a carriage, 2 electricity, 3 a tire, 4 speed, 5 glow..... ( )
15. If a boy can run at the rate of 6 feet in  $\frac{1}{4}$  of a second, how many feet can he run in 10 seconds? ( )
16. A meal always involves (?)  
1 a table, 2 dishes, 3 hunger, 4 food, 5 water..... ( )
17. Of the five words below, four are alike in a certain way. Which is the one not like these four?  
1 bend, 2 shave, 3 chop, 4 whittle, 5 shear..... ( )
18. The opposite of never is (?)  
1 often, 2 sometimes, 3 occasionally, 4 always, 5 frequently..... ( )
19. A clock is related to time as a thermometer is to (?)  
1 a watch, 2 warm, 3 a bulb, 4 mercury, 5 temperature..... ( )
20. Which word makes the truest sentence? Men are (?) shorter than their wives.  
1 always, 2 usually, 3 much, 4 rarely, 5 never..... ( )
21. One number is wrong in the following series. What should that number be?  
1 4 2 5 3 6 4 7 5 9 6 9..... ( )
22. If the first two statements following are true, the third is (?) All members of this club are Republicans. Smith is not a Republican. Smith is a member of this club.  
1 true, 2 false, 3 not certain..... ( )
23. A contest always has (?)  
1 an umpire, 2 opponents, 3 spectators, 4 applause, 5 victory..... ( )
24. Which number in this series appears a second time nearest the beginning?  
6 4 5 3 7 8 0 9 5 9 8 8 6 5 4 7 3 0 8 9 1..... ( )
25. The moon is related to the earth as the earth is to (?)  
1 Mars, 2 the sun, 3 clouds, 4 stars, 5 the universe..... ( )
26. Which word makes the truest sentence? Fathers are (?) wiser than their sons.  
1 always, 2 usually, 3 much, 4 rarely, 5 never..... ( )

27. The opposite of awkward is (?)  
 1 strong, 2 pretty, 3 short, 4 graceful, 5 swift..... ( )
28. A mother is always (?) than her daughter.  
 1 wiser, 2 taller, 3 stouter, 4 older, 5 more wrinkled..... ( )
29. Which one of the six statements below tells the meaning of the following proverb? "The burnt child dreads the fire."  
 1. Frivolity flourishes when authority is absent.  
 2. Unhappy experiences teach us to be careful.  
 3. A thing must be tried before we know its value.  
 4. A meal is judged by the dessert.  
 5. Small animals never play in the presence of large ones.  
 6. Children suffer more from heat than grown people. ( )
30. Which statement above explains this proverb? "When the cat is away, the mice will play." ( )
31. Which statement above explains this proverb? "The proof of the pudding is in the eating." ( )
32. If the settlement of a difference is made by mutual concession, it is called a (?)  
 1 promise, 2 compromise, 3 injunction, 4 coercion, 5 restoration..... ( )
33. What is related to disease as carefulness is to accident?  
 1 doctor, 2 surgery, 3 medicine, 4 hospital, 5 sanitation..... ( )
34. Of the five things below, four are alike in a certain way. Which is the one not like these four?  
 1 smuggle, 2 steal, 3 bribe, 4 cheat, 5 sell..... ( )
35. If 10 boxes full of apples weigh 400 pounds, and each box when empty weighs 4 pounds, how many pounds do all the apples weigh?..... ( )
36. The opposite of hope is (?)  
 1 faith, 2 misery, 3 sorrow, 4 despair, 5 hate..... ( )
37. If all the odd-numbered letters in the alphabet were crossed out, what would be the tenth letter not crossed out? Print it. *Do not mark the alphabet.*  
 A B C D E F G H I J K L M N O P Q R S T U V W X Y Z..... ( )
38. What letter in the word SUPERFLUOUS is the same number in the word (counting from the beginning) as it is in the alphabet? Print it..... ( )
39. What people say about a person constitutes his (?)  
 1 character, 2 gossip, 3 reputation, 4 disposition, 5 personality..... ( )
40. If  $2\frac{1}{2}$  yards of cloth cost 30 cents, how many cents will 10 yards cost?..... ( )
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52. The statement that the moon is made of green cheese is (?)  
 1 absurd, 2 misleading, 3 improbable, 4 unfair, 5 wicked..... ( )

53. Of the five things following, four are alike in a certain way. Which is the one not like these four?  
1 tar, 2 snow, 3 soot, 4 ebony, 5 coal..... ( )
54. What is related to a cube in the same way in which a circle is related to a square?  
1 circumference, 2 sphere, 3 corners, 4 solid, 5 thickness..... ( )
55. If the following words were seen on a wall by looking in a mirror on an opposite wall, which word would appear exactly the same as if seen directly?  
1 OHIO, 2 SAW, 3 NOON, 4 MOTOR, 5 OTTO..... ( )
56. If a strip of cloth 24 inches long will shrink to 22 inches when washed, how many inches long will a 36-inch strip be after shrinking?..... ( )
57. Which of the following is a trait of character?  
1 personality, 2 esteem, 3 love, 4 generosity, 5 health..... ( )
58. Find the two letters in the word DOING which have just as many letters between them in the word as in the alphabet. Print the one of these letters that comes first in the alphabet.  
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z..... ( )
59. Revolution is related to evolution as flying is to (?)  
1 birds, 2 whirling, 3 walking, 4 wings, 5 standing..... ( )
60. One number is wrong in the following series. What should that number be?  
1 3 9 27 81 108..... ( )
61. If Frank can ride a bicycle 30 feet while George runs 20 feet, how many feet can Frank ride while George runs 30 feet?..... ( )
62. Count each N in this series that is followed by an O next to it if the O is not followed by a T next to it. Tell how many N's you count.  
N O N T Q M N O T M O N O O N Q M N N O Q N O T O N A M O N O M..... ( )
63. A man who is averse to change and progress is said to be (?)  
1 democratic, 2 radical, 3 conservative, 4 anarchistic, 5 liberal..... ( )
64. Print the letter which is the fourth letter to the left of the letter which is midway between O and S in the alphabet..... ( )
65. What number is in the space which is in the rectangle and in the triangle but not in the circle? ( )



66. What number is in the same geometrical figure or figures as the number 8?..... ( )
67. How many spaces are there that are in any two but only two geometrical figures?..... ( )
68. A surface is related to a line as a line is to (?)  
1 solid, 2 plane, 3 curve, 4 point, 5 string..... ( )
69. If the first two statements following are true, the third is (?). One cannot become a good violinist without much practice. Charles practices much on the violin. Charles will become a good violinist.  
1 true, 2 false, 3 not certain..... ( )
70. If the words below were arranged to make the best sentence, with what letter would the last word of the sentence end? Print the letter as a capital.  
sincerity traits courtesy character of desirable and are..... ( )
71. A man who is influenced in making a decision by preconceived opinions is said to be (?)  
1 influential, 2 prejudiced, 3 hypocritical, 4 decisive, 5 impartial..... ( )
72. A hotel serves a mixture of 2 parts cream and 3 parts milk. How many pints of cream will it take to make 15 pints of the mixture?..... ( )
73. What is related to blood as physics is to motion?  
1 temperature, 2 veins, 3 body, 4 physiology, 5 geography..... ( )
74. A statement the meaning of which is not definite is said to be (?)  
1 erroneous, 2 doubtful, 3 ambiguous, 4 distorted, 5 hypothetical..... ( )
75. If a wire 20 inches long is to be cut so that one piece is  $\frac{3}{4}$  as long as the other piece, how many inches long must the shorter piece be?..... ( )



Name \_\_\_\_\_ Grade \_\_\_\_\_ Date \_\_\_\_\_

**DIRECTIONS:** Read the directions for each part of the test, and follow them. Answer the easy items first; return to others later. You will have exactly twenty-five minutes.

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PART I

**DIRECTIONS:** Each of the statements in this section of the test has several completions listed with it. In the parentheses before each completion, place a plus (+) if it makes the statement true, and a minus (-) if it makes the statement false. There may be more than one correct completion. Each parentheses must contain a plus or a minus.

**Example:** The composition of cheese is:

- (+) 1/3 water
  - (-) 1/3 carbohydrate
  - (+) 1/3 fat
  - (+) 1/3 protein
- 

**A.** The average composition of milk is:

- ( ) 1. 50% water
- ( ) 2. 3.3% protein
- ( ) 3. 6.3% fat
- ( ) 4. 5% carbohydrate
- ( ) 5. 9.7% mineral matter

**B.** The simple sugars are:

- ( ) 6. cellulose
- ( ) 7. lactose
- ( ) 8. glucose
- ( ) 9. fructose
- ( ) 10. sucrose

**C.** The regulating and protecting foods include:

- ( ) 11. vitamins
- ( ) 12. carbohydrates
- ( ) 13. water
- ( ) 14. fat
- ( ) 15. cellulose

**D.** Milk is a rich source of:

- ( ) 16. Vitamin A
- ( ) 17. Vitamin D
- ( ) 18. Thiamin
- ( ) 19. iron
- ( ) 20. calcium
- ( ) 21. ascorbic acid

## E. Safe milk to purchase for drinking is:

- 22. Grade A-Raw
- 23. Grade A-Raw - Homogenized
- 24. Grade A-Pasteurized
- 25. Grade B-Raw
- 26. Certified
- 27. Grade C

## F. Carbohydrates:

- 28. Build and repair tissues
- 29. Give heat and energy
- 30. Regulate body processes
- 31. Can be stored in the body
- 32. Should be eaten in excess of all other foodstuffs

## G. The egg is:

- 33. A complete protein
- 34. A good source of iron
- 35. Not easily digested
- 36. A good source of Vitamin A

## H. Whole grain cereals are:

- 37. Rich in iron
- 38. Harder to digest than refined cereals
- 39. Are low in vitamins
- 40. High in mineral content

## I. Whole wheat flour:

- 41. Has laxative properties
- 42. Is the same as patent flour
- 43. Is similar to Graham flour
- 44. Has higher nutritive value than white flour

## J. Fish are desirable in the diet because:

- 45. They supply iodine
- 46. They are a protein food
- 47. They contain vitamins
- 48. They are high in carbohydrate

## K. Fruits are valuable in the diet because:

- 49. They have laxative value
- 50. Stimulate the appetite
- 51. Are excellent vitamin foods
- 52. Supply a desirable form of sugar
- 53. Lend variety to the meal
- 54. Are complete protein foods
- 55. They are acid-forming foods

## L. Glandular organ meats should be included in the diet because:

- 56. They provide an economical form of animal protein
- 57. They are high in carbohydrates
- 58. They are excellent blood-builders
- 59. They supply appreciable amounts of the vitamins.

M. Vegetables should receive high consideration in the daily dietary because they :

- 60. Are excellent body regulators
- 61. Supply the highest percentage of energy
- 62. Are low in cellulose
- 63. Are good sources of vitamins and minerals
- 64. Supply a high form of protein
- 65. Offer variety to the diet
- 66. Are especially useful in supplying water to the diet

N. Water:

- 67. Should not be drunk at mealtime
- 68. Aids digestion
- 69. Makes up 70% of our body weight
- 70. Helps to regulate the body temperature

O. Gelatin:

- 71. Is easily digested
- 72. Is a complete protein
- 73. Is high in vitamin D
- 74. May be used as a substitute for meat

P. The daily diet of a normally healthy individual should include at least:

- 75. 1 Quart of milk for children
- 76. 3 - 4 eggs per week
- 77. 1 "heavy" dessert
- 78. 1 serving of meat
- 79. 1 serving of potatoes
- 80. 2 servings of vegetable
- 81. Whole grain cereals and bread
- 82. 1 serving of coffee
- 83. 2 servings of fruit

Q. Vitamin C is the same as:

- 84. Thiamin
- 85. Ascorbic acid
- 86. Nicotinic acid
- 87. Riboflavin

R. Vitamin C:

- 88. Prevents scurvy
- 89. Is abundant in citrus fruits
- 90. Is stored in the body for future use
- 91. Is readily destroyed by heat

S. Vitamin C deficiencies are manifested by: bleeding gums, decayed teeth and pyorrhea. In order to avoid these, we should include in the diet:

- 92. Raw cabbage
- 93. Oranges
- 94. Grapefruit
- 95. Butter



- T. Vitamin B : stimulates intestines, promotes good nerve tone and stimulates growth. That we may profit by this we should include in the diet:
- 96. Oranges
  - 97. Whole wheat bread
  - 98. Leafy vegetables
  - 99. Raisins
- U. Vitamin B<sub>2</sub> Postpones early signs of old age, and prevents nervous depression. To retain your "youth and beauty" eat:
- 100. Liver
  - 101. Eggs
  - 102. Oranges
  - 103. Prunes
- V. Nightblindness, sore eyes and rough, dry skin can be prevented by including Vitamin A - rich foods in the diet. Some of these are:
- 104. Butter
  - 105. Carrots
  - 106. Granulated sugar
  - 107. Cream
  - 108. Egg yolk
- W. Straight, strong bones and teeth are due in great part, to sufficient calcium intake. High calcium foods are:
- 109. Milk
  - 110. Liver
  - 111. Macaroni
  - 112. Turnip greens
- X. Red blood cells, vital to life, need iron. Carefully selected foods containing iron are:
- 113. Liver
  - 114. Egg yolk
  - 115. Molasses
  - 116. Carbonated drinks
- Y. A student had been ordered by her physician to eat foods high in cellulose content. These foods should include:
- 117. Raw vegetables
  - 118. Green vegetables
  - 119. Lean meats
  - 120. White potatoes
  - 121. Cream of wheat
  - 122. Cooked fruits put through a sieve
- Z. Jerry desires to broaden his knowledge of food principles. He should be taught that:
- 123. Good food habits prevent scarlet fever
  - 124. Food maintains a constant body temperature
  - 125. Food influences body weight
  - 126. Overeating increases the capacity to work
  - 127. Good digestion warrants bad eating habits

- 128. Food repairs broken down tissues
- 129. Food promotes normal growth
- 130. Appetite is a sure guide to good food selection

- AA. Sara had decided to increase her vitamin intake, because vitamins:
- 131. Stimulate the appetite
  - 132. Take the place of other foods
  - 133. Causes the digestive tract to function better
  - 134. Help to prevent infection
  - 135. Promote intestinal health
  - 136. Produce immunity from bacterial diseases

## PART II

**DIRECTIONS:** Read the following statements carefully. If the statement is true, put a circle around the letter T; if the statement is false, put a circle around the letter F.

