DIETARY STUDIES OF MISSOURI STATE HOSPITALS
FOR THE INSANE.

by

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INTRODUCTION.

Early in the spring of 1917 food prices increased so rapidly that persons purchasing food in large amounts began to feel, very keenly, the responsibility of their positions. As a result of the high prices the kinds of foods as well as the amount, was limited to a greater degree than it had been for many years, for those who were forced to use economy. According to Weld (1), "Computations based on statistics issued by the United States Bureau of Labor indicate that, considering the average from 1890 to 1899 as 100, retail prices of food had advanced to 154 in 1912." In comparing several retail prices of 1912 (2) with 1917 (3) we find in June 1912 flour sold for \$3.78 per hundred while in the same month in 1917 flour was retailing at \$7.80 per hundred, potatoes in 1912 were retailing at \$3.11 per bushel and in June 1917

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1. Weld.- The Marketing of Farm Products, p. 1.
 2. Bulletin of United States Bureau of Labor Statistics: Retail Prices 1907 and December, 1914.
March (1915), pp. 378-9
 3. Retail Prices June 1, 1917. American Food Journal, 6(1917), p. 306.

they were quoted at \$6.00 per bushel, sugar in June 1912 was selling for \$5.98 per hundred and in June 1917, \$9.20 per hundred. Not all foods had advanced as much as the examples of those given but this was true of practically all the staple foods.

Too many, who were responsible for feeding large groups of people, the high prices and the resulting pressure on the pocket book were sufficient to make them realize the importance of understanding the physiological needs of the body and its relation to food, and the inefficiency in the method of planning dietaries only to suit the appetite, or their convenience. Food could no longer be served at random for the prices previously paid for meals and if changes or substitutions were made in the regular routine diet, the person in charge of serving a large group of people was subject to much criticism. The persons being fed could not understand why they should substitute graham or shorts

bread for the usual white bread, and beans or peas or cheese for a part of the meat to which they had been accustomed. They were opposed to making changes in their food habits. The persons responsible for buying the food and planning the dietaries had to be sure that they were serving adequate food and then to make it as attractive as possible.

It was felt most keenly in the state institutions where large groups of people must be fed adequately on a small per diem basis and on one that has not changed in accordance with the changing price of food. The situation was further complicated by the fact that the greatest increases in price were in the staple foods which made up the largest proportion of the usual institution dietary.

Dr. Scrutchfield, superintendent of Hospital No. 4 had been making some of the substitutions and, desiring to know if their dietaries were adequate or could be further changed to advantage, sent for a dietitian to visit the institution and make a dietary survey with the idea of offering constructive criticism. At his request the investigations of the dietaries was

started and with the assistance of Mr. J. L. Wagner, Secretary of the State Board of Charities, arrangements were made to continue the investigation throughout the four State Insane Hospitals.

The aim and plan of the investigation was to determine the adequacy of the dietaries and to find out if they were planned as economically as possible. In order to do this it was necessary to collect the following data:-

1. The calorie requirement of the patients.
2. The amount of food served.
3. The cost of the food served.
4. The extent to which the food selected was meeting the requirements of the body.

With the ready cooperation of the superintendents and the valuable help of the matrons of dietitian, cooks, bakers, store keepers, attendants and others employed in the institutions it was possible to obtain the data wanted.

SIMILAR INVESTIGATIONS WHICH HAVE BEEN MADE.

From time to time, dietary investigations have been made in different institutions, but comparatively few can be found which were made in hospitals for the insane. Since proper feeding is one of the important factors in the treatment of the insane, it would seem that more studies of the dietaries should be made.

In about 1880, Notel (1) collected data concerning the dietaries of nine Swiss institutions for the insane. He was of the opinion that the food requirements of the insane were the same as those for normal individuals at light work, except in special cases, where a special diet might be necessary. He also stated that a diet for the insane should furnish an abundant quantity of digestible nutrients.

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1. Langworthy.- Dietary Studies in Public Institutions. U. S. Dept. of Agr. Office of Exp. Sta. Annual Report for Year Ended June 30, 1902. p. 405. Quoted by Meinert: Annu-und Volksernahrung. Vol. 2. Die Kost in Staatlichen und Kommunalen Anstalten, die Volkskuchenkost und die Kost der arbeiten klassen, p. 63.
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Von Gellhorn (1) reported similar data for three German institutions. He supplied a diet, in the institution at Uckermunde, to male patients of the second class, furnishing 122.4 grams protein, 71 grams fat, and 475 grams carbohydrates. This diet he considered abundant and it is stated that after it was introduced, the total death rate diminished from 8.6 in 1876 to 5.6 per cent in 1878 - 1879. Von Gellhorn thought that diet constituted a remedial agent and should be taken into account in caring for the insane. Meinert believed from the data given, by Notel and Von Gellhorn, that the daily diet of the insane should correspond to Voits standard. Voits standard was to supply, on an average, 118 grams protein, 56 grams of fat and 500 grams of carbohydrates.

1. Ibid.- p.64. (See footnote p. 5).

About 1901 J. C. Dunlop (1) reported studies made of the diet of pauper lunatics in Scotland. He believed that 118 grams of protein should be supplied daily for men and 94 grams for women. He judged the value of the diet by the energy it supplied rather than the amount of protein because he thought the amount of protein necessary could not be regarded as definitely known. He believed that the average asylum diet should furnish 3,300 calories for men, 3,500 for the male working patients, 3,100 for those comparatively idle male patients, and that the diet for women should be respectively 2,650, 2,800 and 2,500 calories. He found that all the male dietaries studied supplied an average of 3,335 calories and the dietaries for the

1. Langworthy.- Dietary Studies in Public Institutions. U. S. Dept. of Agri. Office of Expt. Sta. Ann. Rpt. for the Year Ending June 30, 1902. pp. 404-06; Knight, Pratt and Langworthy; Dietary Studies in Baltimore, Md. U. S. Dept. Agr. Office Expt. Sta. Bul. 223 pp. 44-6. Both quoted from. Report on Dieting of Pauper Lunatics in Asylums and Lunatic Wards of Poorhouses in Scotland. Ann. Rpt. Gen. Bd. Comrs. Lunacy Scot., 43 (1902), Sup.
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females 2,890 calories. The amount for the men was approximately his proposed standard while for the females it was 9 per cent larger than the proposed standard for women. He laid special stress on the fact that patients should be classified according to their food requirements on the basis of sex and work performed. He advocated the use of variety in the dietaries depending largely upon the dinner menus for the changes, and advised that the same menu should not be served oftener than twice a week. He advised the use of a sufficient amount of condiments and a fair allowance of potatoes or other fresh vegetables.

Gould (1) made the earliest dietary investigations in an asylum for the insane in the U. S. ~~in~~ about 1860. He gives the menu and usually the quantity served, but outside of that the work is interesting chiefly from the historical standpoint. In calculating the nutritive value from the data given, the non-workers per man per day were furnished 78 grams of protein and 1959 total calories and the workers 85 grams of protein and 2,067 total calories.

1. a. Langworthy:- Dietary Studies in Public Institutions. U. S. Dept. of Agr. Office Expt. Sta. Ann. Rpt. for the Year Ended June 30, 1902. p. 406.
Quoted from Gould: Report on Food and Diet Suited for Almshouses, Prisons, and Hospitals, New York, 1852, pp. 79, 80.
 - b. Knight, Pratt and Langworthy: Dietary Studies in Public Institutions in Baltimore, Md., U. S. Dept. Agri., Office of Expt. Sta., Bul. 223, p. 43.
Quoted from Goulds report as cited above.
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Atwater (1) in 1897 started an investigation of dietaries in the New York hospitals for the insane. These investigations were continued through the years of 1897-98, 1898-99, and 1899-1900, and included the study of the dietaries of approximately 4,188 persons. The data obtained from these studies included the daily amounts of protein fat, and carbohydrates served, rejected, and eaten at the tables and the estimated fuel value of these nutrients. Atwater found that the average amount of food eaten considering the patients as a whole amounted to 73 grams of protein, 76 grams of fat, 317 grams of carbohydrates, having a total fuel value of 2,305 energy calories. For general practice, he thought the physiological demands of the body had better be made slightly more than the actual amount consumed. He proposed a ration allowance per person per day of 85 grams of protein and 2,500 total calories. The amount of waste found in these dietary studies averaged about 30 per cent of the total amount served. Atwater formulated a table giving the margin which must be allowed for different per cents of waste. This table is given on Page 94 in this paper.

1. Atwater: State of New York Commission in Lunacy.
Thirteenth Annual Report, pp. 38-323.
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Later, during 1902-03 a study was made under the direction of Atwater (1) in the Government Hospital for the insane, Washington, D. C. The patients in this hospital were furnished on an average a diet which gave practically the same quantities of protein and energy calories as was consumed in the New York State institutions. From what appeared to be the food requirements of persons in health and upon the actual food consumption found in the dietary studies of the insane, Atwater believed the average hospital population would be amply nourished with 90 grams of protein and 2,700 calories of energy per man per day. If the population were approximately one-half women, the daily requirement would be 85 grams of protein and 2,500 total calories of energy. The amount of waste in the Government hospital amounted to about 25 per cent of the total food served, being slightly less than the amount wasted in the New York State Hospitals.

1. Atwater: Dietetics in Relation to Hospitals for the Insane. U. S. Dept. of Agr. Office of Expt. Sta. for the Year Ended June 30, 1904. pp. 483, 487.
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Pratt (1) collected data from a study at Bayview Asylum, Baltimore, Maryland, in May 1905. This institution was taking care of aged and infirm persons with less than 50 per cent of the population insane. The average amount of nutrients eaten per person per day in the four studies made was found to be 117 grams of protein and 2,453 total calories. The average amount of waste in this institution was found to be only about 3 per cent of the food provided. This was an unusually small amount and was thought to be due to the care used in the selection and preparation of the food.

Mr. Charles S. Pitcher (2) read a paper on "Kitchen Organization and Administration" at the meeting of the American Association of Officials of Charity and Corrections in Memphis, Tennessee, 1914. In this

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1. Pratt: Dietary Studies in Public Institutions in Baltimore, Md., U. S. Dept, of Agr ., Office Expt. Sta. Bul. 223, p.83.
 2. Pitcher: Kitchen Organization and Administration. p. 21.
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is given a per capita ration allowance which was found sufficient for use in a State Hospital for the Insane.

Meat and Fish-----	10.5 oz.
Farinaceous foods-----	13.0 "
Butter-----	1.5 "
Chesse-----	.3 "
Coffee-----	.465"
Tea-----	.117"
Milk-----	1 pt.
Eggs-----	.5 egg
Dried Fruit-----	.5 oz.
Sugar-----	2 oz.

Recently a report (1) has been made by the Committee on Dietary and Food Supplies of the New York State Hospitals. This report gives the average daily per capita issue of food and the average cost of

1. Report of Committee on Dietary and Food Supplies in New York State Hospitals, The State Hospital Quarterly, November 1916.
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food for nine months ending June 30, 1916. The daily average per capita issue of food for the nine months in the thirteen hospitals, was 105 grams of protein and 3,021 total calories. The average daily cost per person fed was ~~\$.171134~~ [#] ~~cts.~~. The report also includes the average issue for all hospitals of food supplies for which there is a daily per capita ration allowance. These are given as follows:-

Meat(including poultry, oysters, fish, and clams)	8.7 oz.
Farinaceous foods	12.25 "
Potatoes	8.58 "
Eggs	.50 "
Milk	1.03 pt.
Butter	1.31 oz.
Cheese	.21 oz.
Sugar	1.87 oz.
Tea	.11 oz.
Coffee	.43 oz.
Dried Fruit	.41 oz.

