A STUDY OF THE LOW COST DIET IN A HOME MANAGEMENT HOUSE

by

Jessie Anna Potts

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Evelyn M. Cox

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CHAPTER I

INTRODUCTION

Home economics at the undergraduate level has as its primary objective helping the individual student to achieve a rich and satisfying home and family life. It deals with the social, economic, esthetic, managerial, health, and ethical aspects of family relations, child development, foods, clothing, and housing.

An understanding of sound wholesome family life is basic to attaining optimum personal development and happiness. Education for home and family living should, therefore, be thought of as essential to the well-rounded education of all students, whether they become full-time homemakers, combine homemaking and wage earning, or are employed as full-time workers.[1] A very valuable part of this preparation for successful living is the experience obtained through residence in a home management house.

The home economics curriculum is arranged to give the student as comprehensive a study as possible. The laboratory periods introduce various operations to the student, but time does not permit highly developed skills in any one area. Home management residence provides an ideal co-ordinating experience, giving the students an opportunity to put the principles and theories presented in the various classes into

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1. Ivol Spafford, editor, Home Economics in Higher Education: Criteria for Evaluating Undergraduate Programs (Washington, D. C.: American Home Economics Association, 1949), p. 26.

practice and to further develop skills in performing the various duties found in any household.

On the campus at the Woman's College of the University of North Carolina each home economics major is required to spend one half of a semester in one of the three home management houses owned by the College. During this period the students are responsible for performing the duties normally expected of a homemaker. The work is divided into eight managerial divisions: (1) hostess, (2) assistant hostess, (3) housekeeper, (4) assistant housekeeper, (5) cook, (6) assistant cook, (7) laundress, and (8) assistant laundress. The duties are so rotated that each student has experience in the various responsibilities.

As "hostess" each student is responsible for planning a set of menus on a stated budget and for having them checked by the counselor, a graduate assistant who resides in the house. She does the marketing in one of the large chain stores or in one of the smaller neighborhood stores. She keeps a careful record of the quantities and the cost of the food purchased. At the end of her hostess period, she notes all this information in a record book, which is a part of the permanent file kept by the house.

A budget is set up for each new group entering the house. These budgets vary with each group and within each house, depending upon the number of students in the house. In setting up the budget, the hostess and counselor work out a tentative plan for the discussion and approval of the group. After all necessary changes are made and it is adopted, an effort is made to follow it with little change. Expenses for the period of house residence are taken care of through an allowance of $1.00 per student per day paid into a Home Management House Fund. This sum

must be budgeted to pay for food, entertaining, cleaning supplies, a daily newspaper, magazine subscriptions and incidentals. A typical budget is found in Appendix A.

It is believed that there is a decided advantage in having menus planned on two cost levels, as additional experience is gained in menu planning and money management. The problem of serving attractive, satisfying meals becomes a very real one when one is faced with a limited budget.

Prior to the fall of 1947 three cost levels were used: low, medium, and high. The steady rise in food prices has necessitated an increase in the low cost allowance from time to time in order to provide the students with sufficient food. Since the per capita allowance has remained the same, this has called for a corresponding decrease in other items in the budget. In 1947 it was thought that there was no longer sufficient variance in the three cost levels to show the kinds and amounts of food appropriate for the three cost levels. Since valuable teaching was thus being lost in having the cost levels so close together, one was discarded.

At present, two cost levels are maintained. The low cost level, which theoretically provides for a minimum adequate diet at present day prices, has an allowance of $0.55 per person per day; and the moderate cost level has an allowance of $0.90 per person per day. Each group usually begins with a low cost level, followed by a high cost level. The cost levels are thus alternated throughout the students' residence in the house. The period of a hostess' management depends upon the number of students and the length of time spent in the house. The total

number of meals is divided so that an equal number is planned by each student.

The present per capita allowance to cover raw food cost in the College dining halls is approximately $0.55 per person per day. This budget is set up on the assumption that each student will be present for each meal. Since the students are not required to attend meals, in reality, the per capita allowance is greater than $0.55 per person per day. Most of the food for the College dining halls is purchased in large quantities at wholesale prices. In comparison, the food for the home management house is purchased in small quantities at retail prices. In the home management house it is not possible to take advantage of the practice of purchasing staple groceries in the large economy sizes as would normally be done for a family of eight. The storage space in the house is limited, and it is a policy of the house to carry as small an inventory as possible. This gives each student the opportunity of purchasing all the groceries needed during her hostess period and prevents confusion in transferring groceries from one cost level to another. Thus the home management house is operating on the same per capita budget as the dining halls, but the actual food costs are higher. The argument for the need of a study of the low cost diet was further strengthened by the fact that the students living in the home management house during the early part of the fall of 1951 felt that the low cost allowance was definitely inadequate.

In light of the foregoing, the present investigation was undertaken:

(1) To evaluate the adequacy of the low cost diets in one of the home management houses;

(2) To determine if an adequate diet can be obtained at $0.55 per person per day at current market prices.

CHAPTER II

REVIEW OF LITERATURE

The purpose of Chapter II is to review the literature on nutritional studies made with college women, and the literature on methods for the collection and evaluation of data in nutritional studies with emphasis on individual surveys and family or household surveys.

Nutritional Studies Made with College Women

General studies of the nutritional status of college women will be presented first, followed by studies made in co-operative houses and home management houses.

General Studies

As early as 1917 an interest was being shown in the food consumption of college women.[1] In February of that year MacLeod and Griggs investigated the diets of a group of Vassar College women. They wanted to know how well the diet of the young women at Vassar compared with the theoretical requirements of active girls the age of these students. The weighed inventory method was used and a careful record was kept of both edible and inedible waste. The food was plain but appetizing and showed considerable variation. The average number of calories per person per

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1. Annie Louise MacLeod and Mary A. Griggs, "Dietary Study at Vassar College," Journal of Home Economics, X (March, 1918), 97-107.

day amounted to 2,698 while the raw food cost was found to average $0.14 per meal.

Several years later an investigation was conducted at the University of Illinois on a group of college women to determine their habits of protein intake.[2] The study revealed the average daily protein intake to be 0.94 grams per kilogram of body weight.

Coons and Schiefelbusch endeavored to find some relationship between the diets of the college women and their basal metabolism.[3] There was no direct correlation between the caloric intake and the metabolic rate, nor between the protein content of the diet and the metabolic rate. The half of the group with the lowest basal rates had an average intake of 39.4 calories and 1.12 grams of protein per kilogram of body weight.

During the depression of 1930-1936 a study was made of food economy in a university dormitory managed at moderate cost.[4] The dietary study was made over two eight-day periods in a dormitory occupied by 105 university women. The inventory method was used, and adjustments were made for food waste. The food cost ranged from $0.36 to $0.39 per person per day. A high percentage of the food dollar was spent for meat and a very low percentage for cereals. The investigators considered the dietaries to be adequate and the menus to be very acceptable.

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2. Rossline Arnold Hettler, "Protein Intake and Basal Metabolism of College Women," Journal of Nutrition, V (January, 1932), 69-75.

3. Collie Mae Coons and Anna T. Schiefelbusch, "The Diets of College Women in Relation to Their Basal Metabolism," Journal of Nutrition, V (September, 1932), 459-465.

4. Verz R. Goddard, et al, "Food Economy in a University Managed at Moderate Cost," Journal of the American Dietetic Association, IX (January, 1934), 353-360.

Balance studies were conducted at the Kansas Agricultural Experiment Station on 25 college women eating freely chosen diets.[5] The purpose was to determine the nitrogen, calcium, and phosphorous outputs as an indication of the protein, calcium, and phosphorus intakes. Two periods of four days each were used. During this time the nitrogen excretion indicated that the students were consuming less protein than was thought to be necessary for this age group. The balance studies with calcium and phosphorus showed that the group was receiving amounts of these nutrients that were above the accepted standards. However some of the individuals had intakes for these minerals below the desired level.

For three years students in beginning courses in nutrition at Utah State Agricultural College were required to keep a food consumption record for one week during the course.[6] Quantities of food consumed were estimated in terms of cupfuls or tablespoons, while bread and meat portions were measured with rulers. Of five hundred such records, one hundred which had shown evidence of being carefully prepared were selected for comparison with accepted standards of good nutrition. Since the students were not required to live in the dormitories, it was thought best to classify the records according to living conditions, so the girls were placed in the following groups: home, boarding, bachelor quarters, and dormitories. The diets of all groups were found to be generally lower than the standards set by Daniel and Munsell, Sherman,

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5. M. M. Kramer, et al, "Protein, Calcium and Phosphorus Intakes of College Women as Indicated by Nitrogen, Calcium, and Phosphorus Outputs," Journal of Nutrition, VII (January, 1934), 89-106.

6. Sadie O. Morris and Mildred Bowers, "A Study of the Diets of One Hundred College Women Students," Journal of the American Dietetic Association, XV (May, 1939), 358-362.

and Rose. The average caloric intake was 1,805. The records of all groups showed consistent deficiencies in phosphorus, iron, Vitamin B (thiamine), and ascorbic acid. The differences in the dietaries of all groups were found to be small, although the diets of the students living in the dormitories were found to be superior both in quality and quantity. Diets of the students living at home were found to be the poorest.

Shaw studied the food habits of eighty college students by requiring members of a nutrition class to keep a two-day record of all food eaten.[7] The class made a list of foods which they felt would probably meet the minimum requirements of a college student. The reports were evaluated on this basis. It was found that 32 per cent of the eighty students studied had no breakfasts or had breakfasts that were decidedly inadequate. Sixteen per cent had inadequate lunches and 13 per cent had inadequate dinners; while for 6 per cent all three meals seemed to be inadequate. Interestingly enough 96 per cent of the subjects in this study ate between meals.

The nitrogen, calcium, and phosphorus intakes of Kansas and Ohio college women were discussed by Pittman, McKay, Kunerth, Patton, Edelblute, Cox, Shepek and Chen.[8] The differences between subjects in intakes of nitrogen, calcium, and phosphorus were greater than the differences between periods for the same subjects. Compared with the

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7. Mary Margaret Shaw, "A Study of the Food Habits of Eighty College Students," Journal of Home Economics, XXXII (November, 1940), 614-615.

8. Martha S. Pittman, et al, "Nitrogen, Calcium and Phosphorus Intakes of College Women," Journal of the American Dietetic Association, XVII (December, 1941), 947-953.

Sherman standard, the calcium intake was adequate in all cases; phosphorus intake was below the standard in Ohio subjects but above the standard in Kansas subjects. One Kansas subject was low in nitrogen and five Ohio subjects were low in nitrogen.

In 1942 a report was given on the calcium intake of the same 27 subjects who were living on self-chosen diets.[9] The students were classified as moderately active women. Results showed that the daily caloric intake varied greatly. They ranged from 27.6 to 56.4 calories per kilogram of body weight for the Kansas subjects and from 19.9 to 50.0 calories per kilogram for the Ohio subjects. The mean intake for the two states was 35.7 calories per kilogram. This is below the National Research Council's Recommendations for the moderately active woman.[10]

Leverton and Marsh conducted iron metabolism studies at the University of Nebraska on 69 college women between the ages of 16 and 27 years.[11] They state:

> The average daily intake of 10.44 mg. of iron provided an average daily storage of 1.37 mg. which is ample to replace normal menstrual losses. As the level of intake rose from below 8 mg. to 16 mg. the occurrence of negative balances decreased and the amount of iron that was stored increased.[12]

At Oklahoma Agricultural and Mechanical College, 203 members of an advanced nutrition class kept records of food consumed for seven consecu-

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9. Martha S. Pittman, et al, "The Caloric Intake of Twenty-Seven College Women," Journal of the American Dietetic Association, XVIII (July, 1942), 449-453.

10. Food and Nutrition Board, National Research Council, Recommended Dietary Allowances, National Research Council Reprint and Circular Series No. 115, 1943.

11. Ruth M. Leverton and Alice G. Marsh, "The Iron Metabolism and Requirement of Young Women," Journal of Nutrition, XXIII (March, 1942), 229-237.

12. Ibid., p. 237.

tive days.[13] A record of activity for two representative days was also kept by the students. The mean caloric intake was found to be 2,015.9 calories; while the mean caloric requirement was calculated to be 2,284.7. From the weight data there was little indication that the caloric intake was inadequate. A report was given later on the protein, calcium, phosphorus, and iron intake of the same group of women.[14] The mean intakes were found to be: protein, 64.60 gm.; calcium, 0.8288 gm.; phosphorus, 1.1713 gm.; and for iron 10.335 mg. There were no significant differences noted for the various school terms.

Several midwestern colleges cooperated on a survey of the dietary habits and physical status of college women.[15] A co-ordinated plan of investigation was developed so that the same methods were used at each institution. The states participating were Iowa, Kansas, Minnesota, Nebraska, Ohio, Oklahoma, and Wisconsin. Three thousand four hundred and thirty-two students kept individual records which included the approximate kind and amount of food eaten at the table and between meals. When the diets were studied, it was found that there was a decided shortage in the amount of citrus fruits and tomatoes included in the diet. The intake of green and yellow vegetables and milk was also low for their age group.

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13. Mary Louise Greenwood and Barbara Newkirk Lonsinger, "Food Intake of College Women; Caloric Intake and Energy Requirement," Journal of the American Dietetic Association, XX (November, 1944), 671-675.

14. Mary Louise Greenwood and Barbara Newkirk Lonsinger, "Food Intake of College Women; Protein, Calcium, Phosphorus, and Iron," Journal of the American Dietetic Association, XX (November, 1944), 671-675.

