A STUDY OF THE ADEQUACY OF THE LUNCHES SELECTED BY JUNIOR HIGH SCHOOL STUDENTS

THESIS FOR THE DEGREE OF M. S.

Clara Mildred Green

1931

School children - Food
Tube Lunches etc

A STUDY OF THE FAT BLOOM ON THE LUNCHES SELECTED BY JUNIOR HIGH SCHOOL STUDENTS

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By

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THESIS

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A STUDY OF THE ADEQUACY OF THE LUNCHES

SELECTED BY JUNIOR HIGH SCHOOL STUDENTS

Introduction:

A study of the adequacy of the school cafeteria lunch presents two problems -- first, the study of the [illegible] of food by the cafeteria, and second, the choice of this food by the students.

Very little [illegible] has been [illegible] on the student's food selection, although in recent years, extensive studies on the supply of food, especially in the elementary schools and colleges, have been conducted. The secondary school has not been included in these studies.

A noted study of the food [illegible] students was Dr. Frank Gephart's Dietary Study at St. Paul's School, Concord, New Hampshire. This school had an enrollment of [illegible] boys of high school age. Dr. Gephart's study [illegible] length [illegible] covered three [illegible] survey: 1. nutrition, 2. food value, 3. general, [illegible] adjustment [illegible] palatability. The method for this food value [illegible] of all food served, subtracting from it the weighed waste, and then calculating the amounts of protein and calories based on standard tables of food composition. The re-

sults are listed on the Table, II. The general conclusions were that the quality of the food was exceptional, the quantities of food [illegible] adequate, and the dietary well balanced.

There are several university studies concerning the food supplied to college students. Francis C. [illegible] and Gertrude [illegible] studied the energy and protein content of [illegible] college community. Three types of eating places were represented: the commercial restaurant which [illegible] to serve "standardized meals at a fixed price", college cafeteria, and the drug store where lunches [illegible] were sold. Studies of the "practice house" and the food eaten between meals were also conducted. The comparative results are listed on the Table, II. It was shown that 54 cafeteria dinners furnished 517 - 1610 calories and from 10 to 60 grams of protein, while 50 dinners from 7 commercial restaurants contained 450 - 835 calories, with 13 to 45 grams of protein.

Martha Kramer and Edith Grundmeier made an extensive study of boarding houses and fraternity houses at Kansas State College. It included about sixty organizations or about 465 students in all. The exact results are recorded on the Table I. They found the protein to be sufficient and the energy [illegible] adequate, but none of

TABLE I

COMPARATIVE RESULTS OF CERTAIN DIETARY STUDIES

Taken from - "Nutritive Value and Cost of Food Served to College Students" - Edith Hawley

Investigator	Dietaries Studied	Nutritive Value per Man per Day of - Energy Amt.	Energy % of Standard	Protein Amt.	Protein % of Standard	Calcium Amt.	Calcium % of Standard	Phosphorus Amt.	Phosphorus % of Standard	Iron Amt.	Iron % of Standard
	Number	Cal.	%	Gr.	%	Gr.	%	Gr.	%	Gr.	%
Standard (Sherman) for safety		3,000	100	67	100	.68	100	1.32	100	.015	100
Richards and Talbot	1	3,690	123	135	201	1.10	162	2.12	161	.023	153
Macleod and Griggs	1	3,840	128	141	210	1.11	163	1.95	148	.021	140
Borthwick	1	3,190	106	91	136	.70	103	1.28	97	.019	127
Kramer and Grundmeier	20	2,890	96	82	122	.58	85	1.24	94	.014	93
Bevier	9	3,140	105	87	130	---	---	---	---	---	---
St.Paul's School, Gephart	3	4,000	133	112	167	---	---	---	---	---	---
Additional -											
Benedict and Farr											
Practice House		1,680	55	61	91	---	---	---	---	---	---
Restaurant		2,050	68	73.4	109	---	---	---	---	---	---

the minerals were adequate for more than one half of the group. It was doubtful as to the adequacy of vitamins and cellulose. Sufficient amounts of money had been spent for vegetables and fruits, but the selection was poor as shown by the extravagant use of fancy canned fruits.

Other college studies have been made by Alberta Bortwick, Anna Louise Ireland, Mary A. Griggs, who made a dietary study at Vassar College; and Isabel Bevier, author of a dietary study at the University of Illinois. Their results are found on Table I and show an adequate food supply.

No mention is made here of the city dietaries collected from all over the country, as they deal with families and not the individual school child.

A brief review of the work done in the elementary school may assist in considering the problems faced in a high school study. It is firmly believed that habits formed during elementary grade period are carried over into the high school period. Mabel Hyde Hittredge has summarized descriptions of the school lunches of children in 147 cities of the United States, showing which ones have general supervision and which do not. This report indicates that the quality of lunches was superior where centralized supervision was provided.

Marcel Labbe has written an article on the "Alimentary Education of Children", suggesting that a good educational appeal for health would be made through the kinds of meals prepared for children. However, she has made no actual study of student selection.

Much has been done by colleges and the government in educating the mothers and teachers how to plan and prepare proper lunches and diets for children. Surveys that have been made of food eaten by the elementary school student indicate that there is still extensive work to be done in inducing the child to practice what he and his mother have learned.

Various commercial companies are doing splendid work in raising school lunch standards. The National Dairy Council has just completed a study in three elementary schools. The weight, height and habits of the children were checked, then correct habits were taught. Finally measurable results were taken, one of which was the increased use of milk. They have found that there is a great need of instruction along this line, but that improvement is quickly noticed after a series of lessons has been carried out. In the recent study there has not been time to evaluate results.

A review of what has been done in college and grade schools shows that the school is a good agency for check-

ing and correcting food habits. For this reason, the high school lunch is a logical point for checking results obtained from elementary instruction and determining the practices and the needs of a high school student.

Purpose of the Study:

The purpose of this problem was to study the accuracy of the food supplied to and selected by Junior High School students in the school cafeteria, and to find if this could be changed by instruction. This was determined by measuring the amount and kind of food actually served to and selected by the high school students. This observation was repeated after instruction in lunch selection to ascertain if the child's choice of amount and kind of food was changed.

Experimental Procedure

I. Study of Food Supplied to 102.3 Junior High School Students.

The method of collecting data was similar to that of Cophart's study (5). Previous to the period of survey, a weighed inventory was taken of all food supplies on hand. Then for a period of one week, all daily supplies such as bread, vegetables, and ice cream were weighed. At the close of the period, an inventory was again taken of all the remaining food. As a result, the actual amount consumed was determined. The amounts are recorded in Table II.

From these records, calculations of the amounts of protein, fat, carbohydrate, calories, calcium, phosphorus and iron were made. In the case of commercial foods such as ice cream, chocolate milk, bread and rolls, it was impossible to find out the exact ingredients except by chemical analysis, and so the calculations of food value of these foods were based on figures from standard tables. In the case of foods for which no figures were available, the results of a similar product were used. All calculations were made from Rose's tables (12).

To tabulate these amounts, the following groupings

have been used:-

1. Breads, which include bread, crackers and rolls.
2. Dairy products, which includes butter, cheese, cream, eggs, milk and ice cream.
3. Canned fruits
4. Dried fruits
5. Fresh fruits
6. Meats
7. Miscellaneous
8. Canned vegetables
9. Dried vegetables
10. Fresh vegetables

Gephart (5) in his dietary study used an alphabetical arrangement. The grouping used in this study is more convenient for comparison of sources of food elements such as animal and vegetable proteins. It shows at a glance what part of the diet was made of fresh fruits or vegetables, & to what extent breads furnished the caloric intake.

In short cut methods such as Edith Hawley's (6) foods were classified on a mineral basis. However, in this type of study, the classification described above permits a more accurate comparison of food furnished before and after the conventional supervision of lunch selection. The former method provides a short cut method

of calculation. However, this was not used in this study as it does not provide for foods like molasses, gelatin, brown sugar and cornstarch; a large amount of which was used at this institution.

