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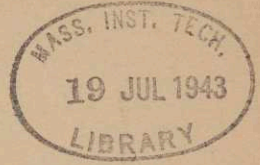
Food as a Factor in Student Life

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Food as a Factor in Student Life

A Contribution to the Study of Student Diet

By

Ellen H. Richards and Marion Talbot

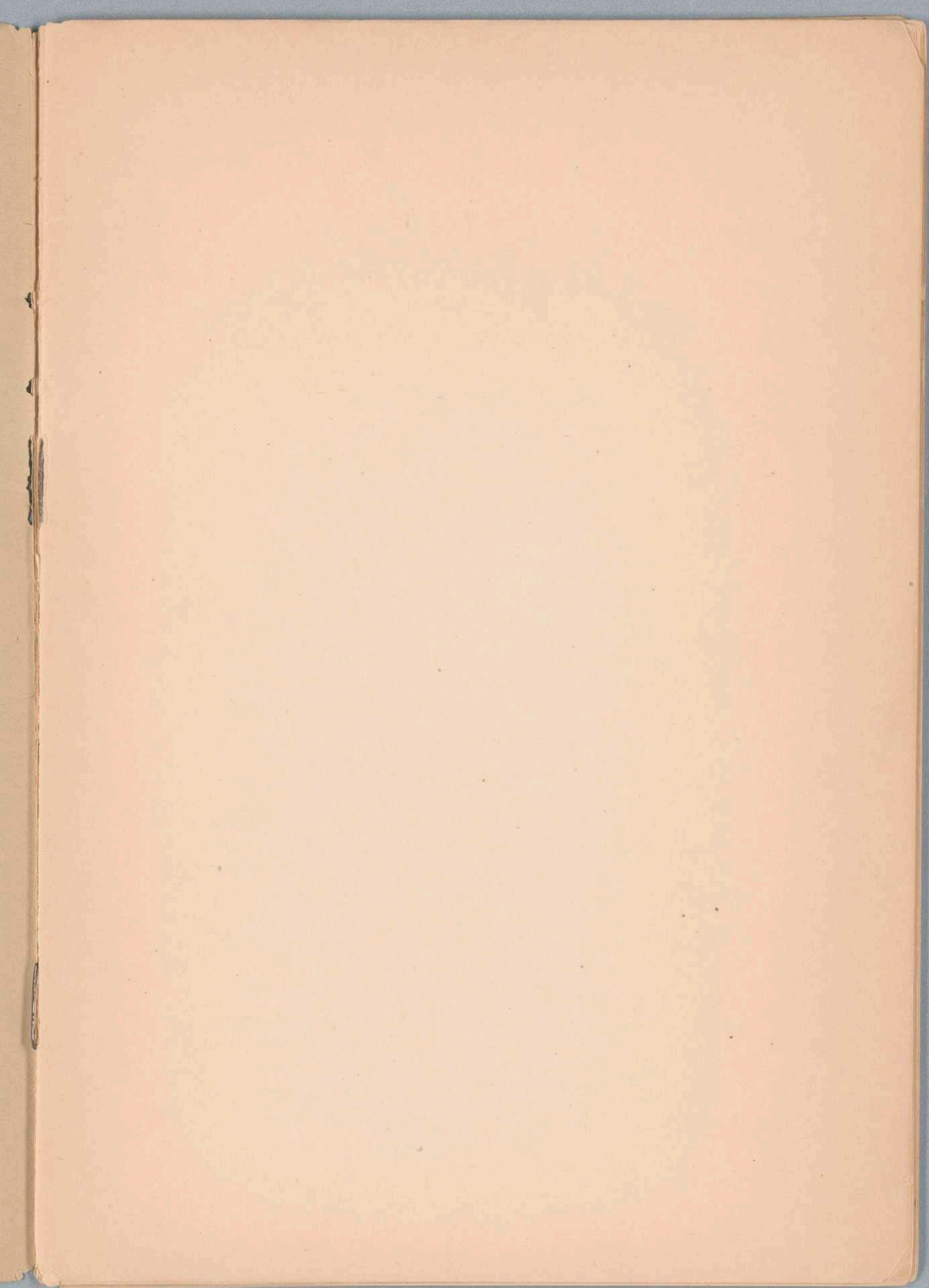
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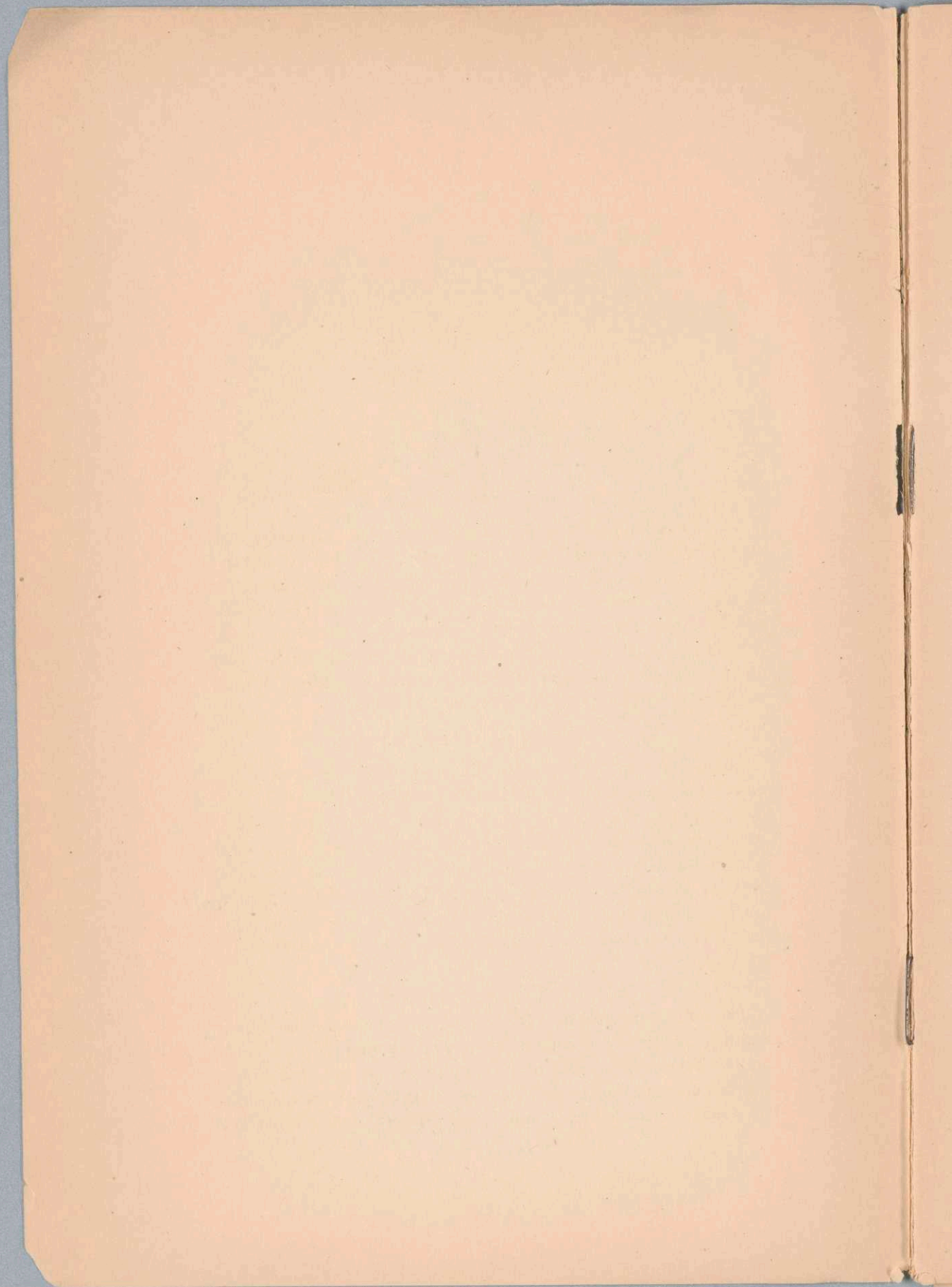
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I.

