A STUDY OF PLATE WASTE IN THE DINING HALL OF A STATE WOMAN'S COLLEGE

by

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CHAPTER I

INTRODUCTION

There have been a great many dietary studies of students in colleges and universities in all parts of the country. Many have compared diets in different kinds or eating places such as cooperative dormitories, cafeterias, sororities, light housekeeping units, and restaurants. The studies have been based on food purchases and inventories, questionnaires or observations of the meals selected in a cafeteria.

Comparatively few studies have taken account of waste. Usually the emphasis has been on the increased cost due to kitchen waste, poor buying, or poor menus. There have been a few studies of plate waste in hospitals and recently in the army. College studies of waste have ordinarily been done on one individual in a group being studied. This study at Woman's College was undertaken to investigate plate waste for a large group of college students and to discover if possible some of the conditions which influence the situation.

A dining room seating about 400 was selected for the study. Plates were scrapped and waste sorted in the pantry outside the dining room where soiled dishes were ordinarily returned. While many students probably knew of the study, the fact that it was carried on out of sight and that it did not apparently interrupt or change the usual dining room routine meant that any psychological effect was probably negligible.

Since the meals served permitted little choice, there was an opportunity to obtain the reaction of a large group to the same menu. It is not known how many of the total number served were present for all the meals studied since no seat assignments were made for breakfast or

lunch. No regular census could have been taken without calling attention to the study. For the same reason, no study could be made of between meal eating and its possible effect on plate waste. The figures obtained are averages for the group and do not show individual differences.

While rationing had been discontinued except for sugar, meats and fats were scarce and food generally expensive. All flour and bread in the state were enriched at the time of the study.

The periods selected for study included a basic week, which was expected to be normal, and three additional days when the usual routine might be changed. Seven consecutive days in November were chosen for the basic part of the study because they fell during a period when there were no special occasions which might have caused emotional disturbances. Results in this period were then compared with those in later periods immediately before and after the Christmas vacation and during mid-year examinations.

It was hoped that this study, including a large number of individuals and attracting a minimum of attention, would provide a reliable picture of plate waste in this dining room.

CHAPTER II

REVIEW OF LITERATURE

Dietary surveys made in colleges and universities have usually concerned food consumption. Plate waste has been studied in hospitals, army camps, and a few colleges. Likes and dislikes of college students and food habits in general have also received consideration.

A detailed study carried on by Donelson, Nelson, Ohlson, Pittman, Leverton, McKay, Kinsman, Armstrong, and Reynolds[1] in seven midwestern colleges from 1936 to 1942 showed the diets were noticeably lacking in amounts of citrus fruits and tomatoes. They also noted an inadequate intake of green and yellow vegetables and milk. The number of students eating whole grain products was low, but it was thought that the enrichment program would offset that.

Goddard, Gardner, Gibson, Harbour, and Hardison[2] in a study done in a dormitory occupied by 105 women operating on a moderate cost level at the University of California tabulated the proportion of calories furnished by various classes of food used during two eight-day periods and compared them with Rose's recommendations for low, moderate, and high income levels. During the first period of their study, the amount of milk exceeded Rose's recommendations for moderate income; vegetables, fruits, and fats exceeded both low and moderate levels; sugar exceeded

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

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

that recommended for all three income levels; eggs, meat, and cheese exceeded only the low income recommendations. During the second period, milk exceeded the moderate income level; cereals did not come up to the recommendations in any of the three income levels; vegetables, fruits, and eggs; meat and cheese exceeded only the low income level, while fats and sugars exceeded recommendations for all three levels.

Lautz, Carter and Ferguson[3] counted servings of meat, seafood, eggs, and milk on trays of men and women students in the cafeteria of the George Peabody College for Teachers. They found that only 49% of the women chose meat, seafood or eggs compared with 73% of the men. Only 24% of the women took milk; whereas, 40% of the men chose it. Almost every man took about twice the amount the average woman took.

In a study that was made to determine the caloric intake of twenty-seven college women on freely chosen diets, Pittman, McKay, Kunerth, Patton, Edelblute, and Cox[4] found the mean caloric intake well below Sherman's standard for moderately active women and still lower than that set by the Committee on Foods and Nutrition of the National Research Council. A study of these students' dietaries showed that the protective foods, particularly milk, green and raw vegetables, citrus fruits and tomatoes, and in some instances, eggs, appeared frequently in the majority of diets. This probably explains why students on these diets were able to maintain general health in spite of the low caloric

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[3] Lautz, Amelia, Ferguson, Sarah and Carter, Caroline, "Meat, Sea Food, Eggs and Milk in the Self-Selected Diets of College Men and Women", Journal of Home Economics, XXXII (November 1940), 615-616.

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

intake. They thought this might indicate a change in dietary habits as striking as the apparent trend toward a decrease in caloric intake.

This decrease in calories, as well as in the amount of protein ingested, was noted by Ohlson, Nelson, and Swanson[5] in making plans for a cooperative study of the dietary status of college students. They cited the study made by Coons and Schiefelbusch which showed that it is almost impossible to meet standards recommended for the other food nutrients when the caloric intake is very low. Since there are few cases of gross deficiency they felt it was obvious that minimum requirements are being met but the studies made during the last decade do suggest the prevalence of a relatively widespread mild chronic malnutrition.

As a part of this cooperative study made from 1936 to 1940, Reynolds, Ohlson, Pittman, McKay, Patton, Donelson, Leverton, Meiller, and Bitting[6] analyzed records kept of all food eaten by students in six colleges and universities for the frequency with which the following groups occurred: milk; green and yellow vegetables; citrus fruits or tomatoes; meat, fish or poultry; and whole grain products. They found meat chosen most often by the largest number of students and whole grain products least often selected. There was an increase in consumption of green or yellow vegetables by upperclassmen over the amount chosen by underclassmen and a similar increase was noted in the amount of tea, coffee, and cola drinks consumed. It was also shown that students ob-

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5 Ohlson, Margaret A., Nelson, P. Mabel, and Swanson, Pearl P., "Cooperative Research Among Colleges", Journal of Home Economics, XXIX (February 1937), 108-113.

6 Reynolds, May S., et al, "Dietary Habits of College Students", Journal of Home Economics, XXXIV (June 1942), 379-384.

taining their meals in commercial eating places had fewer and poorer meals than those eating in dining rooms connected with the school.

By checking trays in a college cafeteria, Latzke[7] found that many students were not receiving adequate, balanced meals. Their diets showed a lack of vegetables, especially raw ones, and fruit; whereas, there were many carbohydrate foods chosen. The diets of women students were decidedly lacking in milk. At only one meal during the day more than one-fifth of the women chose milk.

Shaw[8] analyzed two-day records kept of food eaten by eighty college students, the greater number of whom ate in college dining halls. The findings showed that 45% had one pint of milk each day and 23% had none at all; 31% had one green leafy vegetable each day; whereas, 42% had none; 85% had some other vegetable each day, only 2% having none. Approximately half had a citrus fruit each day and 22% had none; 20% did not have any other fruit either day. Ninety-six percent of the students reported eating between meals. About one-third had inadequate breakfasts or none at all; 16% had inadequate lunches, and 13% inadequate dinners; for 6% all meals were inadequate. Shaw attributes these findings to food dislikes and also loss of appetite at mealtime resulting from between meal eating of sweets.

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7 Latzke, Esther, "A Study of the Diets Selected by College Students from a College Cafeteria", Journal of Home Economics, XXVI (February 1934), 107-114.

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

Young[9] in a study of dietary habits of approximately forty-three college women eating under five different circumstances found that, in general, the best records belonged to those eating in supervised units, although the majority of all records were rather poor.

Wait and Roberts[10], in attempting to find the length of time a dietary survey should be carried on, studied all possible combinations of four consecutive days and found that intakes for about two-thirds of the period varied from the weeks average. Therefore, they concluded that a study carried on for at least seven days is plainly preferred.