15. Eva G. Donelson, et al, "Nutritional Status of Midwestern College Women," Journal of the American Dietetic Association, XXI (March, 1945), 145-147.

Further studies on freely chosen diets were made at Ohio State University, Kansas State College, and Iowa State College with 58 students. The mean caloric value of their weighed diets was approximately 2,000 calories per capita.

Young observed groups of approximately 10 students each, living in establishments, such as, in a sorority house with meals served in a central dormitory; in a supervised dormitory; and in a graduate house where students were free to choose their own eating places.[16]

Each student kept a record of her food intake, both at meals and between meals, for seven consecutive days during two experimental periods.

The records were analyzed in three ways:

(1) A weekly average of the intake of specific nutrients was calculated for each student, and then an average for the group was obtained. The averages were then compared with the National Research Council's Daily Recommended Allowances for both a moderately active woman and a 16 to 20 year old girl. The individual records were also studied in relationship to the minimum requirements. These were arbitrarily taken as two-thirds of the N. R. C. allowances.

(2) The diet records were checked for the frequency with which certain foods commonly listed in dietary patterns occurred.

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16. Charlotte Young, "Dietary Study of Cornell University Women," Journal of the American Dietetic Association, XXII (January, 1946), 25-28.

(3) A study was made of the individual eating habits of the girls.

When the diets were analyzed, it was found that the diets of all the women were within the minimum requirement, that is, two-thirds of the National Research Council's Daily Recommended Allowances. Average intakes for the first period were: calories, 2,194; protein, 68.7 gm.; calcium, 1.063 gm.; iron, 11.03 mg.; Vitamin A, 6,981 I. U.; thiamine, 1.168 mg.; riboflavin, 2.176 mg.; and Vitamin C, 148 mg. Average intakes for the second period were: calories, 2,002; protein, 65.9 gm.; calcium, 1.024 gm.; iron, 9.76 mg.; Vitamin A, 4,664 I. U.; thiamine, 1.015 mg.; riboflavin, 2.030 mg.; and Vitamin C, 120 mg.

Dr. Young states: "On the whole, one is impressed with the evident adequacies of the diets as indicated by these records, rather than with their deficiencies."[17]

Scoular and Foster used the inventory method for examining the food intake of college women.[18] Two periods, each of 14 consecutive days, were studied. The caloric intake was average for this age group but the protein and iron values were high. This was accounted for by the relatively high proportion of the food dollar spent for eggs, cheese, meat, and dairy products.

Tuskegee Institute was the site for a study of food intake of college seniors between the ages of 19-23 years.[19] The subjects were

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17. Ibid., p. 25.

18. Florence I. Scoular and Lillian B. Foster, "Food Intake of College Women," Journal of the American Dietetic Association, XXII (May, 1946), 401-403.

19. Cecile A. Hoover and Maude C. Coggs, "Food Intake of Fifty College Women Studied," Journal of Home Economics, XL (April, 1948), 193-194.

enrolled in an advanced nutrition class, and were divided into two groups: (1) students who were living on the campus and eating in the college dining hall; (2) a. students who lived off campus and ate in various places; b. students who lived and ate in the home management house. Food records were kept by each member of the class for two periods of two days each. The average caloric intake of the group was 1940 calories. The average intakes of protein, Vitamin A, and ascorbic acid were high, while the intakes of calcium, iron, thiamine and riboflavin were satisfactory as measured by N. R. C. allowances. The four day averages were as follows: protein, 75 gm.; calcium, 0.79 gm.; iron, 11.65 gm.; Vitamin A, 10,423 I. U.; thiamine, 1.07 mg.; riboflavin, 1.39 mg.; and ascorbic acid, 124 mg.

Studies Conducted in Co-operative Houses

Several studies have been made with groups living in co-operative houses on different college campuses.[20] The first one reported was conducted by McMillan and Leverton in 1941-1942. Forty-eight home economics students were divided into units of six or eight girls. Each girl had a turn at being first cook, at which time she was responsible for planning menus, shopping, cooking, and keeping the books. The girls as a group decided how much they wished to spend for food.

Records of foods purchased were kept during October and November 1941 and February, March, and April 1942. These foods were classified into groups, and the amounts were compared with quantities recommended

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20. Thelma J. McMillan and Ruth M. Leverton, "The Self-Chosen Diets of College Girls in a Co-operative Dormitory," Journal of Home Economics, XXXV (October, 1943), 514-518.

by the Bureau of Home Economics for an adequate low cost diet. Nutritive value of the daily intake was compared with the recommended allowances of the National Research Council for girls of 16-20 years of age. The money spent for each food group was compared with the long accepted rule of one-fifth of the food dollar for each of the five food groups.

The girls used smaller amounts of nearly all the foods than are recommended for an adequate diet at minimum cost. They did not meet the caloric requirement and were somewnat low in protein. The actual intake was: calories, 1,728; protein, 60 gm.; calcium, 0.94 gm.; Vitamin A, 4,936 I. U.; thiamine, 1.3 mg.; riboflavin, 1.8 mg.; niacin, 11.3 mg.; and ascorbic acid, 74 mg.

"The results of this study of the food choices made by home economics students suggest that in order for a self-chosen diet to be adequate at low cost more emphasis must be placed upon the use of potatoes, legumes, and whole grain cereals."[21]

Later, in one of these same co-operative houses, Leverton and McMillan made a study of the nutritional status of college women who were living on a diet planned from one of the market lists for adequate low cost meals for a sedentary woman suggested by the Bureau of Home Economics.[22] Three groups of students were studied. The experimental group consisted of eight girls living in a co-operative dormitory from October 1942 to April 1943. The authors planned the menus, selected the

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21. Ibid., p. 518.

22. Ruth M. Leverton and Thelma J. McMillan, "Planned and Self-Chosen Low-Cost Diets," Journal of Home Economics, XXXVI (April, 1944), 225-229.

recipes, and did the marketing at a neighborhood self-service store for the experimental group. The girls prepared the meals. In the two control groups of six girls each, the students were living on self-chosen diets. For the experimental group, the cost was $1.69 per person per week. All of the specific nutrients except calories, which were low, either met or exceeded the N. R. C. allowances for a sedentary woman. For the control group the average cost per person per week was $2.10. The control groups received from 97 per cent to 113 per cent of the calcium and vitamins recommended; while for protein and calories they received only 84 per cent and 76 per cent, respectively, of the recommended amount.

The study showed that even a low-cost diet with as few as 1800-2000 calories can furnish the liberal amounts of protein, calcium, and vitamins needed by adolescent girls.

A co-operative house at Texas Technological College provided the setting for a study of trends in the dietary practice of college women.[23] The inventory method was used during the experimental periods in each of the five years from 1940 to 1944. At the time of the study the meals were classified as moderate to low in cost. Food was selected freely by the students who were responsible for its preparation. The average daily caloric intake compared favorably with the standard. The recommended amount of milk was purchased and consumed daily; consumption of potatoes was low; consumption of citrus fruits and tomatoes and of green and yellow vegetables was above the standards; consumption of meat was low, but the quality of the meat was judged good since the diet was adequate

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23. Mina Wolf Lamb and Clara Mueller McPherson, "Trends in Dietary Practices of College Women," Journal of Home Economics, XL (January, 1948), 19-21.

in nutrients. Cereal products were consumed in insufficient quantities, while the consumption of fat and sugar was high, a general characteristic of American diets.

Lamb and McPherson conclude: "Results of this study indicate that the diets of college women are improving in quality and quantity of items selected from the protective food groups."[24]

Jackson and Schuch at Purdue University reported a comparative study of the nutritional adequacy of foods purchased by college women on a limited and on a liberal food budget.[25] Two co-operative houses on a minimum budget were compared with a sorority house on a liberal budget. The expenditure for food differed less than the investigators had expected since the sorority group did not always spend their allowance of $0.50 per person per day.

The greatest deviations from the standards in both groups were the low figures for dairy products and the high figures for fats and sweets.

In the first period the sorority spent the greatest amount of money and obtained the poorest diet. This was accounted for by their low intake of milk and their use of highly refined cereals. The second co-operative group, spending the least amount of money, purchased a superior diet with respect to calcium and phosphorus to that purchased by the sorority group during either of the two studies. This was accomplished through the use of skim milk.

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24. Ibid., p. 21.

25. Pearl Jackson and Cecelia Schuch, "Nutritional Adequacy of Foods Purchased by College Women on Limited and More Liberal Food Budgets," Journal of the American Dietetic Association, XVII (October, 1941), 784-789.

Jackson and Schuch made a study of the breakfast habits of college women at Purdue University.[26]

The study consisted of 3 parts:

(1) Survey made by use of a questionnaire mailed to nutrition and health authorities to obtain their opinions on the value of an adequate breakfast;

(2) Study of the food selections made at breakfast on 1,575 breakfasts in the university dining halls and on 300 breakfasts in a sorority house;

(3) Collection and evaluation of seven-day dietary records obtained from 346 students in freshman food classes.

It was shown that the person who ate no breakfast or who ate an inadequate breakfast did not make up the daily nutritional requirements in the other meals of the day. The investigators felt that there was a need for improvement in the breakfast habits of college women.

A recent study of nutritional intake of forty-nine college women living in a co-operative house was undertaken at the University of Alabama in the spring of 1950.[27] The weighed inventory method was used for one week with a record of all edible waste.

Three methods of evaluation were used: (a) the average daily nutritive intake per person, (b) the number of servings per week of

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26. Patricia Jackson and Cecelia Schuch, "Dietary Habits of Purdue University Women," Journal of Home Economics, XXXIX (June, 1947), 334-336.

27. Celia Jones Wilson, "The Adequacy of Meals in a College Girls' Co-operative House and Recommended Menus and Food Budget," (unpublished Master's thesis, The University of Alabama, Tuscaloosa, 1950), 1-59.

certain foods, and (c) the weight consumed of certain food groups. Of the three methods used, the third one was found to be the most exact. The average daily nutritive intake per person was: calories, 2,157; protein, 58 gm.; calcium, 0.9 gm.; iron, 10 mg.; Vitamin A, 7,117 I. U.; thiamine, 1.2 mg.; riboflavin, 1.8 mg.; niacin, 12 mg.; and ascorbic acid, 100 mg.

The number of servings per week of certain food groups considered essential in an adequate diet was equal to or above the recommended allowances.

According to recommendations, the amounts of eggs, milk, dried legumes, and potatoes purchased were low, while fats and sweets were quite high.

The amount of food waste was not great, but if the food which had been prepared had all been eaten, all recommended allowances would have been met or exceeded except calcium. The investigator suggested that improvement in menu planning would probably lead to less food waste.

Studies Conducted in Home Management Houses

The first record of a study of diets in a home management house was reported from Michigan State College.[28] Records of food expenditures kept during the years 1922-1933 were studied to see what patterns of expenditure were represented. The groups living in the houses consisted of six to eight senior home economics students and one faculty member.

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28. Julia Pond and Irma H. Gross, "Patterns of Food Expenditures in Home Management Houses at Michigan State College," Journal of Home Economics, XXVI (August-September, 1934), 410-413.

Three levels of living were included in the study: low, with an allowance of $0.30 per person per day; medium, with an allowance of $0.60; and high, with an allowance of $0.80. The meals were planned by the students and checked by the director.

For the first eight years the only stated requirement was a pint of milk per person per day. In the fall of 1931 these additional requirements were added for each person per day: two vegetables besides potatoes, two fruits, one whole grain cereal, and one egg.

The percentage spent for milk, cream, and fat was greater on the low-cost level than on the high, while the percentages for meats and fruits and vegetables were greater on the high cost level. The percentages for sugars were practically the same on all levels.

When the patterns of food expenditure at Michigan State College were compared with similar studies, it was found that the percentages spent for fruits and vegetables were high and those for meats and staples were somewhat low.

In 1946 Nancy McCall made a study on the Woman's College campus to evaluate the adequacy of the diets planned in one of the home management houses.[29] At that time the food budget was set up so that the students lived on three cost levels: low, medium, and high, with allowances of from $0.30 to $0.35, from $0.40 to $0.45, and $0.60 per person per day, respectively. Eight students and a director were living in the house studied.

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29. Nancy McCall, "An Evaluation of the Adequacy of Diets Planned in a Home Management House," (unpublished Master's thesis, Woman's College of the University of North Carolina, 1946), 16-28.

The foods purchased were divided into the eleven food groups given by the United States Department of Agriculture. Calories, protein, calcium, iron, Vitamin A, ascorbic acid, thiamine, riboflavin, and niacin were calculated for each food group. The totals for each specific nutrient were then reduced to the amount per person per day for comparison with the National Research Council's recommended dietary allowances for the sedentary woman.

It was found that the girls living in the home management house got a completely adequate diet on only a liberal cost level. The low cost level was found to be low in all of the specific nutrients except Vitamin A and ascorbic acid. The medium cost level was slightly deficient in calories, niacin, and iron, but was more nearly adequate than the low cost level. For liberal cost, all of the specific nutrients either met or exceeded the standards used for the study.

The investigator decided that the menus for all seasons and cost levels could have been improved by the use of more dried beans, eggs, glandular meats, seafoods, and whole grain cereal products. She also concluded there could have been a decrease in the amounts of fats and oils, sugars and syrups, and flour and cereals used on the medium and liberal cost levels.