SOCIAL AND DOMESTIC CONDITIONS OF THE
INVESTIGATION.

CHARACTER OF INVESTIGATION.

It has seemed fitting to many students of sociology that there should be exemplified in some college or other educational institution the possibilities of healthful physical and mental life, as they have been made known by recent advances in both social and physiological science. Under the auspices of the University of Chicago, a practical study of the subject has been made. Its results seem of sufficient value and interest to warrant the presentation of a brief account of them.

NEGLECT OF DIETETICS.

In nearly every state in the Union there is an agricultural experiment station, and in many there are agricultural colleges. The government, representing the people, in this way expends large sums annually for the study of the food of cattle and other animals, but it rarely makes any appropriation for the study of the food of any citizen, even though his body and brain may represent hundreds of thousands of dollars in invested capital, while the brute animal is worth only one or two hundred dollars.

HUMAN BODY AS A MACHINE.

The animal body both of brute and of human being is a living machine, capable of doing work—raising weights, pulling loads and the like. The power of the engine to do its work comes from the consumption of fuel—the burning of wood, coal, or gas. The power of the animal body to do its work comes from the

See all.

consumption of fuel which is furnished to it in the form of food. Animals are more economical machines than the most perfect steam-engine. The latter cannot convert more than one eighth of its available energy into work ; the animal may yield as much as one fifth. In spite of its superiority, however, it is incapable of evolving something from nothing. Nevertheless, it is a common delusion that the animal can go on and do its work indefinitely without fuel, and, therefore, that it has nothing in common with the locomotive or engine. The reason for this delusion is that the latter runs only so long as the supply of visible fuel lasts and then stops dead ; while the human body runs on comfortably for a long time with very little fuel, and it may keep on for some three weeks without any visible supply at all. The explanation of this difference is that the body contains a store of fuel laid up in itself against the time of need. Fat is just as available as fuel when stored up in the body as if supplied from an external source. Five pounds of fat will last ten or twelve days, and the body will support itself on other reserve materials still longer. The work which the human machine can do may be measured by the same standard as the work of any machine, *i. e.*, by the mechanical unit of energy, the foot ton, or the Calorie. The foot ton represents the amount of energy required to raise one ton one foot. The Calorie represents energy in the form of heat sufficient to raise one kilogram of water one degree Centigrade. One Calorie corresponds to 1.53 foot tons.

The animal body, however, is more than a machine. It requires fuel, not only to enable it to work, but it must live or exist, even though it does no work in the ordinary meaning of the term. About two thirds of the food eaten goes merely to sustain existence. While the inanimate machine is sent periodically to the repair shop, the living machine must do its own repairing day by day, and minute by minute.

The food eaten over and above the amount needed to sustain life is the source of the energy which may be manifested in the power to think, to create artistic designs, to write essays and poems, to stimulate others to high endeavor, as well as in the activities which are more purely physical. When its importance

is thus measured, it becomes a matter of wonder why the study of food is a subject that is so generally ignored.

There is another phase of the subject which often escapes notice. It is not enough to shovel fuel into the locomotive. It must burn. So food must be assimilated and made a part of the body, and thus become the available capital of the brain. It is therefore necessary that the conditions of nutrition should be as favorable as possible. The engineer knows that he must not clog his drafts with smoke, nor load his fire-box with stony coal. The student does not seem to know that his fire of genius will not burn clear if he clogs his brain with irritating substances, loads his stomach with indigestible or semi-poisonous food, and neglects exercise and sleep.

SPECIAL NEGLECT OF STUDENT DIETETICS.

The prevalent disregard of the importance of human dietetics is especially noticeable in connection with the life of students. Farmers know that their oxen and horses must be well fed in order that they may do their best work. On the other hand, college trustees and professors too frequently think that they do their duty by their students if they provide a sufficiently heavy load to be hauled. If a student breaks down, the remark is heard on all sides, "What a pity he studied so hard," and no one asks, "Was he well fed?"

PRESENT EXPERIMENT.

It was the privilege of the University of Chicago to take the first step toward remedying this condition, undaunted by the evident difficulties which, owing to the apathy of the community in regard to such matters, seemed almost insurmountable.

To make the experiment in a college was eminently suitable, and as young women are proverbially more exacting and critical as to the table than young men, and at the same time more conversant with household matters, it was quite appropriate to make the first trial in a women's dormitory.

The conditions existing at the University of Chicago were very favorable for an experiment of this kind. The authorities were in sympathy with the movement and the students coming from all parts of the world formed a cosmopolitan community.

ARRANGEMENT OF BUILDINGS.

Three well-appointed, adjoining buildings, each providing accommodations for about 40 students, were ready or nearly ready for occupancy. Each hall had its well-equipped dining room and serving room. Supplementary cooking apparatus only was placed in the two end buildings, the central kitchen, in which the bulk of the cooking was done, being placed in the central building, Kelly Hall. From this the food, ready cooked, was carried to the dining rooms. To these were admitted only the officers and students living in the houses and their guests, or the guests of the University.

It was also at this time possible to secure not only the apparatus used in the widely known Rumford Kitchen at the World's Fair but also the invaluable services of its manager.

THEORETICAL PLAN.

The three halls were organized with the aim in view of establishing a healthful mental and physical life for the 100 or more women who should live in them. In order to help secure the latter end, it was decided to provide a limited variety of food of the best attainable quality, prepared in the best manner, and selected so as to give sufficient nutriment in the right proportion. The low sum of three dollars and a half per week was the price tentatively fixed for board, in the hope that the advantages of life in the halls might thus be made possible to a large number of students. This theoretical plan was held very elastic in order to make it possible to adapt instantaneously the results of the study of the existing conditions. A working scheme having been established, it was hoped that the details might give to others a basis for further accomplishment.

TIME COVERED.