Leverton and Marsh[11] also advocate including weekends in dietary studies since a great deal of difference in eating habits on Saturday and Sunday has been observed. They believe these differences to be due to social activities, change in routine, irregularity of sleep and meal hours with some of the girls, but more stabilized housekeeping routine with others.

Of the few studies of plate waste reported in the literature, the majority have been carried on in hospitals rather than colleges.

One of the earliest studies of plate waste was a part of that made by MacLeod and Griggs[12] at Vassar in 1918. They found a total waste of

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

10 Wait, Bernice and Roberts, Lydia J., "II. Daily Variations in the Energy Intake of the Individual", Journal of the American Dietetic Association, VIII (November 1932), 323-331.

11 Leverton, Ruth M. and Marsh, Alice G., "Comparison of Food Intake for Weekdays and for Saturday and Sunday", Journal of Home Economics, XXXI (February 1939), 111-114.

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

26%. Edible waste amounted to 10.6%.

During Cole's[13] study of edible plate waste in a hospital from 1930 to 1934, there was a gradual decrease from 12.0 ounces to 3.5 ounces per person per day for patients, and during these three years, a decrease from 6.5 to 3.0 ounces per person per day for staff and employees. The reduction was accomplished by reducing size of servings and education of the staff.

Floyd[14] found the edible waste in a large hospital averaged 8.6 ounces per person per day at the beginning of the period studied which was reduced to 2.5 ounces in six months by more careful menu planning and giving smaller servings with second helpings available. It was finally lowered to 1.7 ounces.

Hageman[15] reports a study which took place in the spring and summer of 1944 in a hospital. Plate waste was calculated by collecting each food item in a separate container and recording the amount in gallons. The average waste per person per day was 10.1 ounces of which 2.4 ounces was wasted at breakfast, 3.5 ounces at noon, and 4.2 ounces at night. At breakfast, cooked cereal and toast made up the greatest part of wasted food; at dinner and supper, vegetables, salads, lettuce from all salads, salad dressings and bread and butter made up the largest part.

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[13] Cole, Elizabeth, "Decreasing Food Waste", Modern Hospital, XXXXV (July 1935), p. 94.

[14] Floyd, Marian D., "Reducing the Waste Line", Modern Hospital, LII (February 1939), 92-94.

[15] Hageman, Mary Irene, "A Study of Plate Waste as a Directive Measure in Food Conservation, I", Journal of the American Dietetic Association, XXI, (November 1945), 608-610; II, Journal of the American Dietetic Association, XXI (December 1945), 685-689.

Those foods having the least amount of waste were fruit juices, fruits, fruit salads, meats, fish and poultry, eggs, desserts, milk and milk drinks.

As a further part of this same study, Hageman tried to determine the influence of moderate amount of choice on hospital patients. Clinic patients on selective diets showed the least waste, 5.8 ounces daily; private patients on selective diets averaged 7.1 ounces daily; while the clinic patients on non-selective diets averaged 10.3 ounces daily. The greatest waste was usually at the night meal.

Hageman[16] reviewed the hospital study made by Wait in which it was found that the smallest amount of edible waste for each person per day was 0.02 pounds, the highest was 1.04 pounds with an average of 0.53 pounds. The institutions having the greatest amount of food waste had made no previous specific check on such waste; whereas, those institutions having the least waste had been in the habit of making a systematic check of the food wasted.

Terrell, as reviewed by Hageman[17], reported 0.13 to 3.03 ounces of plate waste per man per day in a survey made in industrial food units and military messes in colleges and universities in western United States.

Goddard, Gardner, Gibson, Harbour, and Hardison[18] in their dietary study made in a university dormitory operating on a moderate cost level, estimated edible waste as 12.4% of total weight of edible food during the first period and 16.4% during the second period.

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16 Ibid., p. 685.
17 Ibid., p. 685
18 Goddard, et al, Op. cit., p. 353.

The study made by Benedict and Farr at the University of New Hampshire was reported by Goddard, Gardner, Gibson, Harbour, and Hardison[19]. They found 12% to 21% of the calories wasted, which they attributed to lack of appetite because of the consumption of "extra foods". Records show that these "extra foods" make up 13% to 19% of total energy intake; thereby more than offsetting the waste as far as calories are concerned.

Howe and Berryman[20] found from a study made in army messes that the total edible waste per man per day in 1941 was 0.39 pounds as compared with 0.38 pounds in 1919. After special efforts had been made to reduce this, the amount of food waste was lowered to 0.32 pounds. They also found the greatest percent of waste was vegetables, cereals and grain products, beans and dry legumes, and dry nuts. The least amount of waste was found in fats, butter and spreads, sugar and syrups, fruits, milk and milk products.

A survey of methods of food conservation in a hospital made by Burns as reviewed by Hageman[21] suggested planning menus in line with likes and dislikes of patients as the chief factor in reducing waste. Also to be considered was routine examination of amount and kind of waste and the use of standard recipes and servings.

Floyd[22] found that waste in a hospital increased sharply when any-

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19 Ibid., p. 353.

20 Howe, Paul E. and Berryman, G. H., "Average Food Consumption in the Training Camps of the United States Army, 1941-1943", American Journal of Physiology, CXXXXIV (September 1945), 588-594.

21 Hageman, op. cit., p. 608.

22 Floyd, op. cit., p. 92.

one was careless about menu planning, preparation of food, service of food, or watching likes and dislikes.

Hack[23] in trying to reduce edible plate waste in the staff cafeteria of a children's hospital, instructed counter girls to gauge portions and to inquire whether small or large ones were desired. If waste became higher than usual, smaller servings were given and an examination of the kind of waste made. It was also found that the quantity of food left could be reduced by changing location of certain items on the counter.

Lynn[24] found in a study made of edible waste in a university school lunchroom that the following factors contributed to an increase or decrease in the amounts of edible food returned:

1. Food preferences of children--the dominant factor
2. Form of service
3. Method of preparation of food items
4. Standard of preparation of food items
5. Quantity of food served
6. Quality of ingredients used in preparation of food items
7. Arrangement of food on plate
8. Seasonability of foods
9. Temperature of the day
10. The day of the week on which the food was served

Lynn also found that those foods having a large amount of plate waste were salads, vegetables, meat substitutes and relishes. Those having a medium amount of plate waste were butter, meat dishes, soups and potatoes. Those having a low amount were desserts, breads, sandwiches, preserves, and beverages.

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[23] Hack, Lillian F., "Self-Service for the Staff", Modern Hospital, LII (January 1939), 90-92.

[24] Lynn, Esther D., "A Study of Plate Waste and Cost of Edible Food Served in the University School Lunch Room at the Ohio State University", Master's Thesis, Ohio State University, Columbia, Ohio, 1934.

An army study described by MacKaye[25] reported the size of ration, soldier preferences and poor mess management to be important causes of mess hall waste. It was also noted that more was eaten if the men went promptly to the table instead of waiting in line, perhaps because the food was cold by the time it could be eaten.

In carrying out a study of disliked and unfamiliar foods, Hall and Hall[26] gave 693 students enrolled in three universities a list of 150 foods with instructions to check those they disliked and those they had never eaten or seen. They found the most universally disliked food was buttermilk with organ meats next. Reasons for dislike in order of importance were taste, texture, cause of illness in the past, general appearance, and odor. The median number of foods disliked by the entire group was approximately nine; the median number unknown or untasted was seven. Women were found to have more food aversions than men, but women were familiar with more foods. Omitting alcoholic beverages and organ meats, the ten most disliked foods were buttermilk, oleomargarine, parsnips, egg plant, caviar, hominy, oysters, turnips, rutabagas, and clams. The ten least known or untasted foods were leeks, abalone, okra, endive, chard, caviar, lentils, rutabagas, persimmons, and brains. The ranking of most disliked to least disliked foods were organ meats (27.4%), alcoholic beverages, shellfish, strong-juiced vegetables, dairy

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25 MacKaye, Milton, "So the Private Said to the General", Saturday Evening Post, (April 22, 1944), p. 9.