**EXAMPLE:**      F Washington is the capitol of the U.S.  
                   T    Washington is the largest city in the U.S.

- 
- T F 1. Food is burned in the body.
  - T F 2. Ripe bananas are indigestible for young children.
  - T F 3. Fish are good brain food.
  - T F 4. Raisins are an excellent source of iron.
  - T F 5. Daily food requirements can be calculated.
  - T F 6. "Cut out" all starches when dieting.
  - T F 7. Milk is fattening.
  - T F 8. Fish and milk should never be taken at the same meal.
  - T F 9. Vitamins are essential to normal life.
  - T F 10. Milk and acid food should never be taken at the same meal.
  - T F 11. To drink milk properly it should be sipped.
  - T F 12. Sugar is a quick source of energy.
  - T F 13. Drinking water with meals is bad for digestion.
  - T F 14. At least as much of the family income should be spent for  
                   milk as for leafy green and yellow vegetables.
  - T F 15. Chewing gum aids digestion.

- T F 16. High meat diet makes people, especially children, fierce and warlike.
- T F 17. You should not eat when you have no appetite.
- T F 18. A craving for sweets shows that your system needs them.
- T F 19. An onion eaten at bedtime will break a cold.
- T F 20. High temperatures will cause protein to toughen.
- T F 21. Weight is an unreliable indication of good physical health.
- T F 22. All protein foods are of equal nutritive value.
- T F 23. Milk should be included in the adult's diet.
- T F 24. Growth will be stunted by the lack of any of the nutritive elements that are required for building tissues.
- T F 25. Adults of the same age, height and weight will require the same amount and kind of food.
- T F 26. Irradiated foods are ones that have had the Vitamin D content raised by being subjected to a sunray lamp.
- T F 27. Energy from our foods gives us the capacity to work.
- T F 28. For growth, a child should have a quart of milk a day.
- T F 29. Fortified foods are those that have had the vitamin or mineral content raised.
- T F 30. The best time to eat candy is at bedtime.
- T F 31. All foods contain minerals.
- T F 32. Eating crusts of bread will make your hair curly.
- T F 33. Iron builds strong bones and teeth.
- T F 34. Skim milk contains more fat than whole milk.
- T F 35. Vitamins give heat and energy.
- T F 36. Polished rice is high in vitamins.
- T F 37. Macaroni is rich in mineral matter.



- T F 38. Leafy vegetables are a good source of cellulose.
- T F 39. Molasses is a rich source of iron.
- T F 40. Cellulose is the "broom of the intestines."
- T F 41. If we take our vitamins and minerals in concentrated form,  
we can eat as we please.
- T F 42. Weakening of tissues with age can be postponed and the active period of life can be prolonged by means of proper feeding.
- T F 43. Overweight may lead to diseases of the heart and circulatory system.
- T F 44. Underweight persons are more subject to tuberculosis than overweight persons.
- T F 45. The peak of mental development is attained only when the body is normally developed.
- T F 46. Posture is an indication of the state of nutrition.
- T F 47. Milk is classed as a fluid food.
- T F 48. Milk is incorrectly called a "Perfect Food."
- T F 49. Grains are an expensive form of fuel foods.
- T F 50. Fruits are poor body-builders.
- T F 51. Liver and kidney are good blood-builders.
- T F 52. Vegetables are low in mineral content.
- T F 53. Most of our sweet foods should be taken in the form of natural sweets, as fresh fruits.
- T F 54. Ordinary white bread is less nutritious than "enriched" bread.
- T F 55. All of the water that we take enters the body by beverages.
- T F 56. Water used in the cooking of vegetables contains quantities of minerals.

- T F 57. Vitamin A can be stored in the body.
- T F 58. Vitamin A is called the anti-infectious vitamin.
- T F 59. Vitamin C is called the "sunshine vitamin."
- T F 60. Cellulose is an excellent fuel food.

FOOD	A	B	C	D	FOOD	A	B	C	D
Meat					Fish				
Beef					Salmon				
Pork					Tuna				
Lamb					Shrimp				
Chicken					Crab				
Turkey					Scallops				
Veal					Sardines				
Bacon					Mackerel				
Ham					Trout				
Hot dog					Brook trout				
Sausage					Steelhead				
Salami					Salmon				
Wurst					Trout				
Butter					Brook trout				
Cheese					Steelhead				
Milk					Salmon				
Yogurt					Trout				
Ice cream					Brook trout				
Butter					Steelhead				
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Butter					Brook trout				
Cheese					Steelhead				
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Milk					Brook trout				
Yogurt					Steelhead				
Ice cream					Salmon				
Butter					Trout				
Cheese					Brook trout				
Milk					Steelhead				
Yogurt					Salmon				

## FOOD SELECTION CHECK SHEET A

NAME \_\_\_\_\_

GRADE \_\_\_\_\_

Use the following symbols in checking (✓) this chart:

A - to indicate that you ALWAYS eat the food when served.S - to indicate that you SOMETIMES eat the food when served.N - to indicate that you NEVER eat the food when it is served.O - to indicate that the food has never been served to you.

FOOD	A	S	N	O	FOOD	A	S	N	O
<b>Beverages:</b>					<b>Fish:</b>				
Carbonated beverages					Canned fish				
Cocoa					Clams				
Coffee					Crabs				
Buttermilk					Lobsters				
Sweet Milk					Fresh fish				
Tea					Salted fish				
<b>Breads:</b>					Smoked fish				
Hot Bread					Oysters				
Biscuits					<b>Fruits:</b>				
Corn bread					Apples				
Muffins					Apricots				
Rolls					Bananas				
Waffles					<b>Berries:</b>				
White Bread					Blue berries				
Whole wheat bread					Black berries				
<b>Cereals:</b>					Raspberries				
Cream of wheat					Cantaloupe				
Cornmeal Mush					Cherries				
Oatmeal					Cranberries				
Shredded Wheat					Dates				
Prepared cereals					Figs				
<b>Dairy Products:</b>					Grapefruit				
Butter					Grapes				
Cheese					Orange				
Cream					Pineapple				
<b>Desserts:</b>					Pears				
Cake					Peaches				
Custard					Plums				
Frozen Sherbert					Raisins				
Gelatin Desserts					Strawberries				
Ice Cream					Watermelon				
Puddings					<b>Meat:</b>				
Pies					Beef and Veal				



FOOD SELECTION CHECK SHEET A  
(CONTINUED)

FOOD	A	S	N	O	FOOD	A	S	N	O
<u>Meat:</u>					<u>Vegetables:</u>				
<u>Beef and Veal</u>					<u>Asparagus</u>				
<u>Brains</u>					<u>Beans</u>				
<u>Hamburger</u>					<u>Lima</u>				
<u>Hot Dog</u>					<u>Kidney</u>				
<u>Kidney</u>					<u>Navy</u>				
<u>Heart</u>					<u>Soy</u>				
<u>Liver</u>					<u>String</u>				
<u>Roast</u>					<u>Beets</u>				
<u>Steak</u>					<u>Broccoli</u>				
<u>Stew</u>					<u>Brussels sprouts</u>				
<u>Sweetbreads</u>					<u>Cabbage</u>				
<u>Tongue</u>					<u>Carrots</u>				
<u>Mutton and Lamb</u>					<u>Cauliflower</u>				
<u>Chops</u>					<u>Celery</u>				
<u>Roast</u>					<u>Corn</u>				
<u>Stew</u>					<u>Eggplant</u>				
<u>Pork</u>					<u>Endive</u>				
<u>Bacon</u>					<u>Kale</u>				
<u>Chops</u>					<u>Lettuce</u>				
<u>Ham</u>					<u>Mushrooms</u>				
<u>Roast</u>					<u>Okra</u>				
<u>Pudding</u>					<u>Onions</u>				
<u>Sausage</u>					<u>Parsnips</u>				
<u>Poultry Products</u>					<u>Peas</u>				
<u>Chicken</u>					<u>Peppers</u>				
<u>Duck</u>					<u>Pimentos</u>				
<u>Eggs</u>					<u>Potatoes, Irish</u>				
<u>Turkey</u>					<u>Potatoes, Sweet</u>				
<u>Miscellaneous:</u>					<u>Rhubarb</u>				
<u>Nuts</u>					<u>Romaine</u>				
<u>Candy</u>					<u>Squash</u>				
<u>Jellies</u>					<u>Spinach</u>				
<u>Pickled Products</u>					<u>Sauerkraut</u>				
<u>Preserves</u>					<u>Tomatoes</u>				
					<u>Turnips</u>				
					<u>Turnip Greens</u>				
					<u>Water Cress</u>				
					<u>Soup:</u>				
					<u>Clear Broth</u>				
					<u>Cream</u>				
					<u>Vegetable</u>				

POINT SYSTEM OF MARKING

Name \_\_\_\_\_ Grade \_\_\_\_\_

Use the following symbols in checking (✓) this chart:

A - to indicate that you ALWAYS eat the food when served.

S - to indicate that you SOMETIMES eat the food when served.