The time assigned to the experiment was from October 1, 1893, to April 1, 1894. Owing to delays in obtaining possession of the halls, and to the difficulty in securing workmen or service during the last month of the World's Fair, the whole plant was not in full working order until nearly the end of the first quarter, so that in reality, the plan as perfected was in operation only three months. During that time the average number of students occupying the halls was 106.

THE STAFF.

The entire staff of service for the three halls included, besides the director of the experiment, three housekeepers,—one for each hall,—two indoor men, three cooks, one kitchen maid, seven waitresses, seven chambermaids, one scrubbing woman, one laundress, twenty-five persons in all.

SOCIAL SIDE.

The life in the Women's Quadrangle began without any fixed traditions save those which had been forming gradually, while the women students were temporarily residing in an apartment house during the first year of the University.

It was the desire of the Deans that the new life should have as far as possible the simple quiet attractions of a home, and be freed from the objectionable features of an ordinary students' boarding house. Hence it was attempted to adopt the standard of living which prevails in good American homes, and it was deemed an economy of mental power, as well as of physical strength, to secure the relief of the students from duties which could be performed by others. The saving of time and potential energy which was thus effected, although involving considerable outlay for service, was believed to outweigh the advantages which have been claimed for domestic work done by students themselves. The possibilities of the social side of the life were not overlooked. An element of educational value is added to a college home when hospitality may be extended with freedom and ease, and in the new University the contribution of the Women's Halls to the general social life seemed of significance, apart from the direct benefit to those partaking in it. At best the life of any student living in a dormitory has a monastic tinge, a selfish or self-absorbed side unfavorable to the best development of character. Provision was therefore made not only for the occasional entertainment of guests privately, but for weekly receptions to members of the University and their friends, the expense of which should not be met by any special tax, but which should be included in the general price for board. This hospitality increased the expense of service far more than that of food, and it should be taken into consideration in comparing the cost of this experiment with that of any other institution.

AUXILIARY MEASURES.

To secure this amount of service and this freedom and dignity in the dining rooms for the limited sum of three and one half dollars a week would have been difficult with full numbers of paying members and with years of experience; with two thirds the maximum number and with little or no precedent, it was not an easy task. It was evident that the outlay for food material must be kept as low as possible, but it was believed that inexpensive food, if it were at the same time wholesome and nutritious, would be eventually, if not at first, acceptable to the majority, provided that it could be made perfect of its kind, and could be served attractively. Special attention was therefore given to the choice of table ware, to the quality and freshness of the table linen, and to serving the food in courses and so quickly that it would be quite hot on reaching the table. The closest attention was paid to securing the greatest attainable digestibility of the food material by means of the best known methods of cookery. It seems to be true that for this purpose a low degree of heat applied for a greater length of time is in general more effective than a high degree applied for a shorter time; hence the largest part of the cooking has been done with apparatus designed according to this idea. Coal, gas, steam and kerosene were all used as fuel, each in the most efficient form.

It is, however, true that even the best methods of cookery will not always make an article of inferior grade equal to one of superior grade; therefore special attention was given to securing the best quality of the food material bought. Even after the standard of quality was once set, constant vigilance was needed to maintain it, as is the common experience. Excellent cold storage facilities aided greatly in the possibilities of economical buying at wholesale rates.

FINANCIAL RESULTS.

The financial results were very satisfactory. By unremitting attention to every detail of expenditure and administration, the income was made to meet the entire cost of the experiment, although it had not been thought probable that, in addition to the current expenses, the extra items of the cost of the inaugura-

tion and the salary of the director of the experiment could be met within so short a time. These last expenses once incurred will not be needed again, and the sum thus saved can go in future for greater variety in food, repairs, replacement, etc.

Since detailed records were kept of each item and of the time of service required for each part of the work, it has been possible to gain valuable information for future use.

For instance, the following facts were learned as to the apportionment of the \$3.50 received per week, per person:

For food,	-	-	-	-	\$1.54	
“ condiments, tea, coffee,	-	-	-	-	.105	\$1.645
“ food of servants,	-	-	-	-	.385	—
“ cooking food	-	-	-	-	.35	
“ serving food,	-	-	-	-	.50	
Extra service in cleaning, laundry, and small expenses					.39	
For expense of inauguration,					.18	1.805
Balance reserve for depreciation of equipment,					.05	—
					\$3.50	

SUMMARY OF SCIENTIFIC RESULTS.

The scientific results may be summed up as follows: The family was well fed, having, after all allowances for waste and refuse, a ration of equal food value to that furnished to the American soldier, if the relative weights of the man and woman are taken into consideration. The proportion of the several ingredients, as will be seen in the statement in Table VI, was also closely corresponding to the theoretical.

An additional proof of the sufficiency of the food was the fact that nearly all gained in weight, in general physical condition, and were able to work with less headache than usual, in spite of the fact that fundamental principles of right living were occasionally ignored, as is unfortunately too frequently the case when the liberty of the individual is unrestricted.

Lest it should be supposed that the simple diet necessitated monotony, there is taken from the record books the menu of three consecutive weeks in the most difficult month of the year, when the winter diet palls and the spring vegetables are yet costly.

In order to indicate the liberality of the diet, there is given in the following pages a comparison of the quantity and cost of each class of food with that of the most economical dietary known to us, that of the Normal School and Business Institute at Valparaiso, Indiana, kindly furnished by Mr. O. P. Kinsey.

Many other results of value from a scientific point of view might be deduced from the tables, notably the large proportion of food purchased which never reaches the table, and the large proportion of that so prepared which is not eaten.

This is due in part to the method in vogue in the market of selling without trimming, so that each household has much garbage, and in part to careless ways of providing, and in part to the fact that service costs more than food, and that it is cheaper to lose one third of a bushel of potatoes by paring than to pay for careful peeling.

COÖPERATION OF HOUSEHOLD.

As to the readiness with which the students accepted the diet, there is less assurance of complete success. So many people are in the habit of finding fault with whatever food is provided, and expect, usually with good reason, to have a choice of a dozen dishes, out of which number one or two may suit, that it would be unreasonable to expect that a simple, nourishing diet, known to be of low cost, would be entirely pleasing to every one, especially in a household made up of people used to the most varied standards of living. It is not too much to say, however, that while a few of the college women failed to enter into the experiment with sympathy, the general body of students were pleased, and made frequent expressions of their interest and approval.

A large measure of the success of the plan and its establishment on a firm foundation is due to the Heads of the Houses, Miss Myra Reynolds, Miss Elizabeth Wallace, and Miss F. C. Brown.

The carrying out of the matter was entrusted to the Deans, Mrs. Alice Freeman Palmer and Miss Marion Talbot, with Mrs. Ellen H. Richards, of the Massachusetts Institute of Technology, as expert adviser, and Miss Maria Daniell as manager. Their efforts were ably seconded in a technical way by Miss S. E. Wentworth, of the New England Kitchen, Miss Antoinette Cary, Mrs. Biggers, Miss Knapp, and Miss Yeomans.