The inadequacies found were not the same for each cost level or season. The author comments:

> The inadequacies found in each instance could have been remedied by more attention to the details involving nutritional adequacy in menu planning. Students have a tendency to plan menus more for personal likes and dislikes and often neglect the principles of nutrition which they have been taught.[30]

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30. Ibid., p. 28.

Methods for Collection and Evaluation of Data in Nutritional Studies

There are many methods available for the collection and evaluation of data in nutritional studies. The method used depends largely upon the following factors: the kind and amount of information desired; the ability of the investigator and the subjects; and the amount of time, money, and facilities available for the collection and analysis of the data. The most difficult and the most important part of a dietary survey is obtaining complete and accurate records.

Family or household surveys and individual surveys may both be used, each serving a different purpose. As family and individual weighed surveys are used at present, they may measure slightly different things. In the family survey purchases are recorded. These are corrected for inedible material by either deduction of weighed inedible waste or deductions based on standard values for inedible portions. The final result represents potential food value of the purchases. In some, allowances are made for edible waste by keeping a weighed record of the amount of this waste. In the individual survey records are kept of the weight of food as served less edible material uneaten, that is, the actual weight of food eaten. It measures food eaten, expressed partly in terms of food as it is bought and partly in terms of cooked food.

The ideal survey is one in which both the family diet and the diet of each individual in the family are recorded separately. This type of survey gives all the information that can be desired for ordinary purposes.

Individual Surveys

Stiebeling lists four methods which are available for studying the dietary intakes of individuals: dietary history, estimates of foods eaten made by the individual, records of food eaten kept by the individual, and laboratory measurement of food eaten.[31] In practice the individual survey has many difficulties and pitfalls of its own. Compound cooked dishes greatly complicate the individual survey. Another cause for concern is the possibility that the mere fact of recording food consumption may alter habits and so give a false picture.

The dietary history.--The purpose of this type of study is to discover the usual food pattern over a relatively long period of time, as contrasted perhaps with a report of menus followed or quantities of different foods eaten in the previous twenty-four hours.[32] This method should certainly reveal major deviations from the usual concept of good food habits. The ideal person to take dietary histories is the nutritionist. With her knowledge of food, she is able to ask pertinent questions and obtain the information desired. The dietary data which are of value both in research and corrective clinical work permit estimations of the average intake for a given period of time.

As a background to the more specific questions regarding food intake, information is obtained in regard to the subject's health habits

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31. Committee on Nutrition Surveys, Food and Nutrition Board of the National Research Council 1949, Nutrition Surveys: Their Techniques and Value, National Research Council Bulletin, Chapter 2, p. 13.

32. Bertha S. Burke, "The Dietary History as a Tool in Research," Journal of the American Dietetic Association, XXIII (December, 1947), 1042-1044.

and other factors which relate to nutrition. The more information that can be obtained relative to the patient's cultural background, occupation, religion, economic status, and the number of people in the family unit, the better fitted the interviewer will be to understand the other information and to fit it to her needs, whether for research or therapeutic purposes.[33] The interviewer then attempts to learn the subject's usual pattern of eating, both at meal times and between meals, and the food consumed is recorded in common household measures. For example, the subject is asked, "What do you usually eat for breakfast?" or "What did you have for breakfast this morning?". In either case, the subject tells about her breakfast habits. Further questions follow until the breakfast is completely recorded in common household measures, including the usual variations. The frequency and usual size of portions, as well as the kinds of foods, are all recorded. The interviewer continues until a complete record has been made of the usual daily food intake for the period under consideration with its variations carefully recorded in kinds and amounts of food.

The next step in the history, known as the "cross check," is very important. The interviewer has available a form containing the usual intake of the subject for a given period. By looking at it, or from familiarity with history-taking, she remembers, for example, the amount of milk in the usual intake. She may then ask the subject, "Do you like or dislike milk?". She then asks further questions, depending upon the information already obtained, as to the subject's usual daily intake of

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33. Elmira E. Blecha, "Dietary Study Methods IV: Dietary History for Use in Diet Therapy," Journal of the American Dietetic Association, XXVII (November, 1951), 968-969.

milk. In other words this serves to verify and clarify the information given in the usual report. By careful questioning on each food group listed in relation to the amount given as usual in the intake for the period, the accuracy of the history is greatly improved. The final result obtained is, as a rule, a surprisingly representative picture of the individual's average intake for the interval. The nutrients for the period studied may be calculated by using the amount of each food or food group most representative of the subject's average intake and calculating the nutrients from food value tables. This is the method most often used when a dietary history is being taken for research purposes. For use in diet therapy the summary of average intake is usually compared with the Basic Seven or some other standard for estimation of adequacy.

Since any dietary history cannot be exact, there has been a tendency to discredit it. Turner and Huenemann studied methods of dietary investigation in 1942.[34] They found that when calculations based on diet histories were compared with those based on diet records, diet histories frequently did not agree with actual diet records. No history was found to agree with the diet record within 20 per cent for all constituents. The chief reason for differences between histories and records seemed to be that patients actually did not know what or how much they ate. Another investigation was reported in 1952 with very similar results.[35] Different groups were studied in five northeastern states.

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34. Ruth L. Huenemann and Dorothea Turner, "Methods of Dietary Investigations," Journal of the American Dietetic Association, XVIII (September, 1942), 562-568.

35. Charlotte M. Young, et al, "A Comparison of Dietary Study Methods. I. Dietary History Vs. Seven-Day Record," Journal of the American Dietetic Association, XXVIII (February, 1952), 127.

It was found almost unanimously for all groups studied and for ten nutrients that the dietary history did not give the same estimate of intake for an individual as the seven day record.

On the other hand, Burke feels that a dietary history properly taken for research purposes serves a very useful purpose if its merits and pitfalls are thoroughly understood so that the resulting evaluations are not used beyond the limits of their dependability. She asserts:

> A detailed history of the dietary habits furnishes important information since the nutritional status of an individual can be no better than his past and present food habits permit. However, the nutritional status may be considerably worse since for various reasons, an individual may be unable to utilize normally the food he eats.[36]

Blecha believes that the dietary history for use in diet therapy serves a very useful purpose as a forerunner of every dietary instruction.[37]

Estimates of food eaten made by the individual.--In 1942 Wiehl described a quantitative method for obtaining estimates of food eaten.[38] Diet histories on consumption of selected foods during one week were collected on 1,103 aircraft workers in Southern California between November 15, 1941 and February 15, 1942. Information concerning the diets of the employees was obtained by interview. One part of the record was a quantitative estimate by the person being interviewed of all food consumed during the two days preceding the interview.

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36. Burke, op. cit., p. 1041.

37. Blecha, op. cit., p. 969.

38. Dorothy G. Wiehl, "Diets of a Group of Aircraft Workers in Southern California," The Milbank Memorial Fund Quarterly, XX (October, 1942), 329-366.

The two-day quantitative diet history furnished a complete description of all food consumed at each meal and between meals. Quantities were stated, when possible, in ordinary units, and the interviewers helped the subjects in estimating amounts.

For the two-day quantitative records, estimates were made of the nutritive value of all foods in calories, protein, calcium, iron, Vitamin A, thiamine, riboflavin, ascorbic acid, and niacin. The other record was for the remaining five days of a one-week period and required, for the most part, only the listing of foods in selected categories which had been included in the diet. It was designed to describe qualitative food choices or food habits over a longer period than two days. For each day the subject was asked to give information on the use of specific foods as follows:

(1) Number of glasses of milk

(2) Number of eggs

(3) Number of slices of whole wheat or rye bread

(4) Type of cereal, if any

(5) Potatoes

(6) Kinds of vegetables

(7) Citrus fruits (approximate amounts of juices) and kinds of other fruits

(8) Kinds of meat

From the five-day qualitative record plus the two-day quantitative record, tabulations of the use during one week of specific foods or types of foods were made for the entire group. This method may be used to classify diets with respect to general type or quality but is unsatis-

factory for the assessment of individual consumption. It is difficult to remember what one has eaten for a whole week so the amounts obtained by this questionnaire survey are only approximate.

Records of food eaten kept by the individual.--The three steps to be followed in obtaining a diet record are:[39]

(1) Explain the purpose for which the record is to be used.

(2) Explain that a record must include only what the person eats on one particular day--not what he usually eats.

(3) Avoid surprise, approval or disapproval of the person's diet while taking the record.

A printed form should be given the subject which provides space for recording each meal, food eaten between meals, and dietary supplements.

A copy of instructions should be provided to accompany the form. They should include the following instructions:

(1) Write down everything you eat or drink. If you miss a meal, write "nothing" in the space for that meal.

(2) Tell how the food is cooked. If you eat a food raw, write "raw" after it.

(3) When you eat two foods together, write down both of them like this:

1 white roll with jelly

1 cup black coffee with 1 teaspoon sugar

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39. Miriam G. Eads and Alla P. Meredith, "Nutrition Studies. II. Methods of Collecting Dietary Data," Public Health Reports, LXIII (June 11, 1948), 777-782.

(4) Write down how much you eat of each food. Tell how many teaspoons or tablespoons you eat; tell whether you eat 1/4 or 1/2 or 1 cupful.

(5) Be sure to write the kind of food you eat. If you eat cereal, write cornflakes, or grits or oatmeal, or whatever kind of cereal it is. Be sure to tell the kind if you eat any of these foods: breads, meat, peas, beans, potatoes, soups, salads, or sandwiches.

Food models and dishes of various sizes and shapes help the person to estimate the quantities of food eaten. This is very important because so few people are accurate in their estimates. Dishes displayed during the interview should be marked to indicate capacity in terms of a standard measure. Young and Huenemann and Turner, as discussed earlier in the paper, believe that the dietary record method is much more accurate than the diet history method. For most investigators this is the most popular method for studying dietary intakes of individuals. Care must be taken to secure complete and accurate data.

Laboratory measurement of food eaten.--The most exacting of dietary methods consists of obtaining accurate results of chemical analyses of food representing the diet actually consumed by individuals.[40] The value of such data depends to a large degree upon the precision of the sampling and evaluation procedures employed. The

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40. Helen A. Hunscher and Icie H. Macy, "Dietary Study Methods. I. Uses and Abuses of Dietary Study Methods," Journal of the American Dietetic Association, XXVII (July, 1951), 559.

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40. Helen A. Hunscher and Icie H. Macy, "Dietary Study Methods. I. Uses and Abuses of Dietary Study Methods," Journal of the American Dietetic Association, XXVII (July, 1951), 559.

investigator may: (1) analyze chemically samples of the individual foods used in the diet, and with the weights of the amounts of each food eaten, calculate the nutritive values of the diet; (2) analyze a mixed diet identical in weight and preparation to that consumed by the experimental subject; (3) analyze a mixture of aliquot portions of each raw food obtained at the time the diet is prepared; or (4) obtain aliquot portions of each food after meals are prepared, combine them in a composite representative of the diet for a period of time, and analyze samples of the composite. The various methods vary a great deal in accuracy. When close comparison is desired, the non-conformity of methods frequently makes it difficult to compare results obtained in different laboratories.

Family or Household Surveys

The simplest unit for a dietary survey is the family or institution.

Stiebeling lists three general methods open to the investigator wishing to study the diets of families or other groups of individuals sharing common food supplies. They are: the food record, the family food account, and the food list.[41]

The food record.--This method makes use of a weighed inventory of foods on hand at the beginning and close of the study, together with a day-by-day record (by weight) of food entering the home with or without records of kitchen and plate waste. The outline that follows is based on standard procedure at the Rouett Research Institute for obtaining data by

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41. Committee on Nutrition Surveys, Food and Nutrition Board of the National Research Council 1949, op. cit., p. 14.

the food record method.[42]

The Basic Data

Food Consumption

(1) Inventory of food at the beginning of the survey

The food on hand is weighed and recorded.

(2) Current purchases

All food purchased, brought from garden, or received from any other source is weighed and recorded.

(3) Final inventory

At the end of the survey, and of any sub-period that is to be treated separately, the food on hand is again weighed and recorded.

Expenditure

(4) Cost

The housewife should be asked to record prices for each food item separately.

Composition of the Family

(5) Age

The ages of all members of the family should be recorded.

(6) Occupations

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42. I. Leith and F. C. Aitken, "Technique and Interpretation of Dietary Surveys," Nutrition Abstracts and Reviews, XIX (January, 1950) 507-525.

(7) Sickness

If any member of the family is ill during the period of the survey or suffers from any chronic disability and is on a special diet or eating poorly, it should be recorded.

(8) Meals out and Visitors

The record forms should include a table on which the absence of any member of the family from any meal or the presence of a visitor or visitors may be entered.

Organization

(9) Record form

A record book of convenient size and providing orderly fashion for all the above data should be given to the investigator for each family.

(10) The ideal would be if the person (or persons) in charge of a survey could be responsible for all the weighings. For reasons of cost, this is not usually possible, but a daily visit should be paid.

(11) At the first survey visit, excluding the preliminary visit of inquiry to explain the purpose and request co-operation, the initial inventory is made, the procedure is outlined and equipment provided.

(12) Accurate scales are used. Milk is recorded in liquid measure, eggs usually by number. Dry goods are usually bought in accurately weighed quantities. Goods that are commonly purchased by price or number, such as

dozen oranges, must be weighed by the seller, the investigator, or the housewife. Certain foods require careful description or specification. For example, green beans, frozen; green beans, canned; green beans, fresh; perch, fresh; perch, frozen filleted. The type and cut of meat must be specified. Processed milk must be fully described. Fruits and nuts must be named and weights given as with or without skin, shell.