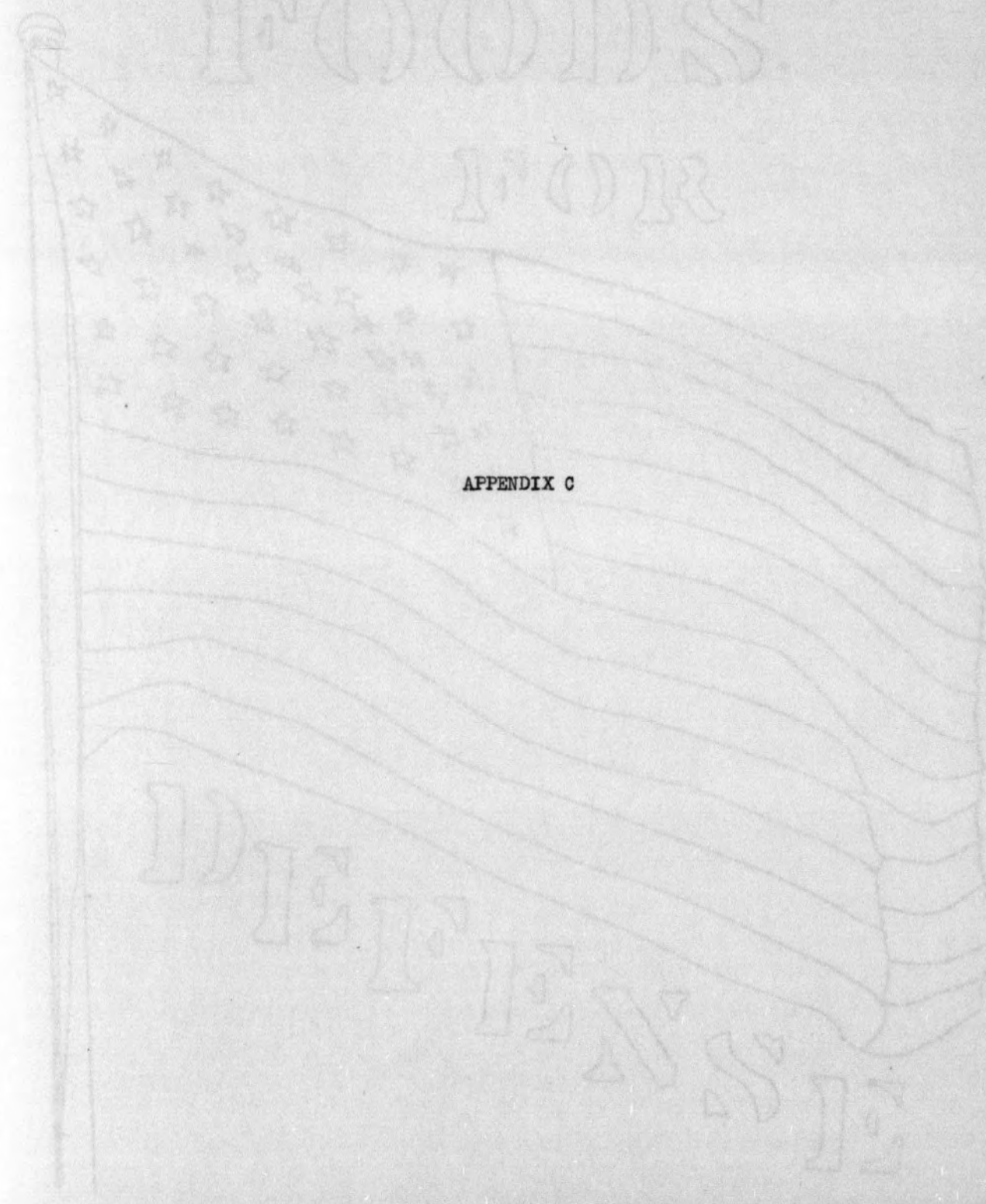
N - to indicate that you NEVER eat the food when it is served.

O - to indicate that the food has never been served to you.

FOOD	A	S	N	O	FOOD	A	S	N	O
<b>Beverages:</b>					<b>Meat:</b>				
Carbonated beverages	0	1	2	0	<b>Beef and Veal</b>				
Cocoa	2	1	0	0	Liver	2	1	0	0
Coffee	0	1	2	0	Roast	2	1	0	0
Buttermilk	2	1	0	0	Steak	2	1	0	0
Sweet Milk	2	1	0	0	Stew	2	1	0	0
Tea	0	1	2	0	Sweetbreads	2	1	0	0
<b>Breads:</b>					Tongue	2	1	0	0
<b>Hot Bread</b>					<b>Mutton and Lamb</b>				
Biscuits	2	1	0	0	Chops	2	1	0	0
Corn bread	2	1	0	0	Roast	2	1	0	0
Muffins	2	1	0	0	Stew	2	1	0	0
Rolls	2	1	0	0	<b>Pork</b>				
Waffles	2	1	0	0	Bacon	2	1	0	0
White Bread	2	1	0	0	Chops	2	1	0	0
Whole wheat bread	2	1	0	0	Ham	2	1	0	0
<b>Cereals:</b>					Roast	2	1	0	0
Cream of wheat	2	1	0	0	Pudding	2	1	0	0
Cornmeal Mush	2	1	0	0	Sausage	2	1	0	0
Oatmeal	2	1	0	0	<b>Poultry Products</b>				
Shredded Wheat	2	1	0	0	Chicken	2	1	0	0
Prepared cereals	2	1	0	0	Duck	2	1	0	0
<b>Dairy Products:</b>					Eggs	2	1	0	0
Butter	2	1	0	0	Turkey	2	1	0	0
Cheese	2	1	0	0	<b>Miscellaneous:</b>				
Cream	2	1	0	0	Nuts	2	1	0	0
<b>Desserts:</b>					Candy	1	2	2	0
Cake	2	1	0	0	Jellies	1	2	2	0
Custard	2	1	0	0	Pickled Products	1	2	2	0
Frozen Sherbert	2	1	0	0	Preserves	1	2	2	0
Gelatin Desserts	2	1	0	0	<b>Vegetables:</b>				
Ice Cream	2	1	0	0	Asparagus	2	1	0	0
Puddings	2	1	0	0	Beans	2	1	0	0
Pies	2	1	0	0	Lima	2	1	0	0
<b>Fish:</b>					Kidney	2	1	0	0
Canned fish	2	1	0	0	Navy	2	1	0	0
Clams	2	1	0	0	Soy	2	1	0	0
Crabs	2	1	0	0	String	2	1	0	0
LOBSTERS	2	1	0	0	Beets	2	1	0	0
Fresh fish	2	1	0	0	Broccoli	2	1	0	0
Salted fish	2	1	0	0	Brussels sprouts	2	1	0	0
Smoked fish	2	1	0	0	Cabbage	2	1	0	0
Oysters	2	1	0	0	Carrots	2	1	0	0
<b>Fruits:</b>					Cauliflower	2	1	0	0
Apples	2	1	0	0	Celery	2	1	0	0
Apricots	2	1	0	0	Corn	2	1	0	0
Bananas	2	1	0	0	Eggplant	2	1	0	0
<b>Berries:</b>					Endive	2	1	0	0
Blue berries	2	1	0	0	Kale	2	1	0	0
Black berries	2	1	0	0	Lettuce	2	1	0	0
Raspberries	2	1	0	0	Mushrooms	2	1	0	0
Cantaloupe	2	1	0	0	Okra	2	1	0	0
Cherries	2	1	0	0	Onions	2	1	0	0
Cranberries	2	1	0	0	Parsnips	2	1	0	0
Dates	2	1	0	0	Peas	2	1	0	0
Figs	2	1	0	0	Peppers	2	1	0	0
Grapefruit	2	1	0	0	Pimentos	2	1	0	0
Grapes	2	1	0	0	Potatoes, Irish	2	1	0	0
Orange	2	1	0	0	Potatoes, Sweet	2	1	0	0
Pineapple	2	1	0	0	Rhubarb	2	1	0	0
Pears	2	1	0	0	Romaine	2	1	0	0
Peaches	2	1	0	0	Squash	2	1	0	0
Plums	2	1	0	0	Spinach	2	1	0	0
Prunes	2	1	0	0	Sauerkraut	2	1	0	0
Strawberries	2	1	0	0	Tomatoes	2	1	0	0
Watermelon	2	1	0	0	Turnips	2	1	0	0
<b>Meat:</b>					Turnip Greens	2	1	0	0
<b>Beef and Veal</b>					Water Cress	2	1	0	0
Brains	2	1	0	0	<b>Soup:</b>				
Hamburger	2	1	0	0	Clear Broth	2	1	0	0
Hot Dog	2	1	0	0	Cream	2	1	0	0
Kidney	2	1	0	0	Vegetable	2	1	0	0

FOODS

FOR



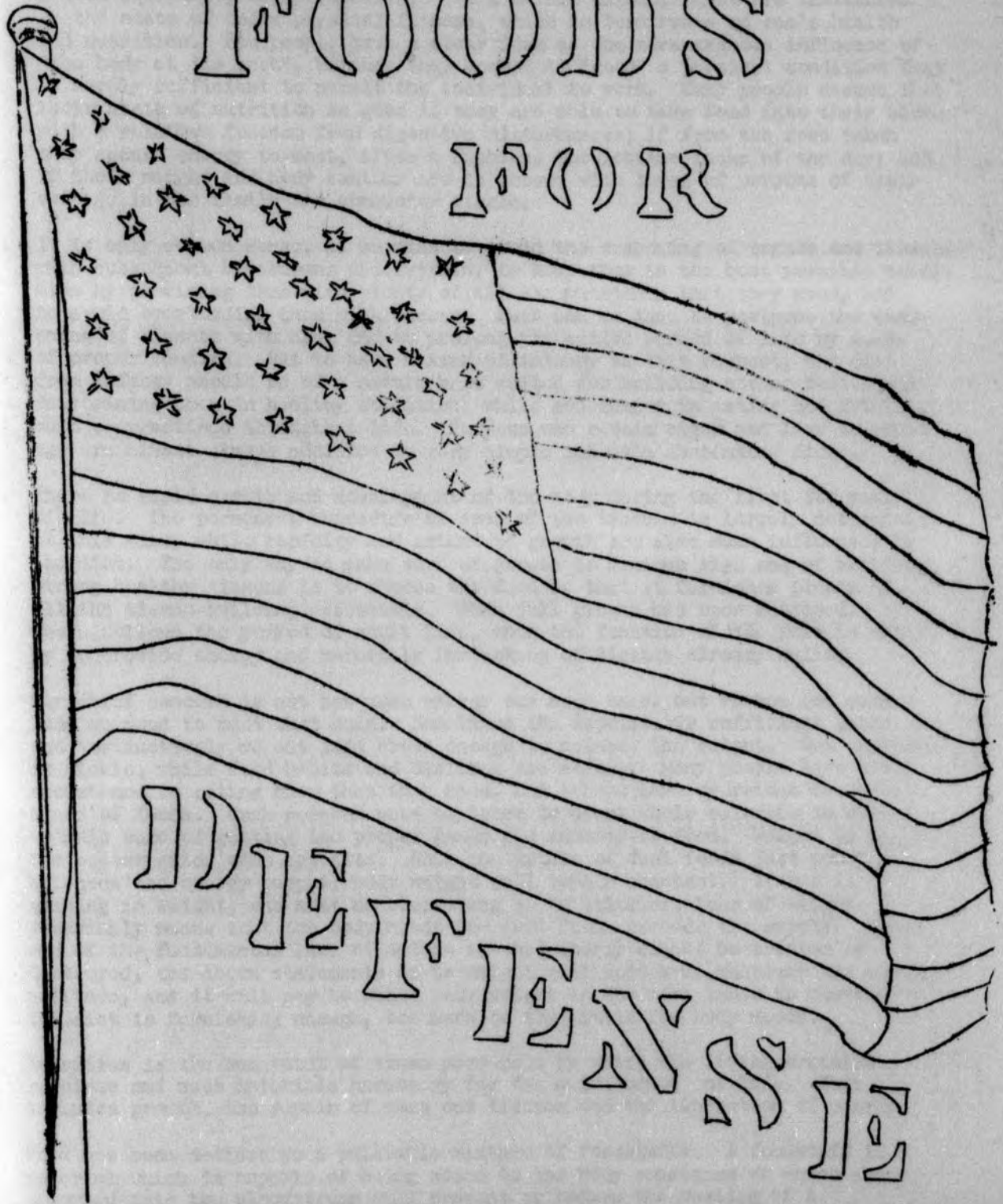
APPENDIX C

DEFENSE



FOODS

FOR



DEFENSE

The statement that fitness increases one's chances of winning laurels in the game of life, is generally accepted. Fitness includes the state of one's mental equipment, and personality. To a marked extent, these are influenced by the state of one's physical fitness, which in turn rests on one's health and nutrition. Few people have a clear idea of the advantageous influence of "the body at its best", because they accept as "good" a physical condition that is merely sufficient to permit the individual to work. Many people assume that their state of nutrition is good if they are able to take food into their bodies with a relative freedom from digestive disturbances; if from the food taken they secure energy to meet, after a fashion, the routine tasks of the day; and if their weight and body contour are in accord with those of persons of their own age in the family and community circle.