Some of these investigations are discussed more in detail later in this paper comparing their results ^{with those} found in the Missouri State Hospital for the Insane.

METHODS USED IN OBTAINING THE DATA.

1. The determination of the calorific requirement.-

A. The combined weights of the patients in terms of an average man.

To obtain the average weight of the patients, two methods were employed. In the first two hospitals in which the investigation was made, No. 1 and No. 4, ^{each patient} was weighed on a pair of physicians scales except those bedridden and in one instance a woman whose weight was too great for the range of the scales. This was rather tedious, and it was decided no more accurate than to weigh the patients in larger groups out doors on the stock scales. So in Hospitals No. 2 and No. 3, the patients were taken out, usually one ward at a time, and were weighed in groups of from 12 to 58. The total weights for the men and women were then divided by the number weighed, thus getting the average weight of the men and the average weight of the women. The weights obtained were not the average weights of all the patients in the institution, for it was not practical to weigh the bedridden patients and no doubt several able-bodied patients were missed. The number weighed averaged from

75 to 95 per cent of the total number in the institution. A larger per cent of the men could be weighed than the women, and a slightly higher per cent of the patients were weighed when the physicians scales were used and the weighing was done indoors, than when they had to go out doors to the scales. In several instances, patients hobbled out to the stock scales to be weighed, when they had not been outside for many months, having made their attendants think they were not able to get out for their daily walk, but had decided this was ^{worth} the effort necessary. In several of the hospitals the convalescing and the most hopeful patients and those in the tuberculosis wards were weighed regularly and records were kept of their weights.

The clothing appeared to be quite uniform in amount and weight and was found to average six pounds when a number of complete outfits were weighed. This amount was deducted from the average weight of the patients in the final results.

B. An estimate of the work done by the patients.

To determine data which would give an estimate of the amount of work done by the patients, they were put in two classes, the working and the patients not working. Those in the not working class, consisted of patients some of whom were bedridden while the rest, with the exception of a few, were able to take their daily walk out of doors, and probably assisted in pushing the floor polisher over the floor or performed some other light duty, which was not regular or daily work. A few of them were not bedfast, and did not go out doors nor do any work in the wards, but spent the time sitting in the halls, sometimes sewing or doing fancy work. They spent a part of the time resting on the bed and the only exercise was gotten walking around in the wards. A number of the patients when disturbed, used considerable energy in one way or another which could not be classed as work, but the attacks usually did not last long.

The patients classed as working patients were those doing various kinds and amounts of work. In the wards there were patients who besides polishing the floors, cleaned and kept in order the dining rooms,

clothesroom, bath rooms, sleeping quarters, halls and living room. Some of them only polished the floors which meant to push or pull a drag over the floor a number of times. Often six or more were lined up, each with a drag, and under the direction of their attendant, pulled the drags up and down the room, following their leader. The patients who worked outside of the wards worked in the kitchen, bakery, dairy, store room, shoe room, sewing room, laundry, on the farm, and at numerous other occupations which are found in an institution of this type. The work which some of them did would be classed as hard work, but the majority of them would be classed as moderate workers. Some of the strongest and best workers were epileptics who, of course, could not be depended upon to do regular work.

It might be well to mention that in Hospitals No. 3 and No. 4, the observer was shown rooms equipped for the patients to do such work as sewing, fancy work, weaving and basketry. This gave a number of the women light work and a change, as well as valuable training. In skillful hands occupational therapy is a valuable aid in curing those suffering from mental disease.

2. The determination of the amount of food material served.

The amount of food material served, was obtained by weighing the food materials used in the preparation of all the meals of the day investigated. Usually very little if any of the nutritive value of the food was lost in the preparation. In several instances the liquid was drawn off the beans before the seasoning was added, and potatoes were allowed to stand in water for sometime after paring, but with meats, the liquid it was cooked in was used for gravy or soup, and the bones which were removed, before or after the meat was cooked, were used again in soup making. In general, the cooks used economical methods of food preparation, and could usually give accurately the weight or measurement of the food materials they used. In several cases, syrup was issued directly from the store room and the amount was obtained from the store keeper. The amount of bread used was given by either the cook or the baker. Where it was possible the calories of bread, rolls and cake served were figured from the ingredients the baker used. Each institution employed an expert baker who made the rolls,

light bread, cakes or cookies and in some instances made the hot breads baked in sheets.

In Hospitals No. 2 and No. 3 it was not possible to keep the amount of food served to the patients separate from that served to the employees. In these two hospitals the food for the patients and employees was prepared in the same kitchen and some dishes served were prepared at the same time. The employees usually received the same cereals and vegetables as the patients but were given in addition thin cream for coffee, more meat and vegetables, a greater variety of each in kind and method of preparation, dessert once a day, fresh fruit occasionally, preserves, butter three times a day, and a more liberal amount of sugar. To have obtained the amount of food served to the patients alone, would have required the weighing of all of the food not only before cooking, but after cooking, and the subtraction from the total amount that part used by the employees. This would have necessitated weighing the food for from 1400 to 1700 patients just at serving time when the kitchen help seemed to be working as fast and as hard as they could with their regular duties. This weighing was done very successfully in Hospital No. 4 in a kitchen

where food was prepared for over 300 patients besides the employees.

Even if the food could have been weighed in the kitchen, it was impossible to keep that used by the attendants separate from the patients for the attendants were served in small dining rooms near the patient's dining room and the food for both was sent up at the same time, and there was a large number of these dining rooms. It seemed advisable to consider the employees as patients, in these two hospitals (No. 1 and No. 3), in figuring the amount of food used in the dietaries, and to include only the food which was served to both the patients and employees and not the extra foods, with the exception of milk and sugar, which the employees received. The reason for this was that in some cases, the patients would appear to be getting foods which were not served to them at all. On the other hand, this would slightly reduce the total per capita calories. This reduction could not be very great because of the small per cent of employees compared with total number in the study and would make the difference very slight in the number of calories.

The food for the officers was prepared in a separate kitchen in allof the institutions and was not considered in the studies made.

In computing the total calories served, Mrs. Rose's "Laboratory Manual of Dietetics" and Bulletin No. 28 "The Chemical Composition of American Food Materials" were used for ascertaining the composition of foods. The amount of the foods used was obtained for two days in each institution except Hospital No. 4, This was the first institution investigated and the food was prepared for the patients in three different kitchens. This made a longer study difficult.

No account was kept of the plate waste or the food not used by the patients except in Hospital No. 4. In this hospital, the units worked with were small enough so that the waste could be handled fairly well but in the larger hospitals this could not be done. Unless the work of collecting and weighing the waste could have been explained and all of the attendants and supervisors could have understood it, it would not be reliable as they considered tea, coffee and such articles as waste.

3. The calculation of the cost of the food.

The prices of the food materials used on the two days during the investigation, were obtained from the store-keeper or steward. The store-keeper had charge of the store-room or store and issued food, clothing and other necessary supplies as they were needed. The contract system of buying was used for a large number of the food materials. The cost of the dietary for each day studied was figured from the price the institution had paid for those articles and not from the market price at that time.

In all of the hospitals a part of the food was produced on the farm. Each hospital had its herd of cows which supplied the institution with milk and cream. They also had chickens but not in large enough numbers to furnish all of the eggs used. Hospital No. 1 was using apples which had been raised on the State Farm and Hospital No.2 raised and killed hogs for their fresh pork and rendered their own lard. Hospital No. 3 was visited last and it was late enough in the spring for them to be having lettuce, radishes and onions from their gardens.

The dietaries were figured in two ways, first, considering only the food materials purchased, and second, including those produced on the farm.

4. The selection of the food.

To get an idea of the foods used, a copy was made of the menus served for each dining room studied, for approximately seven days. It was found that there was a tendency to repeat the same menus for each succeeding week. The reason for this was in part that in making standing orders for certain foods to out-of-town markets, it was more convenient for them to be sent on the same day of each week. This was objectionable because the patients often knew what they were going to have for a meal.

State Hospital No. 1.

State Hospital No. 1 is the oldest of the four state insane hospitals and is located at Fulton, Missouri. Dr. M. O. Biggs was superintendent of the hospital and had been there several years. At the time of the investigation, there were 1238 patients, in the hospital and 168 employees.

All of the menus, those for the patients, employees and officers were in charge of the matron of the hospital. The food for the officers was prepared in a kitchen near the officer's dining room on the second floor of the main building. The food for the employees and patients was prepared in one large kitchen in the main building. All of the patients lived in this building except those who were tubercular and those needing special care and nursing. The tubercular patients lived in a comparatively new building, built especially for this purpose. It was located near the main building, and food for them was prepared in the general kitchen. Those patients requiring special medical care and nursing occupied a small hospital east of the main hospital. It was located far enough from the main building to be away from the noise there and was

equipped with a good diet kitchen.

The employees had to be considered in this study, since their food was prepared in the same kitchen, as was that of the patients. The special diets were prepared in one side of the room and were in charge of one of the cooks.

The kitchen was located on the first floor and was well ventilated and had plenty of sunshine. It was connected to the various parts of the building by tunnels through which food was carried on food trucks. The food was placed in covered metal containers to keep it as hot as possible and to protect it from dust.

The special diets served to those requiring them either the ward or the tubercular patients, are not given on the menus. On the days of investigation, special diets showed variety and were well prepared. Besides eggs and toast, they consisted of vegetable soup, oyster soup, baked potatoes and baked apples.

In the regular dietary for the patients, beef boiled or roasted and sometimes mutton was served for dinner. The food for breakfast contained a part of the days ration of meat and all of the potatoes used

during the day except those used in the special diets*
Two vegetables were usually served at dinner or one vegetable and a cereal. At the time of the investigation, garden supplies from the farm were not yet available, so beans and hominy were served one day and beans and sauer kraut the second day. Later, as is shown by the menus, during the month of May, lettuce or onions and radishes were served as the second vegetable for the noon meal. The suppers consisted usually of either canned or stewed dried fruit and bread, oleomargarine, syrup, coffee and milk. Frequently rice custard was served and the fruit omitted.

The menus show considerable variety in meats, but beans were served rather often and rice custard was served twice in the one week. No fresh vegetables or fruit were served during the two days of the investigation and the only succulent vegetable was the sauer kraut. With the exception of the special diets, milk, beans, sauer kraut, dried peaches and potatoes were depended upon for base forming foods. This condition needs special attention when acid forming cereals

*This was an abnormal condition due to high price of potatoes at the time of this investigation.

are substituted for the base forming potatoes. The menus in May were much better than those in April because of the green vegetables. They probably had plenty of green vegetables in the summer for they had a special hospital garden. A good quality of food was used and this food was well prepared.