As the investigator is familiar with the tables of composition of foods to be used with the survey data and has had experience of the process of summary and analysis, he or she will the more efficiently supervise the recording of data in the required form.

(13) Checks and safeguards; menus and recipes

The investigator should ask the housewife to record the menu for each meal and snacks taken between meals, and she should check these against purchases. This prevents omission through forgetfulness.

She should also ask the housewife to write down the recipes of any compound dishes or cakes which might be left over at the end of the period.

(14) Variants of the procedure

Three main variants of this general plan

a. First and most accurate is that in which waste in preparation of food and plate waste are

recorded separately, and the data are used to determine the proportion of "inedible" material in food as purchased and the waste of "edible" material. This measures actual consumption.

b. Second is that in which all other records remain as before but waste is not recorded.

c. Third records only purchases and makes no inventory.

Tabulations and Summarizing of the Data

(15) Family total of food consumption

The amount consumed of each individual item is determined as the sum of: initial inventory and all purchases, less final inventory.

(16) Group summary in terms of foods purchased

In any large-scale survey, the group will be homogenous or divisible into homogenous groups to be compared with one another. The individual records will accordingly be transferred to one or more summary sheets.

The Interpretation of Results

(17) After the totals have been obtained they must be reduced so the intake is expressed as amount per person per day. This gives the quantities of an order familiar to everyone which may easily be compared to the standard allowances.

> In 1928 Searle and Arnold reported a study made of the meals served in a home management house at Iowa State College.[43] The individual and inventory methods of dietary study were used simultaneously in the hope of showing their relative value as means of measuring food consumption. The inventory method is more often used than the individual method because it is so practical where large numbers of subjects are involved and because it takes so much less time. The investigators concluded as a result of their study that the inventory method appeared to be adequate if the subjects were fairly uniform as to food requirements and habits and if a reliable method was used for computing waste.

Family food account.--Simple running reports are kept of food purchased and produced for household use. No inventory is taken either at the beginning or the end of the period. This is the type of record that a housewife who was living on a budget would keep. It is not as accurate a record as the food record method produces. It does not present a true picture of the actual food intake since no adjustment is made for the beginning and ending inventory. No account is kept of food waste in this method. Stiebeling in Nutrition Surveys: Their Techniques and Values, emphasizes that a record should be kept of both kitchen and

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43. Garnet N. Searle and Rossleene Arnold, "A Comparison of the Individual and the Inventory Methods of Dietary Study," Journal of Home Economics, XX (February, 1928), 84-88.

plate waste since the amount and kind of foods wasted will affect the estimate of the nutritive content of the diet.

The food list.--In this method the investigator used a food list in obtaining from the housewife an estimate of foods used during a certain period of time, usually the last seven days. This method is similar to the method, "Estimate of Food Eaten Made by the Individual." Both are questionnaire surveys. Most investigators feel that surveys which rely on the memory of an individual are not very accurate. It is difficult to remember what one has purchased during an entire week so the amounts obtained by this questionnaire survey are only approximate.

The investigator has not attempted to summarize the literature on nutritional studies made with college women or to summarize methods used in collecting and evaluating data. Pertinent information in the literature served as background for the development of the problem.

CHAPTER III

PROCEDURE

In the fall of 1951 an investigation was undertaken to evaluate the adequacy of the low cost diet in a home management house and to determine whether, at current market prices, it is possible to obtain an adequate diet at $0.55 per person per day. This is the present low-cost allowance in the home management houses.

The study was conducted in the McIver Street Home Management House, which is one of three houses owned and operated by the Woman's College of the University of North Carolina. The McIver Street House is a detached building with adequate space for eight students and one counselor. During the first two periods of this study, seven students and one counselor were living in the house; during the last period, there were six students and one counselor. This house was selected for the study because the investigator felt that if it were not possible to obtain an adequate diet in this establishment, it would be even more difficult to obtain an adequate one in the other two houses, each of which has space for six students and a counselor, but which operate on the same per capita budget. It is generally agreed that as the number of persons fed increases the per capita cost decreases.

The investigation was limited to a study of the low cost diet because it is felt among most investigators that if an adequate diet could be obtained on a low per capita budget, it would be possible to obtain an adequate diet on a higher cost level with much less effort.

Three hostess periods were studied: December 8-13, 1951; January 13-18, 1952; and February 8-12, 1952. The length of the hostess period depended upon the number of students and the length of time spent in the house. During the first period, sixteen meals were served to seven students and one counselor; during the second period, fifteen meals were served to seven students and one counselor; and during the last period, twelve meals were served to six students and one counselor.

Data were collected during a trial period, November 4-9, 1951, to test the adequacy and accuracy of the information obtained. When the investigator discovered that a weighed record of all items purchased was not kept, scales were secured and placed in the house so that each item could be weighed before it was stored.

Prior to each experimental period, the investigator talked to the girls. She explained the purpose of the study and asked for their co-operation. This was followed by a conference with the hostess. Emphasis was placed on the necessity for keeping accurate and complete records.

Charts for collecting the desired data were placed in the most convenient locations. Those for recording waste and for the number of persons served each meal were put on the bulletin board in the kitchen, while the chart for recording the subject's weight at the beginning of each hostess period was placed in the bathroom. The hostess assumed the responsibility of collecting the data and asked for co-operation from the other students when it was necessary. The investigator checked with the hostess frequently during the experimental periods to determine if there were any questions and if the data were being recorded properly.

The food record or weighed inventory method as suggested by Leith and Aitken in Chapter II was used for the collection of all data on food purchases. This information was taken from the regular household book at the end of the hostess periods. The "as purchased" weights of all foods bought were recorded. A beginning inventory was taken from the household book,where it had been recorded as the ending inventory of the previous hostess period. The hostess recorded a complete inventory of all food on hand at the end of her period. Thus beginning and ending inventories were always available. The quantity of food consumed could be determined by adding to the beginning inventory the amount of food purchased and by subtracting from the total the inventory at the end of the experimental period.

The hostess, with the co-operation of the cooks, checked the plates and kitchen waste and estimated the amount of waste immediately after each meal, and recorded this information on the chart provided for the purpose. A record was also kept of the number of persons served each meal. The students were normally required to be present for every meal except Saturday night supper and Sunday morning breakfast. The hostess had the privilege of inviting one guest during her period if she desired. Additional guests were invited on certain occasions, but the expense of social functions was covered by a separate item in the budget.

The investigator studied the chart on which the students recorded their weights and noted that tney were not consistently losing weight on a low cost diet. It was felt that they were probably eating between meals. During the third experimental period, the students were asked to keep a record of all food eaten between meals on a chart provided for

this purpose. They were also given a chart and asked to list comments and suggestions for improvements of menus.

Calories, protein, calcium, iron, Vitamin A, thiamine, riboflavin, niacin, and ascorbic acid of the total inventory (beginning inventory plus food purchased minus ending inventory) were calculated from the tables published by the United States Department of Agriculture in Agriculture Handbook No. 8.[1] The investigator also referred to Food Values of Portions Commonly Used by Bowes and Church.[2] The totals for each specific nutrient were then reduced to the amount per person per day. These in turn were compared with the National Research Council's Recommended Daily Allowances for a 16 to 20 year old girl.[3] Such comparison shows the nutrients in which the diet meets, exceeds, or falls below the intake recommended by the National Research Council for an adequate diet.

The United States Department of Agriculture in a pamphlet "Helping Families Plan Food Budgets" provides a guide for helping families to plan nutritionally adequate meals for the money they have to spend for food.[4] Master food plans are given at two cost levels--low and moderate--for nineteen age, sex, and activity groups. These plans

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1. Bernice K. Watt and Annabel L. Merrill, et al, Composition of Foods--Raw, Processed, Prepared: Agriculture Handbook No. 8. (Washington, D. C.: United States Department of Agriculture, 1950), 147.

2. Anna dePlanter Bowes and Charles F. Church, Food Values of Portions Commonly Used, (Philadelphia College Offset Press, 1946), 58.

3. Food and Nutrition Board, National Research Council, Recommended Dietary Allowances, National Research Council Reprint and Circular Series No. 129, 1948.

4. United States Department of Agriculture, Helping Families Plan Food Budgets, Miscellaneous Publication No. 662, Washington, D. C., 1950, 16pp.

can be used in figuring food requirements for families of different sizes. Two master food plans for meeting the requirements, one at low cost and one at moderate cost, are given. In these plans the Recommended Daily Allowances are translated into terms of food. Foods are classified in eleven groups, and the quantities needed weekly are given for persons in each of nineteen age, sex, and activity groups. From these, plans for families of different sizes and composition can easily be made. Classification of foods into eleven groups is for convenience in planning and for flexibility in the use of the plans. The food groups are: leafy green and yellow vegetables; citrus fruit and tomatoes; potatoes and sweet potatoes; other vegetables and fruit; milk, cheese and ice cream; meat, poultry, and fish; eggs; dry beans and peas, and nuts; flour, cereals, and baked goods; fats and oils; and sugar, sirup, and preserves. The low and the moderate cost plans suggest quantities of food that will furnish nutritionally adequate diets as judged by the National Research Council's Recommended Allowances. Both plans use the same groupings of food, but the plans differ in relative quantities of foods from the different groups and in choice of foods within a group. The low cost plan relies heavily on the cheaper food-groups--potatoes, dry beans and peas, flour and cereals. This plan is also based on selection of the cheaper foods within the groups, for instance, the less expensive cuts of meat and the lower priced vegetables and fruits. It includes foods requiring a considerable amount of home preparation. The moderate cost plan allows for larger quantities from the more expensive food groups such as meat and eggs. It allows for menus with greater variety, some frills, and less home preparation.

The average quantities of food purchased from each group by low-income families, as shown in dietary studies, were used as a starting point for the low cost plan. For the moderate cost plan amounts approximating the purchases from an average family income in the United States were used. These quantities were checked for nutritional adequacy. In preparing the low cost plan, the quantities were adjusted to allow more milk, cereals, dry beans and peas, and potatoes, while other vegetables and fruits, meats and eggs were reduced. Only slight adjustments were made for the moderate cost plan, chiefly an increase in milk and in vegetables other than potatoes. The next step was to modify these average quantities of foods to fit the needs of individuals differing in age, sex, and activity. From these amounts, quantities for family groups of different sizes and composition were worked out. Menus and market orders were then developed and tested in actual family situations. This guide for purchasing foods is commonly referred to as the Government Market Order. Hereafter it will be so designated.

In this study the foods purchased during the three experimental periods were classified into the eleven food groups set up by the United States Department of Agriculture. The number of meals served during the periods varied but each period included less than twenty-one meals. Some adjustment was necessary to set up a standard of comparison. For the first two periods studied, the total amount of food recommended for seven girls and one moderately active woman was calculated for twenty-one meals. This in turn was reduced to the total amount needed for sixteen meals during the first period and for fifteen meals during the second period. This made possible a comparison of the amount actually purchased during these periods with the amount recommended for

both sixteen and fifteen meals, respectively. For the third experimental period the same procedure was followed to obtain the figures for six girls and one moderately active woman for twelve meals.

As a first step in setting up a food budget Sherman suggests that foods be divided into five groups.[5] He recommends that the food dollar be distributed as follows:

> one fifth, more or less, for vegetables and fruits;
> one fifth, or more, for milk and cheese;
> one fifth, or less, for meats, fish, and eggs;
> one fifth, more or less, for bread and cereals;
> one fifth, or less, for fats, sugar, and other groceries and food adjuncts.

The money spent for each of these five different food groups during the three periods studied was calculated in terms of the percentage of the total amount spent for food. These percentages were then compared with Sherman's rule of spending approximately one-fifth of the food dollar for each of the five food groups.

One set of the menus, those planned for December 8-13, 1951, was studied by the investigator to determine whether the diet could be made more adequate at the same cost level by more careful planning. She substituted foods which were less expensive but comparable from a nutritional standpoint for items not appropriate for a low cost diet. By saving in this manner, it was possible to add foods rich in the nutrients which were known to be low in the diet.

A second phase of the investigation was concerned with checking whether the United States Department of Agriculture Market Order could

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5. Henry C. Sherman, Chemistry of Food and Nutrition, (Washington, D. C.: The MacMillan Company, 1946), pp. 533-534.

be used by the students as a guide in purchasing food on their present food budget. The investigator calculated the amount of food recommended for a group of students for one week. A market order was made for one week using the master plan for a low cost diet and selecting foods appropriate for this cost level. A complete dietary analysis was done on the foods included in the market order. The current prices of the food items listed were obtained from The Great Atlantic and Pacific Tea Company, a super market in the down-town shopping area. Using these data, a set of menus was made for one week. The menus were checked carefully for different factors: Were the foods included available and seasonal? Were the menus suitable to the cost level? Was the time required of the cook reasonable? Was the complexity of the preparation suitable to the experience of the person who would prepare the meal? Were they attractive and interesting? Did they fulfill nutritional requirements? Good menus require planning from the standpoint of nutrition, appetite appeal, the availability of food, the cost, and the time and energy required in preparation.

CHAPTER IV

RESULTS

The allowance for food on the low cost level in the home management houses at the Woman's College of the University of North Carolina is $0.55 per person per day. The amounts actually spent during the three experimental periods studied were $0.54, $0.54, and $0.58 per person per day, respectively.

The data collected during the trial period, November 4-7, 1951, were examined for errors in the methods of collection but were not tabulated.