A summary, giving amounts and percentages of protein, fat, carbohydrate, fuel value, calcium, phosphorus and iron furnished by each grouping of food is given in Table III.

TABLE II

RECORD OF FOOD SERVED - First Week

Breads

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Bread, white	6.50	274.17	35.36	1553.83	7631.00	0.793	2.743	.02650
Bread, whole wheat	2.50	110.00	10.20	563.60	2787.50	0.228	1.735	.01800
Crackers, soup *1	19.75	1012.39	940.69	6321.98	39381.50	1.975	9.144	.13400
Crackers, graham *2	1.00	45.36	42.64	334.76	1904.00	0.177	0.708	.00771
Rolls, luncheon	26.31	882.20	113.83	4999.12	24568.74	2.561	8.821	.08500
Rolls, white	8.25	347.99	44.88	1972.16	9685.50	1.007	3.481	.03360
Rolls, whole wheat	2.00	88.00	8.16	450.88	2230.00	0.182	1.388	.01452
		2760.11	1195.76	16196.33	88188.24	6.923	28.020	.50133

*1 minerals or soda crackers
*2 minerals or graham bread

Dairy Products

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Butter	10.50	47.67	4048.38	- - -	36624.00	0.714	0.808	.00955
Cheese, cottage *1	6.00	568.80	27.24	117.06	3488.00	25.338	18.588	.03540
Cheese, American	2.25	293.84	366.39	303.75	4486.50	9.502	6.971	.01328
Cream, 18%	2.70	36.864	273.60	66.53	2880.00	1.440	1.267	.00280
Cream, 40%	5.36	53.72	969.73	72.24	9262.00	1.852	1.852	.00460
Eggs	8.19	1725.00	3105.00	- - -	4830.00	2.173	5.826	.09900
Milk, butter	6.31	86.70	14.28	138.72	1030.20	0.021	2.792	.007200
Milk, Chocolate *2	86.00	1286.56	1560.04	1950.48	27004.00	46.784	36.292	.09374
Milk, whole	399.91	5982.65	7254.37	8916.84	125571.74	217.551	168.762	.43590
Ice cream, vanilla *3	25.00	283.50	1712.25	2064.60	25825.00	13.600	10.550	.02725
Ice cream, maple *4	15.00	170.10	1027.35	1238.40	14895.00	8.160	6.330	.01635
Frost bites *5	2.80	31.75	191.77	231.17	2780.40	1.523	1.182	.03052
		10567.15	20547.40	15099.19	285676.84	328.658	261.220	.84039

*1 minerals, American cheese
2 whole milk
3, 4, 5 minerals, milk

Canned Fruits *

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Apple sauce	3.31	3.01	12.02	558.95	2358.50	0.106	0.179	.00450
Apricots	1.88	7.65	- - -	147.13	620.63	0.120	0.212	.00250
Cherries	1.88	9.36	0.84	1.79	763.13	0.161	0.264	.00539
Grapefruit	1.25	2.84	0.56	331.70	1343.75	0.007	0.007	.00010
Mixed fruit *1	1.88	5.96	0.85	92.10	400.44	0.137	0.205	.00256
Peaches, yellow	6.69	21.20	3.01	327.62	1424.44	0.488	0.729	.00909
Pineapple	2.50	4.53	7.95	412.75	1740.00	0.455	0.318	.00560
Raspberries, red* *2	6.63	51.08	30.08	378.69	1987.50	1.470	1.563	.01800
		105.63	55.32	2850.73	10638.39	2.944	3.477	.04674

*1 Peaches
*2 Calculated on black and all on fresh basis
* Minerals calculated on fresh Basis

Dried Fruits

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Apricots	1.50	31.98	6.81	425.25	1890.00	0.449	0.797	.00950
Dates	0.50	4.31	5.67	160.10	708.00	0.148	0.127	.00681
Prunes	2.50	20.90	- - -	705.25	2902.50	0.613	1.190	.03400
Raisins	0.50	5.22	6.81	155.35	703.50	0.145	0.130	.00470
		62.41	19.29	1445.95	6204.00	1.355	2.414	.05501

TABLE II - CONTINUED

Fresh Fruits A. P.

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Apples	20.00	25.20	25.20	979.80	4280.00	0.640	1.080	.02720
Bananas	4.50	16.29	8.15	291.60	1315.00	0.185	6.340	.01200
Grapefruit	0.50	1.56	1.14	15.88	79.50	0.047	0.047	.00068
Lemons	0.50	1.59	1.14	15.38	70.00	0.182	0.050	.00136
Oranges	25.00	68.00	11.25	964.00	4225.00	5.100	2.375	.02275
		112.64	46.88	2264.66	9969.50	6.154	9.892	.06399

Meats

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Bacon	1.00	45.09	269.44	- - -	2597.00	0.028	0.513	0.00590
Chicken broth	6.00	78.80	89.82	138.78	1686.00	0.046	0.849	0.01180
Corned beef *1	6.00	735.80	508.92	- - -	7458.00	0.427	7.932	0.11037
Fish, tuna	0.81	79.97	15.11	- - -	457.44	0.091	0.923	0.00442
Liver, beef	2.50	229.05	35.15	28.35	1345.00	0.203	2.495	0.09180
Pork, fresh	5.00	244.90	603.30	- - -	6610.00	0.270	4.965	0.06805
Pork, salt	1.00	8.62	391.00	- - -	3555.00	0.005	0.093	0.00129
Steak	4.00	344.72	232.24	- - -	3468.00	0.224	4.172	0.04300
Soup bone	2.50	- - -	- - -	- - -	- - -	- - -	- - -	- - -
		1764.95	2144.98	167.13	27176.44	1.294	21.942	0.32663

*1 minerals, beef

TABLE II - CONTINUED

Miscellaneous

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Barley *1	0.94	48.20	6.20	441.20	2012.00	0.294	1.671	.01621
Chili Sauce *2	1.65	8.87	1.48	29.50	167.39	0.081	0.192	.00295
Chocolate, sweet	0.25	907.25	39.69	57.95	626.00	0.104	0.516	.00300
Chocolate, bitter	0.15	11.70	44.18	27.48	554.40	0.052	0.258	.00154
Cocoa	2.00	195.96	262.20	542.00	4512.00	1.016	6.432	.02450
Corn meal, yellow	0.25	10.45	2155.00	85.50	405.25	0.020	0.216	.00104
Cornstarch	5.75	- - -	- - -	2347.38	9384.00	- - -	- - -	- - -
Creantex	2.00	- - -	907.20	- - -	8164.00	- - -	- - -	- - -
Flour, white	16.00	812.80	72.48	5476.00	25648.00	1.456	6.672	.07260
Flour, graham	3.25	211.12	34.93	1133.54	5694.50	6.190	5.778	.05870
Gelatin	0.38	155.46	0.18	- - -	623.40	- - -	- - -	- - -
Macaroni	2.00	121.56	8.16	672.24	3248.00	0.200	1.306	.01088
Maraschino cherries *3	1.50	6.82	5.45	113.63	531.00	0.638	1.046	.01348
Mayonnaise *4	7.42	- - -	3365.71	- - -	30288.44	- - -	- - -	- - -
Oil, cooking *4	0.50	- - -	226.80	- - -	2041.00	- - -	- - -	- - -
Olives, stuffed	0.40	3.08	45.36	7.80	451.60	0.221	.026	.00526
Pickles *5	0.35	0.79	0.48	4.29	24.50	0.026	.053	.00032
Rice	0.50	18.16	0.78	178.17	795.50	0.044	0.218	.00204
Rusks	0.34	18.10	2.37	102.58	503.80		0.143	.00143
Sphagetti *6	6.81	413.91	27.78	2288.98	11059.44	0.681	4.447	.03705
Syrup, maple	1.01	- - -	- - -	533.07	2135.28	- - -	- - -	- - -
Sugar, brown	4.75	- - -	- -	2046.87	8616.50	- - -	- - -	- - -
Sugar, powdered	3.00	- - -	- - -	1360.80	5442.00	- - -	- - -	- - -
Sugar, white	18.50	- - -	- - -	8391.60	43559.00	- - -	- - -	- - -
Yeast, compressed	0.13	3.28	0.11	58.80	37.52	- - -	- - -	- - -
Potato chips *7	9.43	293.22	2013.70	2013.70	24664.64	0.603	2.501	.05600
		2340.71	9220.24	27673.08	191187.66	11.626	31.475	30.695