The employees, although laboring under many difficulties with new kinds of apparatus, new methods of work and unusual division of labors, contributed largely to the success of the experiment by their willing efforts.

II.

SCIENTIFIC RESULTS OF THE INVESTIGATION.

TABLE I.—DETAILED STATEMENT OF THE COST AND COMPOSITION OF THE FOOD MATERIALS USED IN THE KITCHEN AT KELLY HALL, UNIVERSITY OF CHICAGO, DURING THE SIX MONTHS FROM OCTOBER 1 TO APRIL 1.

The three most important classes of the nutritive ingredients of foods are proteids, fats, and carbohydrates. The human being must have enough of proteid or tissue building substance to make up for the wear and tear of the body, and since many have not reached the period of full development, students must also be furnished with enough to allow also for growth. In the second place, there must be a supply of the energy and heat producing ingredients of food, viz., the proteids, fats and the carbohydrates. The right proportion of fat must be introduced in a palatable and digestible form, since there are indications that its general use in this country may in part account for the excess of energy of the American over his continental neighbors. It is becoming increasingly probable that fat in the daily diet is one of the most necessary ingredients for brain workers, partly for the reason above stated, that it is a storehouse of energy, but also in that it can produce energy without the intervention of some of the processes required in the conversion of starch. After the proteid and fat elements of the food are supplied, there remain the starch, sugars, etc., the so-called carbohydrates, which furnish the rest of the heat and energy needed by the body.

The following table gives therefore not only the quantities and prices, but also the nutrients in the food material purchased and sent to the Kitchen.

	Total lbs.	Cost.	Per cent. waste.	Proteid, net.	Fat, net.	Carbohydrate, net.
Beef:						
Rib roast.....	3887	\$426 97	31.7	332	584	
Tongue.....	429	55 95	34	75	34	
Canned.....	162	14 75	.....	46	12	
Dried.....	210	27 45	.....	52	25	
Shoulder.....	473	35 71	.....	59	118	
Corned.....	738	55 32	.....	164	125	
Shin.....	3553	106 79	50	296	70	
Round.....	298	22 98	.....	52	24	
Chuck.....	510	26 27	.....	89	41	
	10260	\$772 19	.....	1165	1033	

	Total lbs.	Cost.	Per cent. waste.	Proteid, net.	Fat, net.	Carbohydrate, net.
Mutton:						
Whole	3314	\$247 08	27.6	336	360	
Quarters	981		10	124	133	
Veal:						
Fore-quarter	366	20 62	33.3	33	7	
Solid roasts	1445	165 12	.....	192	44	
Chicken	1696	189 53	15	192	72	
Turkey	783	58 89	15	89	33	
Fresh Pork	262	22 67	.....	32	23	
Sausage	252	18 43	.....	23	101	
Liebig Extract	11	12 45	.....	6	.....
Gelatine						
	9110	\$734 79	.....	1027	773	

	Total lbs.	Cost.	Per cent. waste.	Proteid, net.	Fat, net.	Carbohydrate, net.
Ham	534	\$65 29	30	90	112	
Bacon	157	22 06	.....	15	110	
Liver	123	6 78	.....	24	6	
Fresh fish	684	81 21	.....	70	21	
Oysters	120	16 50	.....	7	.2	
Salmon (canned)	180	7 20	.....	35	26	
Shrimps	24	4 60	.....	6	.2	
Salt fish	236	23 70	.....	53	5.2	
Salt pork	222	21 87	.....	67	173	
	2277	\$249 21	.....	367	453.6	
Milk	28776	\$647 46	.....	1007.2	1063.7	1351.5
Butter	2132	617 83	.....	43	1770	10.6
Butterine	355	69 86	.....	.....	309.5	
Cream	2852	249 96	.....	85.6	342.3	85.6
Cheese	96	13 89	.....	29	30	
Eggs	936	162 95	.....	117	112.3	
Olive oil	88	29 25	.....	.....	88	
Nuts	150	3 75	.....	24	79.5	
Sugar	3228	176 09	.....	.....	.....	} 3259.8
Candy	50	7 00	.....	.....	.....
Molasses	248	15 24	.....	.....	.....	171.1
Maple syrup	168	22 25	.....	.....	.....	119.3
	39179	\$2015 53	.....	1305.8	3795.3	4997.9

	Total lbs.	Cost.	Per cent. waste.	Proteid, net.	Fat, net.	Carbohydrate, net.
Flour :						
White	1030	\$21 35	.....	113	13.4	731
Whole wheat	1890	52 40	.....	227	37.8	1204
Bread :						
White	2052	93 08	}	702	50	5716
Rolls	6496	315 48				
Brown	670	31 04				
Oatmeal	700	21 20	.....	98	49	445
Corn products	982	20 35	.....	93.2	39.3	668
Crackers	140	15 75	.....	9.8	.7	79
Rice	224	14 56	.....	16.6	.9	177
Macaroni	125	13 39	.....	10.6	.4	94
Tapioca	60	2 70	.....	.7	.....	50
Barley	20	85	.....	2.1	.5	13
Peas	100	2 80	.....	23	2	53
Beans	280	10 67	.....	67.2	4.2	144
	14779	\$615 62	.....	1363.3	198.2	9374

	Total lbs.	Cost.	Per cent. waste.	Proteid, net.	Fat, net.	Carbohydrate, net.
Potatoes	14142	\$173 86	30	180.0	20.0	1910.0
" sweet	2034	44 85	10	27.5	7.3	475.0
Squash	280	7 90	10	3.5	0.3	20.2
Celery	220	20 15	10	1.7	0.6	12.6
Onions	186	2 65	10	2.8	.....	18.4
Beets	670	4 90	10	7.9	8.4	53.7
Carrots	75	1 53	10	0.6	1.3	5.4
Parsnips	350	3 65	10	5.0	0.6	25.8
Turnips	825	8 82	10	7.4	1.4	59.4
Lettuce	250	5 35	10	3.1	0.6	5.0
Cabbage	830	14 55	10	14.5	3.7	48.5
Tomatoes (canned)	1113	38 45	.....	11.1	2.2	41.2
Corn (canned)	324	22 20	.....	10.0	4.3	76.8
Peas	100	16 20	.....	6.0	0.5	12.0
	21399	\$365 06	.....	281.1	51.2	2764.0

	Total lbs.	Cost.	Per cent. waste.	Proteid, net.	Fat, net.	Carbohydrate, net.
Dried fruits :						
Apricots	331	\$42 83	.....	4.6	.....	165.5
Prunes	337	31 24	.....	7.7	.....	219.0
Cherries	35	3 98	.....	0.8	.....	22.0
Dates	70	3 95	.....	1.4	.....	35.0
Figs	128	13 34	.....	5.1	.....	64.0
Raisins	208	14 85	.....	5.0	1.3	129.0
Currents	130	10 00	.....	1.3	.....	65.0
Apple butter	740	51 80	.....	7.1	.....	355.0
Orange marmalade	24	3 20	.....	0.5	.....	16.8
Cranberry sauce	60	6 60	.....	0.6	.....	24.0
Current jelly	60	3 00	.....	0.6	.....	31.8
Raspberry jam	20	2 40	.....	0.4	.....	12.0
	2143	\$187 19	.....	35.1	1.3	1139.1