26 Hall, Irene S. and Hall, Calvin S., "A Study of Disliked and Unfamiliar Foods", Journal of the American Dietetic Association, XV (September 1939), 540-548.

products, non-shell fish, sweet-juiced vegetables, poultry, fruits, meats and nuts (1.4%).

Leverton[27] reported the results of a questionnaire concerning food likes given to 260 freshmen at the University of Nebraska. It was found that there was no one food all the boys and girls were willing to eat often. About half of the girls indicated none of the fifty foods listed they were willing to eat, while one-fourth checked ten or more they would not eat. Eighty-six percent checked less than six foods they had never tasted. The most popular foods for most girls were apples, oranges, raw tomatoes, and leaf lettuce. There was a noticeable tendency for the girls to prefer fruits and vegetables high in cellulose; whereas, the boys preferred those foods higher in energy. The foods most often checked by the girls as being "unwilling to eat" were buttermilk, squash, turnips, kidneys, and margarine.

Mead[28] believes that if food is presented in a way that is carefully planned and well arranged, people will eat the right food and in discussing food habits says that the "whole problem of food habits in the past has been variously discussed as a phenomenon of 'habit formation' on the loose general basis that any habit once formed is hard to break, that 'early habits' are hard to break, that Americans have learned bad food habits and therefore, it is difficult to teach them good ones. The assumption had been that food habits were just like any other kind of habit and very little attention has been given to the particular way in

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[27] Leverton, Ruth M., "Freshman Food Likes", Journal of Home Economics, XXXVI (November 1944), 589-590.

[28] Mead, Margaret, "Dietary Patterns and Food Habits", Journal of the American Dietetic Association, XIX (January 1943), 1-5.

which they were ingrained".

The Committee on Food Habits of the National Research Council as reported by Sweeny[29] emphasizes the ways in which our national and regional food patterns can be changed; for example, having milk, tea and coffee always on the menu. Also the importance of taking advantage of such mass feeding situations as are developing during the war. There is an attempt being made to introduce lasting changes in the American food pattern.

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29 Sweeny, Mary, "Changing Food Habits", Journal of Home Economics, XXXIV (September 1942), 457-462.

CHAPTER III

METHODS

A basic period of 21 consecutive meals was selected from November 12th to 18th when there were no special occasions which might upset the usual routine. For comparison, three other periods were chosen when the situation would probably be less normal. These were the day before and after Christmas holidays, and a day during the examination period. Unfortunately, only one meal was studied before the holidays because, due to an emergency, college was closed earlier than expected. All three meals were studied on January third, the first day of classes following the Christmas holidays, and on January twenty-fifth, the second day of semester examinations.

The four regular dining rooms of the Woman's College radiate from a central kitchen, and each seats approximately 400. Except for dinners and luncheon on Tuesday, students may eat their meals in any dining room they choose. While some students do confine themselves to one dining room, the majority do not. Out of 219 home economics students questioned, only 57 reported that they usually ate all their meals in the same dining hall. Spencer dining hall was selected for study because it connects with the largest dormitory for upperclass students and it was the impression that a larger number of students ate all of their meals there than in any other dining hall. Of 413 students at dinner in Spencer one evening, 70% reported that they usually ate all of their meals there.

Cafeteria service is used for breakfasts, Sunday night suppers, and lunches, except on Tuesday. Family service is used for dinner and at

noon Tuesday when the weekly chapel program necessitates a late lunch. Spencer seats 432 students at tables for eight. The students who wait on tables and serve at the counter for the cafeteria service eat in a special dining room before the meal, and hence, were not included in the study.

On weekdays, the regular breakfast is served from seven to eight with a modified breakfast consisting of fruit, cereal, bread, coffee, and milk available in one dining hall from 7:45 to 8:30. Lunch is served from 11:30 to 1:30. Dinner is at 6:15. On Sundays, breakfast is from eight to nine, dinner at one, and supper from 5:30 to 6:30.

The number served at cafeteria meals was obtained by counting the trays returned; the number at family service meals by counting the students after they were seated. The dining room hostess counted the students present, but no attention was attracted as this was not an irregular occurrence.

For the cafeteria meals, students who have been trained to use uniform quantities, serve the plates. For the family service, these same trained workers transfer the food to dishes for the eight sitting at each table.

At breakfast, no choice is offered except for cereals. The meal consists of a fruit, choice of a prepared cereal, a main hot dish, usually eggs, bacon, or hot cereal, a hot bread and toast, butter, milk, and coffee. Lunch consists of a main hot dish, often a meat substitute, a salad, bread, butter, dessert, and milk. About once a week, there are sandwiches in place of the main dish. For these, a standard amount of

filling was served and each girl spread her own sandwich. Dinner consists of meat, poultry or fish, two vegetables, one of which is usually starchy, salad or relish, dessert and coffee. At present, because of the butter shortage, one half pat of butter is served twice a day. Milk can be obtained at night if the school physician has signified that the student needs it. Approximately 60 out of the 432 eating dinner in Spencer are given this extra half pint of milk.

Leftovers are served as such, rather than combined with other foods to make a new dish, and are used ordinarily as extras at lunch. They are served to the student only at her request.

At cafeteria meals, students are allowed second helpings of bread and often of the main dish. Only one serving of dessert is permitted. At family style meals, the hostess may request second helpings for her table of any food except dessert.

Sugar in standardized portions is served on request for coffee, cereal, and grapefruit. Each student is limited to two teaspoons. Students help themselves to cream from small pitchers on each table.

At cafeteria meals, each person returns her own tray. At family service meals, the waitress returns the dishes from her two tables.

In order to study the kinds and amount of waste, metal containers were secured into which it could be sorted. They were assembled outside the dining room where the plates were usually scrapped. The student workers removed napkins, glasses and milk bottles from the trays as usual. They were instructed, however, to pour all of the milk remaining in glasses and bottles into a special container provided for that pur-

pose. As far as possible, each different food left on the plates was put into a separate container in order that the kind as well as amount of waste could be determined. The weight of each type of refuse was recorded in pounds and ounces.

In one or two cases mentioned later, it was impossible to secure complete separation. The cereal waste presented a special problem because milk had been added. The cereal bowls were emptied into a metal colander so the milk could drain off. This milk was added to that left in glasses and bottles. To determine the proportion of the weight of the moist cereal due to absorbed milk, a weighed amount of several varieties of dry cereal was soaked in milk and the excess liquid was drained off. The 80% increase in weight represented absorbed milk. This, too, was counted as milk waste.

Whenever possible, jelly was computed separately, but in most cases, it was impossible to separate it from the bread. Likewise it was impossible to separate leftover gravy from the meat or vegetable on which it had been served.

The amount of sugar used was obtained by weighing the container from which it was served before and after each meal. A similar procedure was used for determining the amount of cream used.

Since inedible refuse, such as bones and fruit rinds, could not be separated out, the entire amount of waste was weighed and an allowance made for average amounts of inedible waste as given by Rose.[1]

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[1] Rose, Mary Swartz, A Laboratory Handbook for Dietetics, p. 278.

The total amounts of food served were determined by weighing the container with the food as it was taken to the steam table and weighing again after the meal, thereby giving the quantity served. Subtracting the weights of plate waste gave the quantities of various foods consumed. An attempt was made to determine what factors influence the proportion of waste. An evaluation was made of the effect of food wastage upon the adequacy of the diet.

CHAPTER IV

DISCUSSION OF RESULTS

Evaluation of Meals Served

The meals served during the study were checked by a modification of the Basic Seven. Since bread and flour in the state were enriched at the time of the study, no tabulation for whole wheat or enriched products was made. Tabulation of butter was omitted since the amount, though small (only ½ pat twice a day), was the same each day and waste was negligible.