*1 Rolled oats, for minerals
2 Tomatoes
3 Fresh cherries
4 Cottonseed oil
*5 Cucumbers, for minerals
6 Macaroni
7 Potatoes, for minerals

TABLE II - CONTINUED

Canned Vegetables *

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Asparagus	2.38	29.10	5.39	37.72	313.50	0.268	0.420	.01070
Beans, green	6.25	31.13	2.81	107.69	581.25	0.131	0.148	.03100
*1 Mixed vegetables	6.50	32.44	11.77	274.17	1332.50	1.651	1.359	.01768
Mushrooms	1.00	15.88	1.81	30.85	203.00	0.077	0.490	?
Peas	7.50	122.40	68.25	331.38	1882.50	0.953	4.320	.05780
*2 Pimentos *	0.44	5.18	0.42	8.96	51.80	0.014	0.049	.00077
*3 Sauerkraut	6.25	48.19	14.19	107.75	762.50	1.275	0.825	.03100
Tomatoes	12.50	68.00	11.38	226.25	1287.50	0.625	1.475	.02260
Tomato juice	6.50	35.36	5.92	117.65	669.50	3.250	0.767	.01170
Tomato puree	9.38	51.00	8.53	169.69	965.63	0.468	1.106	.01690
Tomato soup	13.13	89.25	41.74	565.56	2979.38	0.656	1.548	.02370
		525.93	172.21	1977.67	11029.06	9.375	12.507	.22385

* Minerals, fresh basis
*1 Carrots
*2 Peppers
*3 Minerals, cabbage

Dried Vegetables

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Beans, lima	3.75	37.88	25.50	1120.95	5947.50	1.267	5.748	1.119
Beans, navy	2.50	255.15	20.40	675.85	3910.00	1.815	5.342	0.079
		293.03	45.90	1796.80	9857.50	3.022	11.090	1.19800

TABLE II - CONTINUED

Fresh Vegetables A. P.

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Beets	8.75	51.63	39.38	305.64	1461.25	1.155	1.548	.02380
Cabbage	12.00	76.20	10.92	261.24	1447.20	2.448	1.584	.05988
Carrots	27.75	115.22	25.25	931.29	4412.25	7.048	5.799	.07500
Celery	8.75	34.70	3.94	105.16	595.00	3.097	1.470	.01980
Cucumber	0.75	2.38	0.68	8.84	51.00	0.055	0.113	.00068
Head lettuce	12.50	56.75	11.38	141.25	900.00	2.437	2.387	.03970
Onions	9.25	58.74	12.58	373.42	1840.75	1.425	1.887	.02500
Parsnips	6.00	35.40	10.86	293.76	1416.00	1.608	2.170	.01632
Peppers	1.75	12.70	1.59	35.72	206.50	0.047	0.206	.00300
Potatoes, white	105.00	856.80	47.25	7001.40	31920.00	6.720	27.615	.61950
Radishes	0.13	0.51	0.056	2.26	11.60	0.190	0.264	.00544
Spinach	8.75	83.30	11.90	126.88	945.00	2.660	2.695	.14280
Tomatoes	1.00	4.08	1.81	17.69	103.00	0.05	0.118	.00181
		1386.41	177.60	9602.55	45309.55	28.940	47.856	1.03273

TABLE III

SUMMARY OF FOOD SERVED FIRST WEEK

Food Material	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Breads	2760.11	1195.76	16196.33	88188.24	6.925	28.020	.50133
Dairy Products	10567.15	20547.40	15098.19	258676.84	328.658	261.220	.84039
Canned Fruits	105.63	55.32	2250.75	10638.39	2.944	3.477	.04674
Dried Fruits	62.41	19.29	1445.95	6204.00	1.355	2.414	.05501
Fresh Fruits	112.64	46.88	2264.66	9969.50	6.154	9.892	.06399
Meats	1764.95	2144.98	167.13	27176.44	1.294	21.942	.32663
Miscellaneous	2340.71	9220.24	27673.08	191137.66	11.626	31.475	.30695
Canned Vegetables	525.93	172.21	19776.67	11029.06	9.375	12.507	.22385
Dried Vegetables	293.05	45.90	1796.80	9857.50	3.022	11.090	1.19800
Fresh Vegetables	1386.41	177.60	9602.55	45309.55	28.940	47.856	1.03273
GRAND TOTAL	19918.97	33625.58	96273.09	658237.18	400.291	429.895	4.59562

PERCENTAGES

Food Material	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Breads	13.86	3.56	16.82	13.40	1.73	6.52	10.91
Dairy Products	53.05	61.11	15.68	39.30	82.06	60.77	18.29
Canned Fruits	0.53	0.17	2.34	1.62	0.74	0.81	1.02
Dried Fruits	0.31	0.06	1.50	0.94	0.34	0.56	1.20
Fresh Fruits	0.57	0.14	2.35	1.52	1.54	2.30	1.39
Meats	8.86	6.37	0.17	4.13	0.32	5.10	7.11
Miscellaneous	11.75	27.42	28.74	29.05	2.91	7.32	6.68
Canned Vegetables	2.64	0.51	20.54	1.68	2.35	2.91	4.87
Dried Vegetables	1.47	0.53	1.87	1.50	0.76	2.58	26.07
Fresh Vegetables	6.96	0.13	9.97	6.88	7.25	11.13	22.47

Dispersion of Food Supplied to 103.8 Children

The ages 11 to 18 represent a period of great development in height and weight of children. To meet their dietary requirements, their food must be sufficient in amount and adequate in protein, fat, carbohydrate, minerals, and vitamins. Rose (17) has outlined the amounts of these food materials needed by a growing child in one day. She has distributed these foods among three meals, giving an allowance for lunch of approximately 34% of the day's food for a girl requiring 2,500 calories and 40% for a boy requiring 3,000 calories. Thus it may be assumed that at least 25% of the days food should be eaten at noon, which would allow 50% for dinner and 15% for breakfast. However, due to our present habits of living, many children eat very little, if any, breakfast. In their case, it would be safer to set 75% as the amount for lunch, leaving 25% instead of 75% for the supper of the day.

As shown in Table III, the greatest amount of protein, 53.05%, was supplied in the form of dairy products. The next largest amount, 17.36%, came from breads. Foods, such as starch pastes and flour supplied 11.75%, while 3.26% came from meats, and 2.22% from fresh vegetables. The amounts supplied by fruits, canned and dried vegetables were all less than 7%.

The total amount of protein in the food was 13,213.97 grams, or 79.76 gm. per child per day. It is interesting to find that 61.91% was furnished by dairy products and meats, sources of the complete proteins, necessary for growth. Rose (12) has set the adult daily requirement as 0.8 to 1 gram of protein per kilogram of body weight and for normal children has raised this to 1.5 to 2 grams per kilogram of body weight and to 4 grams per kilogram, for underweight children.

Only an estimate of the adequacy of the total amount supplied can be made as the children varied in weight and age, the ages ranging from eleven to thirteen years. A child weighing 100 pounds should have 65.63 grams for 25% of his daily protein or 51.75 grams for 75%. The daily average of 79.76 grams is sufficient for him, but insufficient for any larger child or any child underweight.