Sample Menus¹ Served in State Hospital No. I at Fulton (1917)

Monday May 21		Tuesday May 22	
Breakfast--	Beef Hash Rolled Oats Hot Rolls Butter, Syrup Coffee & Milk	Potato Stew Rolled Oats Hot Rolls Butter, Syrup Coffee & Milk	
Dinner--	Beef Roast Navy Beans Lettuce & Radishes Light Bread Tea & Milk	Beef Boiled Potatoes Greens & Radishes Light Bread Tea & Milk Corn Bread	
Supper--	Rhubarb Sauce Light Bread Butter, Syrup Coffee & Milk	Rice Custard Light Bread Butter, Syrup Coffee & Milk Rhubarb Pie	
Wednesday May 23		Thursday May 24	
Breakfast--	Beef Hash Rolled Oats Hot Rolls Butter, Syrup Coffee & Milk	Hot Frankfurters Wheat Flakes & Sauce Hot Rolls Butter, Syrup Coffee & Milk	
Dinner--	Ox Tail Stew Butter Beans Lettuce, Radishes Light Bread Tea & Milk Corn Bread	Beef Roast Hominy Lettuce, Radishes Light Bread Corn Bread Tea & Milk	
Supper--	Stewed Apricots Light Bread Butter, Syrup Coffee & Milk	Stewed Prunes Light Bread Butter, Syrup Coffee & Milk	

1. The menus do not include the special diets which were served.

Sample Menus¹ Served in State Hospital No.I at Fulton (1917)

	Friday May 25	Saturday May 26	Sunday May 27
Breakfast--	Beef Hash Rolled Oats Hot Rolls Butter, Syrup Coffee & Milk	Beef Hash Rolled Oats Hot Rolls Butter, Syrup Coffee & Milk	Potato Stew Corn Flakes & Sauce Hot Rolls Butter, Syrup Coffee & Milk
Dinner--	Beef Boiled Butter Beans Onions & Radishes Light Bread Corn Bread Tea & Milk	Beef Roast Mexican Beans Lettuce & Radishes Corn Bread Tea & Milk	Mutton Stew Butter Beans Lettuce & Radishes Light Bread Corn Bread Tea & Milk
Supper--	Rice Custard Cookies Light Bread Butter, Syrup Coffee & Milk	Stewed Prunes Light Bread Butter, Syrup Coffee & Milk	Canned Peaches Light Bread Butter, Syrup Coffee & Milk

1. The Menus do not include the special diets which were served.

Table I--Amounts calories and cost of food served on Friday, April 6, 1917, in State Hospital No. I in Fulton, Missouri.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Pork Seasoning(1)	60#	18,300	176,100	\$10.26	\$17.10/100#
Beef	690	205,289	484,380	70.24	10.18/100#
Oysters canned(2)	5#	798	1,640	1.16	1.75/doz 10oz. cans
Oleo	90#	1,958	306,900	17.76	19.74/100#
Eggs (2)	14.2	2,750	7,700	(3)	
Lard	35#		142,870	6.64	18.96/100#
Milk whole	1615#	24,160	507,110	(3)	
Milk butter	85#	5,270	14,025	1.25	.125/gal.
Potatoes (4)	660#	21,542	200,640	29.04	2.67/bu.
Sauerkraut	490#	14,160	50,000	6.25	6.25/cask
Beans pinta (5)	130#	56,290	192,660	15.21	11.70/100#
Tomatoes canned(2)	36#	783	3,708	1.11	.278/gal.
Rolled Oats	50#	15,150	90,150	3.63	7.25/
Corn Meal (6)	105#	17,527	169,365	3.15	3.00/100#
Flour (7)	100#	20,325	160,300	5.30	5.30/100#
Crackers (2)	2#	356	3,750	.16	8.00/100#
Bread Rolls (8) and Cookies		143,738	1,406,459	49.71	
Apples (2)	39#	212	8,346	(3)	
Peaches, dry (9)	150#	13,472	209,850	8.62	5.75/100#
Syrup (10)	175#		187,187	4.74	.37/gal.
Sugar (10)	227		411,778	16.96	7.47/100#
Coffee (11)	40#			5.25	13.12/100#
Tea	12#			.45	.26/#
Total		562,080	4,734,918	256.79	

1. Calculated from Bulletin 28, The Chemical Composition of American Food materials.
2. Used in special diets.
3. Produced on farm.
4. Used in hash and in soup or baked for special diets.
5. Calculated as beans dried, Laboratory Manual of Dietetics by Mrs. Rose.
6. Twenty-five pounds were used for cornbread to serve one third of the patients at dinner.
7. Used for thickening.
8. The cost and calories are computed from receipes used. Average amount of flour used one day was 700#

Bread and Rolls			Cookies	
Flour 700#	--	\$37.10	Flour included in daily amount)	
Sugar 12#	--	.90	Sugar 50#	-- \$3.73
Fat 6#	--	1.14	Fat 35#	-- 6.64
Yeast 2#	--	.125	Soda 26	-- .07
Liquid			Buttermilk 3	gallons
9. Calculated from analysis made by the Department of Agricultural Chemistry University of Missouri.
10. Calculated from the amount used per month.
11. Served twice a day.

Table No. Ia--Amounts calories and cost of food served on Saturday, April 7, 1917, in State Hospital No. I in Fulton, Missouri.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Pork Seasoning(1)	in 60#	18,300	176,100	\$10.26	\$17.10/100#
Beef	690#	205,289	484,380	70.24	10.18/100#
Oysters canned (2)	5	798	1,640	1.16	1.75/doz { 10 oz. cans
Oleo	90#	1,958	306,900	17.76	19.74/100#
Eggs	25.7#	5,150	14,420	(3)	
Lard	35#		142,870	6.64	18.96/100#
Milk whole	1615#	24,160	507,110	(3)	
Milk butter	85#	5,270	14,025	1.25	.125/gal
Potatoes (4)	660#	21,542	200,640	29.04	2.67/bu.
Beans, pinta (5)	130#	56,290	192,660	9.75	7.50/100#
Tomatoes canned (2)	36#	783	3,708	1.11	.278/gal
Hominy	85#	12,801	136,680	3.83	4.50/100#
Rice	55#	7,990	87,505	2.75	5.00/100#
Rolled Oats	50#	15,150	90,150	3.62	7.23/100#
Corn meal (6)	25#	4,173	40,325	.75	3.00/100#
Flour (7)	100#	20,325	160,300	5.30	5.30/100#
Crackers (2)	2#	356	3,750	.16	8.00/100#
Bread and Rolls		142,346	1,168,665	39.27	
Apples (2)	39#	212	8,346	(3)	
Syrup	175#		187,187	4.74	.37/gal.
Sugar	227#		411,778	16.96	7.47/100#
Coffee (10)	40#			5.25	13.12/100#
Tea	1 1/4#			.45	.26/#
Total		542,887	4,339,139	230.29	

1. See pork seasoning table.
2. Used in special diets.
3. Produced on the farm.
4. Used in hash, and in soup or baked for special diets.
5. Calculated from analysis made by the Department of Agricultural Chemistry University of Missouri.
6. For cornbread to serve one third of the patients for dinner.
7. Used for thickening.
8. See bread table for Friday April 6.
9. Calculated from amount used per month.
10. Served twice a day.

Hospital No. 2.

State Hospital No. 2 is located at St. Joseph, Missouri. This hospital was taking care of a larger number of patients than the other three included in the study. Dr. E. H. Bullock was superintendent of the hospital when this study was made, and had been in the hospital less than a year.

The matron and the assistant matron had charge of the menus served. The officers kitchen and dining room was located on the second floor of the main building. The patients food was prepared in one general kitchen and three small kitchens, with the exception of that for the fourteen men who lived on the farm. The menus used for the patients on the farm were practically the same as those used in the hospital proper for the working patients. Their food was prepared on the farm as it was located several miles from the main part of the hospital.

The general kitchen was not as modern as those in some of the hospitals studied. The steam kettles when in operation, made the room rather uncomfortable for the employees and patients working there. The special

diets were prepared in the general kitchen by one of the patients, who had several persons assisting her when she needed help. She had been in charge of this work for several years. The special diets included eggs, toast, whole milk and soup.

The farm dairy herd supplied the institution with a very good quantity of milk, This was served as skimmed milk with the exception of about 30 gallons which was used in the special diets and for the tubercular patients.

This hospital was serving fresh pork which was not being done in the other three insane hospitals. They raised hogs for butchering which not only supplied them with fresh meat but they were also able to render all of the lard they needed. They also served beef of excellent quality which contained a desirable amount of fat. Because of their close proximity to the packing houses they had the opportunity of selecting their own meat and demanded the quality which they were paying for.

The results of the study showed that a large amount of meat or protein rich foods was served. Besides the beef stew, liver, or bacon which was served

for breakfast, weinewursts were usually served twice during the week for dinner, pigs feet once, roast beef once, on Sunday, and beef dumplings on Wednesday.

Fresh pork was cooked with beans and parsnips for seasoning.

The variety of meat was better than that of vegetables served. It was too early for garden products and they were depending on dried beans and peas or parsnips and occasionally potatoes for their vegetables at noon.

For supper a cereal was always served. This was either hominy, mush or rice, and since rice was used as a dessert for dinner several times during the week it was not served so often for supper. This made hominy and mush appear in the supper menu rather often. A cooked dried fruit, usually prunes or peaches, was also served for supper.

For base forming foods the patients had to depend upon the legumes, dried fruit, parsnips, and potatoes and the milk. This was probably sufficient but considering that the amount of meat and cereals or acid forming foods was high, it would have been better to decrease the amount of meat, especially since the protein served was high. The dietaries would also have been

improved by the use of a greater variety of vegetables
and cereals.

Sample Menus³ Served in State Hospital No. II at St. Joseph (1917)
(Continued)

	Wednesday April 18	Friday April 20	Saturday April 21	Sunday April 22
Breakfast--	Bacon Gravy Bread Syrup Coffee Milk	Beef Stew(1) Bread Oleo Syrup Coffee Milk Sugar (2)	Fried Liver Bread Oleo Syrup Coffee Milk	Oatmeal Bread Oleo Syrup Coffee Milk
Dinner--	Beef & Dumplings Bread Tea Milk Rice Pudding	Back Bones Black Eyed Peas Bread Tea Milk Bread Pudding	Back Bones Wienerwursts Bread Parsnips Tea Milk	Beef Roast Gravy Bread Potatoes Tea Milk Rice Pudding
Supper(1)--	Hominy Bread Oleo Syrup Dried Peaches Milk	Hominy Bread Oleo Syrup Dried Peaches	Hominy Bread Oleo Syrup Dried Apples	Mush Bread Oleo Syrup Dried Peaches Cake
	Monday April 23	Tuesday April 24	Wednesday April 25	Thursday April 26
Breakfast--	Beef Stew Bread Oleo Syrup Coffee Milk	Oatmeal Bread Oleo Syrup Coffee Milk	Bacon Gravy Bread Syrup Coffee Milk	Oatmeal Bread Oleo Syrup Coffee Milk
Dinner--	Pork & Beans Parsnips Bread Tea Milk	Parsnips Pork Bread Dressing Bread Tea Milk	Beef & Dumplings Cornbread & Bread Tea Milk Rice Pudding	Pig Feet Navy Beans Bread Tea Milk
Supper(1)--	Mush Bread Oleomargine Syrup Prunes	Rice Bread Oleo Syrup Prunes	Hominy Bread Oleo Syrup Dried Peaches Milk	Mush Bread Oleo Syrup Prunes Milk

See footnotes on following page.