TABLE I

Evaluation of Menus by Modified Basic Seven

			Servings			
Days	Milk Pt.	Eggs No.	Poultry Fish Meat	Green or Yellow Vegetables	Citrus Fruit or Tomato	Other Fruits or Vegetables
Standard	1	3-4 per week	1	1	1	3
Monday	1	1	1	1	1/2	3
Tuesday	1		1	2	2	1
Wednesday	1	1	1	1	1	2-1/2
Thursday	1	1	1	2	1	2
Friday	1	1	1	1	1/2	3-1/2
Saturday	1		1	1	1	3-1/2
Sunday	1	1	1	1	2	2
Thursday, January 3	1	1/2	1	1	1	2-1/2
Friday, January 25	1		2	1	1	2

Table I shows the analysis by the food group method of the meals during the basic week. The citrus fruit group was short on two days but also exceeded the standard on two days. The total servings of fruits and vegetables did not always reach the better standard of five per day.

Table II compares servings per week of nine food groups during the same period with the servings recommended as "good" by a Louisiana

Study[1]. This was chosen as a basis for comparison because it is one of the few studies which has set up a definite standard to be used in checking the number of servings per day of foods offered. On this standard the meals fell short on butter, raw vegetables and citrus fruits.

TABLE II

Comparison of Number of Servings of Eight Food Groups at Woman's College with Louisiana Study

	Servings per Week	
Food Groups	Louisiana Standard	Woman's College
Milk	14 or more	14 or more
Butter	14	7
Eggs	5 or more	5
Vegetables - Green or yellow	7	10
Vegetables - Others	7	8
Vegetables - Raw	7	4
Fruits - Citrus or tomato	7	6
Fruits - Other	7	8

Table III shows the nutritive value of the first day's meals as calculated from Taylor's[2] tables. Although the citrus fruit group was low for that day judged by the Basic Seven, the recommended allowances of the National Research Council[3] were exceeded if full allowance is given for the slaw.

TABLE III

Comparison of Nutritive Values of Meals on November 12th with Recommended Allowances of the National Research Council

	Totals from Menus	NRC Standard
Calories	2662	2100
Protein - gms	81.5	60

1 Coco, Lucille, et al, "A Study of the Adequacy of Diets Consumed by Grade School and High School Students in Louisiana", Louisiana Bulletin 360 (January 1943).

2 Taylor, Clara Mae, Food Values in Shares and Weights

3 Ibid., p. 54.

TABLE III (continued)

Comparison of Nutritive Values of
Meals on November 12th with Recommended Allowances
of the National Research Council

	Totals from Menus	NRC Standard
Calcium - mgm	0.98	0.8
Iron - mgm	16.5	12
Vitamin - I.U.	8717	5000
Thiamine - mgm	1.56	1.2
Ascorbic acid - mgm	75.5	70
Riboflavin - mgm	2.87	1.8

In spite of some variations from the various standards, it seems s safe to assume that the meals furnished are reasonably adequate. However, whether food intake is adequate, depends upon the number of meals missed and upon the amount of plate waste.

Number Present at Meals

In Table IV the number served and the total edible waste for each meal are shown.

TABLE IV

Number Served and Edible Waste at Each Meal

	Breakfast			Lunch			Dinner		
		Edible Waste			Edible Waste			Edible Waste	
Days	No. Served	Pounds	Per Cent	No. Served	Pounds	Per Cent	No. Served	Pounds	Per Cent
Monday	335	.22	17	357	.18	11	382	.06	6
Tuesday	285	.39	30	365	.12	9	393	.07	6
Wednesday	369	.21	23	337	.19	11	359	.09	9
Thursday	367	.27	25	379	.14	13	397	.08	9
Friday	389	.22	20	379	.11	9	257	.08	11
Saturday	331	.33	31	391	.22	13	398	.08	8
Sunday	247	.25	26	314[1]	.29	24	326[2]	.08	8
Average	332	.27	24	360	.18	12	373	.08	9
Thursday, Dec. 20	188	.28	36						
Thursday, Jan. 3	319	.28	27	283	.21	14	393	.15	12
Friday, Jan. 25	377	.34	29	364	.14	13	304	.08	9

1 Supper
2 Noon meal

Judging from the number served, not many students omit the regular

breakfast in Spencer on weekdays. Regular classes meet Monday, Wednesday, Friday and Tuesday, Thursday, Saturday, which may have some relation to the fact that a total of about one hundred more breakfasts were served on Monday, Wednesday and Friday. It may be because there are more eight o'clock classes on those days, or because there are more classes until one o'clock. Tuesday morning was dark and rainy, which might have caused the smaller number then. The number at Sunday breakfast was much smaller, but that is to be expected. There are many students who are away weekends as evidenced by the smaller numbers at other Sunday meals. The smallest number at any breakfast was on December twentieth. Due to an emergency, classes on that morning were cancelled the night before, and many students had left for the holidays before breakfast. There was a rather small number on January third, probably because students, having no morning classes had not returned from Christmas vacation. There were also probably many students who preferred sleeping late that particular morning, either because they had arrived during the night, or had brought food from home. A large number were present at breakfast on January twenty-fifth, probably because most students had examinations that morning.

There seemed to be no apparent reasons for varying numbers at lunch. There were fewer present at lunch on January third than at breakfast, which might have been because of food brought from home, or visiting with friends at nearby sandwich shops.

The number at Sunday supper was low, probably because of those away for the weekend and the unpopularity of the main dish at that particular meal.

There were fewer students at dinner on Friday during the basic week than at any other dinner. This was undoubtedly caused by the unpopularity of the fish served. Many students regularly eat elsewhere on Friday nights. The number at dinner on Friday, January twenty-fifth, was also low, but there were more than on the Friday of the basic week. In addition to the general dislike of fish, many students eat dinner downtown during examination week as a form of diversion.

In general, there were more present at lunch than at breakfast, and more at dinner than at lunch during the basic week. In comparing the later days studied with the average number present during the basic week, there were fewer students at breakfast on December twentieth and January third, and more on January twenty-fifth; there were fewer at lunch on January third, but more on January twenty-fifth; there were more at dinner on January third, but fewer at dinner on January twenty-fifth.

Amount of Edible Waste

Edible waste was determined by deducting the average percent of inedible refuse as given by Rose[4] from the total waste collected. Menus and amount of edible waste in detail are given in the Appendix. Since there was practically no waste of butter and little waste of cream and sugar because of the methods of service, these foods were not included in the tables.

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[4] Rose, Mary Swartz, A Laboratory Handbook for Dietetics, p. 278.

TABLE V

Percent of Edible Waste of Food Items at Each Meal

	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
FRUITS										
Grapefruit						S[1]	B-B[1]	B-B		
Oranges					B	B-B				
Apples			B							
Bananas			B							
Pears		B								
SALADS										
Lettuce (base of salad)				L[1]	L-L					L
Head Lettuce		L							L	
Cabbage & Green Pepper				L						
Pear with Nut & Celery Stuffing				L						
Vegetable				L						
Cottage Cheese & Green Pepper				L						
Macaroni				S						
Potato				D[1]						
Vitamin (congealed vegetable)			D							
Pineapple & Sweet Relish			D							
Apple, Raisin & Celery		L	L							
Cranberry (congealed)	D-D									
Tomato	D									
RELISH										
Carrot & Celery Strips	D									
VEGETABLES										
Collards		D								
Vegetable Soup		L								
Candied Sweet Potatoes		D								
Grits		D								
Rice		D[2]								
Potato Soup		L								
Scalloped Potatoes	D	D								
Peas	D	D								
Carrots and Peas	D-D									
Ten-Minute Cabbage	D									
Buttered Corn	D									
Scalloped Corn	D									
Green Beans	D									
Succotash	D									
Creamed Potatoes	D									
Mashed Potatoes	D									
Browned Potatoes	D									

1. B = Breakfast; L = Lunch; D = Dinner; S = Supper
2. Impossible to separate from turkey chop suey

TABLE V (Continued)