	Total lbs.	Cost.	Per cent. waste.	Proteid, net.	Fat, net.	Carbohydrate, net.
Apples	3648	\$106 10	.....	14.6	.....	551.7
Grapes	2260	51 09	.....	13.4	.....	382.2
Oranges	3283	50 14	20	26.3	.....	299.0
Bananas	1900	59 00	50	45.6	5.7	187.2
Lemons	263	2 50	.....	2.1	.....	30.5
Melons	100	2 50	.....	.....	.....	.....
Plums	90	3 20	.....	1.0	.....	39.0
Peaches	70	5 25	.....	.....	.....	.....
“ (canned)	144	12 80	.....	.....	.....	.....
Pineapple (canned)	144	15 60	.....	3.0	.....	72.0
Cranberries	180	6 85	.....	1.0	.....	14.4
	12082	\$315 03	.....	107.0	5.7	1536.0
Cakes and biscuit	202	\$28 56	.....	14.1	18.0	51.5
Ice cream	40	10 00	.....	1.0	2.0	16.0
Cocoa	148	61 82	.....	22.7	34.2	73.8
Chocolate						
	390	\$100 38	.....	37.8	54.2	141.3

TABLE II.—SUMMARY OF FOOD MATERIALS, COST, AND COMPOSITION.

	Total lbs.	Cost.	Per cent. waste.	Proteid, net	Fat, net.	Carbohy- drate, net.
Beef	10260	\$772 19	30	1165.	1033.	
Other fresh meats	9110	734 79	20	1027.	774.	
Ham, etc.	2277	249 21	7	367.	453.6	
Milk, butter, eggs, sugar, etc.	39179	2015 53	.....	1305.8	3795.3	4997.9
Grains	14779	615 62	.....	1363.3	198.2	9374.0
Potatoes and vegetables...	21399	365 06	22	281.1	51.2	2764.0
Fresh fruit.....	12082	315 03	12.5	107.	5.7	1536.0
Dried "	2143	187 19	.....	35.1	1.3	1139.1
Cakes, etc.....	390	100 38	.....	37.8	54.2	141.3
	119232	\$5355 00		5689.1	5365.5	19952.3
Coffee, tea		147 17				
Sundries and unclassified groceries		498 25				
		\$6000 42				

These figures divided by the number of persons and days give *per person per day*:

	Lbs.	Cost.	Proteid, grams.	Fat, grams.	Carbohy- drate, grams.	Calories.
Food purchased.....	5	\$0 25	126	131	402	3383
Nutrients remaining after deducting actual wastes.			108	102	381	2953

TABLE III.—TABULAR STATEMENT OF BILLS OF FARE OF THREE CONSECUTIVE WEEKS, WITH COSTS AND QUANTITIES.

Table III. gives bills of fare for a period of three consecutive weeks. These are presented with a view to showing the variety secured and the daily apportionment of expense. The proposed limit of expenditure was fixed at \$29.00 per day, or \$0.223 per day per person for 130 persons fed. Any sum spent in excess of this on one day was necessarily offset by the choice of some less expensive articles of food on a following day. After some careful study it was learned that nearly the same amount of certain articles (constants) was used daily. Their value (13.51) deducted from the day's appropriation of \$29.00 gave the sum to be spent on variables.

It will be noted that the season when these bills of fare were given is one when it is difficult to secure much variety. With the advance of spring many articles can be procured which add to the variety and relish.

The following abbreviations are used :

K—Kelly Hall.

B—Beecher Hall.

F—Nancy Foster Hall.

Ciphers indicate that the cost of the article was charged on the account of a previous day.

Constants furnished daily :		Dinner :	
15 lbs. Butter	\$3 50	60 lbs. Beef shank for soup	\$1 94
Coffee, Cocoa, Tea	1 50	61 lbs. Lamb, boiled . . .	5 11
15 lbs. Sugar	75	50 " Potatoes, mashed,	50
12.5 lbs. Flour	25	10 cans Corn	90
24 gals. Milk	4 32	Caper Sauce	20
1.6 " Cream	1 14	Lettuce Salad	75
25 loaves home-made Bread	1 25	Delicate Pudding	64
10 doz. Rolls	80		10 04
	\$13 51	Total for the day	\$30 54
Thursday, March 1.		Friday, March 2.	
Constants	\$13 51	Constants	\$13 51
Breakfast :		Breakfast :	
.5 box Grape fruit	\$1 27	Prune Sauce	\$0 00
5 lbs. Farinose	22	Apple Sauce	24
12 " Codfish, creamed,	1 10	6 lbs. Rolled Wheat . . .	18
57 " Potatoes, baked.	57	Hash on Toast	00
	3 16	35 lbs. Potatoes, baked.	35
Luncheon :			\$0 77
4 lbs. Ham, cold	\$0 44	Luncheon :	
4 " Sausage	27	24 lbs. Tongue, cold . . .	\$2 76
14 " Corned Beef	1 40	44 " Potatoes, escal'p'd	44
16 " Potatoes, creamed	16	Parsnips, fried (K.) . . .	00
12 " Peaches	1 26	Pickled Beets	00
6 " Sugar	30	6 lbs. Peaches for sauce,	00
	3 83		3 20

Dinner:

4 cans Okra for Gumbo	
Soup	\$0 64
3 cans Tomatoes, Gumbo	
Soup	30
62 lbs. Beefsteak	8 68
51 " Potatoes, mashed	51
4 " Hominy, boiled,	08
Parsley	05
Lettuce Salad	75
Chocolate Blanc-mange,	1 22
	<hr/>
	12 23
Total for the day.....	\$29 71

Saturday, March 3.

Constants	\$13 51
Breakfast:	
.8 box Oranges.....	\$1 88
4.5 lbs. Rolled Wheat..	18
10 " Beef, frizzled...	1 12
37 " Potatoes, baked,	37
	<hr/>
	3 55
Luncheon:	
25 lbs. Hamburg Steak,	\$2 00
2 doz. Eggs	40
Potatoes, fried	00
1 gal. Pickles	55
12 lbs. Prunes for sauce,	78
6 " Sugar	30
	<hr/>
	4 03
Dinner:	
60 lbs. Beef shank for	
soup	\$1 80
60 lbs. Beef chuck roast,	3 00
50 " Potatoes	50
21 " Turnips.....	21
3.5 heads Cabbage for	
salad	10
Dressing	17
9 lbs. Figs.....	99
9 " Dates.....	49
	<hr/>
	6 26
Total for the day.....	\$27 35

Sunday, March 4.