Sample Menus Served in State Hospital No.II at St. Joseph (1917)

	Friday April 27	Saturday April 28	Monday April 30	Tuesday May 1
Breakfast--	Beef Stew Bread Oleo Syrup Coffee Milk	Liver Bread Oleo Syrup Coffee Milk	Beef Stew Bread Oleo Syrup Coffee Milk	Oatmeal Bread Oleo Syrup Coffee Milk
Dinner--	Pork Dried Peas Bread Tea Milk Bread Pudding	Navy Beans & Pork Wienerwursts Bread Tea Milk	Pork & Beans Onions Bread Tea Milk	Pork & Parsnips Bread Dressing Tea Bread Milk
Supper (1)-	Hominy Bread Oleo Syrup Dried Peaches Milk	Mush Bread Oleo Syrup Prunes Milk	Mush Bread Oleo Syrup Prunes Milk	Mush Bread Oleo Syrup Prunes Milk

1. Working people were served meat three times a day. Beef roast was usually served for supper.
2. 189# of sugar were served during the day.
3. Eggs, toast, milk and soups were served as special diets and are not indicated on the matrons menus, nor the roast beef served to the working patients for supper.

Table No.II--Amounts, Calories and cost of food served on Friday, April 27, 1917, in State Hospital No.II, St. Joseph, Missouri.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Pork (1)	320#	93,120	409,560	(3)	
Beef (2)	518#	144,250	348,758	\$60.86	\$11.75/100
Oleo	92#	2,002	313,720	13.34	14.50/100
Eggs (4)	24	5,182	14,280	(3)	
Milk, skimmed	2176#	134,042	361,216	(3)	
Milk whole (5)	255#	15,259	80,070	(3)	
Potatoes (6)	30#	979	9,120	1.35	2.69/bu.
Peas, dried	254#	113,386	409,448	19.05	7.50/100#
Hominy	138#	20,783	221,904	4.27	3.10/100#
Flour (7)	12#	2,438	19,236	.74	12.25/bbl.
Bread	1900#	320,568	2,230,600	83.99	(9)
Peaches, dried (8)	187#	16,794	261,613	16.36	8.75/100#
Syrup	274#		292,358	9.87	.47/gal.
Sugar	189#		342,846	14.32	7.58/100#
Sugar, brown (10)	15#		25,860	1.06	7.10/100#
Coffee (11)	20#			2.70	13.50/100#
Tea	4#			.54	13.50/100#
Total		868,803	5,340,589	\$ 228.45	

1. Backbones calculated from Bulletin 53, Carcasses of Pigs, U. S. Department of Agriculture.
2. Including 80# soup bone used in special diets.
3. Produced on farm.
4. Used in special diets.
5. Used in special diets and for tubercular patients.
6. Used in beef stew for breakfast.
7. Used for thickening.
8. Calculated from analysis made by Department of Agricultural Chemistry, University of Missouri.
9. Figured from recipe 1300# flour, 25# lard, 25# sugar, 25# salt, 6# yeast.
10. Calculated from Bulletin 28, The Chemical Composition of American Food Materials.
11. Served twice a day.

Table No. IIa-- Amounts, calories and cost of food served Saturday, April 28, 1917, in State Hospital No. II, St. Joseph, Missouri.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Pork Seasoning (1)	52#	15,860	152,620	\$10.14	\$19.50/100#
Beef (2)	150#	34,763	80,420	17.62	11.75/100#
Wieinerwurst (1)	366#	296,264	543,510	34.77	9.50/100#
Liver	305#	112,887	178,120	10.67	3.50/100#
Oleomargerine	92#	2,002	313,720	13.34	14.50/100#
Eggs (4)	24#	5,182	14,280	(3)	
Milk, skimmed	2176#	134,042	361,216	(3)	
Milk, whole (5)	255#	15,259	80,070	(3)	
Beans, navy	254#	103,693	397,256	30.48	12.00/100#
Cornmeal	138#	23,035	222,594	4.27	3.10/100#
Prunes	207#	6,756	240,327	17.59	8.50/100#
Bread	1900#	320,568	2,230,600(6)	83.99	
Syrup (7)	274#		292,358	9.87	.47/gal.
Sugar	189#		342,846	14.32	7.58/100#
Coffee (8)	20#			2.70	13.50/100#
Tea	4#			.54	13.50/100#
Total		1,070,311	5,449,937	\$250.30	

1. Calculated from Bulletin 28, The Chemical Composition of American Food Materials.
2. Including 80# soup bone used in special diets.
3. Produced on the farm.
4. Used in special diets.
5. Used in special diets and for tubercular patients.
6. Figured from ingredients used, see Table for Friday, April 27.
7. Calculated from Feeding the Family by Mrs. Rose.
8. Served twice a day.

State Hospital No. 3.

State Hospital No. 3 at Nevada is one of the newest hospitals in the State. Dr. W. P. Bradley, who was then Superintendent, had been in the hospital a number of years.

This was the only state insane hospital at that time which had a dietitian and she had been in the hospital only a few months. Before the dietitian was employed the dietaries were taken care of by the matron, as was still being done in the other three hospitals. The matron here had charge of the food served to the officers but had no duties in connection with the food served to the patients. In this way the dietitian could devote all of her time to the patients and employees dietaries. In speaking of the value of the dietitian, Mrs. Tanner, Dr. Bradley said that she more than saved her salary by eliminating waste and that in bread alone she saved them fifty loaves a day. He went on to say the only difficulty they had, with her, was that she was about to starve the pigs on the farm.

The patients in this hospital all lived in the main building except the tubercular patients, who lived in cottages, one for the men and one for the women.

These cottages were built with open air sleeping quarters and the patients were given more or less freedom during the day to sit and walk outside when the weather was suitable. They received in addition to the regular diet extra eggs and milk.

The food for the patients and for the employees was all prepared in one general kitchen which was located on the first floor of the main building. The kitchen seemed to be well planned and equipped. Besides having the usual equipment, of ranges, steam kettles and roasters, a good sized brick oven was built in one corner of the room. This oven was used for baking such foods as potatoes, meats and hot breads. This gave them an opportunity to bake foods, which without the oven would have been cooked in the steam kettles, or on top of the range, the latter method not being very practical in cooking for nearly 1500 people. The steam kettles were not out in the main kitchen but were in an adjoining room. This kept the steam and much of the heat out of the room in which the employees and patients were working. Among the labor saving devices in the kitchen was a potato peeler which the dietitian said saved them a large amount of potatoes. When the patients

pared the potatoes for a meal there was a waste of six hundred pounds while if the peeler was used from the same amount of potatoes they got a waste of one hundred pounds. One end of the kitchen was fitted with vegetable sinks, chairs and tables where the patients prepared the vegetables and fruits when machinery could not be used.

The bakery was equipped with a rotary oven which was giving them good results, being particularly well managed by a successful baker.

The hospital kept a dairy herd which supplied the patients with an abundance of whole milk and also ran a creamery under the direction of an experienced man. Cream was purchased from the farmers who brought it in and made into butter. This was the only hospital of the four which gave their patients butter. More than enough was made during the summer to serve butter twice a day to the patients, and the surplus was placed in cold storage until needed. Figuring the butter at the whole sale market price the creamery was netting the institution money besides giving work to the patients.

The menus were carefully planned and well prepared. The patients were given ^{as great} a variety of foods as possible. The dietitian realized that the serving of certain foods once a day, four and five days in the week would mean, that later it would be useless to serve these foods at all, or serve them and have them wasted. She avoided repeating foods too often and varied the method of preparation as much as possible. The menus were well balanced and special care was taken to see that the patients received sufficient green foods. Although lettuce, radishes and onions were being used from the garden the supply was still limited and to give an adequate amount of green vegetables, cabbage was served even though the price was high. Potatoes were also served and though they were unreasonably high the patients were much better contented if they could have them several times a week, and doubtless consumed a higher proportion of the food served to them, than if cereals had been substituted entirely. Not only this but Mrs. Tanner realized that cereals could not be substituted entirely on account of their acid forming characteristics. With the vegetables, cabbage, potatoes, tomatoes, lettuce, and radishes, the fruit and all of the milk served there

was no question about the adequacy of the base forming foods. With the amount of milk served and the green vegetables the patients doubtless were receiving sufficient vitamine containing food.

The foods were served as well as it was possible to each class of patients. Every effort was made to have the food served hot but this was a problem hard to handle, especially on cool days. Even though the food was carried in closed metal containers it had to be served on the plates, in the majority of cases, before the patients came in and the small portions would soon cool. Several of the attendants in the other hospitals as well as this one distributed the food with considerable speed and care and served it quickly.

Sample Menus Served in State Hospital No.III at Nevada (1917)

	Monday May 14	Tuesday May 15	Wednesday May 16
Breakfast--	Beef Stew Oatmeal Hot Rolls Butter Coffee Sugar Syrup Milk (2) Brown Gravy	Beef Stew Oatmeal Potatoes Hot Rolls Butter Coffee Sugar Syrup Milk (2) Fried Mush (3)	Hash Rice Hot Rolls Butter Coffee Sugar Syrup Milk (2) Sausage (3) Gravy (3)
Dinner--	Pork & Beans Boiled Potatoes Onions Bread Tea Rice Pudding Lemon Sauce Roast Beef (3) Gravy Vegetable Soup (4) Steak (3) Crackers (4)	Fried Liver Gravy Macaroni & Tomatoes Bread Tea Cornstarch Pudding Vanilla Sauce Rice Soup (4) Crackers (4)	Beef Stew & Potatoes Lettuce Bread Tea Lemon Sauce Tapioca Pudding Green Onions Noodle Soup (4) Crackers (4)
Supper--	Beef Stew (1) Mush Milk (2) Bread Butter Tea Syrup Steak (3) Gravy (3)	Beef Stew (1) Apple Sauce Bread Butter Tea Syrup Steak (3) Gravy (3)	Beef Stew (1) Farina Bread Butter Tea Syrup Milk (2) Roast Beef (3) Gravy (3)

1. To working Patients.
2. Whole milk: Buttermilk was also served on the average of 170# 1 day.
3. To Employees.
4. Specials- Eggs, toast and milk were also served for special diets during the day.