An adequate amount of food is absolutely essential in maintaining weight and supplying energy. As calculated, the total number of calories was 658,737.13 or 1198.97 per child per day. Rose (16) has estimated that children from 11 to 13 require 1900 to 4000 calories per day. If 25% or 75% of the daily ration is consumed at noon, a child needing 1900 calories should have 475 calories as 25% or 625 calories as 75%. A student requiring 4000 calories

should get [illegible] calories or 55% or 1400 calories or 75%. Thus 1109.37 calories or [illegible] would be [illegible] sufficient for the lower child.

Minerals are important in child nutrition, as calcium is a constructive element in [illegible] teeth, phosphorous is also needed by the bones as well as by the living cell, and iron is essential for the hemoglobin of the blood. Sherman and Hawley's experiments (13) have set up the standard of 1 gram of calcium, at least 1 gram of phosphorous, and .015 grams of iron as the daily minimum requirement of a child. The food served at the high school furnished 320.131 grams of calcium or a daily average of 0.727 gram per child. 25% of the day's standard would be 0.25 gram and 75% would be 0.75 gram, both of which insure an excess of calcium.

409.803 grams of phosphorous were furnished through out the week or 0.737 gram per child per day. As with the calcium, 25% of the standard would be 0.25 gram and 75% would be 0.75 gram. 0.737 gram is more than adequate. The entire iron content of the week's food was 4,595.68 grams or 0.00376 gram for one day per child. This is a liberal allowance when compared with 25% of the day's minimum - 0.037 gram or 75% -- .00515 gram. The mineral adequacy of the food was due to the large amount of dairy

products consumed. Sometimes, the amount found in vegetables is lessened in the preparation of such foods, as minerals are soluble and often the juices of vegetables are discarded. In this cafeteria, all extracts were saved for soups.

As yet there is no quantitative means of measuring the vitamin content of foods. Those considered in this study are vitamin A, B (undifferentiated B) and C. Vitamin A, known as fat soluble, is found to a great extent in dairy products. As this group furnished 57.05% of the fat of the dietary, it can be assumed that vitamin A was sufficiently supplied. The source of vitamin B is in yeast, vegetables, fruits and whole grain cereals. Of the bread used, whole wheat was the smallest amount. There was no other appreciable amount of cereals consumed. However, the 561.93 pounds of fruits and vegetables probably supplied sufficient vitamin B. Vitamin C is also well distributed in fresh fruits and vegetables, but is easily destroyed by cooking. As these foods were seldom served raw, the amount of vitamin C was probably inadequate. Considering the vitamin content as a whole, the food was rich in vitamin A, probably adequate in vitamin B, although low in C.

Therefore, the food supplied to the students at noon through the cafeteria was adequate in minerals, but

barely sufficient in protein, calories and vitamins to meet the requirements of the larger children.

Study of Lunches Selected by 10[illegible] Junior High School Students

The second phase of this problem was the study of the food actually chosen by students. The previous figures [illegible]. However, provision of well-chosen, well-cooked food does not insure that each child will select an adequate meal, if he selects his own lunch. To determine the food actually eaten by the students, records of the lunches chosen and eaten were secured. Determinations of the adequacy were then made.

The method of obtaining data for this part of the study consisted in checking each tray as it was carried past the cashier's desk. A record was kept of every dish present on the tray. To simplify recording and to prevent impeding the movement of the line, a large sheet with the names of the dishes of the day's menu listed at the top of columns, was used. As each tray was checked, a notation was made under the right column.

In order to classify this material for tables, the numerous [illegible], as [illegible] potatoes, "butterfly salad", "[illegible] pudding", and many others served in the cafeteria, [illegible] classified in accordance with the [illegible]

nourishing dessert. The standard [illegible] by Dr. Lydia Roberts (11) [illegible] consists of one glass of milk, [illegible] or [illegible]; [illegible] bread and butter, a cereal or potatoes; [illegible] full serving of vegetable or fruit. A dessert [illegible] be included, but [illegible] not required. For example, a lunch composed of mashed potatoes, bread and butter, a glass of milk and a serving of [illegible] and [illegible] a lunch of [illegible] lacking [illegible] fruit or vegetable. It [illegible] the lunches chosen by the students are tabulated in Table IV. Desserts are not recorded as they are not essential in a well-balanced lunch [illegible]. That [illegible] of the lunches, for example those composed of milk, [illegible] complete. [illegible] the child, after buying milk, [illegible] free to complete the meal with [illegible] desserts.

Provision of a well-chosen, well-[illegible] does not insure that each child will eat [illegible] the meal [illegible] selects [illegible] lunch. This point is well illustrated through the preceding tables.

It is impossible to determine for a large group, the exact amount of calories, [illegible], carbohydrates, minerals and vitamins needed for lunch, as each individual's

TABLE IV

LUNCHES SELECTED BY STUDENTS FIRST WEEK

	Standard	Lacks 1 sub food	Lacks 2 sub foods	Lacks milk	Lacks veg or fruit	Lacks 1 sub & milk	Lacks 1 sub & veg or fruit	Lacks 2 sub & milk	Lacks 2 sub & veg or fruit	Lacks 2 sub veg or fruit & milk	Lacks sub, veg or fruit & milk	Lacks milk & veg or fruit	No. served on each day
M	5.2%	4.1%	4.1%	7.3%	14.5%	9.4%	19.9%	1.4%	14.4%	0%	10.4%	9.4%	96
T	7.7	7.6	0.7	3.6	23.5	7.3	19.7	1.4	7.3	8.8	6.6	10.29	136
W	7.5	6.6	1.8	5.6	12.2	8.4	21.6	2.8	5.6	4.7	8.4	14.1	106
T	9.5	9.5	5.3	6.3	21.2	5.3	21.2	0	3.19	0	8.5	7.4	94
F	7.6	6.4	1.7	11.11	18.8	8.5	20.5	1.7	5.1	1.7	6.4	11.11	117
Av.	7.4	6.1	2.7	6.78	18.1	7.74	20.58	1.46	7.1	3.0	8.06	10.46	109.8

EXAMPLES OF LUNCHES CHOSEN

Poor

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams	Vitamin A	Vitamin U B	Vitamin C
Potatoes	84	1.85	.08	15.46	69.72	.01186	.04872	.001092	+	+	+
Spagetti *1	110	14.74	.99	81.51	395.80	.02420	.15840	.001320	+	−	−
Potato Chips *2	28	1.90	11.14	15.08	160.16	.00392	.01624	.000364	+	−	−
Lunch-roll	51	4.74	.61	26.88	132.09	.01377	.04741	.000459	−	−	−
		25.23	12.82	136.93	755.77	.05375	.27077	.003235			

*1 macaroni figures
*2 minerals from potatoes

Poor

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams	Vitamin A	Vitamin U B	Vitamin C
Potatoes	84	1.85	.08	15.46	69.72	.01186	.04872	.001092	+	+	+
Lunch roll	51	4.74	.61	26.88	132.09	.01377	.04741	.000459	−	−	−
Bread	21	1.95	.25	11.07	54.39	.00567	.01955	.000189	+	+	−
Butter	9	0.09	7.65	- - -	64.21	.00135	.00153	.000018	+	+	−
Cornstarch * Pudding	140	- - -	- - -	0.26	504.00	- - -	- - -	- - -	−	−	−
		8.63	8.59	53.67	829.41	.03265	.11719	.001758			