2. It is only common sense, if we wish to avoid the weakening of organs and tissues with subsequent breakdowns understrain, to keep them in the best possible condition by providing them with plenty of all the nutrients that they need, but to avoid overloading them with excess. Much can be done to postpone the weakening of tissues with age, and to prolong the active period of life by means of proper feeding. But to have maximum efficiency in this respect, the diet from infancy should be of a nature best suited for building strong bodies and maintaining them in healthy condition, while moderation in eating and drinking must be practiced throughout life. Persons who retain vigor and live to great age are almost always addicted to very simple and even abstemious diets.
3. There is rapid growth and development of the body during the first few years of life. The permanent character of some of the tissues is largely determined at this time, while rapidity and extent of growth are also much influenced by the diet. The only way to make sure of growth to maximum size and of building strong healthy tissues is to choose the food so that it furnishes plenty of all the tissue-building essentials. When full growth has been attained, there follows the period of adult life, when the function of the food is chiefly to provide energy and materials for upkeep of tissues already built.
4. Our chief concern is not how much energy our body uses, but rather how much food we need to meet that need. Sometimes the appetite is sufficient guide and instinctively we eat just about enough to balance the output. But appetite is fickle, while food habits and dislikes are strong. Many people have become accustomed to eating more than they need, and others have aversions to certain kinds of foods. Such persons need to learn to count their calories in order to make sure of getting the proper kinds and amounts of food. Weight is a far better guide than appetite. When the intake of fuel foods just counterbalances the energy output, body weight will remain constant. If one is gaining in weight, one must be overeating as to calories; loss of weight invariably means that the body needs for fuel foods exceeds the supply. Since one of the fundamental laws of nature is that energy cannot be created or destroyed, the above statements as to weight will hold true whatever the mental attitude, and it will pay to watch body weight as the best index to whether the diet is furnishing enough, too much or too little for body needs.
5. Nutrition is the sum total of those processes by which the living organism receives and uses materials necessary for the maintenance of life. This includes growth, the repair of worn out tissues and the liberation of energy.
6. Food has been defined as a palatable mixture of foodstuffs. A foodstuff is a material which is capable of being added to the body substance or which when absorbed into the bloodstream will prevent or reduce the wasting of a

necessary constituent of the organism. For the animal organism, these nutritive substances are: water, inorganic salts or so-called mineral matter, protein, carbohydrates, fats, cellulose, and vitamins.

The substances that enter into our foods, called nutrients or foodstuffs, and they naturally fall into two groups:

- (a) the inorganic nutrients ... water  
   mineral salts  
   cellulose
- (b) the organic nutrients ..... proteins  
   fats  
   carbohydrates

Only the second group can act as fuel foods, since they alone can be burned up to provide energy. It is easy to see that the more water, mineral salts and cellulose a food contains, the lower its fuel value will be while the richer it is in protein, fat and carbohydrate, the higher the food value will be.

Carbohydrates are the sugars and starches found in many of our foods.

Fats are the greasy substances familiar in pure form in butter, lard and food oils.

Proteins are the gluey substances which coagulate on heating, found in meats, legumes, egg, and cheese.

3. The function of the foodstuffs:

		<u>Dietary percentages</u>
Protein.....	Builds and repairs tissues .....	10-15%
Carbohydrates..	Gives heat and energy .....	65-70%
Fats .....	Gives heat and energy .....	15-20%
Water .....	Regulates body processes	
Mineral Matter.	" " "	
Vitamins .....	" " "	
Cellulose .....	" " "	

9. In producing heat or caloric values in the body:

- 1 gram of pure Protein yields 4 calories  
 1 gram of pure Fat yields 9 calories  
 1 gram of pure CHO yields 4 calories

10. The nutritive requirement for an adequate diet for any normal adult:

- (a) Fuel sufficient to supply the energy needed for internal and external work of the body.
- (b) Protein sufficient in quantity and quality to repair wear and tear on the tissues.
- (c) All the mineral elements required for upkeep of the tissues in amounts equal to body needs.
- (d) All the vitamins needed by the body in amounts liberal enough to promote health and high resistance to disease.
- (e) Water sufficient to replace that lost from the body daily.
- (f) Fiber or indigestible residue enough to produce normal evacuation at least once a day.
- (g) Base-forming foods at least sufficient to balance acid-forming foods.

11. Food consists of substances which the body can utilize to furnish energy for work, to build tissues or to regulate body processes. It will thus necessarily be an important factor:

- a. in promoting growth and building strong tissues.
- b. in " proper functioning of organs and tissues.
- c. in controlling weight.
- d. in " acid-base balance of the body.
- e. in preventing dietary deficiency diseases.



- f. in preventing constipation and intestinal putrefaction.
- g. in " indigestion and nervous irritability.
- h. in " functional and metabolic diseases which may be due to overeating.
- i. in " senility and prolonging life.

12. Overweight is associated with:

lack of ambition  
inefficiency  
inconvenience

and may lead to:

diseases of the heart, circulatory system and kidney  
diabetes  
lessened expectancy of life

Underweight is associated with:

nervousness and irritability  
easy fatigue  
lack of appetite  
indigestion  
lowered resistance to bacterial diseases

and may lead to:

anemia  
tuberculosis  
other infectious diseases  
lessened length of life

13. Foods that should be included in the daily diet to meet requirements of an adequate diet:

Meat, poultry or fish .....	1 or more servings
Milk .....	1 pint for adults 1 quart for children
Eggs.....	3 - 4 a week preferably one a day
Potatoes .....	1 serving a day
Vegetables .....	2 servings 1 green or yellow
Fruit .....	2 servings 1 citrus or tomato
Butter .....	2 tbsp. daily
Whole grain or "enriched" cereals and bread .....	$\frac{1}{2}$ of intake
Sugar, fats, etc.....	to complete calories

14. Relative importance of foods may be gained by the suggestion for purchase:

Divide your money into fifths:

- 1/5, more or less for vegetables and fruits
- 1/5, " " " " milk and cheese
- 1/5, " " " " meat, fish, eggs
- 1/5, " " " " bread and cereals
- 1/5, " " " " fats, sugars, other groceries and food adjuncts.

15. According to Dr. Frank G. Boudreau, a noted public health worker, there is a decrease in the steady growth in population which the U.S. has known, that birth rates are highest where social and economic status are lowest, and that there is a drift toward undermining the capacity for high intelligence. He believes that Nutrition, when accepted as a public health measure, will affect agriculture, industry, social conditions and cultural advancement. He believes

the successful promotion of this science and its application to the masses "hold out the promise of greater human vitality, longer life in its prime, higher cultural development, more social contentment, a more humane ordering of the universe and perhaps, as a result, a more peaceful world". 25.

16. The peak of mental development is attained only when the body develops to the full. Poor health may result in one of two extremes: the first, a lack of mental ability, or power of concentration, listlessness and fatigue; the second, an excess of nervous energy, irritability and instability of reactions. The former condition is often associated with an overweight body, poor muscular tone, edema of the tissues; with the latter may be found an underweight body, poor appetite, poor digestion and a tired and sad facial expression.

As a result of good physical and mental health, an individual will give an instant impression of bodily fitness. His alert glance, his ready attack on any problem presented, his ability to concentrate or to relax as occasion demands, and even more than these, a buoyant spirit are evidenced of life that is abundant physically.

17. The evidence that something like one-third of our people are under-nourished is finding a good deal of medical support, according to Dr. Sherman, who tells us that if we replace the average diet with an adequate diet we get a 10% increase in the active, virile life span. This would mean more to us in terms of human longevity than to wipe out cancer as a cause of death.

Children who have had a good nutritional start and who have gradually assumed responsibility for their own food habits are more likely to be both healthy and happy. Moreover they have a good chance of growing into vigorous adults ready and eager to carry on their share of the productive work of the country. The best nourished children the country has ever known can probably be found today in those families that have known what foods are needed for healthy growth and have been able to provide those foods. But in spite of all our knowledge of nutrition, and the progress we have made in applying it, many children in the U. S. today are undernourished.

Call it malnutrition, call it undernourishment, call it dietary deficiency, or what you will -- when men, women and children fail to eat the foods that give them full life vigor, they are in fact--starving.

18. Physical signs of good nutrition:  
The person whose nutrition is good presents an appearance of good health. His weight is in good proportion to his height, age and build. He is alert, vigorous and active. His skin is clear, smooth, soft, slightly moist, and somewhat pink; often there is a marked color of pink in the cheeks. The hair is plentiful and lustrous, not brittle or extremely dry. The eyes are bright and clear with no dark circles or rings under them, and the mucous membranes are pink and the tongue is red, uncoated and moist. The fat beneath the skin is firm and plentiful so that it cannot be raised in deep folds between the fingers. The muscles are firm and strong; their development is good throughout the body. The chest is broad and deep, with an expansion of not less than two and one half inches. The bones of the arms and legs are straight and well developed, with no enlargements of the joints. The teeth are clean and free from cavities, well formed, and enameled. The breath is sweet, the posture indicates vigor, the nervous system is stable, and the entire body functions properly.

At the top of the list, among those foods of unusually high value stand the proteins of milk and meat. Of distinctly lower value are the plant proteins as those of wheat, corn, peas, beans. These foods are either lacking or low in some of the essentials of the perfect protein. Just as a chain is as strong as its weakest link, so is a protein as valuable as the building stones which it provides in smallest amounts. When taken alone as the sole source of protein none of these grains will long maintain health and vigor. They must be supplemented by proteins from a different source.

2. McLester maintains that if a man would enjoy sustained vigor and would experience his normal expectancy, as well as contribute to the improvement of the race, he must eat a liberal quantity of good protein.
3. No two proteins are exactly alike, because of difference in structure. Variation in the quality of protein has resulted in their classification as complete, partially complete and incomplete, based upon their ability to support normal growth and to maintain life. Complete proteins support growth and maintain life; partially complete maintain life and incomplete fail to do either of themselves.
4. If we ate no protein, the tissues would slowly starve to death, even though plenty of carbohydrate and fat were available for fuel supply. This is true because protein must furnish material for tissue building and repair, as well as energy.
5. There is no substitute for protein, because the body must be built from protein-containing foods and therefore must be provided in the diet, not only for health, but for life itself.
6. Protein requirement:  
 1 gram per kilogram of body weight for adults and children.  
 This requirement will vary to some extent according to age, size, kind of protein eaten.
7. Disadvantages of High Protein Diet:                      Disadvantages of Low Protein Diet:  
 May result in:    May result in:  
 Stimulation to metabolism    Stunted growth  
 Disadvantageous in growth    Functional nervous diseases  
 "    " hot climates    Lessened efficiency and stamina  
 Intestinal putrefaction    Earlier senility  
 Strain on liver and kidneys  
 Lessened health and vigor
8. Hygiene of Protein Foods:
  - (a) Keep the use of protein foods down to a medium sized serving of one protein-rich food (exclusive of milk) in each meal.
  - (b) Milk is not a protein-rich food; adults should take at least 1 pint and children 1 quart daily.
  - (c) Do not take any considerable amount of protein-rich food along with fatty foods, as they make a combination which is hard to digest, and slows down digestion; do not cook such foods by frying (fried steak) for the same reason.
  - (d) Foods rich in protein take on a leathery consistency if cooked at too high a temperature. Special care is often necessary to insure slow cooking at low temperatures. The leathery texture of overcooked protein foods makes it difficult for the digestive juices to penetrate them, hence they are hard to digest.



## CARBOHYDRATES AND FATS

27.

1. Carbohydrates and Fats are usually considered together as they are the fuel food. It is upon these two classes of nutrients that we depend for our heat and energy.
2. The energy requirement of a person for 24 hours or for a shorter period can be determined with a high degree of accuracy. This figure is the sum total of
  - a. the basal metabolism
  - b. the energy liberated in exercise or work
  - c. The energy required for the digestion of food
3. Carbohydrate is the most economical and readily available source of energy for the accomplishment of work and that labor can be more efficiently performed when the diet consists largely of this foodstuff. Among the common carbohydrates are sugars and starches.
4. More Carbohydrate foods are used by the body to supply its energy needs than other nutrients. This is because:
  - a. the body can use them more readily
  - b. they are found more widely distributed in nature than any other nutrient and are therefore more economical
  - c. they can be more completely oxidized and their waste products are more easily disposed of.
5. Requirement of Carbohydrate:  
Calculating on the basis of body weight, from 4 to 6 grams of Carbohydrate per kilogram of body weight per day.
6. Disadvantages of excess Carbohydrate intake:
  - a. In the form of starchy foods:  
Often leads to constipation
  - b. In the form of concentrated sweets:  
May lead to gastrointestinal disturbances, favoring fermentation and promoting gas formation.
  - c. Storage as a dipose tissue which leads to:  
diabetes  
cardiac (heart) disturbances  
kidney disturbances
7. Hygiene of Carbohydrates:
  - Of Sweets:
    - a. Keep the total amount of sugar in the diet low and take only small amounts of the more concentrated sweets.
    - b. Avoid eating candy between meals, but if it is taken on an empty stomach drink 1 - 2 glasses of water.
    - c. Take most sweets in more dilute forms, such as fresh fruits.
    - d. Learn to like foods less sweet.
  - Of Starchy Foods:
    - a. Do not eat more than 2 foods rich in starch at the same meal.
    - b. Chew starchy foods thoroughly.
    - c. Avoid soft, doughy breads, doughs soggy in texture, and flour mixtures rich with fat, especially fried foods which have absorbed much fat in cooking. All of these foods are hard to digest.
    - d. Take at least some of the cereal foods in the form of the less highly milled products - whole wheat breads and breakfast foods.