Constants	\$13 51
Breakfast:	
12.5 doz. Oranges	\$1 88
4.5 lbs. Rolled Oats....	13
6 qts. Beans, to be baked	55
4 lbs. Pork	35
Fish balls	60
12 loaves Boston Brown	
Bread	77
1 gal. Pickles	55
	<hr/>
	4 69

Dinner:

60 lbs. Beef shank for	
soup	\$1 85
35 lbs. Beef, roast	6 60
25 " Turkey, roast....	2 88
25 " Potatoes, mashed	25
10 " Parsnips	14
4 cans Peas.....	55
3 qts. Olives	85
Frozen Pudding.....	1 71
	<hr/>
	14 83
Supper:	
Cold meat.....	\$0 00
8 lbs. Peaches for sauce,	12
8 lbs. Sugar	40
2 boxes Wafers.....	46
Crackers	32
	<hr/>
	1 30
Total for the day.....	\$34 33

Monday, March 5.

Constants	\$13 51
Breakfast:	
12.5 doz. Oranges.....	\$1 88
5 lbs. Farinose	22
36 " Ham	4 05
40 " Potatoes, baked,	40
	<hr/>
	6 55
Luncheon:	
Cold meat.....	\$0 00
Fried Potato balls	00
Peach sauce	00
Apple sauce	24
	<hr/>
	0 24
Dinner:	
Beef soup	\$0 00
Beef, roast (K.)	00
14 lbs. Lamb Chops (B.	
and F.)	1 19
39 lbs. Potatoes	39
Beets	25
Cabbage	20
Dressing	17
Prune Pudding.....	47
	<hr/>
	2 67
Reception and supper, Beecher:	
Salmon	\$0 64
Mayonaise	53
Cold Ham.....	00
Celery	45
5 lbs. Tea	30
9 boxes Wafers	2 39
2 doz. Oranges	30
1.5 doz. Lemons.....	18
.5 bunch Bananas	75
	<hr/>
	5 54
Total for the day.....	\$28 51

Tuesday, March 6.

Constants	\$13 51	
Breakfast:		
12 lbs. Prunes, for sauce,	\$1 08	
5 " Farinose	22	
12 doz. Eggs, dropped.	2 40	
38 lbs. Potatoes	38	
		4 08
Luncheon:		
Biscuit stew	\$0 05	
Parsnips, fried	00	
Peach sauce	00	
Apple " (K.)	16	
		0 21
Dinner:		
14 lbs. Potatoes for soup	\$0 14	
10 " Turkey, roast...	1 20	
61 " Chicken, broiled,	6 71	
50 " Potatoes, mashed	50	
3 " Rice to be boiled	18	
Pickled Beets	00	
12 lbs. Dates	66	
1 " Ginger	30	
12 " Figs	1 32	
		11 01
Total for the day	\$28 18	

Wednesday, March 7.

Constants	\$13 51	
Breakfast:		
4.5 lbs. Rolled Wheat..	\$0 18	
Meat, creamed (F. & B.),	00	
3 cans Salmon, creamed		
(K.)	45	
36 lbs. Baked Potatoes.	36	
Apple sauce	42	
		0 96
Luncheon:		
Baked Beans (K.)	\$0 00	
Brown Bread (K.)	00	
Hash (B. and F.)	00	
10 lbs. Golden Grain,		
mush	30	
Syrup	85	
		1 15
Dinner:		
2 gals. Tomatoes, for		
soup	\$0 60	
15 lbs. Beefsteak (K.)..	2 10	
27 " Beef, roast (F.)..	2 24	
Beef, cold (B.)	00	
52 lbs. Mashed Potatoes	52	
Kidney Beans	40	
5 heads Cabbage, for		
salad	30	
Dressing	17	
Rice Pudding	33	
		9 76
Total for the day	\$25 38	

Thursday, March 8.

Constants	\$13 51	
Breakfast:		
8 lbs. Apple Sauce....	\$0 32	
4.5 " Rolled Wheat ..	18	
10 " Bacon	1 18	
Fried Mush	00	
		1 68
Luncheon:		
Cold Meat (K.)	\$0 00	
14 cans Salmon	2 10	
58 lbs. Potatoes	58	
17 " Raspberry jam..	2 04	
		4 72
Dinner:		
60 lbs. Beef shank, for		
soup	\$1 80	
64 lbs. Lamb, roast ...	5 44	
62 " Potatoes, mashed	62	
Rice	18	
2 gals. Tomatoes	60	
5 lbs. Raisins	35	
1.7 lbs. Nuts	56	
10 " Candy	1 15	
		10 70
Total for the day	\$30 71	

Friday, March 9.

Constants	\$13 51	
Breakfast:		
15.5 doz. Oranges	\$1 88	
4.5 lbs. Rolled Wheat.	18	
25 " Sausage (beef),	1 63	
34 " Baked Potatoes	34	
		4 03
Luncheon:		
Cold Ham (K.)	\$0 00	
" Lamb (B.)	00	
Meat in brown sauce (F.),	00	
14 lbs. Potatoes, baked.	14	
Prune Sauce	00	
2 lbs. Apple Sauce	16	
		30
Dinner:		
9 cans Asparagus, for		
soup	\$1 66	
32 lbs. Turkey, roast (K.)	3 54	
Oyster Sauce	1 10	
6 cans Peas (F.)	84	
40 lbs. Corned Beef (B.		
and F.)	2 40	
55 lbs. Potatoes, mashed,	55	
8 heads Cabbage (B. and		
F.)	39	
2 pks. Beets (B. and F.)	35	
50 heads Lettuce	50	
Dressing	17	
Lemon Sherbet	1 67	
Wafers	69	
		14 16
Total for the day	\$32 00	

Saturday, March 10.

Constants		\$13 51	
Breakfast:			
6 lbs. Apple Sauce	\$0 48		
6 " Farinose	28		
7.5 lbs. Beef, frizzled...	88		
37 " Potatoes, baked,	46		
			2 10
Luncheon:			
Hash on Toast	\$0 00		
Potato Balls	00		
Fried Potatoes	00		
6 lbs. Apricots for sauce,	81		
1.5 lbs. Sugar	08		
4 lbs. Apple Sauce	32		
			1 21
Dinner:			
58 lbs. Beef shank, for			
soup	\$1 74		
20 lbs. Corned Beef (F.)	1 20		
Turkey with Oysters (K.)	0 00		
23 lbs. Veal, roast (B.)	2 30		
1 can Peas (K.)	14		
55 lbs. Potatoes	69		
10 " Parsnips	15		
Pickled Beets	00		
Tapioca, cream	91		
			7 13
Total for the day		\$23 95	

Sunday, March 11.