Sample Menus Served in State Hospital No.III at Nevada (continued)(1917)

	Thursday May 10	Friday May 11	Saturday May 12	Sunday May 13
Breakfast--	Beef Stew Oatmeal Hot Rolls Butter Coffee Milk (2) Syrup Sugar Dried Peaches Steak (3)	Bacon Gravy Potatoes Farina Butter Hot Rolls Sugar Coffee Syrup Milk (2) Eggs (3)	Baked Hash Oatmeal Hot Rolls Butter Coffee Sugar Syrup Milk (2) Bacon (3) Gravy (3)	Baked Beans Oatmeal Hot Rolls Butter Coffee Sugar Syrup Milk (2) Eggs (3) Biscuit (3)
Dinner--	Roast Beef Potatoes Rice Cold Slaw Radishes Bread Tea Choc.Blamange(3) Tomato Soup (4)	Soy Beans Macaroni & Tomatoes Radishes Bread Tea Bread Pudding Lemon Sauce (3) Asparagus (3) Vegetable Soup (4)	Wienerwursts Kidney Beans & pork seasoning Lettuce dressed with Vinegar Corn Bread Tea Lemon Custard Potato Soup (4)	Roast Beef Onions Bread Tea Potatoes Rhubarb Pie Radishes (3) Oyster Soup(4)
Supper--	Beef Stew (1) Mush Milk (2) Bread Butter Tea Syrup Steak (3) Salmon (3)	Beef Stew (1) Prunes Bread Butter Tea Syrup Gingerbread Steak (3) Bacon (3) Jelly (3)	Beef Stew (1) Rice Bread Butter Tea Syrup Roast (3) Canned Peaches (2)	Bologna Crackers Bread Butter Tea Syrup Cake Fresh Tomatoes (3) Hot Milk (3) Toast

See footnotes on following page.

Table No. III--Amounts, calories and cost of food served Thursday, May 10, 1917 in State Hospital No. III, Nevada, Missouri.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Beef Stew	80#	27,725	63,680	\$10.37	\$12.96/100
Beef roast	375#	115,570	263,250	48.60	12.96/100
Eggs (1)	13#	3,160	8,736	(2)	
Butter	88#	1,598	306,944	(2)	
Milk, whole	2508#	150,079	787,512	(2)	
Buttermilk	170#	11,472	28,220	(2)	
Potatoes	1200#	39,168	364,800	62.00	3.10/bu.
Cabbage	500#	14,500	71,500	42.50	8.50/100
Radishes	250#	4,075	23,250	(3)	
Tomatoes	27#	588	2,781	1.62	.54/gal.
Oatmeal	65#	18,985	117,650	3.28	5.05/100
Rice	65#	9,443	103,415	5.20	8.00/100
Cornmeal	117#	19,530	188,721	4.68	4.00/100
Hot Rolls (3)	380#	40,799	477,526	18.60	(3)
Bread (3)	666#	78,190	766,705	30.20	(3)
Syrup (1)	159#		169,638	6.96	.60/gal.
Sugar (4)	242#		438,988	19.24	7.95/100
Coffee (5)	51#			7.65	.15/#
Tea (6)	20#			4.60	.23/#
Total (7)		399,882	4,183,316	\$ 265.50	

1. Calculated from Feeding the Family by Mrs. Rose.
2. Produced on the farm.
3. Calories and cost were calculated from the receipes used.
 - Hot Rolls
Flour 200#, Fat 25#, Sugar 30#, Yeast 3/4#, and liquid.
 - Bread
Flour 600#, Fat 40#, Sugar 30#, Yeast 3/4#, and liquid.
Two thirds of this receipe was used for one day. Amount used for officer dining room was deducted.
4. The daily amount was figured from the average amount used by the institution for a year deducting the average amount used in the officers dining rooms and the amount used in bread, rolls, and cake.
5. Coffee was served once per day.
6. Tea was served twice per day.
7. Does not include steak, chocolate pudding and salmon served to employees
8. The amount of buttermilk was determined by taking the average of the amount used for three months.

Table No. IIIa--Amounts, calories and cost of food served Friday, May 11, 1917, in State Hospital No. III, in Nevada, Missouri.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Bacon	30#	5,836	85,080	\$10.49	\$34.98/100#
Beef Stew	40#	13,862	31,840	5.18	12.96/100#
Butter	106#	1,924	369,728	(2)	
Eggs (1)(9)	58#	11,600	32,480	(2)	
Milk, whole	2508#	150,079	787,513	(2)	
Buttermilk (2)	170#	11,472	28,220	(2)	
Oleomargarine	6#	130	20,460	1.06	17.74/100#
Beans, Soy (3)	150#	122,700	343,950	10.43	6.95/100#
Potatoes	1020#	33,292	310,080	52.70	3.10/bu.
Tomatoes (9)	90#	1,958	9,270	5.40	.54/gal.
Veg. for soup (9)	10#	261	1,424		
Radishes	250#	4,075	23,250	(2)	
Farina (4)	75#	15,600	123,075	5.25	7.00/100#
Macaroni	85#	20,665	138,040	6.80	8.00/100#
Flour(thickening)	26#	5,283	41,678	1.70	6.55/100#
Hot Rolls (5)	380#	40,799	477,526	18.60	(1)
Bread (5)	666#	78,190	766,705	30.20	(1)
Bread Pudding (1)	130#	15,860	153,790	6.04	.046/#
Gingerbread (6)(7)		19,418	381,181	14.60	
Molasses	42#	1,829	54,642	2.10	.60/gal.
Syrup (1)	159#		169,638	6.96	.60/gal.
Sugar (9)	242#		438,988	15.11	7.95/100#
Coffee	51#			7.65	.15/#
Tea	20#			4.60	.23/#
Lemons (3)	2 doz.	72	600	.48	5.00/box
Prunes	150#	4,896	174,150	16.50	.11#
Total		559,801	4,963,308	221.85	

1. Feeding the Family by Mrs. Rose.
2. Produced on the Farm.
3. Feeds and Feeding by Henry and Morrison.
4. The Chemical Composition of American Food Materials, Bulletin 28.
5. See Table for Thursday, May 10.
6. Recipe for Gingerbread--flour 75#, molasses 8 gallons, sugar 30#, fat 20#, Soda 1#, liquid.
7. See Table for May 10 Sugar and Gingerbread for April 10.
8. Does not include eggs for breakfast, asparagus, steak, bacon and jelly served to employees.
9. The special diets consisted of a number of the eggs and the vegetable soup.

State Hospital No. 4.

State Hospital No. 4 is the newest of the four state insane hospitals and is located at Farmington, Missouri. Dr. G. E. Scrutchfield was Superintendent of the hospital at the time the investigation was made.

This hospital had the smallest number of patients and was built to a certain extent on the cottage plan. There were three kitchens which supplied the food for the patients and the dietaries prepared in each were in charge of a matron.

The patients in the receiving and infirmary wards lived in one building, those in the receiving wards lived on the first floor and those in the infirmary wards on the second floor. Some of the patients in the receiving wards were those who had just been admitted to the institution and had not been sent to special wards, while others had been there for some time and never sent to another ward. These patients were among the best in the institution and were treated accordingly in regard to liberties and service of food. Those in the infirmary wards were as a rule the older patients, the crippled or deformed and in general the more or less help-

less patients. It was noticed that a number of these patients had poor teeth or none at all and they undoubtedly experienced difficulty in masticating their food. The food for the patients in this building was prepared in a kitchen located on the first floor. A woman cook had charge of the preparation of the meals assisted by several male patients. The total number of patients in this building was 172, making the quantity of food easily handled by one woman.

The buildings known as the Hall and that for the tubercular patients were placed away from the other buildings. They were connected by a tunnel through which the food was sent. The food for the patients in both buildings was prepared in the kitchen in the Hall. A woman also had charge of the preparation of this food. The patients in the Hall were the untidy patients, epileptics, and as a rule the most hopeless class of patients found in an institution of this kind. The building for the tubercular patients was quite new and was built especially for patients afflicted with that disease. At the time of the investigation there were 166 patients in the two buildings.

The remainder of the patients, 339, lived in cottages or dormitories located within easy walking distance of the general dining room. The dining room was in a centrally located building in which were not only the patients dining rooms, one for men and one for women, but the dining room for the employees and the dining room and kitchen for the officers. The kitchen for the patients and employees was conveniently located near the dining rooms and was also connected to the building used for the bakery and store. This bakery supplied all of the kitchens with the bread, rolls and cakes used and even the shorts bread which they baked and served hot like corn bread.

The dietaries used for the receiving, infirm-ary and tubercular patients contained more milk, eggs and meat than those served to the patients in the Hall and the general dining room. However, the working patients received more meat than those not working and if there were any extras, as a small amount left over from the employees dining room, it was given to the working patients. Cereals, as vegetables and desserts, beans and dried fruit formed the main part of the diet.

Green or fresh vegetables were not served because it did not seem possible to afford them at that time and the supply of farm products had been exhausted. For base forming foods they were depending upon, beans, dried fruit, the milk, which was in small amount in the general dining room but larger in the other two buildings. This was returned to the kitchen and in general the amount of these foods returned was not large. A number of these foods were repeated so often that there would seem to be danger of the patients refusing to eat them. Even though fresh fruit and vegetables could not be obtained the menus could have been improved by changing the method of preparation of some of the articles of food. The percent of protein calories showed that a sufficient amount of that food stuff was served and as long as the food returned was small the calories were sufficient. In this hospital the food wasted and returned to the kitchen was weighed. The results are given in the following table for the days the studies were made.

	Receiving & Infirmary Dining Rooms	Hall and Tb. Dining Rooms	General Dining Room
Breakfast	7# cooked Rolled oats Returned	3# bread returned 18 $\frac{1}{2}$ # plate waste	6# hash returned 6# oats returned 10# bread returned 6# plate waste
Dinner	6 $\frac{1}{2}$ # bread dress- ing returned 2# beans return- ed 7 $\frac{1}{2}$ # bread return- ed 7 $\frac{3}{4}$ # plate waste	2# beans returned 5# spaghetti re- turned 5# cornbread re- turned 12# plate waste	14# hominy returned 2# beans returned 5 $\frac{1}{2}$ # bread returned 21# plate waste
Supper	9# peaches re- turned 7# rice return- ed 2 $\frac{1}{2}$ # bread return- ed 2 $\frac{1}{2}$ # plate waste	15# plate waste	8# bread returned 5# rice returned 1 $\frac{1}{2}$ # peaches returned 2 $\frac{1}{2}$ # hominy

Sample Menus served in State Hospital No. IV at Farmington
to Patients in Receiving and Infirmary Wards (1917)(continued)

	Sunday March 11	Monday March 12	Tuesday March 13	Wednesday March 14
Breakfast--	Rolled Oats Evap. Fruit Rolls & Bread Oleo Syrup Coffee Milk Specials (1)	Rolled Oats Evap. Apples Rolls & Bread Oleo Syrup Coffee Milk	Rolled Oats Fried Potatoes Rolls & Bread Oleo Syrup Coffee Milk	Rolled Oats Hash Rolls & Bread Oleo Syrup Coffee Milk
Dinner--	Roast Beef Potatoes Tomatoes Bread Oleo Milk Tapioca Pudding	Roast Beef Spanish Rice Spaghetti Bread (corn) Oleo Milk	Roast Beef Pinta Beans Pearl Hominy Bread Oleo Milk	Roast Beef Soup Potatoes Bread Oleo Milk Pie
Supper--	Mush Milk Bread Oleo Syrup Cookies	Flake Hominy Milk Bread Oleo Evaporated Peaches Gingerbread Syrup	Rice Milk Bread Oleo Evaporated Peaches Sugar Tea	Mush Milk Bread Oleo Syrup

1. See foot note on following page.

Sample Menus Served in Hospital No. IV to Patients in
Receiving and Infirmary Wards

	Friday March 16	Saturday March 17	Monday March 19
Breakfast--	Rolled Oats Evaporated Fruit Rolls & Bread Oleo Syrup Coffee Milk	Rolled Oats Evaporated Fruit Rolls & Bread Oleo Syrup Coffee Milk	Rolled Oats Evaporated Fruit Rolls & Bread Oleo Syrup Coffee Milk
Dinner--	Roast Beef Dumplings Navy Beans Corn Bread Oleo Milk	Roast Beef Bread Dressing Lima Beans Bread(Shorts) Oleo	Roast Beef Spanish Rice Spaghetti Bread Oleo
Supper--	Flake Hominy Hash Bread Oleo Syrup Sugar Tea	Rice, Milk Bread Oleo Syrup Evaporated Peaches Tea Sugar	Flake Hominy Bread Oleo Syrup Evaporated Apples Tea Sugar

1. The special diets, when needed, consisted usually of milk toast and eggs soft cooked, hard cooked or fried. On March 17th special diets totaled 75.