## PAGE

1. Fats are widely distributed in nature and are an excellent source of energy, but are not so readily or liberally used for carrying on the work of the body.
2. Although fats are finally quite completely digested and absorbed, they are digested somewhat more slowly than the carbohydrates and proteins, and have a decided action on slowing down the digestion of the other foodstuffs.
3. Aside from energy production function, fats are valuable as:
  - a. padding around the vital organs
  - b. subcutaneous fat (fat layer under the skin) to conserve body heat
  - c. carriers of Vitamins A,D,E
  - d. lubricants to promote good elimination of waste material from body
  - e. phosphorus-bearing nutrients (needed for brain and nerve cells)
  - f. depressors of the secretion of HCl (hydrochloric acid of the stomach)
  - g. as dietary reinforcing agents.
4. Requirement of fats per day:  
1 - 2 grams per kilogram of body weight per day.
5. Disadvantages of excessive Fat intake:
  - a. Digestion of fat not easily handled
  - b. Produces acid condition of the body
  - c. Deposits fat around heart, kidneys, etc., causing them to be less active
  - d. Leads to overweight.

1. Increasing recognition is being accorded the mineral elements of food and the disabilities which accompany their deficiency. Some of the Mineral Elements found in the body are, no doubt, of chance occurrence, but others are known to be essential to both structure and function.
2. Three chief purposes are:
  - a. they contribute to the supporting framework of the body and teeth.
  - b. they form an important part of cell structure.
  - c. they influence function of the tissues through the blood.
3. Conditions affecting availability of Mineral Elements in foods:
  - a. the peel of fruits and vegetables and the hull of grain are rich in Minerals. These are lost in great part in preparation of the food for the table.
  - b. In cooking, much of the Mineral content is dissolved out in the cooking water and is discarded.
  - c. Sometimes the mineral in the food is unavailable to man because of combination with some other substances.
4. About 3.5% of the body weight is composed of Mineral Elements, which must be furnished in utilizable form by our food if we would grow and thrive.
5. Minerals are needed:
  - a. for replacement
  - b. for building new tissues
  - c. for regulating the body processes
6. Minerals required for positive health:

Iron.....	blood
Copper.....	blood
Manganese.....	body processes
Zinc.....	growth
Chlorine.....	blood, gastric juice
Iodine.....	thyroid gland
Sulfur.....	cells, glands
Calcium.....	bones, teeth, blood
Phosphorus.....	bones, cells, blood
Magnesium.....	bones, tissues
Sodium.....	body fluids
Potassium.....	tissues, glandular secretions
Fluorine.....	bones, teeth
Cobalt.....	) In minute quantities for normal functioning of the body
Silicon.....	
Aluminum.....	
Perhaps others.....	
7. Haphazard provision of Minerals is unwise, because of varied food habits.
8. Results of Mineral Insufficiency:

Calcium:	Poor development of bones and teeth, rickets, nervousness, retarded growth
Phosphorus:	Poor development of bones and teeth, Rickets, Retarded growth.
Iron:	Anemia, low vitality, retarded growth.
Iodine:	enlarged thyroid, lowered mental and physical activities, muscles tend to be weak and flabby.
9. See outline in Proudfit: Nutrition and Diet Therapy, for more complete discussion.



WATER

1. Water is the most urgently needed of the foodstuffs, which need can be measured by the exceedingly promptness with which symptoms of deprivation appear and their extreme gravity. As a rule death results within 60-72 hours in water deprivation.
2. Water is required for the transportation to the cells of the nutritive elements and carried away waste products; supplied liquid for body fluid; regulates body temperatures.
3. 70% of the body weight is water.
4. Too little water often results in headaches, nervousness, reduced secretion of digestive fluids, which may lead to vomiting, inability to digest and absorb food, constipation and intestinal putrefaction. These symptoms clear up when more water is taken, for a moderate amount of water taken along with the food promotes digestion and absorption by stimulating the flow of digestive juice and diluting the contents of the stomach and intestines. Water in itself yields no energy to the body, while it is an important constituent to all tissues and acts in many ways to promote and regulate body processes.
5. The average adult needs 4 to 8 glasses of water daily (in addition to what he gets in foods and beverages) in order to make up his "water balance", and to promote digestion, and maintain proper dilution of salts in the blood and tissues. This may be taken either between meals or at the meal. The drinking of moderate amounts of water with meals tends to increase the secretion of digestive juices and promote digestion, unless it is iced or used to wash down unchewed food, when it slows down digestion.
6. Absorption of water takes place in the large and small intestines. Water leaves the body through the kidneys, lungs, skin, large and small intestines.
7. Sources of water for the body;
  - a. ingested fluids
  - b. water contained in solid foods
  - c. water produced in metabolism
8. Suggestions of times and amounts of water-drinking:
 

1 - 2 glasses on rising	1 - 2
1 glass before or during meal	1
1 glass in middle of the morning	1
1 glass in middle of the afternoon	1
	6 - 7 glasses

1. Vitamins are chemical substances which are small, ridiculously small, in the amounts required, but profoundly influence the person's health and well-being. The lower animals are accustomed to derive their nourishment from fresh native foods, such as plants and the flesh of other animals. When they are made to live upon purified, highly refined foods, nutritional failure results and characteristic diseases often ensue.
2. All the well defined vitamins have been isolated in pure crystalline form, and are now being identified by their chemical names.
3. Our daily diet should provide most of the vitamins we need, but this depends upon how well we choose and prepare the food we eat each day.
4. Vitamins are body regulators. Their action is similar to that of certain secretions of the ductless glands, and certain mineral elements, which are likewise needed in very small amounts, but have a powerful effect in controlling or co-ordinating body processes. Since they are organic substances, they can be destroyed by heat and oxidation, if sufficiently severe.
5. In general, we may say of all the Vitamins that they are needed by the animal body for:
  - a) Growth
  - b) Reproduction
  - c) Maintaining health and vigor through promoting:
    1. Normal functioning of the digestive tract
    2. Normal nutrition
    3. Health of tissues
    4. Resistance to bacterial diseases
  - d) Preventing deficiency diseases.

Note:

See: Proudfit: Nutrition and Diet Therapy: Chap. VII  
Vitamin Manual-P. 56-60  
Vitex Vitamin Chart

1. Vitamin A is a fat-soluble vitamin, which was discovered by McCollum and Davis when they observed that young rats and other animals failed to grow and sickened unless butterfat or some other product carrying this vitamin was added to their diet.
2. Vitamin A has a precursor--the yellow pigment, carotene. It is widespread in nature, being associated with chlorophyll in the green leaves of plants. It is also found in the yellow vegetables: carrots and sweet potatoes.
3. This vitamin is stored in the liver (95%) and small amounts in kidneys and lungs.
4. Evidences of deficiency:
  - Xerophthalmia--eyelids swell and are sticky and scabby
  - Stunted growth
  - Skin dry, rough, cracked. Increased pigmentation
  - Nervous system affected by jerky gait, cramps, dulling of touch and temperature senses.
  - Atrophy of epithelial cells.
5. Subclinical symptoms of deficiency:
  - Nightblindness
  - Change in cell structure, which become dry and inactive
  - Lowered resistance to skin infection and respiratory diseases
  - Enamel on teeth is not properly produced and formed
  - Bone tissues change
6. Foods Valuable for Vitamin A:
 

<ul style="list-style-type: none"> <li>6/ Cod Liver Oil</li> </ul>	<ul style="list-style-type: none"> <li>2/ Asparagus</li> <li>Bananas</li> <li>Brussels Sprouts</li> <li>Cantaloupe</li> <li>Cherries (fresh)</li> <li>Corn - yellow</li> <li>Cornmeal - yellow</li> <li>Dates</li> <li>Kidney</li> <li>Lettuce</li> <li>Milk - whole</li> <li>Oranges</li> <li>Peas - green</li> <li>Pineapple (fresh)</li> <li>Squash (summer)</li> <li>Sweet Potatoes</li> </ul>	<ul style="list-style-type: none"> <li>1/ Almonds</li> <li>Apples</li> <li>Beans</li> <li>Bread (made with milk)</li> <li>Bread - whole wheat</li> <li>Cabbage</li> <li>Cauliflower</li> <li>Cottage Cheese</li> <li>Cucumbers</li> <li>Eggplant</li> <li>Figs</li> <li>Fish - fatty</li> <li>Grapefruit</li> <li>Meat - fatty</li> <li>Peanuts</li> <li>Pears</li> <li>Pecans</li> <li>Potatoes - white</li> <li>Strawberries</li> <li>Walnuts</li> </ul>
<ul style="list-style-type: none"> <li>5/ Beet greens</li> <li>Chard</li> <li>Dandelion Greens</li> <li>Kale</li> <li>Spinach</li> <li>Turnip Greens</li> </ul>		
<ul style="list-style-type: none"> <li>4/ Liver</li> <li>Broccoli</li> <li>Collards</li> <li>Apricots</li> </ul>		
<ul style="list-style-type: none"> <li>3/ Butter</li> <li>Carrots</li> <li>Cheese</li> <li>Cream 40%</li> <li>Eggs</li> <li>Peaches - yellow</li> <li>Poppers</li> <li>Prunes</li> <li>Squash - winter</li> <li>Pumpkins</li> <li>Sweet Potatoes</li> </ul>		



1. The story of Vitamin B Complex had its beginning in the story of beriberi. The recognition by Takaki, a physician of the Japanese navy that faulty diets were responsible for the enormous number of cases of beriberi among the sailors of his country and his success in almost eliminating the disease by means of an improved ration were epoch making. Later beriberi was produced in pigeons fed on polished rice.

2. Members of the B-Complex which have been found to be effective in man:

- B<sub>1</sub> - Thiamin
- B<sub>2</sub> - Riboflavin
  - Niacin or Nicotinic Acid
  - P-P Factor (Pellagra-preventive)
  - Pantothonic Acid

Other members of the B-Complex are still under consideration as curative or preventive in man. Numerous members have found to be effective in rats.

3. THIAMIN • Vitamin B<sub>1</sub>

1. Thiamin cannot be stored in the body, so we must depend upon our food for our current supply. This vitamin is water-soluble.

2. Evidences of Deficiency:

- Abnormal functioning of the digestive tract
- Heart muscles affected
- Diseases nerves - Neuritis
- Beriberi

3. Subclinical Symptoms:

- |  |                       |
|--|-----------------------|
| Loss of appetite                               | Numbness and tingling |
| Loss of weight and strength                    | Depression            |
| Muscle cramps                                  | Irritability          |
| Diarrhoea, abdominal pains                     | Distractibility       |
| Palpitation                                    | Apprehension          |
| Labored breathing                              | Forgetfulness         |
| Edema  | Nausea                |
| Burning sensation in various parts of the body | Anemia                |
| Headache                                       | Nervousness           |

4. Food Sources for Thiamin:

- |                      |                    |              |                   |               |
|----------------------|--------------------|--------------|-------------------|---------------|
| 5/ Wheat Germ        | 2/ Asparagus       | Potatoes     | 1/ Apples         | Peaches       |
| Yeast Extract        | Broccoli           | Raspberries  | Bananas           | Pears         |
| Dried Brewer's Yeast | Cabbage            | String beans | Beets             | Peppers       |
|                      | Cauliflower        | Tomatoes     | Blueberries       |               |
|                      | Carrots            | Watercress   | Blackberries      |               |
| 4/ Whole Grain Bread | Corn               |              | Brussol's Sprouts |               |
| Whole Grain Cereal   | Dried Fruits       |              | Canataloupe       |               |
| Nuts                 | Eggs               |              | Celery            | Pumpkins      |
| Legumes              | Lettuce            |              | Cheese            | Radishes      |
| Oysters              | Meat (except pork) |              | Cherries          | Raisins       |
| Liver                | Milk               |              | Cream             | Squash        |
| Kidney               | Okra               |              | Cucumbers         | Straw-berries |
| Pork                 | Oranges            |              | Eggplant          |               |
|                      | Parsnips           |              | Grapofruit        |               |
| 3/ Leafy Vegetables  | Pears              |              | Grapes            | Turnips       |
|                      | Pineapple          |              | Lemons            | Water-melons  |
|                      | Plums              |              | Onions            |               |

1. Riboflavin is a water-soluble yellow-green fluorescent pigment.
2. Riboflavin is stored in the liver, kidney and heart, but the body guards this store. It is therefore necessary to constantly supplement the store.
3. Evidences of Deficiency:
  - Impaired digestion
  - Stunted growth
  - Nerve degeneration
  - Early senility (old age)
4. Subclinical Symptoms:
  - Split lips (in corner of mouth)
  - Lessened vigor
  - Loss of hair
  - Scaling of skin around ears, mouth and nose
  - Nutritional cataracts
  - Retarded growth
  - Sore eyes
  - Nervous disturbances
5. Food Sources for Riboflavin:
 