* made with ½ water

Medium

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams	Vitamin A	Vitamin U B	Vitamin C
Potatoes	84	1.85	.080	15.46	69.72	.01186	.04872	.001092	+	+	+
Pork	28	5.69	5.320	- - -	70.56	.00336	.06132	.000840	+ +	−	−
Peas	96	6.72	0.480	16.22	96.00	.02688	.12192	.001632	+	+ +	+
Jello *	42	2.74	.003	- - -	11.01	- - -	- - -	- - -	−	−	−
Milk	144.5	4.77	5.780	7.23	99.71	.17340	.13439	.002899	+ +	+ +	+
		21.72	11.633	38.91	347.00	.21550	.36635	.006454			

EXAMPLES OF LUNCHES CHOSEN (2)

Medium

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams	Vitamin A	Vitamin U B	Vitamin C
Potato	84	1.85	.08	15.46	69.72	.01186	.04872	.001092	+	+	+
Deviled Egg	12	1.61	1.26	- - -	17.76	.00804	.02160	.000360	+	+	+
Maple Syrup	98	- - -	- - -	69.97	280.28	.10486	.01274	.002940	—	—	—
Potato chips	28	4.74	.61	26.88	130.09	.01377	.04741	.000459	+	-	—
		8.20	1.95	114.26	499.85	.13853	.13047	.004851			

Good

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams	Vitamin A	Vitamin U B	Vitamin C
Spaghetti *1	110.0	14.74	.99	81.51	393.80	.02420	.15840	.001320	+	—	-
Corn	102.0	3.16	1.12	20.09	105.02	.00612	.10516	.00816	+	+	+
Ice cream *2	92.0	3.04	3.68	4.60	63.48	.11040	.08556	.000184	+	+	+
Milk	144.5	4.77	5.78	7.23	99.71	.17340	.13459	.002890	+ +	+ +	+
W W bread	26.0	2.50	0.23	12.92	64.74	.00520	.03978	.000416	+	+ +	-
Butter	9.0	.09	7.65	- - -	69.21	.00135	.00153	.000018	+	+	—
		28.30	19.45	126.35	795.96	.32067	.52472	.005644			

*1. Figures on macaroni
*2. Minerals from Milk.

Good

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams	Vitamin A	Vitamin U B	Vitamin C
Potatoes	84.0	1.85	.08	15.46	69.72	.01186	.04872	.001092	+	+	+
Cottage Cheese *;	75.0	15.68	.75	3.23	82.50	.69825	.51225	.000975	+	+	+
Milk	144.5	4.77	5.78	7.23	99.71	.17340	.15439	.002890	+ +	+ +	+
W W Bread	26.0	2.50	0.23	12.92	64.74	.00520	.03978	.000416	—	+ +	—
Butter	9.0	0.09	7.65	- - -	69.21	.00135	.00153	.000018	+	+	—
Asparagus	270.0	4.86	0.54	8.91	59.40	.06750	.01053	.002700	+	+	+
Salad Dressing	11.0	- - -	22.00	- - -	198.00	- - -	- - -	- - -	+	—	—
		29.75	37.03	47.75	643.20	.95756	.74720	.008091			

* Minerals on American cheese

[illegible] Table No. IV, [illegible] children of [illegible], [illegible] vegetable, [illegible] vegetable [illegible] (10.5) selected [illegible] vegetable [illegible]. [illegible] from 3. [illegible] fed, [illegible] vegetable [illegible].

10% [illegible] vegetable [illegible].

the caloric needs but are lacking in cellulose, minerals and vitamins. On a whole the lunches were inadequate or poorly balanced, although the food supplied was sufficient and the day's menu easily permitted the selection of standard lunches.

Instruction of Junior High School Students in Choice of Adequate Lunches

The third phase of this problem dealt with instruction of the students concerning the selection of a lunch. In a study of this type, it was impossible to take actual class time for food lessons, so instruction that could be carried out in the cafeteria was used. In [illegible] this way, however, the students could make immediate application of what they were learning. The instruction part followed the first survey and was carried out for several weeks preceding the second survey.

Series of commercial and hand-made posters were used, and effectively displayed in the lunch room. A project of interest was that of three cages of rats placed where the cafeteria line formed each day. This naturally attracted the students while they were waiting in line at noon. At the beginning, the rats were of the same age and approximately the same weight. The rats in one cage were fed all protein foods, those in the second cage were fed all [illegible], and those in the third cage were fed a balanced ration. After several weeks, the results of the feeding showed up as expected. The students voluntarily, [illegible] "Crestie" [illegible] desserts. Graphs recording the weights were [illegible] the cages.

The [illegible] effective device used [illegible] the lunches. This [illegible] the [illegible] by the National Dairy Council. [illegible] most satisfactory [illegible] of [illegible] cream [illegible] or ice cream; a vegetable besides potato, or fruit or both; two servings of [illegible] such as bread and butter, potatoes or [illegible] cheese; and a dessert if desired; [illegible], [illegible] an adequate lunch [illegible].

Students [illegible] to choose a correct lunch were given [illegible] colors, telling [illegible] learned. For example, [illegible] lunch [illegible] vegetable, [illegible] fact. This [illegible] carried out on different [illegible]. Then on certain days, [illegible] beforehand [illegible] the students, rewards were given [illegible] the [illegible] who had selected good lunches. The [illegible] were usually "Great bites", [illegible] ice cream [illegible]. Often the children were required to [illegible] three cards before [illegible] prize.

In order that [illegible] students [illegible] would [illegible] adequate lunch, [illegible] large [illegible] telling [illegible] lunch, [illegible] the cafeteria counter. [illegible] students [illegible] brought their [illegible] checked, they [illegible] their lunch, but were referred to [illegible]. Some days the student

were selected and the lunch labeled, [illegible] the student hall. At the beginning, the cards were allowed to remain [illegible] in order to perfect it, but as the instruction progressed, this was discontinued. Posters, telling [illegible] that while [illegible] were placed along the counter. It was interesting to note the boys study their trays as they picked out their meals.

In order to aid the student in visualizing a correct lunch, trays containing good combinations at various prices, selected from the day's menu were set up. These were labeled and placed near the entrance. On some days, a good lunch was contrasted against a poor lunch. The latter lunch usually contained more than one dessert and no vegetable. To avoid monotony, a table covered with a linen cloth and holding tapers, flowers and a standard lunch was displayed one noon.

As a whole the students responded to the instruction and were interested in lunch selection. Every method was employed to keep the instruction from seeming like class room work, but rather as an extra-curricular activity, yet with more seriousness than a class room lesson as the effects applied directly to the students' health.

Study of Food Supplied after Instruction in Selection

The method of recording [illegible] was the [illegible] used in the first part of the study. The results are recorded in the same manner as in Table No. V. Table VI is a summary of the weight in grams and percentages of protein, fat, carbohydrate, calories, calcium, phosphorus and iron furnished by each grouping of foods. Table No. VII compares the first week with the second week.