Table I gives the nutritive value of the diets per person per day during the three periods. None of the diets met the standard for all of the nutrients. The energy value was above the recommended allowance during the third period, but low during the first two. Protein was low during all periods. The figure for calcium during the third period almost met the standard but the figures during the first and second period were low. The intake of iron was highest during the second period but was below the recommended allowance in all periods. The Vitamin A values were consistently high. The analysis showed that all thiamine and riboflavin intakes were below the standard. The intake of niacin was slightly high during the first period, and slightly low during the other two periods. Ascorbic acid figures were high during all three periods.

The degree of deviation of the per capita intake of nutrients from The Daily Recommended Allowances of the National Research Council is shown in Table II.

TABLE I

NUTRITIVE VALUE OF THE LOW COST MENUS

SERVED IN A HOME MANAGEMENT HOUSE

DURING THREE EXPERIMENTAL PERIODS

	I December 8-13, 1951	II January 13-18, 1952	III February 8-12, 1952	D. R. A. of N. R. C. Girl 16-20 Years Old
Calories	2,085.	1,864.	2,412.	2,400.
Protein, gm.	58.5	56.6	63.2	75.0
Calcium, gm.	.93	.96	.99	1.0
Iron, mg.	10.5	12.0	10.5	15.0
Vitamin A, I. U.	6,690.	8,036.	9,011.	5,000.
Thiamine, mg.	1.05	1.08	1.14	1.2
Riboflavin, mg.	1.63	1.69	1.76	1.8
Niacin, mg.	12.7	10.7	11.7	12.0
Ascorbic acid, mg.	99.	119.	117.	80.

TABLE II

DEVIATION OF THE PER CAPITA INTAKE OF NUTRIENTS

FROM DAILY RECOMMENDED ALLOWANCES OF

NATIONAL RESEARCH COUNCIL

	I Dec. 8-13, 1951 Per cent	II Jan. 13-18, 1952 Per cent	III Feb. 8-12, 1952 Per cent
Calories	-13.1	-22.3	+ .5
Protein, gm.	-22.0	-24.5	-15.7
Calcium, gm.	- 7.0	- 4.0	- 1.0
Iron, mg.	-30.0	-20.0	-30.0
Vitamin A, I. U.	+33.8	+60.7	+80.2
Thiamine, mg.	-12.5	-10.0	- 5.
Riboflavin, mg.	- 9.4	- 6.1	- 2.2
Niacin, mg.	+ 5.8	-10.8	- 7.9
Ascorbic acid, mg.	+23.8	+48.8	+46.3

Tables III, IV, and V give comparisons of the amounts of food recommended in the Government Market Order and the amounts actually purchased during the periods of December 8-13, 1951; January 13-18, 1952; and February 8-12, 1952. The total amount of food purchased in five of the food groups was lower than the recommended allowances during all three periods. These food groups were: potatoes and sweet potatoes; milk, cheese, and ice cream; meat, poultry, and fish; eggs; and flour, cereals, and baked goods. The total amount of food purchased was consistently high in four food groups: citrus fruit and tomatoes; other vegetables and fruits; dry beans and peas, and nuts; and sugar, sirup, and preserves. The totals for the other groups--i. e., leafy green and yellow vegetables and fats and oils, were below the standard during the first two periods and above the standard during the third period.

The amount of money and the per cent of the food dollar spent for each of the five different food groups suggested by Sherman are presented in Table VI. In no instance was the food dollar distributed as recommended. The per cent of the food dollar spent for vegetables and fruits was above the recommendations during all three experimental periods; the per cent spent for bread and cereals, fats, sugars, and miscellaneous was consistently below the recommendation. The amount spent for milk and cheese was higher than the standard during the first two periods but exactly met the standard in the third period. During the first period the recommended allowance for meat, fish, and eggs was met, but during the last two periods the figures were lower than the standard.

TABLE III

COMPARISON OF THE AMOUNT OF FOOD RECOMMENDED IN THE GOVERNMENT MARKET ORDER WITH THE AMOUNT ACTUALLY PURCHASED DECEMBER 8-13, 1951

Food Groups	Amount Recommended For 21 meals	Amount Recommended For 16 meals	Amount Actually Purchased Dec. 8-13, 1951	Difference	Per Cent Difference
Leafy Green, and Yellow Vegetables	18 lbs.	13 lbs. 8 oz.	6 lbs. 12 oz.	-6 lbs. 12 oz.	-50.
Citrus Fruit, Tomatoes	17 lbs. 12 oz.	13 lbs. 5 oz.	15 lbs.	+1 lb. 11 oz.	+12.7
Potatoes, Sweet Potatoes	24 lbs.	18 lbs.	11 lbs. 1 oz.	-6 lbs. 15 oz.	-38.5
Other Vegetables and Fruits	14 lbs.	10 lbs. 8 oz.	15 lbs.	+4 lbs. 8 oz.	+42.9
Milk,Cheese,Ice Cream	40 qts.	30 qts.	25 qts.	-5 qts.	-16.7
Meat, Poultry, Fish	16 lbs.	12 lbs.	7 lbs. 6 oz.	-4 lbs. 10 oz.	-30.2
Eggs	40	30	13	-17	-56.7
Dry Beans and Peas, Nuts	2 lbs.	1 lb. 8 oz.	1 lb. 15 oz.	+7 oz.	+29.2
Flour, Cereals, Baked Goods	26 lbs.	19 lbs. 8 oz.	11 lbs.	-7 lbs. 8 oz.	-38.5
Fats, Oils	6 lbs.	4 lbs. 8 oz.	2 lbs. 8 oz.	-2 lbs.	-44.4
Sugar, Sirup, Preserves	5 lbs. 2 oz.	3 lbs. 13 oz.	5 lbs. 3 oz.	+1 lb. 6 oz.	+36.1

TABLE IV

COMPARISON OF THE AMOUNT OF FOOD RECOMMENDED IN THE GOVERNMENT MARKET ORDER WITH THE AMOUNT ACTUALLY PURCHASED JANUARY 13-18, 1952

Food Groups	Amount Recommended For 21 meals	Amount Recommended For 15 meals	Amount Actually Purchased Jan. 13-18, 1952	Difference	Per Cent Difference
Leafy Green, and Yellow Vegetables	18 lbs.	12 lbs. 13 oz.	11 lbs. 6 oz.	-1 lb. 7 oz.	-11.2
Citrus Fruit, Tomatoes	17 lbs. 12 oz.	12 lbs. 11 oz.	17 lbs. 5 oz.	+4 lbs. 10 oz.	+36.5
Potatoes, Sweet Potatoes	24 lbs.	17 lbs. 9 oz.	7 lbs.	-10 lbs. 9 oz.	-60.1
Other Vegetables and Fruits	14 lbs.	10 lbs.	15 lbs. 15 oz.	+5 lbs. 15 oz.	+59.4
Milk, Cheese, Ice Cream	40 qts.	28½ qts.	24½ qts.	-4 qts.	-14.0
Meat, Poultry, Fish	16 lbs.	11 lbs. 7 oz.	5 lbs. 2½ oz.	-6 lbs. 5½ oz.	-46.7
Eggs	40	29	12	-17	-58.6
Dry Beans and Peas, Nuts	2 lbs.	1 lb. 7 oz.	3 lbs. 6 oz.	+1 lb. 15 oz.	+134.8
Flour, Cereals, Baked Goods	26 lbs.	18 lbs. 9 oz.	10 lbs. 9 oz.	-8 lbs.	-43.1
Fats, Oils	6 lbs.	4 lbs. 5 oz.	2 lbs. 12 oz.	-1 lb. 9 oz.	-36.2
Sugar, Sirup, Preserves	5 lbs. 2 oz.	3 lbs. 11 oz.	5 lbs. 5 oz.	+1 lb. 10 oz.	+44.1

TABLE V

COMPARISON OF THE AMOUNT OF FOOD RECOMMENDED IN THE GOVERNMENT MARKET ORDER WITH THE AMOUNT ACTUALLY PURCHASED FEBRUARY 8-12, 1952

Food Groups	Amount Recommended For 21 meals	Amount Recommended For 12 meals	Amount Actually Purchased Feb. 8-12, 1952	Difference	Per Cent Difference
Leafy Green, and Yellow Vegetables	15 lbs. 12 oz.	9 lbs.	11 lbs. 8 oz.	+2 lbs. 8 oz.	+27.8
Citrus Fruit, Tomatoes	15 lbs. 8 oz.	8 lbs. 12 oz.	12 lbs. 2 oz.	+3 lbs. 6 oz.	+38.6
Potatoes, Sweet Potatoes	21 lbs.	12 lbs.	8 lbs.	-4 lbs.	-33.3
Other Vegetables and Fruits	12 lbs. 4 oz.	7 lbs.	9 lbs. 7 oz.	+2 lbs. 7 oz.	+34.8
Milk, Cheese, Ice Cream	35 qts.	20 qts.	17 qts.	-3 qts.	-15.0
Meat, Poultry, Fish	14 lbs.	8 lbs.	4 lbs. 2½ oz.	-3 lbs. 13½ oz.	-48.0
Eggs	35	20	12	-8	-40.0
Dry Beans and Peas, Nuts	1 lb. 12 oz.	1 lb.	3 lbs. 3 oz.	+2 lbs. 3 oz.	+212.9
Flour, Cereals, Baked Goods	21 lbs. 12 oz.	12 lbs. 8 oz.	8 lbs. 15 oz.	-3 lbs. 9 oz.	-28.5
Fats, Oils	5 lbs. 4 oz.	3 lbs.	4 lbs. 4 oz.	+1 lb. 4 oz.	+41.7
Sugar, Sirup, Preserves	4 lbs. 8 oz.	2 lbs. 8 oz.	3 lbs. 10 oz.	+1 lb. 2 oz.	+45.0

TABLE VI

DISTRIBUTION OF THE FOOD DOLLAR

Food Groups	December 8-13, 1951 Total Amount Spent	December 8-13, 1951 Per Cent of Food Dollar	January 13-18, 1952 Total Amount Spent	January 13-18, 1952 Per Cent of Food Dollar	February 8-12, 1952 Total Amount Spent	February 8-12, 1952 Per Cent of Food Dollar
Vegetables, Fruits	$ 7.20	30.7	$ 8.47	35.8	$ 5.55	34.9
Milk, Cheese	5.71	24.4	5.86	24.8	3.18	20.0
Meat, Fish, Eggs	4.82	20.6	3.54	14.9	2.92	18.4
Bread and Cereals	2.05	8.7	2.26	9.6	1.94	12.2
Fats, Sugars and Miscellaneous	3.67	15.6	3.52	14.9	2.30	14.5
Totals	$23.45	100.0	$23.65	100.0	$15.89	100.0

The revisions which the investigator suggested for the first period menus in an effort to use the available money more wisely resulted in an increased supply of all nutrients except one. The amount of increase in no case exceeded six per cent and for one nutrient, ascorbic acid, there was no change. The supply of this nutrient was already more than adequate. These results are recorded in Table VII.

The amount of food waste was considerably higher during the third period. A record of the amount of food consumed between meals was also available. The investigator felt that it was important to see how much this food influenced the nutritive value of the diet. When an analysis was completed, it was found that the value of the food eaten between meals was greater than the value of the food waste for all nutrients except ascorbic acid. The figure for ascorbic acid remained the same. The nutritive value of the food waste and food eaten between meals is recorded in Table VIII.

The students commented on every meal served during the third hostess period. The hostess did not comment on any meal. The following is a tabulation of the fifty-six statements made by the group:

Favorable comments	25
Unfavorable comments	9
Mixed (Favorable and Unfavorable)	15
Miscellaneous	7
Total	56

Only one girl gave suggestions for improvements in the menus.

The nutritive analysis of the Government Market Order is found in Table IX. The Daily Recommended Allowances of the National Research Council were exceeded for all nutrients. The energy value was slightly below the standard.

TABLE VII

NUTRITIVE VALUE OF THE MENUS--DECEMBER 8-13, 1951--

AS THE RESULT OF CHANGES SUGGESTED

BY THE INVESTIGATOR

	Nutrients in Original Menus	Adjustment in Nutrients	Final Totals	D. R. A. of N. R. C. Girl 16-20 Years old	Per Cent Deviation
Calories	2,085	+29	2,114	2,400	-11.9
Protein, gm.	58.5	+1.6	60.1	75.0	-19.9
Calcium, gm.	.93	-.01	.92	1.0	-8.0
Iron, mg.	10.5	+.8	11.3	15.0	-24.7
Vitamin A, I. U.	6,690	+179	6,869	5,000	+37.4
Thiamine, mg.	1.05	+.02	1.07	1.2	-10.8
Riboflavin, mg.	1.63	+.03	1.66	1.8	-7.8
Niacin, mg.	12.7	+.5	13.2	12.0	+10.0
Ascorbic acid, mg.	99	-	99	80	+23.8

TABLE VIII

NUTRITIVE CONTENT OF THE MENUS

FEBRUARY 8-12, 1952

WITH CORRECTIONS FOR

WASTE AND FOOD EATEN BETWEEN MEALS

	Nutritive Value of Menus	Waste	Food Eaten Between Meals	Nutrients Consumed	Per Cent Deviation from N. R. C. D. R. A.
Calories	2,412	73	419	2,758	+14.9
Protein, gm.	63.2	2.1	7.6	68.7	-8.4
Calcium, gm.	.99	.03	.08	1.04	+4.0
Iron, mg.	10.5	.5	1.1	11.1	-26.0
Vitamin A, I. U.	9,011	348	689	9,352	+87.0
Thiamine, mg.	1.14	.07	.08	1.15	-4.2
Riboflavin, mg.	1.76	.06	.11	1.81	+.6
Niacin, mg.	11.7	.5	1.4	12.6	+5.0
Ascorbic acid, mg.	117	3	3	117	+46.3

TABLE IX

NUTRITIVE ANALYSIS OF

GOVERNMENT MARKET ORDER

	Nutritive Value of Foods Included in Government Market Order	D. R. A. of N. R. C. Girl 16-20 Years old	Per Cent Deviation
Calories	2,325	2,400	-3.1
Protein, gm.	83.0	75.0	+10.7
Calcium, gm.	1.13	1.0	+13.0
Iron, mg.	16.3	15.0	+8.7
Vitamin A, I. U.	17,106	5,000	+242.1
Thiamine, mg.	1.74	1.2	+45.0
Riboflavin, mg.	2.60	1.8	+44.4
Niacin, mg.	16.7	12.0	+39.2
Ascorbic acid, mg.	113	80	+41.3

CHAPTER V

DISCUSSION

An evaluation of the adequacy of meals served in a home management house at the Woman's College of the University of North Carolina revealed that the menus did not supply all of the nutrients in the quantities recommended for the 16 to 20 year old girl. The menus were planned by one of the students residing in the house. This student was also responsible for securing all food necessary for serving the menus.