<ul style="list-style-type: none"> <li>5/ Kidney Yeast (Dry)</li> <li style="padding-left: 20px;">Liver Yeast Extracts</li> <li>4/ Cheese Peanuts</li> <li style="padding-left: 20px;">Egg Yolk Prunes</li> <li style="padding-left: 20px;">Heart Turnip Gr.</li> <li style="padding-left: 20px;">Kale Wheat germ</li> <li style="padding-left: 20px;">Legumes (dried)</li> <li style="padding-left: 40px;">yeast-moist</li> <li>3/ Beet Greens</li> <li style="padding-left: 20px;">Broccoli</li> <li style="padding-left: 20px;">Chard</li> <li style="padding-left: 20px;">Dandelion Greens</li> <li style="padding-left: 20px;">Eggs</li> <li style="padding-left: 20px;">Endive</li> <li style="padding-left: 20px;">Fish</li> <li style="padding-left: 20px;">Lima Beans</li> <li style="padding-left: 20px;">Meat, Lean</li> <li style="padding-left: 20px;">Mustard Greens</li> <li style="padding-left: 20px;">Nuts</li> <li style="padding-left: 20px;">Spinach</li> <li style="padding-left: 20px;">Water Cross</li> <li>2/ Apricots - Dried</li> <li style="padding-left: 20px;">Asparagus</li> <li style="padding-left: 20px;">Bananas</li> <li style="padding-left: 20px;">Cabbage - Green</li> <li style="padding-left: 20px;">Carrots</li> <li style="padding-left: 20px;">Cauliflower</li> <li style="padding-left: 20px;">Cream Cheese</li> <li style="padding-left: 20px;">Figs - Dried</li> <li style="padding-left: 20px;">Lettuce - Green</li> <li style="padding-left: 20px;">Milk</li> <li style="padding-left: 20px;">Oysters</li> <li style="padding-left: 20px;">Peas - Green</li> </ul>	<ul style="list-style-type: none"> <li>1/ Apples</li> <li style="padding-left: 20px;">Apricots - Fresh</li> <li style="padding-left: 20px;">Bacon</li> <li style="padding-left: 20px;">Beets</li> <li style="padding-left: 20px;">Blueberries</li> <li style="padding-left: 20px;">Celery</li> <li style="padding-left: 20px;">Corn - Green</li> <li style="padding-left: 20px;">Cream</li> <li style="padding-left: 20px;">Dates</li> <li style="padding-left: 20px;">Eggplant</li> <li style="padding-left: 20px;">Grapefruit</li> <li style="padding-left: 20px;">Locks</li> <li style="padding-left: 20px;">Lemons</li> <li style="padding-left: 20px;">Onions</li> <li style="padding-left: 20px;">Oranges</li> <li style="padding-left: 20px;">Peaches</li> <li style="padding-left: 20px;">Pears</li> <li style="padding-left: 20px;">Pineapple</li> <li style="padding-left: 20px;">Potatoes - White</li> <li style="padding-left: 20px;">Pumpkins</li> <li style="padding-left: 20px;">Radishes</li> <li style="padding-left: 20px;">String Beans</li> <li style="padding-left: 20px;">Tomatoes</li> <li style="padding-left: 20px;">Turnips</li> <li>Watermellon</li> <li>Raisins</li> <li>Squash</li> <li>Sweet Potatoes</li> <li>Whole Wheat Bread</li> <li>Whole Wheat Cereal</li> </ul>
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1. Nicotinic Acid is part of the Vitamin B-Complex, and like other members of the vitamin group, is water soluble.
2. Evidences of Deficiency:
  - Pellagra
  - Black tongue (in dogs)
  - Skin and mouth lesions
  - Inflammation of alimentary tract
  - Nervous system affected
3. Subclinical signs
 

Loss of appetite and strength	Numbness
Indigestion	Nervousness
Diarrhoea	Palpitation
Abdominal pains	Depression
Dizziness	Irritability
Headache	
4. Food Sources - Same as other members of the B-Complex group.

## FOODS LOW IN VITAMINS

Lard	Sugars
Salt Pork	Syrups
Bacon	Honey
Some Margarines	Candies
Hardened Vegetable Oils	Cakes
as: Crisco, etc.	Preserves
Vegetable Oils	White Flour
Olive Oil	White bread made with water
Cottonseed Oil	Refined Breakfast Cereals
Corn Oil	Cornmeal - highly milled
Meat Extracts	Cornstarch
Gelatin	Tapioca
Egg White	



ASCORBIC ACID \* (VITAMIN C)

1. Scurvy, the scourge of sailing vessels was found to be cured and prevented by the use of citrus fruit juices. This led to a further study of the presence for Ascorbic Acid in other foods.
2. Vitamin C or Ascorbic acid is water-soluble, and cannot be stored or manufactured in the body. It is a very readily destroyed by heat and exposure to the air.
3. Evidences of Deficiency:
  - Scurvy
  - Osteodentin
  - Hemorrhages in tissues
  - Swelling of the joints
  - Affects: teeth, bones, blood vessels
4. Subclinical Symptoms:
 

<ul style="list-style-type: none"> <li>Dental caries</li> <li>Pyorrhea</li> <li>Gum infection</li> <li style="padding-left: 20px;">swelling &amp; bleeding</li> <li>Anomia</li> <li>Malnutrition</li> <li>Infection</li> <li>Loss of weight</li> <li>Shortness of breath</li> </ul>	<ul style="list-style-type: none"> <li>Easily bruised</li> <li>Nervous disorders</li> <li>Loss of appetite</li> <li>Infants growth</li> <li>Impaired growth</li> <li>Tender joints</li> <li>Lowered resistance to</li> <li style="padding-left: 20px;">Tuberculosis &amp; diphtheria</li> <li>Sallow complexion</li> <li>General lack of resistance to infection</li> </ul>
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5. Food Sources for Ascorbic Acid:
 

<ul style="list-style-type: none"> <li>3/ Cabbage - raw</li> <li>Citrus fruits</li> <li style="padding-left: 20px;">Grapofruit</li> <li style="padding-left: 20px;">Lemons</li> <li style="padding-left: 20px;">Oranges</li> <li>Horseradish</li> <li>Parsley</li> </ul>	<ul style="list-style-type: none"> <li>2/ Asparagus</li> <li>Broccoli</li> <li>Brussel's Sprouts</li> <li>Cabbage - cooked</li> <li>Cauliflower</li> <li>Cranberries</li> <li>Gooseberries</li> <li>Huckleberries</li> <li>Kohlrabi</li> <li>Leafy Vegetables</li> <li style="padding-left: 20px;">Beet Greens</li> <li style="padding-left: 20px;">Dandelion greens</li> <li style="padding-left: 20px;">Chard</li> <li style="padding-left: 20px;">Kale</li> <li style="padding-left: 20px;">Mustard Greens</li> <li style="padding-left: 20px;">Spinach</li> <li style="padding-left: 20px;">Turnip Greens</li> <li>Loganberries</li> <li>Onions - raw</li> <li>Peas - Green</li> <li>Pineapple - Fr. or Ca.</li> <li>Radishes</li> <li>Rhubarb</li> <li>Turnips - cooked</li> </ul>	<ul style="list-style-type: none"> <li>1/ Apples</li> <li>Apricots - Fresh</li> <li>Bananas</li> <li>Blueberries</li> <li>Celery</li> <li>Cherries</li> <li>Corn</li> <li>Cucumbers</li> <li>Eggplant</li> <li>Endive</li> <li>Milk - raw</li> <li>Okra</li> <li>Oysters - Raw</li> <li>Parsnips</li> <li>Peachos</li> <li>Plums</li> <li>Potatoes - Sweet</li> <li>Potatoes - white</li> <li>Pumpkins</li> <li>Squash</li> <li>Watermelon</li> </ul>
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1. Vitamin D, sometimes called the "sunshine vitamin", is fat-soluble. Fortunately the body can synthesize this vitamin for itself, so that we are entirely dependent upon our food for it. The body can make it from a fat-like substance in or near the skin when sunlight strikes directly on the skin, if no clothing interferes. These light rays are absorbed by clothing, window glass and by particles of soot or moisture in the air of cities. Little of them gets through to the average city dweller, especially in the winter. Vitamin D can be stored in the body to some extent.
2. This vitamin is especially essential to children to enable them to assimilate the mineral elements and to deposit Calcium and Phosphorus in the bones and teeth so that these tissues will be strong.
3. Foods have been treated by irradiation from a sun lamp to increase the Vitamin D content.
4. Evidences of Deficiency:
  - Rickets:
    - Enlargement of the wrist, knees, ankles
    - Bowed legs
    - Beading of the ribs
  - Osteoporosis
  - Convulsions
  - Curvature of the spine
  - Soft bones
5. Subclinical Symptoms:
 

Tetany	Retarded growth
Bad teeth	Restlessness
Soft bones	Lack of vigor
Brittle bones	Hay fever
Chronic arthritis	Infantile paralysis
Psoriasis	Pain in joints
Constipation	
6. Food Sources of Vitamin D:
  - a) Does not occur in food to any extent.
  - b) Eggs, liver, milk and fish oils (salmon, herring) are the only natural food sources, but they contain such a small amount that it is doubtful if they should be considered of practical value as a source.
  - c) Foods that have been irradiated or fortified with vitamin D are good sources.
  - d) Direct Sources:
    - Cod Liver Oil, Viosterol, sunshine.

Cellulose and Hemicellulose

1. The food of man, like that of the lower animals must contain "roughage"-- not only because of the vitamin-carrying properties of the rough native foods, such as vegetables, but for other reasons as well.
2. Roughage or cellulose stimulates the membrane of the large intestines for evacuation of waste products. The food that leaves the most satisfactory type of residue contains a great deal of dead cellulose or related material. The results are still better if fruits are eaten with the peeling.
3. Three average servings of fruit and three average servings of vegetables with whole grain bread and breakfast cereals will provide 5 - 6 grams of fiber which is sufficient to supply the needs of the average person.
4. Though it can be of no use to the body as a whole since the human digestive tract cannot digest and absorb it, cellulose is really necessary as a sort of body regulator in order to have the functions of digestion and excretion run smoothly.
5. Cellulose, of which the fibrous parts of the plants are made, resist the action of the digestive juices and remain as insoluble, undigested residue at the end of the normal digestive process.

6. High Residue Foods

Raw fruits, especially  
with skins & seeds  
Raw vegetables  
Cooked vegetables  
Onions  
Parsnips  
Oyster plant  
Leafy greens  
Woody stems  
Peas, beans, corn  
Whole grain cereals  
Whole wheat bread  
Bran bread

Softer Residue Foods

Pulp of raw fruit  
Cooked fruit  
Cooked vegetables  
Cauliflower  
Asparagus  
Broccoli tops  
Beets  
Strained tomatoes  
Chopped spinach  
Whole grain cereals  
cooked a long time:  
Oatmeal  
Wheatena  
Shredded wheat  
Puffed wheat  
Brown Rice

Low Residue Foods

Sugar  
Milk  
Fats  
Meats  
Potatoes without skins  
White bread  
Highly milled cereals  
Cream of wheat  
Corn flakes  
Cornmeal mush  
Hominy  
Grapenuts  
Pearled barley  
Puffed rice  
White rice



1. Necessity of Milk in the Diet:

Milk is the most important of all foods. It is indispensable to the infant, it is essential to the proper development of the young child, and it should form invariably the chief article of the diet of the older child. For the adult, too, it is always a valuable, and at times, a well-nigh essential adjunct to diet. Milk has never been accorded adequate place in the American dietary.

2. Average Composition of Cow's Milk:

Water.....	87.7%	Ash Content.....	0.7%
Solids.....	12.2	Calcium.....	.12
Fats.....	3.4	Magnesium.....	.012
Casein.....	2.7	Potassium.....	.143
Milk Sugar.....	4.7	Sodium.....	.051
		Phosphorus.....	.093
		Chlorine.....	.106
		Sulfur.....	.034
		Iron.....	.00024

3. Components of Milk:

**Protein:** In the complete form. It contains 22 Amino Acids.

**Carbohydrate:** Lactose (milk sugar) It is this ingredient, which when acted upon by bacteria, produce Lactic Acid milk or Sour Milk.

**Fats:** In the form of Cream.

Vitamins:	A	Thiamin (B <sub>1</sub> )	Ascorbic Acid (C)	Riboflavin (B <sub>2</sub> )
Whole	///	///	- to //	///
Skim	///	///	- to //	///

Key: - indicates no appreciable amount  
 " " fair vitamin content  
 // " good source  
 /// " excellent source

Vitamin content depends upon cow's diet. Milk can be and is fortified with D.