Constants		\$13 51	
Breakfast:			
0.6 box Oranges	\$1 66		
5 lbs. Rolled Oats	22		
Fish Balls	1 30		
Baked Beans	63		
Brown Bread	77		
0.5 gals. Pickles	27		
			4 85
Dinner:			
2 gals. Tomatoes, for			
soup	\$0 60		
27 lbs. Beef, roast (K.			
and F.)	3 24		
27 lbs. Turkey, roast (B.)	2 97		
52 " Potatoes, mashed	65		
23 " Turnips	23		
Lettuce	50		
Dressing	17		
Peach Sherbet	2 30		
3 boxes Wafers	69		
			11 35
Supper:			
Potato Salad	\$0 00		
Dressing	17		
Peach Sauce	84		
3 boxes Wafers	69		
8 lbs. Sugar	40		
			2 10
Total for the day		\$31 81	

Monday, March 12.

Constants		\$13 51	
Breakfast:			
5 lbs. Farinose	\$0 22		
10 pots Marmalade	1 40		
Sausage (beef)	00		
6 doz. Eggs	96		
Potato Balls	00		
			2 58
Luncheon:			
Cold Meat (K. and B.)	\$0 00		
Hashed Turkey (F.) ...	00		
20 lbs. Baked Potatoes			
(F.)	25		
Creamed Potatoes (K.			
and B.)	00		
12 lbs. Prune Sauce ...	78		
Biscuit	12		
			1 15
Dinner:			
10 cans Corn for soup..	\$0 90		
30 lbs. Lamb Chops ...	2 55		
39 " Mashed Potatoes	49		
Beans	00		
3 heads Cabbage	21		
Dressing	17		
Delicate Pudding	64		
			4 96

Reception and supper, Kelly:

.5 lb. Tea	\$0 30		
4 cans Salmon	60		
4 boxes Wafers	1 15		
1 doz. Lemons	25		
1.2 doz. Oranges	25		
1 doz. Bananas	25		
Mayonaise	53		
			3 33

Total for the day

Tuesday, March 13.

Constants		\$13 51	
Breakfast:			
Bananas	\$1 25		
4.5 lbs. Rolled Wheat..	18		
Broiled Ham and Eggs			
(F.)	63		
33 lbs. Cold Ham	3 72		
33 " Potatoes, baked.	41		
			6 20
Luncheon:			
Hash	\$0 00		
23 lbs. Potatoes	29		
4 " Apple Butter ...	32		
			0 61

Dinner:	
Gumbo Soup	\$0 58
36 lbs. Lamb, roast	3 06
11 " Veal, roast	1 10
48 " Potatoes	61
Turnips	00
Parsnips	00
3 heads of Cabbage for salad	21
Dressing	17
0.6 box Oranges	1 68
3 lbs. Walnuts	24
1 lb. Raisins	07
	<hr/>
	7 72
Total for the day	\$28 04

Wednesday, March 14.

Constants	\$13 51
Breakfast:	
0.5 box Oranges	\$1 13
5 lbs. Rolled Oats	22
Minced Meat on Toast.	22
20 lbs. Potatoes, baked (F.)	22
Potatoes, fried (K. and B.)	00
	<hr/>
	1 57
Luncheon:	
Baked Beans (K.)	\$0 00
10 lbs. Irish Stew (F.) ..	85
9 " Shepherd's Pie (B.)	76
Stewed Peaches	00
16 lbs. Potatoes, baked.	20
	<hr/>
	1 81
Dinner:	
8 lbs. Potato for soup.	\$0 12
52 " Beef, roast	6 24
59 " Potatoes	74
Corn	00
Blanc-mange	1 00
	<hr/>
	8 10
Total for the day	\$24 99

Thursday, March 15.

Constants	\$13 51
Breakfast:	
4.5 lbs. Rolled Wheat ..	\$0 18
12 pots Marmalade	1 60
11 lbs. Beef, frizzled ...	1 30
35 " Potatoes	44
	<hr/>
	3 52
Luncheon:	
28 lbs. Tongue, cold ...	\$2 52
23 " Potatoes, cream'd	29
English Loaf Cake	87
Corn Bread	16
Peach Sauce	00
	<hr/>
	3 84

Dinner:	
57 lbs. Beef shank for soup	\$1 71
24 lbs. Oxtail for stew ..	72
53 " Mashed Potatoes	66
Beets	00
16 lbs. Parsnips	16
Cabbage salad	21
1.6 doz. Eggs	30
.3 box Oranges	75
.4 bunch Bananas	83
	<hr/>
	5 36
Total for the day	\$26 21

Friday, March 16.

Constants	\$13 51
Breakfast:	
.3 bunch Bananas (K.) ..	\$0 48
.5 box Oranges (B. and F.)	1 08
5 lbs. Rolled Oats	18
25 " Potatoes	32
Minced Beef	00
Sausages	00
4.5 doz. Eggs, scrambled	90
Potato balls (F.)	00
	<hr/>
	2 94
Luncheon:	
51 lbs. Irish stew (K. and B.)	4 33
6 cans Salmon, cream'd	90
38 lbs. Potatoes, baked.	48
4 " Apple Butter ...	32
	<hr/>
	6 03
Dinner:	
2 gals. Tomatoes for soup	\$0 60
11 lbs. Beef Steak (K.) ..	1 54
51 " Lamb, boiled (B. and F.)	4 33
51 lbs. Potatoes	64
22 " Turnips	22
Cottage Pudding	1 07
Lemon Sauce	24
	<hr/>
	7 64
Total for the day	\$30 14

Saturday, March 17.

Constants	\$13 51
Breakfast:	
1 bunch Bananas	\$1 25
2.5 doz. Oranges (K.) ..	30
5 lbs. Farinose	22
Fried Potatoes	00
6 doz. Eggs, scrambled (B. and K.)	1 08
Beef, frizzled (F.)	00
15 lbs. Potatoes (F.) ...	19
	<hr/>
	3 04

Luncheon:	
Irish Stew (F.)	\$0 00
Meat in brown gravy (B. and K.)	00
16 Loaf cakes	1 28
60 lbs. Sweet Potatoes, baked	1 00
Fruit Sauce	00
	— 2 28
Dinner:	
9 lbs. Potatoes for soup	\$0 12
26 " Turkey, roast (F.)	2 60
14 " Steak (B.)	1 96
41 " Lamb, boiled (K.)	3 48
50 " Potatoes	63
3 " Boiled Hominy.	06
Tapioca Pudding (K. and B.)	60
Lemon Sherbet (F.)	80
Water Cress	25
	— 10 53

Total for the day..... \$29 36

Sunday, March 18.

Constants	\$13 51
Breakfast:	
.6 box Oranges	\$1 69
4.5 lbs. Rolled Wheat..	18
Baked Beans	63
Brown Bread	77
Fish balls	1 30
	— 4 57
Dinner:	
Beef Soup	\$1 92
52 lbs. Turkey, roast (B. and K.)	5 20
25.5 lbs. Beef, roast (F.)	3 18
51 lbs. Potatoes, mashed	75
16 " Parsnips	16
Cranberry Jam	80
Water Cress	25
Lemon Sherbet	1 67
2 boxes Wafers	60
	— 14 53
Supper:	
2.3 lbs. Chipped Beef ..	\$0 24
1 can Beef, corned.	20
4 lbs. Apple Butter	32
Loaf Cake	00
	— 0 76

Total for the day..... \$33 37

Monday, March 19.