The following plan was used for making out market orders during the three hostess periods:

1. The amount of food to be used was calculated from recipes. This food was available either from the inventory on hand or was purchased.

2. Before any purchases were made, the cost of each food item needed was figured and the cost of all articles was totaled. A reserve was left for incidental purchases.

3. If the total cost was greater or less than the food allowance for that period, the hostess made adjustments in the kind or quantity of food before she made any purchases.

The first hostess in the fall of 1951 secured the prices of articles by consulting the newspaper, by calling grocery stores, or by actually going to the stores. Succeeding hostesses were able to check many of the food prices in a record book which was kept on file. When the menus for the three experimental periods studied were examined, it was

noted that they followed closely the same pattern. In general the nutrients which were inadequate during one period were low during the other two periods. The same held true for the types of food purchased.

The nutritive value of the low cost diets was studied carefully to see how these diets compared with the Daily Recommended Allowances of the National Research Council. The standard used for comparison was that of the 16 to 20 year old girl. The average age of the girls living in the home management house was 20.8 years. Although the age was slightly above the maximum of the standard selected, many investigators feel that college girls should be classified in this group. Many women do not reach their maximum growth until they are twenty-one or twenty-two years of age; therefore, during periods of growth a liberal supply of nutrients should be provided in the diet.

The nutrients contributed by the menus during the three periods will be discussed separately.

Calories

The average caloric intake for the three periods studied was 2,085; 1,864; and 2,412, respectively. On the basis of the Daily Recommended Allowance of the National Research Council, the energy value was low during the first two periods. Yet the girls showed no consistent loss of weight.

During the first period six students lost weight; one student gained weight; and one student maintained her same weight.

During the second period three students lost weight; three students gained weight; one remained the same; and one did not record her weight. See Appendix F.

During the third period five students lost weight and two students maintained their same weight.

This indicates that the caloric content of the diet was not adequate for all the girls. For a weight loss to occur, the number of calories consumed must be less than the calories expended. The fact that all the girls did not lose weight during these periods may be explained by two reasons. First, many investigators feel that the caloric recommendation is too high. Pittman and others studied the caloric intakes of twenty-seven college women from Kansas and Ohio, using as a standard of comparison the National Research Council Recommended Allowance of 2,400 calories daily. They affirm:

> If it may be assumed that the energy intake of a normal person who maintains his weight while eating a freely chosen diet over a fairly long period represents his caloric needs, then as a rule, the standards commonly used are too high for these twenty-seven college women.[1]

Second, students may have eaten food in addition to that provided in the house. Records of food eaten between meals and kept during the third period revealed that the number of calories provided by this extra food amounted to an average of 419 daily. These calories were not distributed evenly among the students. But, each one of the girls ate some food in addition to that served in the dining room. A part of these extra calories was added by a box of food sent to one of the girls for her birthday. It is impossible to determine whether the students would have eaten an equivalent amount of food if the birthday box had not been available. It is very likely that they would have, since they reported the consumption of various

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1. Martha S. Pittman, et al, "The Caloric Intakes of Twenty-Seven College Women," Journal of the American Dietetic Association, XVIII (July, 1942), 452.

other "snacks," such as, "cokes," ice cream, cheese sandwiches, tangerine, popcorn, and others.

Protein

The per capita intake of protein was 22.0, 24.5, and 15.7 per cent below the recommended allowances for the three periods.

The amounts of meats, milk, and eggs purchased were correspondingly low according to the suggestions of the Government Market Order. The foods rich in animal protein are usually the most expensive items in the food budget. On a low cost budget they are necessarily limited.

This low intake is of special significance since many investigators believe that young girls need a liberal supply of protein. Ohlson and others made a study of the protein requirement of women, using a group at Iowa State College.[2] They found that few of the women ate more than 70 grams of protein each day, that is, unless they also had more than 2,000 calories. They offered evidence to show that from 70 to 90 grams of protein daily helps to protect young women during periods of physiological strain.

Calcium

The per capita intake of calcium was only slightly low during the three experimental periods. This may be explained in that it has been a policy of the house to purchase one pint of milk per person per day. Funds with which to purchase this amount of milk were taken out of the food allowance at the beginning of each hostess period. Until the fall of

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2. Margaret A. Ohlson, et al, "Studies of the Protein Requirements of Women," Journal of the American Dietetic Association, XXIV (September, 1948), 745.

1951 the daily requirement of milk was always purchased in the form of fresh milk. This practice was an excellent method for making certain that a definite amount was included in the diet; however, both dry skim milk and evaporated milk are less expensive and may easily be used in cooking. Dry skim milk costs approximately one-third that of fluid milk. Thus money saved in this manner may be used for purchasing food in other groups. Although the vitamin A value is lowered in substituting dry skim milk for fluid milk, this substitution would not have created a problem during any of the periods studied since the vitamin A values were consistently high. During the third experimental period, reconstituted dry skim milk was used part of the time; and the amount of fresh milk that would ordinarily have been purchased was reduced. The nutritive value of the diet was raised during this period, but the nutrients were not evenly distributed among the girls. Complying with their doctors' advice, two of the girls drank an extra glass of milk each day.

Iron

One of the most serious deficiencies revealed in the dietary analyses was that of iron. This amounted to -30, -20, and -30 per cent, respectively. A shortage of iron is particularly serious with young women of this age. Iron and protein, which is also insufficiently supplied in these low cost menus, are essential for hemoglobin formation. A lack of these two nutrients is one of the causes of anemia. While no data on the hemoglobin levels of these subjects are available, others have reported that a mild degree of anemia is common in young women. For this reason many authorities recommend a liberal intake of iron.[3]

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3. Margaret S. Chaney and Margaret Ahlborn, Nutrition, (Houghton Mifflin Company, 1949), 133-135.

Vitamin A

The menus served in each of the first two experimental periods did not use as much food in the leafy green and yellow vegetable group as the Government Market Order specified. The vitamin A content in all these periods exceeded the Daily Recommended Allowance. This can be accounted for by the classification of foods in the Government Market Order. The sweet potato, an important source of vitamin A, was grouped with the white potato, rather than with the yellow vegetables. Sweet potatoes appeared in the menus at least once in each hostess period.

Thiamine

The recommended allowance of thiamine was not met in any of the periods studied. The cereal group averaged 36.7 per cent below the desired level. The thiamine value would have been even lower had the quantity of dry beans and peas not been greater than the amount suggested on the low cost Government Market Order. None of the other food groups contribute thiamine in any significant quantity.

Riboflavin

A positive correlation between the amount of protein and the amount of riboflavin has been observed in many diets. This was found to be true in this study. In each case where protein was low the riboflavin was also low.

Niacin

Niacin is a nutrient which is expected to be deficient in a low cost diet. The investigator was surprised to find this nutrient adequate in the first hostess period and only slightly low during the other two

periods. The peanut butter purchased in each hostess period raised the niacin content of the diet considerably. Nuts are an important substitute for the more expensive meats, the food group which, on a more liberal allowance, furnishes the highest proportion of the daily niacin.

Ascorbic Acid

Each of the three sets of menus analyzed appeared to be more than adequate in the anti-scrobutic vitamin. According to the figures, they supplied +23.8, +48.8, and +46.3 per cent of the standard used in this study. The figures per se are misleading. The tables of food composition used (Agriculture Handbook No. 8) reported the ascorbic acid in the raw food. Because this vitamin is easily destroyed in ordinary cooking procedures, the amount of this nutrient consumed by the subjects was less than the above figures actually indicate.

A buffet meal was served during the second experimental period. The cost of this meal was provided for in a separate item in the budget. The allowance was $1.00 per person. The buffet was a high cost meal; and since the food was not purchased out of the regular food budget, the nutrients were not included in the analysis. All calculations were based on fifteen meals rather than on sixteen meals.

From the information obtained in this study, the menus served in the home management house from February 8-12, 1952, were more adequate than those served in either of the two earlier periods. There are two factors which may offer an explanation of this:

(1) The actual per capita food cost during this period was $0.58 per person per day. This difference of $0.03 in the daily per capita food expenditure amounted to an increase of only $0.84. But this was a 5.5 per cent increase.

(2) The cost of food had decreased slightly from the very high levels of the early part of the school year.

The food dollar was not distributed among the five food groups as suggested by Sherman in any of the three periods studied. This observation prompted the investigator to determine how the food dollar was divided when the groceries in the Government Market Order were classified in this same way. This, too, did not follow Dr. Sherman's classic rule of one-fifth of the food dollar for each of the five food groups. In general, fruits and vegetables and milk take one-fifth; breads and cereals, and fats, sugars, and miscellaneous take a little more than a tenth; and meats, fish, and eggs take about one-third of the food dollar. Neither did the menus served in the home management house at the time of this study follow the latter distribution, that of the Government Market Order. A greater amount of money was spent on the fruits and vegetable group, and a smaller amount was spent on the meat group.

A record of the food waste was kept during all experimental periods. During the first two periods the food waste was so very small that it was considered unimportant. In the third period the food waste was much greater because the girls in this group left more plate waste. To get a more accurate picture of the actual consumption of nutrients during this period, the waste was calculated and an adjustment made in the nutritive analysis of the menus.

A comparison was made between the nutritive value of the waste and the nutritive value of the food eaten between meals. This food was eaten in addition to that served on the menus. The extra food contributed a greater amount of each of the nutrients, with the exception of ascorbic acid, than was discarded as waste. The ascorbic acid remained unchanged.

In the case of calcium, riboflavin, and niacin, the net consumption of nutrients was satisfactory as the result of eating the extra food. The protein, iron, and thiamine were still supplied at a level below the recommended amount; but the degree of the deficiency was less in each case. For example, the average daily consumption of protein from the menus served was 61.1 grams. The extra food brought the protein consumption up to 68.7 grams. This was a change from -18.5 per cent to -8.4 per cent.

Although there were no data available on the amount of food eaten between meals in the first two hostess periods of this study, the investigator is reasonably certain from her contact with the subjects that there was some extra food eaten. Naturally, food patterns had already been established before the students entered the home management house. The habit of eating between meals was included in these food patterns. Eating "snacks" between meals is a popular pastime among students at Woman's College. The Counselor stated that there may have been more extra food eaten by the students in the third group, since they had more definite food dislikes and since they had the greatest amount of plate waste.

The investigator observed that the breakfast meals planned by the students were very light and lacked "staying" quality. A small amount of one of the protein foods would have made these meals much more satisfying.

This was not possible on the present limited food budget. Therefore, cereal would be the most logical food to add in order to make the breakfast meal more adequate; but many college students do not enjoy the meal and do not like cereal for breakfast.

The investigator felt that comments and suggestions for improvements of the menus served might give her some insight into the reasons for the students' feeling that the low cost meals were inadequate. During the third period charts were provided for the comments. This was the first hostess period for a new group of students. They were probably less critical and not quite so eager to suggest improvements as they might have been after they became more familiar with the management of the house. The general feeling among the students was that the breakfast meals were not adequate. Perhaps the long period of time between the breakfast meal and the noon meal accounted, in part, for the following typical comments made about the breakfast meals:

"Not too nourishing or filling"

"Inadequate meal--not enough to eat considering light supper the night before"

"Good but not enough--lacking in eggs"

There were similar comments made about the luncheon and dinner menus:

"Good but not enough to eat--only one sandwich"

"Good, colorful--however, not enough meat (one small sausage)"

"Somewhat light but the gift (birthday cake) balanced it"

These statements represent the opinion of several students, not just one. They support the previously stated opinion of the investigator; that is, the low cost meals served at the present time in the home management house do not provide enough food to satisfy the students.

In reviewing the first period menus in an effort to use the available money more wisely, the investigator substituted canned lima beans for frozen lima beans. Evaporated milk was substituted for the six quarts of fresh milk used in cooking; and the frozen orange juice was replaced with an equivalent amount of the canned juice. With the money saved by making these changes, it was possible to purchase an additional dozen eggs and one box of cereal. Part of the eggs were added to one of the breakfast menus and the others were used at the Sunday night supper. The cereal was served on Wednesday morning. The nutritive value of the menus was raised as the result of these changes, but the diet was still inadequate in all but three of the nutrients.