4. Digestibility of Milk:

- Milk reaches the stomach in a fluid form and is changed into a solid form of small globules.
- Milk is the most digestible of all foods. When taken by adults in large quantities, milk is more completely digested if mixed with other foods; a graham cracker, for instance, probably enhances the nutritive value of a glass of milk taken between meals.

5. Nutritive Value of Milk

- The great nutritional value of milk is due to the high quality of its proteins, to its richness in mineral elements, and vitamins, and to the easy digestibility of its fats.
- It protects against nutritional failure and therefore is classed among the protective goods.

6. Standards of Milk:

Grade	Raw	Pasteurized
A	200,000 per cc (indiv.)	30,000 per cc - non-pathogenic
B	200,000 per cc (clump)	50,000 per cc "
C	1,000,000 per cc	50,000 per cc "
Certified	10,000 per cc (about 1/365 of all milk produced)	

7. Purchasable Forms of Milk:

A - Whole Milk: Raw, Pasteurized, Homogenized, Irradiated, Vitamin D.

B - Skim Milk: Raw, Pasteurized

C - Dried Milk (KLM): Whole or Skim.

In reconstructing dried milk, sprinkle the dry milk on the surface of the water and mix with a spoon. Let stand for 5 min. then beat.

1 c. water plus 3 tbsp. powder will yield 1 cup skim milk

1 quart of water plus 3/4 cup powder will yield 1 quart milk

D - Treated Milk

Vitamin D or Irradiated

Acidophilus

Homogenized

Lactic Acid

E - Evaporated: 1/2 to 2/5 of former volume; water removed. Can be reconditioned by adding water.

F - Condensed: Evaporated to 2/5 of former volume. 16% cane sugar added.

8. Experimental Recipes:

1. Use in Dietary:

Grains furnish the bulk of the world's food supply. The richness of grain in carbohydrate, and protein, the facility with which it may be stored and transported, and the ease with which it is prepared for the table all combine to make it a stable food. No other food furnishes an abundance of carbohydrate and protein so cheaply.

In America, wheat is the grain largely used; rye and barley come next in order of importance, and then Maize (Indian corn) and oats. Rice is consumed in such enormous amounts in oriental countries that, taking the world as a whole, it must be regarded as the most important grain.

2. Wheat:

The wheat kernel consists of 82% starch. The wheat germ is rich in protein of excellent quality, containing Vitamins A, Thiamin, E, and Riboflavin, and has an abundance of mineral elements. It also contains an oil. Surrounding the whole are several layers of bran; this is richer in ash than any other part of the kernel.

Flours can be obtained as: Graham, which contains the whole kernel, finely ground. It is highly nutritive and laxative. Whole grain or Whole Wheat flour is similar to Graham flour. Patent flour is the highest grade white flour. The white flour may be obtained in many grades.

3. Rice: This grain can be obtained in three forms:

- a. unhulled, with the husk adhering to the kernel.
- b. cured: without the husk, but retaining the bran.
- c. polished: the husk, germ and bran all removed. Polished rice is markedly deficient in respect to the quality of its protein and the quantity of its vitamins and minerals.

4. Nutritive Value of Grains:

- a. The carbohydrate of grain is its chief nutritive constituent, and man's main carbohydrate food the world over.
- b. Vitamin A is present in only small amounts.  
Thiamin is contained in abundance in the whole grain, but is removed almost entirely in the milling process.  
Ascorbic Acid is present only in germinating seeds.  
Vitamin E is present in the whole grain, especially in the wheat germ oil.  
Riboflavin is also present in the whole grain.
- c. Mineral constituents of grains are held chiefly in the embryo, and in the outer layers of the kernel. White flour contains only about 1/10 to 1/5 of the original ash. It is especially poor in calcium, iron, sodium, phosphorus and chlorine.
- d. The cellulose of the outer layers of the kernel is sometimes of value as a stimulant to peristalsis. The laxative effect of bran is not due alone to cellulose, but also to some extent to the oil of the grain or perhaps to still other unknown laxative substances.



- c. Whole Wheat and similar flours have become popular because of their superiority in protein, vitamin and mineral content, as well as because of their laxative properties. Whole wheat and Graham flours are not as easily digested as the finer flours; they are also inferior in keeping qualities.

1. Fish does not differ materially from other forms of meat. Its proteins are equal in nutritive value to those of other animals. It usually contains less fat and more water.
2. Purchasable forms:
  - Dried: salt is applied to the fish for dehydration. In some places the salt is added as soon as the fish are caught; later further water is removed by pressure and drying by air.
  - Canned: The forms of canned fish with which we are most familiar are: codfish, salmon, tuna and sardines. Most of them are salted then heated and the can is sealed. Some also have oil or tomato dressing added.
  - Fresh: In seacoast towns the fresh fish may be either fresh or salt water fish. Inland towns have only fresh water fish, or in more recent times, salt water fish shipped by refrigeration.
  - Shellfish: Oysters, clams, shrimp, lobsters and crabs. These fish are very perishable, and are therefore known only in and near seacoast towns.
3. Nutritive Value of Fish:
  - Proteins: Fish, being a so-called form of meat are classified as a complete protein food. Their protein is of the highest quality.
  - Carbohydrates: Fish contain fat in varying amounts. Tuna and salmon being among the highest. The shellfish contain little or no fat.
  - Mineral Matter: Fish have about the same amount of calcium and phosphorus, but are lower in iron. Salt water fish should be included in the diet primarily for their iodine content.
  - Water: Fish are high in water content, causing the flesh to be less firm than meat. This factor being an important consideration in the preservation, as they are easily spoiled, often causing epidemics of food poisoning.
  - Vitamins: Small amounts of A, rich in Thiamin and fair amounts of D.
4. Digestibility: The digestibility and utilization of fish and shellfish is about the same as that of beef and other meats.

1. The value of vegetables as body-regulators cannot be over-emphasized, because their contribution of minerals, vitamins, cellulose and water is of the utmost importance to health and well-being. Vegetables, as a rule, are not so universally liked as meat; but if vegetables are properly prepared and attractively served, prejudice against them should disappear.

2. Nutritive Value of Vegetables:

**Carbohydrates:** The chief source of energy in vegetables is starch. Some vegetables contain as much as 5% of their carbohydrate in the form of sugar. One method of classification of vegetables is on their carbohydrate content.

**Protein:** Of the vegetables, dry legumes contain the greatest amount of protein. The biological value of their protein is not as that of milk, eggs and lean meat (except soybeans). However, it is abundant and when combined with milk or cheese, furnishes the essential growth material.

**Minerals:** As a whole, vegetables are considered a good supplementary source of calcium. Copper is found in roots, tubers and legumes. Legumes are also a good source of phosphorus, potassium, iron and calcium. Most green vegetables are valuable sources of iron.

**Vitamins:** As a source of vitamins, vegetables are outstanding in nutritional value. Vitamin A occurs as carotene in certain yellow and some green vegetables. Of the leafy varieties, the darker-colored have a higher vitamin A content than those with leaves. Vegetables are probable sources of thiamin, while riboflavin occurs in such vegetables as beet tops, turnip tops and other leafy varieties. Most vegetables, if eaten raw, must be considered as sources of ascorbic acid. Tomatoes are recognized as the outstanding source of ascorbic acid. Because of the large quantities of potatoes eaten, they are considered a good source of this vitamin.

3. Classification of Vegetables:

- a) Leaves: lettuce, cabbage, spinach, turniptops, beet tops, Brussels sprouts, etc.
- b) Flowers: broccoli, cauliflower.
- c) Fruit: squash, eggplant, green pepper, cucumber, tomato, okra, pumpkin, etc.
- d) Stems: celery, asparagus, small green onion, rhubarb, etc.
- e) Roots: carrots, beets, turnips, radishes, sweet potatoes, etc.
- f) Tubers: Irish potatoes, Jerusalem artichokes
- g) Bulbs: mature onions
- h) Seeds: beans, peas, corn (green)

4. Place in the Diet:

- a) The iron, and copper found in such vegetables as spinach, lettuce, lima beans, etc., assist in the building of the



red blood cells.

- b) Vegetables and fruits act as neutralizing agents in the body, furnishing the alkaline salts which help to maintain the proper degree of alkalinity in the blood. They likewise furnish salts necessary to some of the digestive juices and act as a mild laxative, thus promoting good elimination.
- c) The cellulose which forms the greater part of the stems, leaves, skin, membrane and other fiber of vegetables and fruits mechanically stimulates peristalsis in the intestinal tract by providing the necessary bulk to the food mass. It is almost impossible to furnish sufficient bulk to the diet without the use of vegetables and fruits.
- d) The vitamin content of vegetables and fruits makes them invaluable as promoters of growth and builders of resistance to disease.
- e) The high water content of some fruits and vegetables makes them especially useful in bringing fluid into the diet, which under certain conditions is particularly desirable.

1. Liver and kidney are especially high in nutritional value, being rich in iron, copper and in Vitamin A, and containing to a smaller extent vitamins Thiamin and Riboflavin. Both of these organs contain substances which assist the body in building and replenishing red blood cells, which property gives them an outstanding place in the treatment of anemia. Calf's liver is more delicate in flavor than the liver either of beef or pork; since the relation is in demand. Raw liver is somewhat richer than cooked liver in minerals and vitamins, but is less palatable.
2. Sweetbreads, which are the thymus glands or the pancreas of the calf, are considered a great delicacy. They are more or less expensive but are delicate in flavor and texture and are easily digested.
3. The glandular or organ meats furnish more complete food than do the supporting and contractile tissues. They provide appreciable amounts of Vitamin A, thiamin, and riboflavin, with small amounts of ascorbic acid, and the quality of protein is high. McCollum and his associates studied the nutritive value of the protein of kidney, liver and muscle. They found that kidney has the greatest nutritive value, that liver is second and that muscle is third. They considered the protein of kidney, liver and milk as being most nutritional. The superiority of the organs has seldom received adequate recognition.

## EGGS

1. The suitability of Eggs for growth rank next to milk. Because of this and the richness in iron, it serves as an excellent adjunct to milk in the diet of the child and of the adult recuperating from illness. The yolk is much more nutritive than the whites, it carries the vitamins and a large part of the mineral elements and about seven times as much energy.
2. Nutritive Value of Eggs:
  - The yellow of the yolk is due to certain carotin-like pigment.
  - The proteins are of the highest quality, ranking second only to milk.
  - The fat contained mostly in the yolk is easily assimilated. 78% of it can be digested in the stomach.
  - Vitamins A, Thiamin, D and Riboflavin are present. The yolk is rich in Vitamin A and Riboflavin. It also contains appreciable amounts of Thiamin. Egg yolk is much richer in vitamins even than milk.
  - Ascorbic Acid content of the egg is questionable.
  - Mineral Elements: Calcium, Phosphorus and iron are found chiefly in the yolk.
  - Eggs are classed as acid-forms, as they contain a large amount of sulfur.
3. Digestibility of Eggs:
  - Highly digestible.
  - 98% of the protein is utilized.
  - In the raw state; it has been stated that the whites are well utilized whether taken raw, beaten or cooked, yet other authorities believe that the raw protein is indigestible and poorly absorbed unless mixed with milk or other food.
  - The order of speed with which cooked eggs leave the stomach:
    - Soft-cooked - Hard-cooked - Scrambled - Properly fried.
  - Eggs stimulate the stomach a little less and leave it a little sooner than meat.
  - The temperature at which eggs are cooked determines the tenderness, digestibility, texture, and attractiveness.
4. Characteristics of Fresh Eggs:
  - a) Air space - not large; less than 3/4 inches in diameter.
  - b) White firm and clear
  - c) Yolk dimly seen through the white as a shadowy object indistinct in outline.
  - d) Distinguishing Characteristics:
    - No shrinkage and general firm condition of white and yolk.
    - The yolk of such an egg is stiff and well rounded; the white is not watery and it whips well.
5. Purchasable Forms:
  - New-laid or day-old eggs
  - Fresh eggs - slightly older than new-laid eggs
  - Cold storage- preserved by refrigeration
  - Frozen eggs - eggs are separated and whites and yolks are preserved at low temp.
  - Egg powder - water content removed



## FRUITS

1. Fruits are of value because of their laxative and base-forming properties, and their vitamins, as well as for their attractive flavor. Their caloric value, which is limited, depends largely upon the amount of sugar which it contains. Fruits are better body builders than vegetables.
2. The apple leads among the orchard fruits. It contains small amounts of Vitamin A, thiamin, ascorbic acid and riboflavin. It has definite laxative properties, probably owing to the cellulose content. The young apple contains a large amount of starch, but as it ripens the starch is rapidly converted into sugar; a fully ripe apple contains little or no starch. The acid content decreases as the sugar increases.
3. The citrus fruits are next in importance to the apple. **Oranges offer an excellent source of readily assimilable dextrose.** Lemons, grapefruits, limes and tangerines come under this class. The chief value of citrus fruits lies in their rich ascorbic acid content. The orange, and to a less extent, the grapefruit contain Vitamin A, thiamin and riboflavin; the others, only thiamin. Orange juice is given to infants as a routine factor for the prevention of scurvy.