	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
MEATS AND EGGS										
Fish			D				D			
Pork Chops				D						
Omelet			B							
Hard-Cooked Eggs			B							
Fried Eggs		B								
Scrambled Eggs		B								
Creamed Eggs		B								
Roast Lamb		D								
Turkey Chop Suey		D[1]								
Corned Beef Hash		B								
Bologna	D									
Turkey Pie	D									
American Noodles - ground beef	D									
Bacon	B[2]									
Meat Loaf	D									
Sausage	D									
DESSERTS										
Baked Apples						L				
Lemon Rice Pudding			L							
Raspberry Cobbler		L								
Fruit Jello		L								
Cottage Pudding - Chocolate Sauce		L								
Fruit Cup	L									
One-crust Apricot Pie	D									
Cherry Cobbler	L									
Apple Betty, Sterling Sauce	L									
Orange Cream Cake	D									
Banana Cake	D									
Lemon Pie	D									
Chocolate Pie	D									
Ice Cream	D[3]									
MILK	L[4]-S	B[5]	B[6]	B						
BREADS										
Loaf Bread	L-D[7]	D				D				
French Crumb Cake		B	B-B							
Toast		B[8]	B							

1 Impossible to separate from rice
2 Served three times
3 Served four times
4 Served nine times
5 Served six times
6. Served three times
7 Served seven times
8 Served five times

TABLE V (Continued)

	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%
BREADS (Continued)										
Whole Wheat Biscuits		B								
Cornbread		L	L							
Crackers		L-S								
All Bran Muffins		B								
Tomato Rolls		L								
Biscuits		B-B								
Orange Muffins		B								
Fruit Rolls	S									
Plain Muffins	L									
Fruit Muffins	B									
Coffee Cake	B									
Plain Rolls	L									
French Bread	D									
SANDWICHES										
Pimento Cheese)[1]		L								
Egg - Olive)										
Cream Cheese & Olive)	L									
Peanut Butter & Jelly)										

1 Impossible to separate

As shown in Table V, breakfast fruits show the largest amount of edible waste, especially grapefruit and oranges which ranged from 40% to 80% wasted. No preparation except cutting in half is possible with the number served and the difficulty in eating when the student is in a hurry is probably the chief reason for the waste. When grapefruit was served as a dessert at Sunday supper, there was a noticeably smaller amount of waste. This might have been due to having more time to eat or because the pink variety, which is usually more popular, was served then. Apples, bananas and pears, which are easier to eat, appeared to have less waste, but whole fruits may be taken from the dining room to be eaten later, which would reduce the amount of waste collected. How much error is thus introduced is not known, but from the weights of fresh fruit and

waste shown in the tables in the Appendix, the amount of fruit taken from the dining room cannot be large.

Most salads showed 20% to 40% edible waste, except for lettuce, especially when used as the base of a salad, ran much higher. Smaller pieces of lettuce were used with salads at dinner, but still practically none was eaten. Lettuce salad with French dressing was served twice. Once it was well eaten, but on January twenty-fifth, there was a large amount wasted, probably because of the repetition of flavor and color at that meal.

There were usually smaller amounts of salads wasted at dinner than at lunch. This may have been because of the kind of salad or because smaller servings were given at dinner. Congealed cranberry and tomato and lettuce salads had the least amount of waste.

Fruit salads usually had less waste than vegetable salads. Hageman[5] also found that a larger percentage of vegetable salads and lettuce were wasted in a hospital.

Vegetables had up to 20% edible waste. Potatoes had a little less waste usually. Vegetables served hot seemed to be preferred to vegetable salads. Green beans, corn, cabbage, carrots, and peas had the least amount of waste. There were no apparent reasons for differences in the amounts of the vegetables wasted.

Comparatively small amounts of meat were wasted at dinner except in the case of pork chops and fish, where the difficulty in separating out bones was probably the reason. There is also a general dislike of fish

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5 Hageman, Mary Irene, "A Study of Plate Waste as a Directive Measure in Food Conservation, I", Journal of the American Dietetic Association, XXI (November 1945), 608-610.

among many students. There was somewhat more waste of lamb and corned beef hash than other meats, except those mentioned above. Most meats had less than 10% wasted.

Eggs had a higher wastage than the meats served at breakfast. This may be because, by the time the student has eaten her fruit and cereal, they have become cold and unappetizing.

Very little of the desserts were wasted, except for baked apples and lemon rice pudding. Some of the baked apples were underdone, which increased the waste but did not account for all of it. Desserts served at lunch showed a greater waste in most cases than those at dinner. Ice cream had the least amount of any dessert, with most pies next in order.

At breakfast during the basic week there was an average of one-half pint or more of milk per person served and there was a large amount wasted, but this is undoubtedly because a half-pint bottle is served. The top is used for cereal and the rest is left. There was also a great deal of milk left in cereal bowls. At lunch and Sunday supper, 97% of the students took one-half pint of milk and there was very little waste. Although a record was not kept of any milk wasted by the relatively small number of students receiving the supplementary amount at dinner, it was noted that there was almost no waste.

The popularity of milk is at variance with Latzke's[6] observations in a college cafeteria, where she found that only at one meal in the day

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[6] Latzke, Esther, "A Study of the Diets Selected by College Students from a College Cafeteria", Journal of Home Economics, XXVI (February 1934), 107-114.

did more than one-fifth of the women chose milk. Lautz[7] found only 24% of the women taking milk in a college cafeteria.

Larger quantities of bread were eaten at lunch than at breakfast or dinner, but the waste seems comparable with those meals. French bread, rolls and muffins had the smallest amounts of waste, and French crumb cake, toast and cornbread the largest. On one occasion there was a great deal of waste of loaf bread, but that was undoubtedly because turkey pie with a biscuit topping was served at that meal.

When sandwiches were served, it was impossible to separate the filling from the bread. However, there were relatively small amounts wasted, of which the larger part was bread, rather than the filling. This would be expected since students make their own sandwiches and may ask for as many slices of bread as they want; whereas, the servings of the fillings are standardized.

Although there was more total waste on January third and twenty-fifth, the proportionate waste of the different types of food was similar to that of the basic week.

The average percent of plate waste per person per day during the basic week was 12% as compared with 10.6% found by MacLeod and Griggs[8] at Vassar and 12.4% to 16.4% reported by Goddard, Gardner, Gibson, Harbour, and Hardison[9] in a university dormitory.

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7 Lautz, Amelia, Carter, Caroline, and Ferguson, Sarah, "Meat, Sea Food, Eggs and Milk in the Self Selected Diets of College Men and Women", Journal of Home Economics, XXXII (November 1940), 615-616.

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

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

Several hospital studies report waste by weight. Cole[10] reported waste of from 12 ounces to 3.5 ounces per person per day; Floyd[11], a range from 8.6 ounces to 1.7 ounces; Hageman[12], 10.1 ounces. Other studies quoted by Hageman[13] showed very small amounts. The total waste in this study compares favorably with these reports, ranging from 3.1 ounces to 2.1 ounces.

It may be noted in Table IV that there is about 0.10 pound per person per day decrease from breakfast to lunch, and again from lunch to dinner during the basic week. This was the reverse of Hageman's[14] findings in a hospital where the amount of plate waste increased from breakfast to lunch, with dinner having the largest amount. However, most college students rise at the last minute and eat breakfast hurriedly in order to be prompt for classes. This is illustrated by the fact that grapefruit and orange halves are among the most poorly eaten foods.

Influence of Type of Service on Edible Waste

The type of service has an influence on plate waste as shown in Table IV. Lunch on Tuesday, served family style, had 9% waste, which is less than most other lunches and is comparable to dinners where family service was used. This may not mean better food consumption, but only that the student has more choice. At family style meals, a student may

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10 Cole, Elizabeth, "Decreasing Food Waste", Modern Hospital, XXXXV (July 1935), 94.

11 Floyd, Marian D., "Reducing the Waste Line", Modern Hospital, LII (February 1939), 92-94.

12 Hageman, op. cit., 608-610.

13 Ibid., 608-610.

14 Ibid., 608-610.

refuse a food; whereas, at cafeteria meals, she is more likely to take the plate as served and then leave those foods not wanted.