The students need more experience in determining the amount of food necessary for a low cost diet. There is a wide range in the amount of training they have had in food preparation and in menu planning. Clothing and housing majors are required to live in the house, yet have only one basic food course. The Government Market Order was proposed by the United States Department of Agriculture as a guide for obtaining an adequate food intake at a low cost level. The investigator felt it was important to be sure that it could be used by the girls with their present budget. The market order was made out using the Master Food Plan, and a complete nutritive analysis was made to check its adequacy. The recommendations of the National Research Council were either met or exceeded for all of the nutrients. Since many of the dietary standards were exceeded when this plan was used, it may appear to be too liberal. It should be remembered, however, that the investigator had had more experience in planning menus than the

students residing in the home management house. When prices were obtained for the items listed in the market order, it was found that the per capita cost was $0.654 per day.

All phases of the investigation point to the fact that $0.55 per person per day is not enough to obtain an adequate diet at current market prices.

CHAPTER VI

SUMMARY AND RECOMMENDATIONS

A study was made in a home management house at the Woman's College of the University of North Carolina to evaluate the adequacy of the diet on the low cost level and to determine whether an adequate diet could be obtained at the present per capita allowance of $0.55 per person per day.

The weighed inventory method was used for the collection of all data on food purchases during three experimental periods. The "as purchased" weights of all foods and beginning and ending inventories were taken from the regular household book. Records were kept of the number of persons served each meal, and of all edible waste. The students entered their individual body weights on charts at the beginning of each hostess period. During the third experimental period, lists were obtained of all food eaten between meals; and comments and suggestions for improvements of menus were recorded.

The amount of money actually spent during the three experimental periods was $0.54, $0.54, and $0.58, respectively. The expenditure was slightly lower than the allowance during the first two periods and slightly higher during the third period.

The intake of nutrients per person per day was not entirely adequate during any of the three experimental periods when compared with the Daily Recommended Allowances of the National Research Council for a 16 to 20 year old girl.

The average daily nutritive value of the low cost menus during the three periods follows:

First Period — Calories, 2,085; Protein, 58.5 gm.; Calcium, 0.93 gm.; Iron, 10.5 mg.; Vitamin A, 6,690 I. U.; Thiamine, 1.05 mg.; Riboflavin, 1.63 mg.; Niacin, 12.7 mg.; and Ascorbic Acid, 99 mg.

Second Period — Calories, 1.864; Protein, 56.6 gm.; Calcium, 0.96 gm.; Iron, 12.0 mg.; Vitamin A, 8,036 I. U.; Thiamine, 1.08 mg.; Riboflavin, 1.69 mg.; Niacin, 10.7 mg.; and Ascorbic Acid, 119 mg.

Third Period — Calories, 2,412; Protein, 63.2 gm.; Calcium, 0.99 gm.; Iron, 10.5 mg.; Vitamin A, 9,011 I. U.; Thiamine, 1.14 mg.; Riboflavin, 1.76 mg.; Niacin, 11.7 mg.; and Ascorbic Acid, 117 mg.

The energy value was low during the first two periods and it was slightly high during the third period. The intakes of vitamin A and ascorbic acid were above the standard during all periods; the intakes of protein and iron were below the standard.

The amount of food waste was so very small during the first two periods that it was considered insignificant. Therefore, the nutritive value of the food waste was calculated only for the third period. During this time a record was kept of the food eaten between meals. When the nutritive value of food waste was compared with the nutritive value of food eaten between meals, it was found that the value of the food eaten between meals was greater in each case except ascorbic acid, which remained the same.

A market order patterned after the Master Food Plan for a Low Cost Diet, published by the U. S. Department of Agriculture, was made in an attempt to see whether it could be used by the students as a guide for purchasing groceries. When the foods were priced at a super market, it

was revealed that at current market prices the cost was $0.654 per person per day. A complete analysis of this market order showed that it was adequate for all nutrients. Calories were slightly low.

A comparison of the amount of food recommended in the Government Market Order for an adequate low cost diet with the amounts actually purchased during the three periods revealed that the amount spent for citrus fruit and tomatoes; other vegetables and fruits; and sugar, sirup and preserves was higher than the recommended allowance. The amount spent for potatoes and sweet potatoes; meat, cheese and ice cream; eggs; and meat, poultry and fish was low during all periods. The amounts spent for milk, cheese, and ice cream were slightly low.

In the three periods studied the food dollar was not distributed among the five groups as suggested by Sherman in Chemistry of Food and Nutrition. A high percentage of the food dollar was spent for vegetables and fruits, and a very low percentage of the food dollar was spent for bread and cereals.

Student comments and suggestions for improvements of the menus indicated that the low cost meals served in the home management house during the study did not provide adequate food for the students.

Recommendations

In light of the investigation, the following recommendations are made:

I. The nutritional adequacy of the low cost diet in a home management house at Woman's College may be increased through the use of

   A. Dry skim milk or evaporated milk in place of fresh whole milk in the preparation of cooked foods.

B. More cereals, preferably the uncooked variety, at breakfast.

C. At least one egg per person per day.

D. Frozen foods only when they are less expensive than the fresh or canned variety.

E. Potatoes or sweet potatoes twice daily. Rice, noodles, macaroni or spaghetti may be substituted.

F. Prepared mixes only when time does not permit the preparation of a regular recipe.

II. The entire sum allotted for the food budget be spent during each hostess period.

III. The low cost allowance of $0.55 per person per day be increased so that the students may follow an established guide or guides for making low cost menus and market orders.

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APPENDIXES

APPENDIX A

A TYPICAL BUDGET

NOVEMBER 27, 1951 - JANUARY 23, 1952

Items	Proposed Expenditure
Food	$207.18
Milk	40.48
Household Supplies	22.58
Newspaper	2.50
Care and Repair	5.00
Books and Magazines	2.26
Dessert	4.00
Tea	11.00
Buffet	13.00
Available Funds	$308.00

APPENDIX B

MENUS SERVED--DECEMBER 8-13, 1951

Cost per person per day: $0.54

Day	Breakfast	Lunch	Dinner
Saturday	Grapefruit Halves Toast Butter* Jelly Coffee Cream Sugar	Chili Con Carne with Rice Head Lettuce Salad Peach Cobbler Coffee Tea Cream Sugar	Toasted Cheese Sandwiches Cucumber Pickles Potato Chips Peanut Butter Cookies Milk
Sunday	Tomato Juice Waffles Butter Maple Syrup Coffee Milk Cream Sugar	Baked Chicken Candied Yams Lima Beans Biscuits Butter Vanilla Ice Cream Coffee Tea Cream Sugar	Tomato Jelly Ring Cottage Cheese Ritz Crackers Peanut Butter Cookies Milk
Monday	Orange Juice Oatmeal with Raisins Jelly Toast Butter Coffee Cream Sugar	Cream of Tomato Soup Peanut Butter-Jelly Sandwiches Orange Sections Milk	Sausage Patties Red Cabbage Grits Gravy Cornbread Butter Congealed Fruit Cocktail Coffee Tea Cream Sugar
Tuesday	Orange Juice French Toast with Jelly Coffee Cream Sugar	Pimiento Cheese Sandwiches Apple-Raisin Salad Gingerbread Milk	Salmon Loaf Baked Potatoes Buttered Beets Biscuits Butter Coffee Tea Cream Sugar
Wednesday	Stewed Prunes Jelly Toast Butter Coffee Milk Cream Sugar	Potato Soup Croutons Carrot Cube Salad Chocolate Pudding Milk	Spaghetti with Meat Sauce Cole Slaw Baked Apples Coffee Tea Cream Sugar
Thursday	Grapefruit Juice Potato Patties Toast Butter Coffee Cream Sugar		

*Oleomargarine was actually used, but it was called "butter" on some of the menus.

APPENDIX C

MENUS SERVED--JANUARY 13-18, 1952

Cost per person per day: $0.54

Day	Breakfast	Lunch	Dinner
Sunday	Grapefruit Juice Waffles Syrup Butter Milk Coffee	Roast Chicken Dressing Sweet Potatoes Green Beans Head Lettuce Salad Biscuits Butter* Ice Cream Coffee Tea	Potted Meat Sandwiches Potato Salad Carrot Strips Peanut Butter Cookies Milk
Monday	Orange Halves French Toast Jelly Coffee	Clam Chowder Croutons Head Lettuce Salad Cherry Cobbler Milk	Macaroni and Cheese Spinach Tomato Slices Biscuits Butter Blackberry Pie Coffee Tea
Tuesday	Prunes Oatmeal Cream Toast Butter Coffee	Pork and Beans Slaw Cornbread Butter Fruit Jello Milk	Buffet
Wednesday	Grapefruit Halves Cinnamon Toast Coffee	Vegetable Soup Peanut Butter, Jelly Sandwiches Fruit Cocktail Milk	Scalloped Potatoes with Ham Harvard Beets Collards Biscuits Butter Lime Sherbet Coffee Tea
Thursday	Orange Juice Toast Butter Jelly Coffee	Tomato Soup Egg Salad Sandwich Baked Apple Milk	Weiners & Sauerkraut Baked Potato Carrot Strips Celery Curls Cornbread Butter Chocolate Pudding Coffee Tea
Friday	Tomato Juice Oatmeal with Raisins Toast Butter Coffee		

*Oleomargarine was actually used, but it was called "butter" on some of the menus.

APPENDIX D

MENUS SERVED--FEBRUARY 8-12, 1952

Cost per person per day: $0.58

Day	Breakfast	Lunch	Dinner
Friday			Pork Sausage Baked Potatoes Green Beans Carrot & Celery Strips Plain Muffins Peaches Cookies Coffee
Saturday	Tomato Juice Prepared Cereal Milk French Toast Jelly Coffee	Potato Soup Pork and Beans Head Lettuce French Dressing Spice Cake Coffee	Bacon, Lettuce and Tomato Sandwiches Celery Strips Carrot Cubes Apples Milk
Sunday	Orange Half Doughnut Coffee	Meat Stuffed Rye Loaf Candied Yams Green Peas Apple,Cabbage,Raisin Salad Lemon Pie Coffee	Potato Salad in Lettuce Cups Peanut Butter-Prune Spread Sandwich Cup Cakes Milk
Monday	Grapefruit Halves Oatmeal with Raisins Milk Toast Margarine Jelly	Macaroni & Cheese Fresh Fruit Salad Muffins Margarine Chocolate Pudding Milk	Chicken Croquettes Kale Buttered Beets Vegetable Congealed Salad Biscuits Margarine Coconut Cream Tarts Coffee
Tuesday	Stewed Prunes Bacon Toast Margarine Coffee	Cream of Chicken Soup Crackers Blackeyed Peas Slaw Cookies Milk	

APPENDIX E

SAMPLE WEEK'S MENUS USING THE GOVERNMENT MARKET ORDER

Cost per person per day: $0.654

Day	Breakfast	Lunch	Dinner
Sunday	Orange Halves Waffles Butter* Syrup Coffee Milk	Roast Pork Baked Sweet Potatoes Green Beans Carrots-Celery Whole Wheat Rolls Butter Coffee Milk Chocolate Cake	Congealed Fruit Salad Corned Beef Sandwich Milk Chocolate Cup Cake
Monday	Prunes Puffed Wheat Toast Butter Bacon Coffee Milk	Macaroni & Cheese Buttered Cabbage Scalloped Tomatoes Toast Rolls Milk Oatmeal Cookies	Meat Loaf Gravy Mashed Potatoes Spiced Beets Biscuits Butter Jelly Coffee
Tuesday	Grapefruit Juice Oatmeal with Raisins Toast Butter Coffee Milk	Spanish Omelet Turnip Greens Buttered Toast Milk Prune Whip	Beef Stew with Carrots, Onions, and Potatoes Slaw Corn Muffins Butter Coffee Baked Apple
Wednesday	Tomato Juice Cornflakes French Toast Coffee Milk	Split Pea Soup Grilled Cheese Sandwich Croutons Milk Graham Crackers	Franks Potato Salad Carrot Sticks Celery Weiner Rolls Coffee Chocolate Pudding
Thursday	Orange Halves Wheatena Toast Butter Coffee Milk	Creamed Dried Beef on Toast Waldorf Salad Milk Gingerbread	Liver Loaf Baked Potato Buttered Carrots Corn Muffins Butter Coffee Whipped Jello

*Oleomargarine was actually used, but it was called "butter" on some of the menus.