Table No. IV--Amounts, calories and cost of food served on Saturday March 17, 1917 in State Hospital No. IV, Farmington, Missouri, in Receiving and Infirmary Wards.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Beef E. P. (1)	31#	8494	15965	627	10.45/100
Oleo	95#	207	32395	164	17.23/100
Eggs (2)	9.3#	2276	6300	(9)	
Milk whole	51#	3052	16014	(9)	
Milk skimmed	178.5#	10995	29631	(9)	
Beans dry	18#	5911	28548	117	6.50/100
Onion	1.75	44	348	28	.161#
Rolled Oats	7#	2121	12621	213	3.05/100
Rice	20#	2905	31820	100.	5.00/100
Flour thickening	2#	406	3206	.15	7.40/100
Bread (3)	39#	6580	45786	352	
Toast	5#	889	9580		
Bread Shorts (5)	56.2#	5796	40950	.95	(6)
Buns	45.9#	6656	66786	.37	
Apples canned (7)	56#	213	40880	161	2.75/case
Peaches dried (8)	24#	2155	33576	222	9.25
Syrup (10)	47.9#		51109	114	1.95/case
Sugar	15#		27210	115	7.65
Coffee	3#			45	.151#
Tea	14#			29	.231#
Total		58,700	507,343	\$22.74	

1. This beef weighed 60# before cooked and boned. Received roast once per day and hash four times 1 week.
2. Special diets
3. Includes 17# bread used in bread dressing.
4. Includes to cost of the toast and yeast and flour in the buns.
5. The calories and cost were computed from the receipe 100# shorts flour, 4# baking powder, 8# fat, 2½# salt, 15 gal. liquid. Made 21 pans baked in sheets.
6. The cost of the extra fat and sugar used in the buns.
7. Calculated from Bulletin 28, The Chemical Composition of American Food Materials.
8. Calculated from analysis made by the department of Agricultural Chemistry University of Missouri.
9. Produced on the farm.
10. Feeding the Family by Mrs. Rose.

Sample Menus Served in State Hospital No. IV at Farmington to
Patients in the Hall and Tuberculosis Wards. (1917)

	Sunday March 11	Monday March 12	Thursday March 15	Friday March 16
Breakfast--	Rolled Oats Evaporated Fruit Rolls-Bread Oleo Syrup Sugar Coffee Milk (2) Specials (2)	Rolled Oats Evaporated Fruit Rolls-Bread Oleo Syrup Coffee Milk (2)	Rolled Oats Evaporated Fruit Rolls-Bread Oleo Syrup Sugar Coffee Milk (2)	Rolled Oats Evaporated Fruit Rolls-Bread Oleo Syrup Sugar Coffee Milk (2)
Dinner--	Potatoes Lima Beans Bread Oleo Coffee Milk (1)(2) Tapioca Pudding	Spaghetti Pinta Beans Bread Oleo Coffee Milk (1)(2)	Beef Stew (3) Dumplings Gravy Navy Beans Bread Oleo Milk (1)(2)	Chile Con Carne Spaghetti Bread Oleo Coffee Sugar Milk (1)(2)
Supper--	Mush Bread Oleo Syrup Tea Evaporated Peaches Cakes Milk (1)(2)	Flake Hominy Bread Oleo Syrup Tea Evaporated Apples Gingerbread Milk (1)(2)	Flake Hominy Bread Oleo Syrup Evaporated Apples Tea Milk (1)(2)	Mush Bread Oleo Syrup Evaporated Peaches Tea Milk (1)(2)

See foot notes on following page.

Sample Menus Served in State Hospital No. IV at Farmington
to the Patients in the Hall and Tuberculosis Wards. (1917)

	Saturday March 17	Sunday March 18	Monday March 19
Breakfast--	Rolled Oats Evaporated Fruit Rolls-Bread Oleo Syrup Sugar Coffee Milk (2)	Rolled Oats Evaporated Fruit Rolls-Bread Oleo Syrup Sugar Coffee Milk (2)	Rolled Oats Evaporated Apples Rolls-Bread Oleo Syrup Sugar Coffee Milk (2)
Dinner--	Roast Beef (3) Bread Dressing Gravy Navy Beans Bread Oleo Coffee Sugar Milk (1)(2)	Potatoes seasoned with drippings Lima Beans Bread Oleo Syrup Sugar Coffee Tapioca Pudding Milk (1)(2)	Roast Beef (3) Spaghetti Pinta Beans Cornbread Oleo Coffee Milk (1)(2)
Supper--	Flake Hominy Bread Oleo Syrup Evaporated Apples Tea Milk (1)(2)	Mush Bread Oleo Syrup Tea Cookies Milk (1)(2)	Rice Bread Oleo Syrup Evaporated Peaches Tea Milk (1)(2) Gingerbread

1. Tubercular patients received milk to drink for dinner and supper.
2. Whole milk was used in special diets. The special diets consisted of eggs and milk toast and were served when needed.
3. Beef was served to tubercular patients three times a week and to patients in the Hall two times a week.

Table No. IVa--Amounts, calories and cost of Food Served on Monday, March 19, 1917, in State Hospital No. IV, Farmington, Mo., in the Hall and Tuberculosis Wards.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Beef (1)	23#	8931	16813	\$ 2.40	\$10.45/100#
Oleo	8#	174	27280	1.38	17.23/100#
Butter (2)	2#	36	6976	(3)	
Eggs	6#	1459	4032	(3)	
Milk Whole (4)	51#	3052	16014	(3)	
Milk skimmed	144.5#	8901	23987	(3)	
Pinta Beans (5)	21.5#	9309	31855	1.40	6.50/100#
Spaghetti (6)	19#	4298	31540	1.05	5.50/100#
Rolled Oats	9 1/2#	2878	17128	.29	2.75/90#
Rice	9#	1307	14319	.45	5.00/100#
Bread	27.5#	4640	32285	2.44	
Toast (7)	3#	533	5748	(11)	
Buns (6)	51#	7395	74205	.41	(8)
Cornbread (9)	5 pans	3974	48124	.95	
Gingerbread (6)	24#	2947	40080	.79	
Apples dried	18.5#	536	24383	1.20	6.50/100#
Peaches dried (5)	16#	1437	22383	1.48	9.25/100#
Syrup (10)	47.9		51109	1.14	1.95/case
Sugar	18#		32652	1.38	7.65/100#
Coffee (12)	3#			.45	.151 #
Tea (13)	1 1/4#			.29	.231 #
Total		61,771	513,937	\$ 16.76	

1. For tubercular patients. Served three times per week. Hall Patients received meat two times per week.
2. For twelve employees.
3. Produced on farm.
4. For tubercular patients to drink, special diets, and employees coffee.
5. Calculated from analysis made by the Department of Agricultural Chemistry University of Missouri.
6. Calculated from Bulletin 28, The Chemical Composition of American Food Materials.
7. For special diets.
8. Cost only of fat and sugar added to buns. Cost of other ingredients are included in the bread.
9. Calories and cost figured from recipe used. 100# cornmeal, 10# fat, 3# baking powder and liquid, makes twenty one pans.
10. Calculated from Feeding the Family by Mrs. Rose.
11. Included in cost of bread.
12. For breakfast and dinner.
13. For supper.

Sample Menus Served in State Hospital No. IV at Farmington to Patients in the General Dining Rooms.

	Tuesday March 13	Wednesday March 14	Thursday March 15	Friday March 16
Breakfast--	Rolled Oats Hash Evaporated Fruit Rolls & Bread Oleo (1) Syrup Coffee Sugar (2) Milk	Rolled Oats Hash Evaporated Fruit Rolls & Bread Oleo (1) Syrup Coffee Sugar (2) Milk	Rolled Oats Hash Evaporated Fruit Rolls & Bread Oleo (1) Syrup Coffee Sugar (2) Milk	Rolled Oats Hash Evaporated Fruit Rolls & Bread Oleo (1) Syrup Coffee Sugar (2) Milk
Dinner--	Roast Beef (3) Lima Beans Potatoes Bread Oleo (1) Coffee Sugar (2)	Roast Beef (3) Macaroni Beans Bread Oleo (1) Coffee Sugar (2)	Roast Beef (3) Hominy Navy Beans Bread Oleo (1) Coffee Sugar (2)	Roast Beef(3) Hominy Pinta Beans Bread Oleo (1) Coffee Sugar (2)
Supper--	Cold Roast Beef (3) Mush Bread Oleo (1) Syrup Sugar (2) Tea Milk Cookies	Cold Roast Beef (3) Hominy Bread Oleo (1) Syrup Sugar (2) Tea Milk Evaporated Apples	Cold Roast Beef (3) Rice Bread Oleo (1) Syrup Sugar (2) Tea Milk Evaporated Apples	Cold Roast Beef (3) Mush Bread Oleo (1) Syrup Sugar (2) Tea Milk Evaporated Apples

See foot notes on following page.

Sample Menus Served in State Hospital No. IV at Farmington
to Patients in the General Dining Rooms

	Saturday March 17	Sunday March 18	Monday March 19	Tuesday March 20
Breakfast--	Rolled Oats Hash Evaporated Fruit Rolls & Bread Oleo (1) Syrup Coffee Sugar (2) Milk	Rolled Oats Hash Evaporated Fruit Rolls & Bread Oleo (1) Syrup Coffee Sugar (2) Milk	Rolled Oats Hash Evaporated Fruit Rolls & Bread Oleo (1) Syrup Coffee Sugar (2) Milk	Rolled Oats Hash Rolls & Bread Oleo (1) Syrup Sugar (2)
Dinner--	Macaroni Lima Beans Graham Bread Oleo (1) Coffee Sugar (2)	Potatoes Pinta Beans Bread Oleo (1) Coffee Sugar (2) Tapioca Pudding	Macaroni Navy Beans Bread Oleo (1) Coffee Sugar (2) Pickles	Beef Roast Beans Hominy Shorts Bread Oleo (1) Coffee Sugar (2)
Supper--	Cold Roast Beef (3) Rice Bread Oleo (1) Syrup Sugar (2) Tea Milk Evaporated Peaches	Mush Bread Oleo (1) Syrup Sugar (2) Tea Milk Cookies	Cold Roast Beef Flakes Bread Oleo (1) Syrup Sugar (2) Tea Milk	Cold Roast Beef Rice Bread Oleo (1) Syrup Sugar Tea Milk

1. The working patients received oleomargarine three times a day. The patients not working received oleomargarine three times a day only when meat was not served. Oleo was served with hash.
2. The working patients were seated at seven tables and were given sugar, meat and oleo as extras.
3. The patients received meat two times a week, except working patients who were given meat two times a day and hash for breakfast. All of the patients received hash for breakfast.