Influence of Menus on Edible Waste

The somewhat less waste at lunch on Monday and Friday is believed to be due to the menu rather than factors of time or classes. On Monday, in addition to the regular menu, there were three leftovers, two of which were extremely popular. Friday's lunch included sandwiches, which are popular, and the small amount of sandwiches wasted offset the larger quantity of vegetable salad not eaten. There was also little waste of the cherry cobbler included in the menu.

Menus would also seem to be the reason for variations in amount of plate waste at night meals. The dinners on Friday during the basic week and on January third had the largest quantity. The waste on Friday was undoubtedly due to the unpopularity of fish. From the appearance of the pork chops left on plates January third, it seemed that little effort was made to remove meat from the bones as has been mentioned before.

Influence of Special Periods on Edible Waste

The amount of plate waste at breakfast on December twentieth was larger than at any other meal during the entire study. This was due partly to the oranges, but was undoubtedly due also to the excitement over leaving for Christmas vacation which was intensified by the unexpected cancelling, the night before, of all morning classes.

There was a relatively large amount of waste at breakfast on January third due to grapefruit and the excitement of returning to school after Christmas vacation. The large amount of waste at breakfast

on January twenty-fifth was due to the usual waste of grapefruit, increased somewhat by the nervous strain of examinations. There was probably even more of a rush on that morning as well as last minute studying while waiting in line and eating.

The waste at lunch January third and twenty-fifth was slightly higher than the average for the basic week. That on January twenty-fifth was undoubtedly due to the poor combination of flavors and colors of foods included in the menu.

There was somewhat more waste at dinner on January third than at any other dinner. This was caused by the large amount of pork chops wasted and could also have been increased by more eating between meals, possibly food brought from home, or by more conversation during the meal. This meal time was also probably the first time many students saw some of their friends following the vacation, which would result in more talking and thus less eating. It was noted that there seemed to be more excited conversation being carried on January third than any other day. The waste at dinner on Friday, January twenty-fifth, was slightly less than on Friday during the basic week. The same kind of fish was served both times, but it looked more appetizing the second time, and the vegetables and dessert at that meal were more popular.

Summary

From the findings of this study, it is apparent that the foods most poorly consumed are breakfast fruits, especially grapefruit and oranges; fish and vegetable salads, including the lettuce used as a base for the salad.

The most popular foods appear to be ice cream, certain breads, and milk at lunch.

None of the ten most disliked or unfamiliar foods listed by Hall and Hall[15] were included in the menus at any time, which undoubtedly has tended to decrease the amount of waste.

It does not seem likely that the students are consuming an adequate amount of citrus fruits and vegetables. In comparing the menus with the modified Basic Seven, they were a little short on these two groups and, since a good deal of these are wasted, it is doubtful if there is sufficient intake. Donelson, Nelson, Ohlson, Pittman, Leverton, McKay, Kinsman, Armstrong, and Reynolds[16] found diets in seven midwestern colleges noticeably lacking in amounts of citrus fruits and tomatoes, and also noted an inadequate intake of green and yellow vegetables. Foods eaten between meals are in all probability chiefly carbohydrates, thus not helping to offset the large amount of waste of fruits and vegetables.

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15 Hall, Irene S. and Hall, Calvin S., "A Study of Disliked and Unfamiliar Foods", Journal of the American Dietetics Association, XV (September 1939), 540-548.

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

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

To determine the extent to which students were taking advantage of the diet offered, plate waste was studied in Spencer dining hall for twenty-one consecutive meals and seven meals at later periods before and after Christmas vacation and during first semester examinations. The total quantity of each food served was weighed; the total waste weighed; the estimated amount of inedible waste deducted. From this the foods that were best liked and those least cared for could be noted.

It was found that:

1. The meals seem generally adequate.
2. Grapefruit and lettuce had more waste than any other food every time they were served.
3. Salads showed a higher percent of waste than any other group.
4. There was little difference in the percent of different vegetables wasted.
5. Milk at lunch, certain breads and desserts, especially ice cream, had the least amount of waste.
6. There was more plate waste at breakfast than at the other meals, which was undoubtedly due to eating hurriedly.
7. There was the least amount of plate waste at dinner.
8. The total amount of edible food wasted was between the findings of two other college studies and compares favorably with other reported studies.
9. There was less plate waste with family style service than at cafeteria meals.
10. The amount of waste at lunch and dinner seems to depend on popularity of individual foods.
11. The amount of waste seems to be increased by excitement or strain as shown on December twentieth, January third and twenty-fifth.

RECOMMENDATIONS

The waste of citrus fruits at breakfast could probably be lowered by serving fruit juices.

Salad waste might be reduced by giving smaller servings of the salad and lettuce at lunch.

It is recommended that a special effort be made to reduce waste in fruits and vegetables since this group seems to be less generously provided in the diet.

Milk waste at breakfast might be reduced by having milk for cereal in a pitcher, but this involved bulk milk which is a sanitary problem.

It might be possible to reduce a large part of the bread waste by limiting first servings to small amounts and allowing extra servings to those who want more.

It is recommended that an investigation be made as to why fish is generally disliked by students from all over the country.

An educational campaign would probably help to reduce waste a great deal by making students conscious of what they leave on their plates. Such a campaign would be especially timely in view of the present world shortages of food.

A further study would be desirable to follow individuals. This study has shown only food habits of the group as a whole and furnishes no basis for judging how many women have poor diets. Judging from the studies reported in the literature, there may be a good many with inadequate food intakes, even when adequate meals are provided.

A study of between meal eating would probably show a relationship to the amount wasted at meals.

It might be desirable to study waste at other seasons, especially during the hot summer weather, and for the same reason, compare waste during winter examinations with those in May or July.

BIBLIOGRAPHY

1. Cole, Elizabeth, "Decreasing Food Waste", Modern Hospital, XXXXV (July 1935), 94.

2. Coco, Lucille, et al, "A Study of the Adequacy of Diets Consumed by Grade School and High School Students in Louisiana", Louisiana Bulletin 360 (January 1943).

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

4. Floyd, Marian D., "Reducing the Waste Line", Modern Hospital, LII (February 1939), 92-94.

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

6. Hack, Lillian F., "Self-Service for the Staff", Modern Hospital, LII (January 1939), 90-92.

7. Hageman, Mary Irene, "A Study of Plate Waste as a Directive Measure in Food Conservation, I", Journal of the American Dietetic Association, XXI (November 1945), 608-610; II, Journal of the American Dietetic Association, XXI (December 1945), 685-689.

8. Hall, Irene S. and Hall, Calvin S., "A Study of Disliked and Unfamiliar Foods", Journal of the American Dietetic Association, XV (September 1939), 540-548.

9. Howe, Paul E. and Berryman, G. H., "Average Food Consumption in the Training Camps of the United States Army, 1941-1943", American Journal of Physiology, CXXXXIV (September 1945), 588-594.

10. Latzke, Esther. "A Study of the Diets Selected by College Students from a College Cafeteria", Journal of Home Economics, XXVI (February 1934), 107-114.

11. Lautz, Amelia; Carter, Caroline and Ferguson, Sarah, "Meat, Sea Food, Eggs, and Milk in the Self-Selected Diets of College Men and Women", Journal of Home Economics, XXXII (November 1940), 615-616.

12. Leverton, Ruth M., "Freshman Food Likes", Journal of Home Economics, XXXVI (November 1944), 589-590.

13. Leverton, Ruth M. and Marsh, Alice G., "Comparison of Food Intakes for Weekdays and for Saturday and Sunday", Journal of Home Economics, XXXI (February 1939), 111-114.

14. Lynn, Esther D., "A Study of Plate Waste and Cost of Edible Food Served in the University School Lunch Room at the Ohio State University", Master's Thesis, Ohio State University, Columbia, Ohio, 1934.

15. MacKaye, Milton, "So the Private Said to the General", Saturday Evening Post, (April 22, 1944), p. 9.

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

17. Mead, Margaret, "Dietary Patterns and Food Habits", Journal of the American Dietetic Association, XIX (January 1943), 1-5.

18. Ohlson, Margaret A.; Nelson, P. Mabel, and Swanson, Pearl P., "Cooperative Research Among Colleges", Journal of Home Economics, XXIX (February 1937), 108-113.