Constants	\$13 51
Breakfast:	
5 lbs. Farinose	\$0 22
11 pots Marmalade	1 54
Cold Meat	00
Potato Balls	00
	— 1 76

Luncheon:	
Meat in brown gravy ..	\$0 00
60 lbs. Sweet Potatoes..	1 00
Corn Bread (K.)	20
Fruit Sauce	1 10
	— 2 30

Dinner:	
Soup, vermicelli	\$0 00
55 lbs. Veal, roast	5 50
50 " Potatoes	63
2 cans Tomatoes	60
Water Cress	25
Rice Pudding	30
	— 7 28

Reception and supper, Foster:

Turkey for salad	\$0 00
11 lbs. Ham, cold	1 21
Mayonaise	27
Water Cress	00
Celery	70
Tapioca	05
6 cans Peaches	95
1 doz. Lemons	15
.5 lbs. Tea	30
3 boxes Crackers	69
	— 4 32

Total for the day..... \$29 17

Tuesday, March 20.

Constants	\$13 51
Breakfast:	
.7 box Oranges	\$1 69
5 lbs. Oatmeal	18
8 " Sausage	52
Chops	75
Potatoes, fried	00
	— 3 14
Luncheon:	
Minced Meat	\$0 00
60 lbs. Sweet Potatoes..	1 00
Corn Bread (F.)	45
12 lbs. Apricot Sauce ..	1 98
.5 gal. Pickles	27
	— 3 70

Dinner:	
10 cans Corn for soup..	\$0 90
54 lbs. Lamb, roast	4 59
50 " Potatoes	63
3 " Hominy	06
3 qts. Olives	65
9 lbs. Dried Fruit	90
.5 bunch Bananas	65
2 cans Peaches	32
	— 8 70

Total for the day..... \$29 05

TABLE V.—COMPARISON OF A SCHOOL DIETARY WITH THE UNIVERSITY OF CHICAGO DIETARY.

Several significant and interesting facts are shown by an examination of the following comparison of a wholesome and sufficient dietary of a school in Indiana, where 600 students were boarded at \$1.40 per week, with that of the University of Chicago, where 106 students were boarded at \$3.50 per week. One source of advantage on the side of the school is that a much larger number of persons are fed and certain expenses are proportionately reduced. In the second place, very little service beside student help is furnished at the school, and a large item of expense is thus removed. Another difference is seen in the substitution at the school of cheaper foods, such as cereals, vegetables, syrup, and butterine, for meat, milk, cream, fruits, and other more expensive foods, though the actual amount of nourishment furnished was practically the same in both cases.

	QUANTITY PER PERSON PER DAY.		PERCENTAGE OF TOTAL COST OF EACH ARTICLE.	
	Lbs. Indiana.	Lbs. Chicago.	Per cent. Indiana.	Per cent. Chicago.
Beef.....	.476	.442	.17	.128
Other meats.....	.....	.401	.....	.141
Fish.....	.119	.052	.067	.022
Flour and Grain.....	.785	.437	.125	.103
Potatoes.....	1.085	.680	.090	.036
Vegetables (other than potatoes).....	.490	.219	.05	.024
Beans.....	.057	.015	.008	.002
Milk.....	.666	1.295	.073	.108
Cream.....	.....	.120	.....	.041
Sugar.....	.135	.140	.056	.029
Syrup.....	.095	.017	.017	.006
Butter.....	.....	.089	.....	.103
Butterine.....	.119	.014	.134	.011
Dried fruits.....	.171	.090	.057	.031
Fresh " }.....	.259	.508	.070	.052
Canned " }				
Sundries.....	.....	.022	.....	.013
Tea, coffee.....	.026	.020	.047	.025
Cocoa, chocolate.....	.....	.006	.....	.013
Eggs and Cheese.....	.....	.043	.....	.029
Unclassified groceries.....	.095	.020	.036	.083

TABLE VI.—STANDARD AND ACTUAL DIETARIES.

The question arises of how much significance are such computations as to real nutrition. In other words how much dependence can be put upon calculations of nutritive values. It can only be completely answered by many experiments of a character similar to the present one, but the results of many investigations in Germany and elsewhere have given considerable confidence in certain standards for the average person, although it is granted at the outset that there are personal idiosyncrasies in the human animal more often than in the domestic animal, so that only a general average dietary can be assumed. From this, however wisely it may be chosen, a few individuals will of necessity vary in their needs.

To the zeal of Professor W. O. Atwater, of Wesleyan University and the Storrs Agricultural Experiment Station, is due most of the work in the investigation of foods and dietaries which has been done in this country. From his tables are taken the following standard dietaries with which the one now reported is compared:

		NUTRIENTS.				Potential Energy. Calories.
		Proteid, grams.	Fat, grams.	Carbohy- drates, grams.	Total grams.	
<i>Standard Dietaries.</i>						
Play- fair.	Voit. { Woman at moderate work (German).....	92	44	400	536	2425
	Man " " "	118	56	500	674	3055
Atwater.	{ Man at hard work "	145	100	450	695	3370
	{ Man with moderate exercise (English).....	119	51	531	701	3140
	{ Active laborer "	156	71	568	795	3630
	{ Hard-worked laborer "	185	71	568	824	3750
Atwater.	{ Woman with light exercise (American).....	80	80	300	460	2300
	{ Man " " "	100	100	360	560	2815
	{ Man at moderate work "	125	125	450	700	3520
	{ Man at Hard work "	150	150	500	800	4060
<i>Actual Dietaries.</i>						
	Sewing-girl (London) bare subsistence.....	53	33	316	402	1820
	University professor (Germany).....	100	100	240	440	2324
	Average of wage-workers in Mass. and Conn., food purchased	152	225	625	1002	5275
	Average of professional men and students, food purchased	133	163	508	804	4140
	U. S. army ration.....	120	161	454	735	3850
	Women Students University of Chicago, average weight 120 pounds	126	131	402	659	3383
	Equivalent calculated for 156 pounds weight.....	164	170	521	855	4398

TABLE VII.—UNIVERSITY OF CHICAGO DIETARY.

In order to establish a factor for future calculations, an estimate of actual waste was made, which, although far from being as exact as is desirable, is a distinct contribution to our knowledge. It shows that ten per cent., the usual estimate, is the minimum amount which must be deducted from the usual dietaries, while the actual amount is frequently much larger.

The per cent. of indigestibility would be in most cases somewhat greater than in the present one, since in this case great pains was taken to secure the highest limit of digestibility as well as the lowest limit of waste.

	NUTRIENTS.				POTENTIAL ENERGY.	
	Proteid, grams.	Fat, grams.	Carbohy- drates, grams.	Total grams.	Calories used by persons weighing 120 lbs.	Equivalent calories for 136 lbs.
Food as bought	126	131	402	659	3370	4398
Less 10% waste	113	118	362	593	3045	3958
Less actual waste	108	102	381	591	2953	3833

III.

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