TABLE V

RECORD OF FOOD SERVED - Second Week

Breads

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Bread, white	8.50	358.53	46.24	2031.93	9979.00	1.037	3.507	.03468
Bread, whole wheat	6.00	264.00	24.48	1352.64	6690.00	1.446	4.164	.04346
*1 Crackers, soup	14.75	756.08	702.54	4721.47	28231.50	1.475	6.829	.10030
Rolls, *2 luncheon	11.38	483.79	62.42	2741.45	13673.18	1.404	4.838	.04681
Rolls, white	14.50	611.61	78.88	3466.22	17023.00	0.160	0.522	.00507
Rolls, whole wheat	5.00	220.00	20.40	1127.20	5575.00	0.455	2.870	.03630
		2604.01	934.96	15440.91	81171.68	5.977	22.810	.26662

*1 Soda crackers for minerals.
*2 Bread

Dairy Products

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Butter	20.50	93.07	7903.93	- - -	71504.00	1.394	1.579	.01866
Cheese, American	3.00	391.92	488.52	4.05	5988.10	12.669	9.294	.01770
*1 Cheese, cottage	4.50	426.60	20.43	87.80	2241.10	19.003	15.941	.02655
Cheese, Pimento	0.33	43.11	53.74	0.45	394.68	1.394	1.022	.00195
Cream 18%	5.40	61.20	452.88	110.16	4773.60	2.387	2.100	.00477
Cream 40%	4.39	43.76	795.60	59.67	7578.09	1.516	1.516	.00378
Eggs	6.29	334.27	261.24	- - -	3679.79	1.655	4.488	.07540
Milk, butter	9.44	130.14	21.69	208.22	1561.68	4.589	4.230	.01090
*2 Milk, chocolate	51.06	763.86	926.23	1158.04	16032.84	27.777	21.547	.05566
Milk, whole	420.32	6290.21	7624.50	9530.62	131522.62	228.840	176.239	.38140
*3 Ice cream	44.80	515.20	3111.31	3750.65	45131.52	24.371	18.906	.04883
*4 Frost Bites	0.61	6.92	41.78	50.36	605.73	3.518	2.574	.00665
		91100.26	27102.40	14960.02	291013.55	328.913	257.436	.65225

*1 American cheese, for minerals
*2 Plain milk
*3 Milk, for minerals
*4 Ice cream; milk, for minerals

TABLE V - CONTINUED

Canned Fruits *

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
*1 Mixed Fruits	3.88	12.30	1.75	190.08	826.44	0.283	0.423	.00528
Apple sauce	1.83	1.07	4.26	198.28	823.81	0.0373	0.064	.00160
Apricots	1.00	4.08	- - -	78.47	331.00	0.064	0.113	.00136
Grapefruit	3.31	7.52	1.49	879.01	3560.94	0.315	0.301	.00450
Peaches	6.69	21.20	3.01	327.62	1424.44	0.488	0.729	.00909
Pineapple	5.00	9.05	15.90	825.50	3480.00	0.910	0.635	.01135
		55.22	26.41	2498.96	10459.63	2.433	2.265	.03318

* Minerals calculated on fresh
*1 Peaches

Dried Fruits

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Prunes	5.25	42.84	- - -	1481.03	6095.25	1.286	2.499	.07145
		42.84	- - -	1481.03	6095.25	1.286	2.499	.07145

Fresh Fruits A. P.

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Bananas	6.25	22.63	11.31	405.00	1812.50	0.256	0.881	.01700
Oranges	30.00	81.60	13.50	1156.80	5070.00	6.120	2.850	.02730
Pineapple	8.00	14.48	10.88	352.32	1568.00	1.456	1.016	.01802
Rhubarb	8.00	14148	14148	79.84	496.00	1.600	1.128	.03632
Strawberries	8.00	32.64	21.76	254.00	1344.00	1.488	1.016	.29040
		165.83	71.93	2447.96	10290.50	10.920	6.891	.38904

TABLE V - CONTINUED

Meats

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Bacon	2.0	86.18	538.88	- - -	5194.00	0.056	1.026	.01180
Beef	5.0	375.55	430.90	- - -	5420.00	0.040	0.040	.00770
Corned beef	0.5	35.38	59.42	- - -	*1 676.50	0.028	0.522	.00545
Frankfurters	*1 2.5	241.55	89.60	- - -	1772.50	0.140	2.608	.02723
Liver	2.0	183.24	28.12	22.68	1076.00	0.162	0.162	.07348
Salmon *2	8.0	707.60	272.16	- - -	5280.00	0.654	0.654	.03264
		1629.50	1419.08	22.68	19419.00	1.080	5.012	0.15830

*1 Beef
*2 Minerals calculated on fresh

Miscellaneous

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
*1 Chile sauce	0.15	81.60	0.14	2.72	15.45	.0075	.018	.00027
*2 Clam juice	2.37	69.87	4.29	45.15	497.70	1.140	.495	.04731
Cocoa	1.00	97.98	131.10	171.90	2256.00	0.508	3.216	.01225
Cornstarch	1.00	- - -	- - -	408.24	1632.00	- - -	- - -	- - -
*3 Creamtex	3.00	- - -	1360.80	- - -	12246.00	- - -	- - -	- - -
Flour, white	30.00	1524.00	135.90	10192.50	48090.00	2.730	12.510	.01362
Flour, graham	4.00	250.40	34.76	1280.56	6532.00	0.708	6.604	.06712
Gelatin	0.25	103.64	0.12	- - -	415.60	- - -	- - -	- - -
Macaroni	1.25	76.00	5.00	420.00	2030.00	0.120	0.820	.00680
*4 Maraschino cherries	0.50	2.27	1.82	37.88	177.00	.0430	.071	.00091
*5 Mayonnaise	6.00	- - -	2721.60	- - -	24492.00	- - -	- - -	- - -
Oil, cottonseed	0.25	- - -	1000.00	- - -	1000.00	- - -	- - -	- - -
Olives	0.42	2.09	52.58	22.10	569.94	.232	.027	.00552
*6 Pickles	0.57	1.29	7.80	6.98	39.90	.042	.086	.00052

Miscellaneous -(Continued)

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
*7 Pimentos	0.21	1.52	0.19	4.29	24.78	.006	.025	.00038
Rice	3.50	127.12	4.76	1254.19	5568.50	0.144	1.525	.01428
*8 Rusks	0.68	36.19	4.73	205.15	1007.60	0.088	0.286	.00286
*9 Salad dressing	1.40	6.36	539.78	- - -	4883.20	0.095	0.108	.00127
Sugar, brown	2.00	- - -	- - -	860.84	3448.00	- - -	- - -	- - -
Sugar, powdered	2.00	- - -	- - -	917.20	3626.00	- - -	- - -	- - -
Sugar, white	22.00	- - -	- - -	99.79	39908.00	- - -	- - -	- - -
Yeast	0.06	6.00	- - -	12.00	18.00	- - -	- - -	- - -
*10 Potato chips	12.34	247.52	1448.72	1699.88	20820.30	0.790	3.245	.07281
Tapioca	0.01	0.22	0.06	49.90	201.00	0.014	0.052	.00090
		2603.07	7454.15	17691.27	179499.47	7.122	29.088	.24682

*1 Canned tomatoes
2 Round clams
3 Cottonseed oil
4 Fresh cherries
5 Cottonseed oil
*6 Cucumbers, for minerals
7 Peppers
8 White bread
9 Butter
10 Potatoes, for minerals

Canned Vegetables *

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Beans, green	2.38	11.83	1.07	40.92	220.88	0.497	0.560	.01180
Beans, wax	2.38	31.75	2.87	109.84	592.88	1.332	1.505	.03180
*1 Bean, sprouts	5.63	40.82	7.66	143.00	805.09	1.148	0.743	.02809
Corn	11.25	142.88	61.20	969.64	5006.25	0.304	5.326	.04080
Peas	18.44	300.90	16.78	819.55	4627.81	2.342	10.620	.14215
*2 Sauer kraut	6.25	125.29	36.89	280.15	1982.50	1.275	0.825	.03118
Tomatoes	12.38	67.32	11.26	223.99	1274.63	0.619	1.460	.02239
Tomato puree	12.50	68.00	11.38	226.25	1287.50	0.625	1.475	.00262
Tomato soup	6.56	44.63	20.87	282.78	1489.69	0.328	0.774	.01188
		835.42	169.98	3096.12	17287.23	8.470	23.288	.32271

*1 Calculated on cabbage
*2 Minerals calculated on cabbage
* Minerals of all vegetables calculated on fresh

TABLE V - CONTINUED

Dried Vegetables

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Beans, lima	4.75	389.98	32.30	1419.87	7533.50	0.603	2.864	.04308
Beans, kidney	0.50	51.03	4.08	135.17	782.00	0.363	1.069	.01588
		441.01	36.38	1555.04	8315.50	0.966	3.935	.05896

Fresh Vegetables A. P.