The base-forming properties of the citrus fruits is important. Their acids do not increase the acidity of the body; in fact the reverse is true.

Canned fruit juices, especially the citrus fruits, are extensively used because of their ascorbic acid content.

4. Peaches, pears, plums, prunes, cherries and apricots all present in a greater or less degree the same laxative, ascorbic acid and base-forming properties as other fruits. Apricots, peaches, prunes and raisins have been found to have good blood-building qualities.
5. The banana has not been accorded the place in the diet to which it is entitled. When fully ripe it is a most valuable addition to the diet of young children. It can also be given to infants. This fruit when unripe consists largely of starch, and is therefore difficult of digestion; as the ripening process goes on, a large part of the starch is converted into sugar. Therefore, bananas should be fully ripe if they are eaten raw. Cooked bananas are easily digested. Recently the ascorbic acid content has been shown to be excellent.
6. Berries possess the same advantage as other fruits. Raspberries are especially rich in ascorbic acid.
7. Pineapple, popular for its flavor, is high in Vitamin A, thiamin and ascorbic acid.
8. **Experimental Recipes:**

APPROXIMATE NUTRITIVE VALUE OF OUR MOST FREQUENTLY USED FOODS

Compiled from Various Sources - Vitamin Values are Given in Terms of International Units Except Riboflavin Which is Given in Sherman Units

FOOD	APPROX. MEASURE - SERVINGS			GRAMS (APPROX.)				MINERALS MG				VITAMINS				S.B.
	Os.	Cal	Pro.	Fat	Carb	CA	P.	FE	A	B	C	D	Ribo.			
<b>Milk &amp; Milk Products</b>																
Butter	1 Tbsp.	100	0	11	0	0	0	0	200	0	0	10	0			
Buttermilk	1 c.	85	9	1	10	.22	.19	.5	6	13	85		77			
Cheese, American	1 1/4 cube	150	7.8	10	0	.50	.12	.4	400	0	0		70			
Cheese, Am. Dry	1 lb. grated	33	2	3	0	.01	.05	.1	135		0		16			
Cheese, Cottage, Skim	5 lb.	100	19	1	4	.01	.10	0	50		0					
Cheese, soft cream	2 lb.	100	3	10	0	0	.05	.1	635		0		12			
Cream 20%	1/2 c. (scant)	100	1	10	2	.05	.05	.1	300							
Cream 40% (Whipping)	1 c.	468	6	44	11	.24	.20	.4	1235							
Milk, whole	1 c.	907	5	94	7	.24	.20	.4	2590							
Milk, skimmed	1 c.	170	8	10	12	.50	.22	.6	275	50	50	5	150			
Milk, dried, whole	3 lb. (scant)	90	8	1	12	.50	.20	.5	0	50	50		150			
Milk, condensed	1 1/2 lb.	100	5	6	8	.20	.15	.3	170	15			90			
Milk, evaporated	1/2 c.	100	2	3	16	.06	.04	.1	200	10	0		95			
Milk, malted	1 lb.	50	2	1	8	.25	.20	.5	25	10	0		20			
<b>Meats</b>																
Bacon, cooked, 16 g.	1 med. sl	16 g.	3	10	0	0	0	0	0	10	0		5			
Chicken, boned	1/2 c.	95	12	6	0	0	.8	1.9		84						
Ham, boiled (lean)	1 sl. 5"x5"x1/g"	100	11	6	0	0	.11	1.0		60						
Ham, smoked, lean	1 sl.	266	19	20	0	0	.27	2.0		200			75			
Lamb Chops, broiled	1 chop	100	6	8	0	0	.08	0.8		20			15			
Liver, Beef 3x6x1/2"	100 g.	125	20	5	2	0	.20	7.0	7000	70		45	600			
Pork chop, loin E.P.	1 med.	252	20	19	0					350			75			
Round Steak, lean	1 sl.	156	21	8	0	.01	.20	4.0	50	40			75			
Veal leg, roast	1 sl.	100	23	5	0	.06	.20	2.7	0	20			100			
<b>Fish</b>																
C-cub meat, canned	1 c.	35	6			.01	.07	.3								
Oysters	6 med.	50	6	1	3	0	.15	3.1	100	60		40	4			
Salmon	1/2 c.	50	10	6	0	0	.12	0	200	10		300	60			
T-out, fresh 2x3x1"	100 g.	165	18	10		.02	.20	.8	200							

D - Dried C - Canned R - Raw F - Fresh

Food	Measure	Gms.	Oz.	Cal.	Pro.	Fat	Carb	Ca	P	Fe	A	B	C	D	Fibo.
<b>Eggs</b>															
Eggs, whole E.P.	1 med	50	1.8	75	7	5	0	.04	.08	1.5	500	25	0	7	60
Egg white	1 med	53	1.2	15	4	0	0								40
Egg yolk	1 med	17	.6	60	3	5	0		.06	1.2	800	45			30
<b>Beans and Peas</b>															
Beans, dried limas	1/2 c cooked	100	3.5	120	7		20	.02	.18	2.0		50			80
Beans, green	1/2 c.	75	3.0	100	6			.02	.18	2.0		50			80
Beans, baked & canned	1/2 c.	100	3.5	120	7		17	.04	.34	2.0					
Peas, black eye	1/2 c cooked	100	3.5	100	7		16	.02	.30	1.5					
Peanuts	1 c.	50	1.0	170	8	9	7	.02	.18	0.7		30			60
Peanut butter	1 Tb.	16		100	5	7	3	.01	.07	0.4		20			36
<b>Cereal Food</b>															
<b>Cereal Food</b>															
Bran, prepared	2/5 c	26	0.9	40	4	1	5	.04	.29	4.0		20			
Bread, 100% W. Wh.	1 med sl.	30	1.1	75	3		15	.03	.04	.5		23			
Oatmeal, cooked	1/2 c	100	3.5	170	3		11.1	.08	.07	.6		30			
Broad, rye	1/2 c	30		75	3		15		.04	.5					
<b>Refined cereals</b>															
Bread, white (milk)	1 med sl.	29	1.0	75	3		15				2				
Corrmeal, yellow															
whole grain	3 Tb.	28	1.0	100	3	1	21	.01	.03	.2	2.7	18			9
Cornstarch	1/2 c.	28	1.0	100			25								
Farina, light	1/2 c uncooked	28	1.0	100	3		21		.07	.5		1			
Hominy grits	1/2 c cooked	130	4.0	170	2		22	.01	.01	.2					
Macaroni uncooked	1/2 c. 1 <sup>st</sup> piece	28	1.0	100	4		21	.01	.03	.3		1			
Rice, polished	1/2 c.	100	3.5	100	2		20		.02						
<b>Food Fruits</b>															
Apples, A.P.	1 med	150	5.0	75	1	1	16	.01	.02	.5	60	4-10	48-300		24
Apricots*(D)A.P.	9 halves	36	1.3	100	2		23	.02	.04	2.7	1750	12	140		34
Bananas, A.P.	1 med	156	5.5	100	1	1	22	.01	.03	.6	115	15	170		30
Bananas, E.P.	1 med	100	3.5	100	1	1	22	.01	.03	.6	115	15	170		30
Blackberries	1 c	100	3.5	62	1	1	12	.05	.03	1.4	210	11	60		
Cantaloupe, A.P.	1/4 melon 5 <sup>th</sup>	385	13.6	50	1		10	.05	.05	1.6	600	50	1000		
Cantaloupe, E.P.	1 c. cubos	100	3.5	20	1		6	.02	.02	.5	200	10	350		
Cranberries	1 c	100	3.5	50	1	1	10	.02	.02	1.0	15		250		
Dates, unstoned	3-4	30	1.0	100	1	1	23	.02	.02	1.0	23	6			
Figs* (f)	2 mod large	32	1.1	100	1		23	.07	.04	.8	50	20	50		10



Food	Measure	Gms.	Oz.	Cal.	Pro.	Fat	Carb	Ca	P	Fe	A	B	C	Ribo.
<b>FOOD FRUIT (cont'd)</b>														
Grapefruit, E. P.	½ c. pulp	100	3.5	47	1	0	10	.04	.04	.6		10	650	40
Grapes, Malaga	20 grapes	100	3.4	78	1	1	15	.02	.04	.9	19	10	3	
Grape juice, concord	½ c.	100	3.5	70			17	.01	.01	.4		7		
Lemon juice	2 T	28	1.0	11			3					3	200	
Orange	1 med.	150	5.3	80	1		16	.04	.02	.9	70	60	1000	45
Orange juice	½ c. scant	100	3.5	55	1		13	.02	.01	.4	300	30	1000	5
Peaches, A. P.	1 med.	111	3.8	50			12	.02	.04	.7	1400	11	500	
Peaches * (F) E. P.	1 med.	100	3.5	51	1		12	.02	.04	.7	1400	11	500	
Pears * (C)	2 hlvs & 2 J.	100	3.5	76			18	.01	.01	.3		21		
Pineapple * (F) 1 sl. 1" thick		100	3.5	57			14	.01	.01	.4	40	20	200	20
Pineapple*(C) 4% syrup ½ sl.		100	3.5	96			23				20	12	200	10
Plums, (F) A. P.	4 plums ½"	100	3.5	100	1		11	.03	.02	1.0		70	150	
Prunes, A. P.	4 med.	39	1.4	100	1		24	.02	.02	1.0	400	13	50	80
Raisins	½ c. seeded	29	1.0	100	1		22	.02	.02	1.0	20	16		14
Rubarb	1 c 1" pieces	100	3.5	18	1		4	.05	.03	.5		21	400	
Strawberries	2/3 c	100	3.5	39	1		7	.04	.03	.7	60	11	500	
Tomato (F) ripe red 1 sm 2 ½" diam		100	3.5	20	1		4	.02	.02	.5	1000	17	500	20
Tomatoes * (C)	½ c.	100	3.5	21	1		4	.02	.02	.5	1000	17	350	20
Tomato juice * (C) ½ c. scant		100	3.5	24	1		5	.01	.01	.5	1000	17	500	20
Watermelon A. P.	2 ½ x 2 ½"	400	14.0	50	1		11	.01		.2	200	14	200	20
Watermelon, E. P.	½ c. diced	100	3.5	30			7	.02		.2	100	10	140	10
<b>FOOD VEGETABLES</b>														
Asparagus* (F)	4lg stlk 7 ½"	100	3.5	25	2		4	.02	.04	1.0	500	70	120	
Beans, string* (F)	½ c 1" piece	50	1.9	40	1		4	.02	.03	.6	500	16	90	25
Beets	2 med.	100	3.5	50	2		10	.08	.04	.9	12	5	60	50
Beet greens	½ c steamed	100	3.5	33	2		6	.09	.04	3.0		50	400	250
Broccoli	3-6 stlk 6" long	100	3.5	37	3		6	.12	.06	1.0	2000	20	180	140
Cabbage, new green	2/3 c.	70	2.0	20	1		4	.03	.02	.3	30	25	415	38
Cabbage, chinesis	½ c. shredded	50	1.8	8	1		1	.03	.02	.4	700	6	250	13
Carrots, 2 young car. 3-4" long		100	3.5	45	1		9	.06	.04	.6	2000	20	70	50
Cauliflower	2/3 c.	100	3.5	30	2		5	.12	.06	.8	30	20	550	60
Chard, leaves only	1/3 c. cooked	100	3.5	25	1		4	.14	.04	2.6	7040		320	
Corn* (C)	1/3 c.	100	3.5	98	3		19	.01	.09	.5			100	
Corn, green	1 ear 6"	125	4.2	50	2		10	.01	.09	.3		50	100	
Dandelion greens	2.3 c. steamed	50	1.8	25	1		4	.04	.01	1.9	8750	25	50	
Egg plant 2 sl. 4" diam x 3/8"		100	3.5	50	3		1	.02	.03	.6	35	20	70	
Maio	1 c cooked	100	3.5	50	3		1	.03	.05	1.6	21000	25		200
Mustard greens	½ c steamed	100	3.5	30	2		5	.03	.05	1.4	110	25		750