Table No. IVb--Amounts, calories and cost of food served on Tuesday, March 20, 1917, in State Hospital No. 4, Farmington, Missouri.
General Dining Room.

Food Material	Amount	Protein Calories	Total Calories	Cost	Price
Bacon	18#	3500	51048	\$ 3.32	\$18.46/100#
Beef (1)	80#	31068	58480	8.36	10.45/100#
Oleo	16#	348	54560	2.76	17.23/100#
Milk Skimmed	136#	8377	22576	(2)	
Beans dry	35#				
Beans cooked (4)	13#	15936 (3)	61812	2.54	6.50/100#
Parsnips (4)	3#	87	882		
Potatoes	45#	1469	13680	1.66	2.22/bu.
Potatoes fried (5)	26#	3208	67496	.96	
Hominy dry	20#				
Hominy cooked (4)	16#	3668 (3)	38240	.66	2.75/100#
Rice	16#	2324	25456	.80	5.00/100#
Rolled Oats	9#	2728	16227	.27	2.75/90#
Bread	116#	19572	136184	9.28 (6)	
Buns	86.7#	14628	111785	.70 (7)	
Bread Shorts (8)	112.5#	11596	81902	1.90	
Peaches dry (9)	36#	3233	50364	3.33	9.25/100#
Syrup (10)	109#		116303	2.60	
Sugar	7#		12698	.54	7.65/100#
Coffee (11)	7#			1.05	.151/#
Tea (12)	2#			.46	.23/#
Total		121,742	955,015	\$ 39.68	

1. The working men received meat three times per day, other patients twice a week and all received hash for breakfast.
2. Produced on the farm.
3. Calories for dry and cooked.
4. Left overs from Employees dining room.
5. Calculated as potato chips.
6. Includes cost of flour and yeast used in buns.
7. Cost of extra fat and sugar used in buns.
8. See Shorts bread in table for receiving and infirmary wards.
9. Calculated from analysis made by the Department of Agricultural Chemistry University of Missouri.
10. Feeding the Family by Mrs. Rose.
11. Coffee was served twice a day.
12. Tea was served once a day.

GENERAL DISCUSSION.

In general the food throughout the hospitals was conveyed by food trucks to the dumb waiters which carried the food up to the dining rooms on the different floors. It was placed in metal containers in the majority of the hospitals, some were covered and some were not. The food was received by the attendants in the dining rooms who supervised the distribution of it to the tables.

The dining rooms had to be managed and furnished differently because of the various classes of patients. Usually long tables were used with chairs or benches for the seating of the patients. Benches had to be used in dining rooms where the patients were hard to control. In the dining rooms used by the more hopeful and quiet patients table cloths were on the tables and the patients were allowed to serve themselves, with the assistance of the attendants who were always near. In the dining rooms where the patients were more demented, tables covered with oil cloth were used, or bare tables with the tops cleaned and scrubbed until in some cases they were as smooth as glass.

The dishes for the most part were enameled ware and consisted of one cup and one plate for a service. This was not satisfactory as it had chipped off which made it unsanitary, disagreeable and one might say dangerous. Aluminum was objected to because of the great expense. With the few better patients regular institution dishes were used.

The silver of a service varied with the type of patient. It was dangerous for many of them to have a knife and fork so they were given a spoon. The more reliable patients were given a knife, fork, and spoon but this class of patients usually was not large.

For the patients who could not serve themselves, the food was placed on the plates before they came to the dining room. The bread was usually placed by the plate on the table with the oleo or butter on top of it. The other foods were placed on the plates. If meat was served, the bones were usually removed. Care had to be taken for a number of patients would not eat or try to eat everything placed on their plates. The dietitian said that when they served boiled eggs on Easter it was necessary in the case of some of the patients to

remove the shells to prevent their being eaten.

One can see that the patients were more or less at the mercy of the attendants. It was quite necessary for the matron or dietitian to visit the dining room as often as possible during meal time to see that the food was being served properly. In some instances there was noticed a lack of uniformity in serving the plates. It might happen that a slice of bread was an inch or inch and a half thick or extremely small. One patient might receive a large serving of lean meat, another one all fat, and another a very small piece. It was necessary to see that the plates were served carefully avoiding a swimming mixture of beans and hominy or something equally unattractive. Some patients would not object to this at all but others were appreciative.

The attendants had to see that the plates were refilled, that plenty of bread was supplied and that the patients were eating what they were given. Some, if not watched, would hide the food wherever it was most convenient, and would continue to take more. The attendants were often seen encouraging the patients to

eat and were frequently successful in getting a patient to eat more food. It was necessary for the patients to be watched closely. One woman was seen to take food, chew it, remove it to her plate and chew a fresh mouthful of food for a while. Probably this was only a periodic spell but she was not getting much food. Also it was necessary to see that the attendants did not keep more food than they were supposed to have for use on their own tables. Some who had large appetites might be found hoarding large quantities of milk or other foods sent up to the patients.

The attendants have a hard position to fill and on the whole were very kind to the patients and did all they could to make the surroundings as pleasant as possible and took a personal interest in the welfare of their charges.

It might be of interest to mention that a number of patients were seen helping their comrades in many ways. They helped those who had difficulty in walking, cut the food on the plates for those who were not able to use the knife, fed them with the spoon and in general took considerable care of them.

DISCUSSION OR RESULTS.

The following pages give a discussion of the results of the studies, including (A) comparison of the data obtained from the four hospitals and (B) A comparison with other similar studies which have been made.

1. To determine the calorie requirement

A. The weight of the patients.

When the investigation was first planned the patients were to be weighed for two reasons, first to calculate the calorie requirement per pound and, second to compare the weight of the inmates in the insane hospitals with the weight of the normal adult. It was not possible to keep the weights of those working and those not working separate and to classify the work they did when such a large number of patients were to be weighed. Working patients were not all in one ward but scattered throughout the various wards and were usually out at work when the weighing was done and had to be weighed at different times. When the weighing was done outside on the stock scales it was possible to have them weighed on their way to work or as they returned but even then the kind or amount of work each was doing varied to a great extent. But it was

possible to obtain the weights of a known number of patients and to compare them with the weight of the average normal adult. As was stated before the weights were obtained of from 75-95 per cent of the total number of patients in the institution.

The summary in Table V shows the highest average weight for both men and women to be in State Hospital No. 3. The average weight of the men was 143.3 pounds and of the women 131.8 pounds. The lowest average weight found was 131 pounds for men and 112 pounds for women in State Hospital No. 4. No attempt was made to take the height of the patients but those in Hospital No. 4 appeared to be less tall than those in the other hospitals.

One noticeable feature in comparing hospitals No. 1 , No. 2, and No. 3, is that the difference in the average of the mens weight was slightly over 2 pounds while there was as much as 16 pounds difference in the averages for the women in the three hospitals. The table shows, in Hospital No. 4, the difference in the weights of the various classes of patients. The highest average for the women was found in the general

See next page for unfolded version.

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Table No. V showing the number of persons considered in the investigation, classifying them as working patients, non-working patients, and employees. The average weights of the patients are also given.

Institution	Type of Ward	Number of Patients		Average Weight of Patients(1) Pounds		Number of(2) Non-Working Patients		Number of Working Patients		Total Number of Patients	Number of Employees	Total Number of Persons Fed
		Men	Women	Men	Women	Men	Women	Men	Women			
Hospital Number I	All Wards	722	516	141.2	125.8	427	244	295	272	1238	168	1406
Hospital Number II	All Wards	922	833	141.6	115	779	589	349	244	1755	(3)	1755
Hospital Number III	All Wards	683	605	143.3	131.8	309	301	374	304	1288	152	1440
Hospital Number IV	Receiving Ward	35	30	135	114		7	35	23	65	(3)	
	Infirmary Ward	54	53	125	108	38	35	16	18	107	(3)	
	Hall Ward	52	56	148	113	2	33	50	23	108	)	
	Tubercu- losis Ward	32	38	117	104	32	38			70	)	12
	General Wards	169	170	130	121			169	170	339	3	689 (4)
Average Weight of all patients in Hospital Number IV				131	112							
All Hospitals in Study				139.2	121							

1. Six pounds per capita was deducted for the average weight of the clothing.
2. A number of these patients, when able, polished the floor and assisted with other light duties on the ward.
3. The Employees had a separate kitchen and dining room and were not considered in the study.
4. Twelve Employees were considered in the total number of persons fed.

ward, receiving wards and hall while the highest average for the men was found in the hall and the receiving wards.

The average weight for the women in the hall was 1 pound less than in the receiving ward, while the men weighed 13 pounds more in the hall than in the receiving ward. The average weights were the lowest in the tuberculosis wards. The women patients in the infirmary ward averaged only four pounds higher than the tubercular patients and the men 8 pounds higher.

There were striking differences in the weights of some of the patients on the same ward. Hospital No. 1 held the record for the heaviest woman patient. One could not be weighed on the physicians scales which were used but in one ward one patient weighed 350 pounds, while another one in the same ward weighed 70 pounds. In Hospital No. 4 in the mens infirmary ward one patient weighed 206 pounds while another who was probably about fifteen years old weighed 55 pounds. These examples are extreme but there were a number of patients not bed-fast who weighed 70 pounds while a number weighed 200 pounds or more.

The average weight for the patients, in all the hospitals, was 139.2 pounds for the men and 120.9 pounds for the women. Taking the average (1) weight of normal adult to be 154 pounds for the men and 123 for the women, the men patients in the studies were much more below normal in weight than the women, the men being 14 pounds approximately and the women 2 pounds below normal weight. It may be that men are not able to stand the indoor and more or less inactive life which it necessarily means for a large number of them, as well as women.

In comparing the average weights found with other institutions H. A. Pratt, in his investigation (2) made at Bayview Asylum in Baltimore, Maryland, found the

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1. Rose:- Feeding the Family. pp. 47, 75.
 2. Knight, Pratt and Langworthy Dietary Studies in Public Institutions in Baltimore, Maryland, U. S. Dept. of Agr., Office of Experiment Stations, Bulletin 223, pp. 44, 50, 60.
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average weight of 25 average sized inmates in that institution to be 145 pounds for the men and 118 pounds for the women. Mr. H. L. Knight in investigations made one year later than Mr. Pratt's in the same city estimated the average weight of the women in a home for aged women at 131 pounds. He also found in the German Aged Peoples Home in Baltimore the average weight of 18 men to be $141\frac{1}{2}$ pounds and 20 women to average 134 pounds. These three investigations were not made with insane patients but aged people, the majority being over 65 years of age, while Mr. Pratt mentioned a department for the insane in the Bayview Hospital but he does not state that any of those weighed were of that department.

In concluding we can say that the men average more below normal in weight than the women and that the average weight of the women varies to a greater degree in the different institutions than the average weight of the men. It is possible that the excessive weight of a few of the women brought up the average in a way which might lead to misinterpretation.

B. The amount of work done

In these studies the patients were placed as accurately as possible in two groups; the working patients and the non-working patients.