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

20. Reynolds, May S., et al, "Dietary Habits of College Students", Journal of Home Economics, XXXIV (June 1942), 379-384.

21. Rose, Mary Swartz, A Laboratory Handbook for Dietetics, New York: The Macmillan Company, 1939, p. 278.

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

23. Sweeny, Mary, "Changing Food Habits", Journal of Home Economics, XXXIV (September 1942), 457-462.

24. Taylor, Clara Mae, Food Values in Shares and Weights, New York: The Macmillan Company, 1942.

25. Wait, Bernice and Roberts, Lydia J., "II. Daily Variations in the Energy Intake of the Individual", Journal of the American Dietetic Association, VIII (November 1932), 323-331.

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

APPENDIX

TABLE I

Amount of Food Served and Edible Waste

Monday, November 12, 1945

Monday, November 12, 1945	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 335 served			
Pears	148.28	24.42[1]	18.
Dry Cereal	14.0	1.21[2]	9.
Scrambled Eggs	42.0	7.19	17.
Orange Muffins	47.0	4.94	11.
Toast	19.5	2.81	14.
Milk	175.23	32.16[2]	17.
TOTAL	446.01	72.33	17.
LUNCH - 357 served			
Baked Lima Beans & Tomato	120.00	11.13	9.
Cabbage & Green Pepper Salad	80.0	30.25	38.
Cornbread	38.87	7.0	18.
Apple Betty, Sterling Sauce	121.31	6.88	6.
Milk	196.73	9.19	5.
LEFTOVERS			
Asparagus	7.0	2.06	29.
Chicken a la King	25.	0.25	1.
Cake with white icing	26.	0.13	1.
TOTAL	614.91	66.89	11.
DINNER - 382 served			
Meat Loaf	84.12	5.88	6.
Scalloped Potatoes	97.50	4.81	5.
Carrots & Peas	70.00	6.75	10.
Green & Stuffed Olives[3]			
Loaf Bread	20.44	0.88	4.
Banana Cake, whipped cream	63.38	3.31	5.
TOTAL	335.44	21.63	6.

AVERAGE WASTE PER PERSON PER DAY 0.15 pounds, 2.4 ounces

1 Estimated edible waste 0.10% inedible refuse as given by Rose deducted from total waste of 27.13 pounds.

2 Corrected weight.

3 Waste not calculated because amount was negligible.

TABLE II

Amount of Food Served and Edible Waste

Tuesday, November 13, 1945

Tuesday, November 13, 1945	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 285 served			
Grapefruit	108.8	53.64[1]	74.
Dry Cereal	11.2	1.19[2]	11.
Oatmeal	45.0	5.19	12.
Coffee Cake	44.0	4.13	9.
Toast	19.56	1.38	7.
Milk	177.48	46.75[2]	26.
TOTAL	406.04	112.28	30.
LUNCH - 365 served			
Scalloped Corn, Bacon Garnish	85.31	8.75	10.
Apple, Celery & Raisin Salad	91.0	14.06	15.
Plain Rolls	42.0	1.56	4.
Fruit Jello, Whipped Cream	81.19	8.88	11.
Milk	203.71	10.44	5.
TOTAL	503.21	43.69	9.
DINNER - 393 served			
Turkey Chop Suey	82.0	16.44[3]	12.
Rice	59.0		
Buttered Green Beans	53.0	5.31	10.
Tomato Salad, French Dressing	59.69	1.68	3.
Loaf Bread	29.88	1.0	1.
Crushed Orange Ice Cream	143.0	1.88	1.
TOTAL	426.57	26.31	6.

AVERAGE WASTE PER PERSON PER DAY 0.17 pounds, 2.7 ounces

1 Estimated edible waste 33% inedible refuse as given by Rose deducted from total waste of 80.06 pounds.
2 Corrected weight.
3 Impossible to separate.

TABLE III

Amount of Food Served and Edible Waste

Wednesday, November 14, 1945

Wednesday, November 14, 1945	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 369 served			
Fresh Apples	84.75	18.66[1]	29.
Dry Cereal	13.44	1.91[2]	14.
Creamed Eggs	38.0	6.56	17.
Biscuits	16.56	2.13	13.
Toast	16.88	2.0	12.
Orange Marmalade	12.5	2.44	20.
Milk	184.36	43.90[2]	24.
TOTAL	366.49	77.60	23.
LUNCH - 337 served			
Cream of Potato Soup	134.0	14.44	11.
Stuffed Pear Salad:			
Pears	66.0	0.38	1.
Nut & Celery Stuffing	22.0	12.31	66.
Lettuce	33.0	12.88	39.
Crackers	10.0	1.62	16.
Tomato Rolls	60.89	8.94	15.
Cottage Pudding, Chocolate Sauce	56.25	6.13	11.
Milk	194.57	9.06	5.
TOTAL	576.71	65.76	11.
DINNER - 359 served			
Country Sausage	51.75	3.31[3]	6.
Gravy	21.50	---	---
Grits	90.0	12.0[3]	13.
Collards	53.25	10.62	20.
Cranberry Salad	67.5	4.12	6.
Loaf Bread	25.0	0.75	3.
Lemon Pie	62.5	1.81	3.
TOTAL	371.5	32.61	9.

AVERAGE WASTE PER PERSON PER DAY 0.17 pounds, 2.7 ounces

1 Corrected weight--25% inedible refuse as given by Rose deducted from total waste of 24.88 pounds.
2 Corrected weight.
3 Gravy could not be separated.

TABLE IV

Amount of Food Served and Edible Waste

Thursday, November 15, 1945

Thursday, November 15, 1945	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 367 served			
Oranges	100.5	44.16[1]	60.
Dry Cereal	12.88	2.26[2]	18.
Hard-Cooked Eggs	31.62	5.95[3]	21.
All-bran Muffins	49.56	8.06	16.
Toast	16.87	2.31	14.
Milk	209.63	37.36[2]	18.
TOTAL	421.06	100.1	25.
LUNCH - 379 served			
American Noodles	100.0	7.56	8.
Lettuce Salad, French Dressing	24.43	6.62	17.
Loaf Bread	45.0	2.0	4.
Baked Apples	60.88	25.03[4]	55.
Milk	194.02	10.13	5.
TOTAL	424.33	51.34	13.
DINNER - 397 served			
Sliced Bologna	26.0	2.5	10.
Sliced Cheese	26.5	2.0	8.
Potato Salad	44.94	17.19	38.
Buttered Corn	76.0	6.38	8.
Sweet Pickles[5]			
French Bread	27.0	0.88	4.
Banana Ice Cream	145.75	1.94	1.
TOTAL	346.19	30.89	9.

AVERAGE WASTE PER PERSON PER DAY 0.16 pounds, 2.6 ounces

1 Corrected weight. 27% inedible refuse as given by Rose deducted from total waste of 60.5 pounds.
2 Corrected weight.
3 Corrected weight. 11% inedible refuse as given by Rose deducted from total waste of 6.69 pounds.
4 Corrected weight. 25% inedible refuse as given by Rose deducted from total waste of 33.37 pounds.
5 Waste not calculated because amount was negligible.

TABLE V

Amount of Food Served and Edible Waste

Friday, November 16, 1945

Friday, November 16, 1945	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 389 served			
Bananas	161.25	29.51[1]	28.
Dry Cereal	15.68	3.55[2]	23.
Omelet	38.25	11.44	30.
French Crumb Cake	47.25	6.56	14.
Toast	28.12	2.12	8.
Milk	199.4	32.82	16.
TOTAL	489.95	86.0	20.
LUNCH - 379 served			
Cream Cheese & Olive Sandwiches) Peanut Butter & Jelly Sandwiches)	114.5	8.19	7.
Vegetable Salad	58.94	19.81	33.
Cherry Cobbler, Whipped Cream	107.0	5.44	7.
Milk	182.75	7.19	4.
TOTAL	463.19	40.63	9.
DINNER - 257 served			
Fresh Fish	42.0	6.87[3]	29.
Creamed Potatoes	68.75	4.06	6.
10-Minute Cabbage	52.5	5.5	10.
Pineapple & Sweet Relish Salad	18.06	4.37	24.
Loaf Bread	4.32	.75	17.
Orange Cream Cake	40.28	2.19	5.
TOTAL	225.91	23.74	11.