Food Material	Weight Pounds	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Asparagus	5.00	40.80	4.55	74.80	1005.00	0.565	0.885	.02265
Beets	10.00	59.00	4.50	349.30	1670.00	1.320	1.770	.02720
Cabbage	21.50	136.53	19.57	468.06	2601.50	4.386	2.838	.10728
Carrots E. P.	15.00	74.85	27.15	632.70	3075.00	3.810	3.135	.04080
Celery	7.50	30.60	3.38	88.43	510.00	2.655	1.260	.01700
Greens	12.00	130.56	54.48	576.96	3324.00	3.540	3.048	.16330
Lettuce	15.00	68.10	13.65	169.50	1080.00	2.925	2.865	.04770
Onions	13.50	98.01	1.84	604.80	2970.00	2.079	2.754	.03672
Peppers	2.00	14.52	1.82	40.82	236.00	0.054	0.236	.00362
Potatoes	112.50	918.00	50.63	7501.50	34200.00	7.200	29.588	.66375
Spinach	8.00	76.16	10.78	116.00	864.00	2.432	2.464	.13064
		1647.13	157.35	10622.87	51535.50	30.966	50.848	1.26066

TABLE VI

SUMMARY OF SECOND WEEK

Food Material	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Breads	2694.01	934.96	15446.91	81171.68	5.977	22.810	0.26662
Dairy Products	9099.60	21,702.40	14960.02	291013.55	328.913	257.436	0.65225
Canned Fruits	55.22	26.39	2498.96	10459.63	2.433	2.265	0.05318
Dried Fruits	42.84	- - -	1481.03	6095.25	1.286	2.499	0.07145
Fresh Fruits	165.83	71.93	2447.96	10290.50	10.920	6.891	0.38904
Meats	1629.50	1419.08	22.68	19419.00	0.080	5.012	0.15830
Miscellaneous	2633.07	7454.15	17691.27	179499.47	7.122	29.088	0.24682
Canned Vegetables	833.42	169.98	3096.12	17287.23	8.470	23.288	0.32271
Dried Vegetables	441.01	36.38	1555.04	8315.50	0.966	3.933	0.05896
Fresh Vegetables	1647.13	157.35	10622.87	51535.50	30.966	50.843	1.26066
GRAND TOTAL	19241.63	31972.62	69816.86	675087.31	397.133	404.065	3.45999

PERCENTAGES

Food Material	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
Breads	14.00	2.92	74.08	12.02	1.51	5.65	7.71
Dairy Products	47.29	67.88	7.13	43.11	82.82	63.71	18.85
Canned Fruits	0.28	0.08	1.19	1.55	0.51	0.56	0.96
Dried Fruits	0.22		0.71	0.90	0.32	0.62	2.07
Fresh Fruits	0.86	0.23	1.18	1.53	2.75	1.71	11.24
Meats	8.47	4.44	0.01	2.88	.02	1.24	4.58
Miscellaneous	13.86	23.31	8.43	26.59	1.79	7.20	7.13
Canned Vegetables	4.33	0.53	1.48	2.56	2.13	5.76	9.33
Dried Vegetables	2.29	0.11	0.74	1.23	0.24	0.97	1.71
Fresh Vegetables	8.56	0.49	5.06	7.63	7.80	12.58	36.44

TABLE VII

COMPARISON OF FOOD CONSTITUENTS SERVED FIRST AND SECOND WEEKS

Grand Total	Protein Grams	Fat Grams	Carbohydrate Grams	Fuel Value Calories	Calcium Grams	Phosphorous Grams	Iron Grams
First Week	19918.97	33625.58	78474.09	653237.18	399.291	429.893	4.59562
Second Week	19841.63	31972.62	69816.86	675037.31	397.133	404.065	3.45299

TABLE VIII

AVERAGE AMOUNT OF FOOD CONSTITUENTS PER CHILD PER DAY, FIRST AND SECOND WEEKS

Standard for Safety, 25%, 35%	Protein Grams 25.68 31.75*	Fuel Value Calories 1475 2065*	Calcium Grams 0.25 0.35	Phosphorous Grams 0.25 0.35	Iron Grams 0.0037 0.0053
First Week	36.26	1198.97	0.727	0.783	0.008370
Second Week	34.57	1339.46	0.788	0.802	0.006904

* For a child weighing 100 lbs.

* 25 - 35% of average of 1900 + 4000 cal.

Discussion of Adequacy of Food Supplied after Instruction

The food supplied after instruction in lunch selection was evaluated as to adequacy of protein, calories, fat, carbohydrate, minerals and vitamins. In the second week, a total of 19241.67 grams of protein or a daily average of 34.57 grams per child was served. For a student weighing 100 pounds, this would be sufficient protein, as he would require 25.63 grams on a 55% level or 31.75 grams on a 75% level. This would not be adequate for a larger child, however. As to the quality of this protein, 47.89% came from animal sources, thus insuring complete proteins.

There was an increase in the calories supplied as the first week showed a total of 653,257.18 which increased to 675,037.71 for the second week. This was probably due to the children eating more food rather than temperature or season as the first phase was carried out in March and the second in late May. The daily average of 1559.46 calories per child is all right for the 55% level of 1475 calories, but too low for the 75% level of 2065 calories. 527.175 grams of calcium were furnished in the second week, giving a daily average of 0.753 grams per child. 404.065 grams of phosphorus were in the second week's food. This averaged 0.598 grams per

child per day. Both the calcium and phosphorus showed an increase and were sufficient as 25% of the daily requirement for calcium and phosphorus is 0.25 gram and 75% is 0.75 gram.

7.45999 grams of iron, averaging .006904 gram per child per day showed sufficient iron when compared with the 25% minimum of .0027 gram and the 75% minimum of .0052 gram. As in the first week's study, the mineral content was very high. This is good as minerals are essential in child growth.

The vitamin content of the second week showed an improvement, but this is not so closely related to the selection of the foods as are the other factors. The explanation of the vitamin increase is due to the added amount, 79.25 pounds, of fresh vegetables and fruits used. The second week's study came in the late spring and made this increase possible. The vitamin A content was again high due to the large use of dairy products. Vitamin B, Undifferentiated B was adequate and vitamin C was increased due to the above mentioned reason.

Comparing this week with the first, it is noted that the calories increased due to selection of more substantial foods. The protein, fat, carbohydrate and minerals did not appear very much higher. The food furnished by means of this cafeteria to the high school students may be considered adequate in terms of protein, fat, carbohydrate, calories, minerals and vitamins.

<u>Study of Selection of Lunches After Instruction</u>

The method of studying the lunches selected after the instruction period was the same as in the second phase. The results are presented in the same manner in Table IX. Table X is a summary, comparing the lunches selected before and after the instruction.