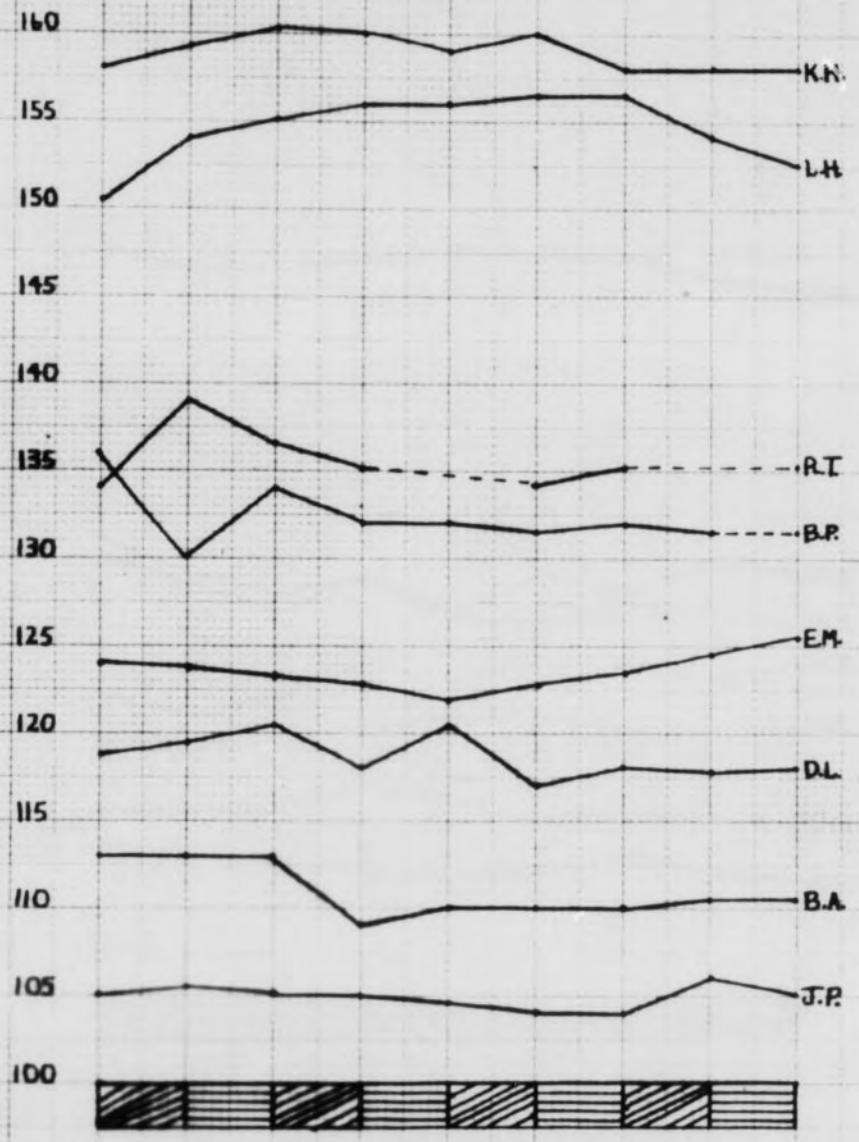
APPENDIX E (Continued)

SAMPLE WEEK'S MENUS USING THE

GOVERNMENT MARKET ORDER

Day	Breakfast	Lunch	Dinner
Friday	Bran Flakes Bacon Cinnamon Toast Coffee Milk	Baked Beans Spinach Fried Apples Whole Wheat Rolls Butter Milk Fruit Cup	Fried Perch Buttered Potatoes Tossed Vegetable Salad Cornbread Butter Coffee Lemon Sherbet
Saturday	Grapefruit Juice Puffed Wheat Cheese Toast Coffee Milk	Baked Beef Hash Cabbage, Carrot, Raisin Salad Whole Wheat Rolls Butter Fruit Cup	Egg Salad Sandwich Peanut Butter, Jelly Sandwich Potato Chips Milk Oatmeal Cookies

APPENDIX F



GRAPHIC RECORD OF STUDENT'S WEIGHT

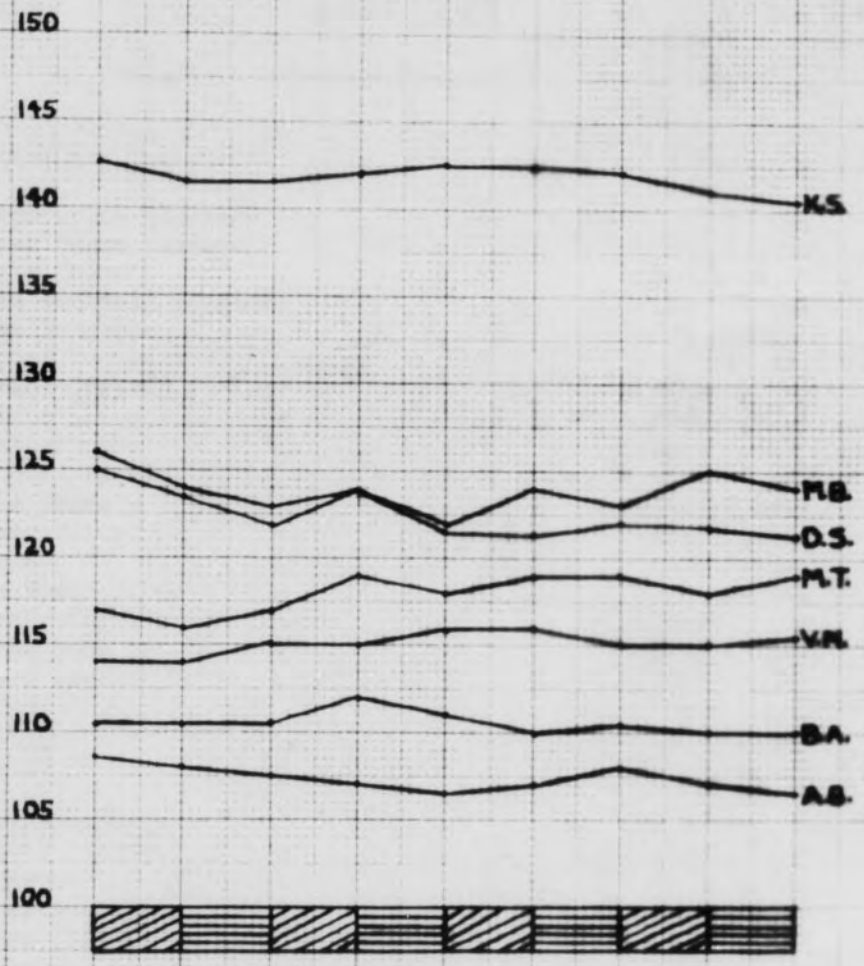
NOVEMBER 27, 1951 - JANUARY 23, 1952

LOW COST

MODERATE COST

---NOT RECORDED

APPENDIX O



GRAPHIC RECORD OF STUDENT'S WEIGHT

FEBRUARY 8, 1952 - MARCH 13, 1952

LOW COST

MODERATE COST

APPENDIX H

MARKET ORDER

December 8-13, 1951

Vegetables and Fruits	Amount	Cost
Orange Juice (frozen)	12 oz.	$ 0.40
Kidney Beans (canned)	15 oz.	0.15
Potato Chips	4-3/4 oz.	0.29
Fruit Cocktail (canned)	1 lb. 14 oz.	0.44
Sweet Potatoes	2-3/4 lbs.	0.35
Raisins	15 oz.	0.25
Peaches (dried)	1 lb.	0.43
Lettuce	2 lbs.	0.27
Potatoes	6 lbs.	0.30
Cucumber Pickle	8 oz.	0.20
Apple Sauce	2 lbs. 2 oz.	0.25
Tomato Juice	2 lbs. 8½ oz.	0.36
Lemons	3 oz.	0.08
Lima Beans (frozen)	20 oz.	0.58
Grapefruit	2½ lbs.	0.30
Tomato Soup	1 lb. 5 oz.	0.24
Prunes (dried)	1 lb.	0.29
Onions	3/4 lb.	0.09
Tomatoes	2 lbs. 6 oz.	0.40
Cabbage	2½ lbs.	0.22
Oranges	2½ lbs.	0.15
Beets (canned)	2 lbs.	0.25
Carrots (canned)	1 lb.	0.20
Pimiento	4 oz.	0.12
Grapefruit Juice	2 lbs. 14 oz.	0.23
Apples (fresh)	6 lbs.	0.30
Potatoes	2 lbs.	0.12
Meats and Eggs		
Eggs	1 doz.	0.75
Chicken	3 lbs. 2 oz.	1.50
Ground Beef	1 lb.	0.66
Salmon	1 lb.	0.57
Ground Beef	3/4 lb.	0.48
Pork Sausage	1½ lbs.	0.80
Eggs	¼ doz.	0.17

Breads and Cereals	Amount	Cost
Oatmeal	1 lb. 4 oz.	0.19
Ritz Crackers	8 oz.	0.22
Rice	12 oz.	0.16
Waffle Mix	1 lb. 4 oz.	0.20
Bread	3 lbs.	0.44
Flour	2 lbs.	0.27
Spaghetti	14 oz.	0.25
Bread	1½ lbs.	0.22
Fats, Sugars, Miscellaneous		
Jewel Shortening	1 lb.	0.28
Chocolate Pudding	8 oz.	0.16
Baking Powder	4 oz.	0.10
Ice Cream Mix	10 oz.	0.30
Coffee	1 lb.	0.77
Sugar (white)	2 lbs.	0.25
Apple Jelly	12 oz.	0.18
Peanut Butter	12 oz.	0.37
Maple Syrup	12 oz.	0.23
Margarine	1½ lbs.	0.44
Sugar (white)	2 lbs.	0.22
Vanilla	½ oz.	0.15
Milk and Cheese		
Cheese (American)	1 lb.	0.71
Cottage Cheese	8 oz.	gift
Total		$18.30

APPENDIX I

MARKET ORDER

January 13-18, 1952

Vegetables and Fruits	Amount	Cost
Fruit Cocktail (canned)	1 lb. 14 oz.	$ 0.44
Beets (canned)	2 lbs.	0.29
Blackberries (canned)	1 lb. 3 oz.	0.22
Kraut (canned)	1 lb. 14 oz.	0.29
Sweet Potatoes	2 lbs. 3 oz.	0.34
Apples (fresh)	3½ lbs.	0.44
Potatoes	7 lbs.	0.49
Lettuce	1½ lbs.	0.29
Spinach (frozen)	28 oz.	0.38
Cherries (canned)	1 lb. 3 oz.	0.25
Clam Chowder Soup	21 oz.	0.36
Vegetable Soup	22 oz.	0.30
Pork and Beans	2 lbs. 10 oz.	0.38
Grapefruit Juice	1 qt. 14 oz.	0.23
Green Beans (frozen)	1 lb. 4 oz.	0.50
Tomato Soup	21 oz.	0.24
Carrots (fresh)	1 lb.	0.25
Tomato Juice	46 oz.	0.29
Grapefruit (4)	5½ lbs.	0.39
Prunes (dried)	1 lb.	0.29
Tomatoes	14 oz.	0.23
Orange Juice (frozen)	6 oz.	0.23
Oranges	4 lbs. 6 oz.	0.19
Bananas	1 lb. 1 oz.	0.14
Lettuce	10 oz.	0.21
Collards (fresh)	2¼ lbs.	0.44
Meat, Fish, and Eggs		
Potted Meat	6½ oz.	0.22
Eggs (1 doz.)	1 lb. 15 oz.	0.63
Weiners	1½ lbs.	0.76
Spiced Ham	1 lb.	0.68
Chicken	2¼ lbs.	gift

Breads and Cereals	Amount	Cost
Cornmeal	1½ lbs.	0.18
Flour	2 lbs.	0.28
Waffle Mix	14 oz.	0.31
Macaroni	8 oz.	0.13
Loaf Bread	3 lbs.	0.46
Pie Crust Mix	18 oz.	0.37
Loaf Bread	3 lbs.	0.48
Oatmeal	1 lbs. 4 oz.	0.19
Fats, Sugars, Miscellaneous		
Salad dressing	8 oz.	0.24
Apple Jelly	12 oz.	0.16
Brown Sugar	1 lb.	0.13
Sugar	2 lbs.	0.22
Coffee	1 lb.	0.77
Margarine	1½ lbs.	0.38
Peanut Butter	12 oz.	0.37
Jewel Shortening	1 lb.	0.30
Jello	6 oz.	0.19
Chocolate Pudding	8 oz.	0.20
Pickles	8 oz.	0.17
Sugar	2 lbs.	0.23
Vanilla	1½ oz.	0.27
Salad dressing	8 oz.	0.24
Jello	3 oz.	0.07
Milk and Cheese		
Ice Cream Mix	10 oz.	0.39
Cheese	½ lb.	0.33
Pet Milk	6 oz.	0.08
Total		$17.53

APPENDIX J

MARKET ORDER

February 8-12, 1952

Vegetables and Fruits	Amount	Cost
Lettuce	2-3/4 lbs.	0.38
Carrots (fresh)	1½ lbs.	0.15
Celery	1¼ lbs.	0.19
Tomatoes (fresh)	1 lb.	0.20
Cabbage	2½ lbs.	0.13
Sweet Potatoes	2½ lbs.	0.42
Onions	10 oz.	0.05
Irish Potatoes	5½ lbs.	0.39
Kale (frozen)	12 oz.	0.23
Green Beans (frozen)	10 oz.	0.23
Peas (dry)	12 oz.	0.16
Beets (canned)	2 lbs.	0.36
Peas (canned)	2 lbs. 2 oz.	0.40
Pork and Beans	1 lb. 15 oz.	0.25
Tomato Juice	14 oz.	0.31
Grapefruit	4 lbs. 12 oz.	0.25
Oranges	5 lbs.	0.26
Lemons	8 oz.	0.08
Apples (fresh)	4 lbs.	0.35
Coconut	4 oz.	0.18
Prunes (dried)	1 lb.	0.29
Peaches (canned)	1 lb. 13 oz.	0.29
Meat and Eggs		
Chicken	1 lb. 14½ oz.	1.05
Ground Beef	3/4 lb.	0.52
Bacon	1 lb.	0.49
Eggs (1 doz.)	1-3/4 lbs.	0.49
Prok Sausage	8 oz.	0.37
Breads and Cereals		
Crackers	7 oz.	0.18
Macaroni	7 oz.	0.12
Bread	1½ lb.	0.23
Rye Bread	11 oz.	0.17
Flour	2 lbs.	0.24
Bread	1½ lb.	0.23