AVERAGE WASTE PER PERSON PER DAY 0.15 pounds, 2.4 ounces

1 Corrected weight. 35% inedible refuse as given by Rose deducted from total waste of 45.25 pounds.
2 Corrected weight.
3 Corrected weight. 43% inedible refuse as given by Rose deducted from total waste of 12.06 pounds.

TABLE VI

Amount of Food Served and Edible Waste

Saturday, November 17, 1945

Saturday, November 17, 1945	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 331 served			
Grapefruit	138.16	64.32[1]	69.
Dry Cereal	14.0	1.86[2]	13.
Bacon	30.25	1.5	5.
Whole Wheat Biscuits	22.75	2.75[3]	12.
Toast	11.25	2.5[3]	22.
Honey	4.75	0.75	16.
Milk	185.44	36.76[2]	19.
TOTAL	406.6	110.44	31.
LUNCH - 391 served			
Vegetable Soup	180.0	28.81	16.
Cottage Cheese & Green Pepper Salad:			
Cottage Cheese & Green Pepper	54.68	18.43	32.
Lettuce	25.83	12.19	47.
Plain Muffins	114.31	9.82	9.
Crackers	11.0	1.88	17.
Fruit Cup	93.02	7.25	8.
Milk	193.5	9.06	5.
TOTAL	672.34	87.44	13.
DINNER - 398 served			
Roast Lamb	37.12	6.81[4]	19.
Dressing	69.0	6.94[4]	10.
Gravy	9.5	---	---
Browned Potatoes	105.0	4.56	4.
Succotash	59.0	5.31	9.
Celery & Carrot Strips	11.06	0.13	1.
Loaf Bread	28.09	2.05	7.
One Crust Apricot Pie, Whipped Cream	100.0	8.06	8.
TOTAL	418.77	33.86	8.

AVERAGE WASTE PER PERSON PER DAY 0.13 pounds, 2.1 ounces

1 Corrected weight. 33% inedible refuse as given by Rose deducted from total waste of 96.0 pounds.
2 Corrected weight.
3 Some honey could not be separated.
4 Gravy could not be separated.

TABLE VII

Amount of Food Served and Edible Waste

Sunday, November 18, 1945

Sunday, November 18, 1945	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 247 served			
Oranges	63.0	25.96[1]	41.
Dry Cereal	7.28	1.26[2]	17.
Fried Eggs	11.66	2.19	19.
Fruit Muffins	31.25	2.81	9.
Toast	11.25	1.81	16.
Milk	127.93	28.24[2]	22.
TOTAL	252.37	62.27	26.
DINNER - 326 served			
Turkey Pie	108.5	9.56	9.
Candied Sweet Potatoes	70.0	9.19	13.
Buttered Peas	48.7	5.75	12.
Cranberry Relish[3]			
Loaf Bread	4.88	2.81	58.
Butterscotch Pecan Ice Cream	115.5	0.62	1.
TOTAL	347.58	27.93	8.
SUPPER - 314 served			
Macaroni Salad	57.5	19.69	34.
Ritz Crackers	12.0	1.31	11.
Fruit Rolls	32.5	3.13	10.
Texas Grapefruit	129.6	54.60[4]	55.
Milk	173.63	13.06	2.
TOTAL	405.23	91.79	24.

AVERAGE WASTE PER PERSON PER DAY 0.20 pounds, 3.2 ounces

1 Corrected weight. 27% inedible refuse as given by Rose deducted from total waste of 35.56 pounds.
2 Corrected weight.
3 Waste not calculated because amount was negligible.
4 Corrected weight. 33% inedible refuse as given by Rose deducted from total waste of 81.5 pounds.

TABLE VIII

Amount of Food Served and Edible Waste

BREAKFAST

Thursday, December 20, 1945

Thursday, December 20, 1945	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 188 served			
Oranges	43.75	25.24[1]	58.
Dry Cereal	10.64	0.83[2]	9.
Bacon	16.5	0.81	5.
Crumb Cake	21.0	4.62	22.
Toast	11.25	0.88	8.
Milk	56.55	20.99[2]	37.
TOTAL	159.69	53.37	36.

AVERAGE WASTE PER PERSON 0.28 pounds, 4.5 ounces

1 Corrected weight. 27% inedible refuse as given by Rose deducted from total waste of 34.57 pounds.

2 Corrected weight.

TABLE IX

Amount of Food Served and Edible Waste

Thursday, January 3, 1946

Thursday, January 3, 1946	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 319 served			
Grapefruit	122.31	52.34[1]	64.
Dry Cereal	10.64	1.07[2]	11.
Bacon	19.12	1.31	7.
French Crumb Cake	30.18	7.19	24.
Toast	31.5	1.0	3.
Milk	153.27	24.42[2]	16.
TOTAL	367.02	87.33	27.
LUNCH - 283 served			
Apple, Raisin & Celery Salad:			
Apple, Raisin & Celery	90.0	22.5	25.
Lettuce	8.22	8.01	97.
Pimento Cheese Sandwiches) Egg-Olive Sandwiches)	73.25	8.06	11.
Raspberry Cobbler, Whipped Cream	80.93	11.0	14.
Milk	166.13	9.81	6.
TOTAL	418.53	59.38	14.
DINNER - 393 served			
Pork Chops	108.5	33.94[3-4]	39.
Gravy	16.63	---	---
Mashed Potatoes	109.39	6.19[4]	6.
Peas & Carrots	94.0	6.94	8.
Cranberry Salad	49.75	4.31	2.
Loaf Bread	12.0	0.75	6.
Cherry Ice Cream	137.5	7.50	5.
TOTAL	527.77	59.63	12.

AVERAGE WASTE PER PERSON PER DAY 0.22 pounds, 3.5 ounces

1 Corrected weight. 33% inedible refuse as given by Rose deducted from total waste of 78.12 pounds.
2 Corrected weight.
3 Corrected weight. 20% inedible refuse as given by Rose deducted from total waste of 42.43 pounds.
4 Impossible to separate gravy.

TABLE X

Amount of Food Served and Edible Waste

Friday, January 25, 1946

Friday, January 25, 1946	Amount Served Pounds	EDIBLE WASTE Weight Pounds	EDIBLE WASTE Per Cent
BREAKFAST - 377 served			
Grapefruit	176.0	76.38[1]	76.
Dry Cereal	6.72	1.54[2]	23.
Corned Beef Hash	82.7	9.31	11.
Whole Wheat Biscuits	15.75	3.12	20.
Toast	14.07	2.37	17.
Milk	197.8	33.9[2]	17.
TOTAL	493.04	126.62	29.
LUNCH - 364 served			
Mexican Rarebit on Toast	95.0	4.87	5.
Head Lettuce, French Dressing	24.25	17.99	85.
Cornbread Apple Butter	34.0) 28.0)	7.94	23.
Lemon Rice Pudding	35.0	10.31	29.
Milk	165.02	9.69	8.
TOTAL	381.27	50.80	13.
DINNER - 304 served			
Fish	28.0	5.16[3]	61.
Scalloped Potatoes	70.0	6.94	10.
Green Peas	63.5	3.63	6.
Vitamin Salad	26.62	5.6	21.
Loaf Bread	14.08	0.19	1.
Chocolate Pie, Whipped Cream	75.5	2.25	3.
TOTAL	277.7	23.77	9.

AVERAGE WASTE PER PERSON PER DAY 0.20 pounds, 3.2 ounces

1 Corrected weight. 33% inedible refuse as given by Rose deducted from total waste of 114.0 pounds.

2 Corrected weight.

3 Corrected weight. 43% inedible refuse as given by Rose deducted from total waste of 9.06 pounds.