TABLE IX

LUNCHES SELECTED BY STUDENTS SECOND WEEK

	Stan-dard	Lacks 1 sub food	Lacks 2 sub foods	Lacks milk	Lacks veg or fruit	Lacks 1 sub & milk	Lacks 1 sub & veg or fruit	Lacks 2 sub & milk	Lacks 2 sub & veg or fruit	Lacks 2 sub veg or fruit & milk	Lacks sub,veg or fruit & milk	Lacks milk & veg or fruit	No. served on each day
M	19%	13%	4%	11%	13%	13%	13%	10%	11%	2%	3%	8%	100
T	39.46	14.91	4.38	4.38	7.88	8.77	11.40	0.87	4.38	0	0.87	2.63	114
W	45.45	7.42	4.13	6.61	9.09	5.78	9.91	0	3.30	0.82	5.78	1.60	121
T	45.16	13.56	1.36	6.84	8.21	4.10	6.84	0	6.84	0	2.60	4.10	73
F	42.70	8.33	3.12	9.37	20.83	1.04	8.33	0	2.08	0	0	4.16	96
Av.	38.35	11.44	3.39	7.44	11.80	6.538	9.89	0.17	5.52	0.56	2.45	18.098	100.8

TABLE X

COMPARISON OF LUNCHES SELECTED BY STUDENTS BEFORE AND AFTER INSTRUCTION

Week	Stan-dard	Lacks 1 sub food	Lacks 2 sub foods	Lacks milk	Lacks veg or fruit	Lacks 1 sub & milk	Lacks 1 sub & veg or fruit	Lacks 2 sub & milk	Lacks 2 sub & veg or fruit	Lacks 2 sub veg or fruit & milk	Lacks sub,veg or fruit & milk	Lacks milk & veg or fruit	No. served on each day
	%	%	%	%	%	%	%	%	%	%	%	%	
First	7.4	6.10	2.7	6.78	18.1	7.74	20.58	1.46	7.1	3.0	8.06	10.46	109.8
Second	38.35	11.44	3.39	7.44	11.80	6.538	9.89	0.17	5.52	0.56	2.45	18.098	100.8

[illegible] IN-[illegible]

[illegible] ... [illegible] the [illegible], [illegible] in-[illegible] ([illegible]) [illegible] the [illegible] observation. [illegible] 0.[illegible]. It is [illegible] with [illegible] from 10.[illegible] to 11.[illegible]. [illegible] from [illegible] to 0.[illegible].

In [illegible] fact, [illegible] all the [illegible] failing to [illegible] vege-[illegible] of the [illegible] the interest of [illegible] vegetables [illegible] the lunch to the [illegible] of milk. However, [illegible] very small increase, [illegible] only 0.[illegible]%.

The lunch [illegible] not increase, and the children [illegible] pride in [illegible] their [illegible].

Conclusion :

A quantitative [illegible] of the food selected from the cafeteria by the students of Battersill Junior High School showed:-

1. An adequate amount of food was supplied but there was no allowance for any surplus.

2. The students did not choose their lunches wisely.

3. After instruction, the children showed improvement in their selection.

[illegible]

Cream of tomato soup	.03
Meat loaf	.10
Mashed potatoes	.05
Refried beans	.05
Buttered beets	.05
Bran muffins	.07
Salads	
Head lettuce	.05
Peach	.10
Orange bowls	.10
Cottage cheese	.05
Desserts	
Caramel pudding	.07
Cake	.03
Cherry pie a la mode	.07
Oranges	.05
Luncheon rolls	.03
Ice cream	.05
Bread, white, whole wheat	.03
Butter	.01
Milk	.02,3,4

TYPICAL MENU, FIRST WEEK

Cream of vegetable soup	.05
Mashed potatoes	.05
Creamed dried beef on noodles	.05 & .10
Italian spaghetti	.05 & .10
Tomatoes	.05
Lima beans	.05
Bran muffins	.05
Salads	
Peach, grapefruit	.10
Health	.05 & .10
Orange	.10
Cole slaw	.05
Desserts	
Fruit custard	.05
Devils food cake	.05
Sauce	.05
Luncheon roll	.05
Ice cream	.05
Bread, white, whole wheat	.05
Butter	.05
Milk	.0[illegible], [illegible], [illegible]

[illegible] MENU, FIRST [illegible]

[illegible] cocktail	.05
Beef vegetable soup	.05
Mashed potatoes	.05
Roast pork	.10
Fried liver	.10
Creamed carrots	.05
Peas	.05
Butter bread	.05
Salads	
Cottage cheese	.05
Tomato cheese	.10
Fruit jello	.10
Deviled egg	.05 & .10
Asparagus, tomato	.10
Desserts	
Jello	.05
Maple syrup	.05
Oranges	.05
Apple betty	.05
Raspberry short cake	.05
Lemon roll	.05
Ice cream	.05
Bread, white, whole wheat	.05
Butter	.05
Milk	.05, 2, 4

[illegible]

Tomato cocktail	.05
Bean soup	.05
Mashed spot taco	.05
Hungarian goulash	.05 & .10
Sweet corn	.05
Spinach	.05
English muffins	.05
Salads	
Tuna fish	.05 & .10
Fruit sandwich	.10
Asparagus, cucumber, cheese	.10
Desserts	
Whipped cream cake	.05
Sunset pudding	.05
Rice pudding	.05
Apples or oranges	.05
Luncheon roll	.05
Ice cream	.05
Potato chips	.05
Bread, white, whole wheat	.05
Butter	.05
Milk	.05,7,4

FRIDAY MENU, FIRST WEEK

Cream of tomato soup	.05
Mashed potatoes	.05
Baked beans	.05 & .10
Hungarian goulash	.05 & .10
Creamed corn beef on toast	.05
Parsnips	.05
Sauer kraut	.05
Salads	
Macaroni	.05 & .10
Head lettuce	.05
Fruit	.10
Desserts	
Apples	.03
Prune whip	.05
Tapioca pudding	.05
Rice pudding	.05
Sunset pudding	.05
Jello	.05
Luncheon roll	.03
Ice cream	.05
Bread, white, whole wheat	.02
Butter	.02
Milk	.02,3,4

[illegible] MENU, SECOND WEEK

Cream of tomato soup	.05
Mashed pot [illegible]	.05
Chop suey	.05 & .10
[illegible] and frankfurters	.05 & .10
Peas	.05
Graham muffins	.02
Salads	
Pear, cheese	.10
Head lettuce	.05
Cottage cheese	.05
Fruit	.10
Desserts	
Caramel pudding	.05
Devil's food cake	.05
Rhubarb	.05
Luncheon roll	.05
Ice cream	.05
Bread, white, whole wheat	.02
Butter	.02
Milk	.02,3,4

THICK [illegible], SPOON [illegible]

Cream of corn soup	.05
Diced potato in dried beef gravy	.10
Spinach	.05
Lima beans	.05
Graham muffins	.05
Salads	
Health	.05
Peach	.10
Pineapple	.10
Head lettuce	.05
Desserts	
Jello	.05
Fresh pineapple	.05
Whipped cream cake	.05
Luncheon roll	.03
Ice cream	.05
Bread, white, whole wheat	.02
Butter	.02
Milk	.02,5,4

[illegible]

Cream of vegetable soup	.03
Mashed potatoes	.05
Vegetable a la casserole	.05 & .10
Macaroni & cheese	.05 & .10
Asparagus	.05
Wax beans	.05
Nut bread	.02
Salads	
Cabbage	.05
Banana pineapple	.10
Fruit	.10
Desserts	
Jello	.05
Fresh pineapple	.05
Whipped cream cake	.05
Luncheon roll	.03
Ice cream	.05
Bread, white, whole wheat	.02
Butter	.02
Milk	.02,3,4

THURSDAY MENU, SECOND WEEK

Cream of tomato soup	.05
Mashed potatoes	.05
Meat loaf	.05 & .10
Bacon and liver	.05 & .10
Buttered beets	.05
Sweet corn	.05
Lima beans	.05
Graham muffins	.02
Salads	
Vegetable	.05
Peach or pear fruit	.10
Head lettuce	.05
Fruit jello	.05
Desserts	
Chocolate pudding	.05
Prune sauce	.05
Washington pie	.05
Luncheon roll	.03
Ice cream	.05
Bread, white, whole wheat	.02
Butter	.02
Milk	.02,3,4

FRIDAY MENU, SPRING LEEK

Cream of potato soup	.05
Mashed potatoes	.05
Salmon souffle	.05 & .10
Creamed chipped beef on rocks	.05 & .10
Dandelion greens	.05
Pears	.05
English muffins	.02
Salads	
Cold slaw	.05
Mixed fruits	.10
Deviled egg	.10
Deserts	
Fresh pineapple	.05
Devils food cake	.05
Luncheon roll	.03
Ice cream	.05
Bread, white, whole wheat	.02
Butter	.02
Milk	.02,F,4

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