The patients classed as non-workers were those who were bedfast invalids, semi-invalids and those who were able to walk about but performed no work at all with the exception of a few who did a small amount of light work irregularly. It was not thought that any of these patients could be correctly classed as workers.

Those patients classed as working patients did not do a uniform amount of work, a few worked hard, using considerable energy, as for example, out on the farm, in the laundry, kitchen, bakery, etc., Others assisted in serving the food, washing dishes, taking care of the rooms and patients and many other duties requiring a limited amount of energy.

It seems that this classification, non-working and working patients, would give the average energy requirement of the patients. They could not be classed according to wards for in some wards all but a few would be comparatively hard workers, while in others

of 40 or 50 patients, perhaps only 2 would be doing hard work. There were seldom any wards which did not have at least 3 or 4 patients who were able to assist with some of the duties.

Atwater (1) in his studies of New York hospitals for the insane separated the hospital population into four classes, "1. The infirm, including the unproductive, inactive and unappreciative chronic patients. 2. The workers, including those chronic patients engaged in productive employment, and the more active of the restless and disturbed patients. 3. The acute, including all patients recently admitted, and the sick. 4. The employees." He (1) says this classification separates the population of the hospital into divisions with widely differing dietary needs and it is a matter of common observation that, "of the patients, workers need more substantial nourishment than do the infirm, and that the acute and also the sick among the chronic need more careful attention to the adaptation of the food

1. Atwater:-Dietaries for Hospitals for the Insane, State of New York State Commission in Lunacy Thirteenth Annual Report. p. 68.
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and the individual than do the chronic workers or non-workers.

We can also assume that the employees, representing a class of normal people, on the average decidedly younger in age than the patients, working actively and earning their own living, may reasonably be provided with a somewhat different diet. The force of this classification is more apparent when we consider that the bulk of the population of the hospital is made up of patients of the chronic class, and that a very considerable percentage of these are unproductive and comparatively inactive".

In Hospitals No. 3 and No. 4 a higher percentage of patients were classed as working patients than in Hospitals No. 1 and No. 2. This may be accounted for, in part, by the fact that the study in Hospital No. 3, was made last and there were more opportunities to give patients work as the weather was warmer and the gardens and other farm activities were in progress. This would not explain the high percent of working patients in Hospital No. 4 for it was too early for much farming. In this hospital there were less than half as many patients as in Hospital No. 3, and

as they used the cottage system for approximately half of the patients there were more occasions to give these patients work. If they did not have work outside of the cottage they spent a part of their time cleaning, scrubbing, polishing floors, airing bedding, etc., in the building in which they lived. The patients who lived in cottages were able to walk to the general dining room three times a day and for the most part appeared to be quite active.

In Hospital No. 1 the percentage classed as non-workers was only slightly higher than in Hospital No. 3. This study was made earlier in the Spring than that in Hospital No. 3, and the weather on those particular days was slightly disagreeable, so that the number of patients working out was less than usual.

Hospital No. 2 had a very high percentage of non-working patients. This was in part due to continuous rain while the studies were being made. Their number of non-workers is probably higher than in the other hospitals because of the larger number of patients. But in the Spring and Summer they can usually give a large proportion work, because they do extensive farming and have gardens and fruit to care for. This is also

true of all the hospitals.

C. The calculation of the number of calories required.

In Table No. VI the energy requirement of the patients was figured according to the amount of work they were doing, considering their requirement to be the same as that of normal adults. According to Mrs. Rose (1) the energy requirement of men, chiefly sitting at work, is 2200 to 2800 calories per person per day, and for women at sedentary occupations 2000 to 2200 calories. Although some of these patients could be classed as patients at rest, many were more active, therefore it seemed better to figure the requirement a little too high than too low, especially since the average weights were below normal. It appeared that 2500 calories per person per day for the men and 2000 calories for the women would make a good average. Mrs. Rose considers for men who are working, developing muscular strength 3,000 to 3,500 the daily calorie requirement and for women in occupation involving standing, walking or manual labor 2,200 to 2,500 calories per day.

1. Rose, Mrs., Feeding the Family. pp. 55,76.

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Table No. VI Showing the Calorie Requirements of the four hospitals

CALORIE REQUIREMENT OF NON-WORKING PATIENTS			CALORIE REQUIREMENT OF WORKING PATIENTS			CALORIE REQUIREMENT FOR EMPLOYEES			
Institution	No. of pa- tients	Calorie re- quirement per person per day	Total No. of Calories re- quired	No. of patients	Calorie re- quirement per person per day	Total No. calories required	No. of (1) Employees	Calories re- quired per person per day	Total No. of calories required
Hospital No. I									
Men	427	2,500	1,067,500	295	3,000	885,000	168 (2)	2,700	453,600
Women	244	2,000	488,000	272	2,500	680,000			
Total-1,555,500						Total-1,565,000	Total-453,600		
							Sum of Totals 3,574,000, Total calorie require- ment per day for Hospital No. I		
Hospital No. II									
Men	573	2,500	1,432,500	349	3,000	1,047,000			
Women	589	2,000	1,178,000	244	2,500	610,000			
Total-2,610,000						Total-1,657,000			
							Sum of Totals 4,267,500, Total calorie require- ment per day for Hospital No. II		
Hospital No. III									
Men	309	2,500	772,500	374	3,000	1,122,000	152 (2)	2,700	410,000
Women	301	2,000	602,000	304	2,500	760,000			
Total-1,374,500						Total-1,882,000	Total-410,000		
							Sum of Totals 3,666,900, Total calorie require- ment per day for Hospital No. III.		
Hospital No. IV									
Men	72	2,500	180,000	270	3,000	810,000			
Women	113	2,000	226,000	234	2,500	585,500			
Total-406,000						Total-1,395,500			

1. The number of employees are given only when they were considered in the investigation.
2. Includes men and women.
3. Only twelve employees were considered in the investigation and their calorie requirement was figured with the working patients.

In the studies in which the employees were considered their requirements was figured at 2700 calories per person per day. This would be ample for the employees as the women would require less than this amount with a few exceptions perhaps, and the men on the average would require this amount except those working out who would require slightly more.

The attendants, of course, perform very little if any muscular work so that their requirement would be low. Atwater (1) found in four studies, in the State Hospitals for the insane in New York, that the employees actually consumed 2,668 calories. It is not likely that the employees would eat less than their requirements and it seems that allowing them 2,700 calories would be sufficient.

Calculating the average daily per capita requirements of each hospital giving each class the following allowance; non-working men 2,500 calories, non-working women 2,000 calories, working men 3,000 calories, working women 2,500 calories and the employees 2,700 calories, the average per capita requirement for the four hospitals was 2,533 calories.

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1. Atwater:-Dietaries for Hospitals for the Insane. State of New York State Commission in Lunacy, Thirteenth Ann. Rpt. p. 108.
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The average per capita requirements varied from 2,431 to 2,614 calories in the four hospitals. In Hospitals No. 1 and No. 3 where the number of persons in the study were 1406 and 1440 respectively, including the employees, the requirement varied only 4 calories from 2,542 to 2,546 calories, see Table VIII. Hospital No. 3 required the highest number of calories probably due to the fact that they had a slightly higher percent of working people when the study was made.

In Hospital No. 2 where a much higher percent of the patients were non-workers the daily calorie requirement per person figured the lowest of the four hospitals and was approximately 100 calories less than the requirements in Hospitals No. 1 and No. 3.

The daily per capita requirement of Hospital No. 4 figured the highest being 2,614 calories. This was because a higher percent of the patients were classified as working patients than in the other three hospitals.

As far as can be found the actual energy requirements of the insane has not been worked out.

According to Langworthy (1) Nötel, who collected data showing the nutrients supplied in nine Swiss institutions for the insane, was of the opinion that the food requirements of the insane were the same as those of normal persons doing light work except in special mental conditions where special diets were required. Von Gellhorn, in a German institution at Uckermunde gave to male patients of the second class, 122.4 grams protein, 71 grams fat and 475 grams carbohydrates. This would furnish over 3,000 calories. He states that this diet was abundant and that the death rate was reduced 3 per cent in two years. Meinert believed the daily diet of the insane should correspond to Voit's standard and supply 118 grams protein, of which 100 grams should be digestible, 56 grams of fat and 500 grams of carbohydrates, This would give practically the same number of calories as Nötel advocated. J. C. Dunlop after studying the diets of pauper lunatics in Scotland believed that the average asylum diet should furnish 3,300 calories to the men and 3,500 to male working patients and

1. Langworthy:-Dietary Studies of Groups, Especially in Public Institutions. U. S. Dept. of Agr., Office of Exp. Sta. Ann. Rpt. for year ended June 30, 1902.
pp. 405-6.
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3,100 to comparatively idle patients. That for women it should be 2,650, 2,800 and 2,500 calories respectively.

Atwater (1) says concerning the dietary standards for the insane, that the patients in the Government Hospital for the insane at Washington, consumed on an average, a diet, furnishing practically the same quantities of protein and energy as those in the diet of similar patients in New York State institution. He says, "Basing our inferences upon what would appear to be the food requirements of persons in health and upon the actual food consumption in the majority of American hospitals for the insane in which dietaries studies have been made, it would seem that the average hospital population would be amply nourished with a diet furnishing 90 grams of protein and 2,700 calories of energy per man per day, and very likely somewhat less would suffice for healthful nourishment. It is, however, better to

1. Atwater:-Dietetics in Relation to Hospitals for the Insane. U. S. Dept. of Agr., Office of Exp. Stat. Ann. Rpt. for the year ended June 30, 1904. pp. 484-5
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consider the physiological demands as requiring a diet supplying 100 grams of total (corresponding to 92 grams of digestible protein and having a fuel value of 2,950 calories of energy per man per day. The corresponding data on the basis of 'per person' per day, assuming the population to be approximately one-half women, would be 85 grams of the total, or 78 grams of digestible protein, and 2,500 calories of energy." He distinguishes between the physiological standard which supplies the required amount of nourishment and the ration allowance. The latter must be sufficient to meet the individual's physiological demands and allow a margin for waste, shrinkage, etc.

The average calorie requirement of the patients in the Missouri State Insane Hospitals figured 2,533 calories per capita per day considering their energy requirement to be the same as the normal adult. This is 33 calories more than Atwater considered as the average energy requirement necessary to meet the physiological demands of such patients.

2. The amount of food served in the different hospitals.

A. Calories of food served.

The total energy calories and protein calories of food served to the patient are worked out in detail in Tables No. I and Ia, No. II and IIa, No. III and IIIa, No. IV, IVa, and IVb, for Hospitals Nos. 1, 2, 3 and 4 respectively. The tables give the data for the two day's study in each hospital with the exception of Hospital No. 4 when^{ed} study was made for one day in each of the three kitchens.

Table No. VII gives a summary of the data found in the above tables. It includes the total number of calories served on each day of the study, the average number of calories served per day, the average number of calories served per person per day, the total protein calories served each day, the average protein calories served and the per cent of protein calories served.

In comparing the average daily per capita calories served Hospital No. 1 served 3,227 total calories, No. 2, 3,074, Hospital No. 3, 3175, and Hospital No. 4 served 2,868 calories. Hospital No. 1 served

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Table No. VII comparing the calorie requirement of the hospitals with the amount of food served and showing the amount spent for food.

	Hospital No. I	Hospital No. II	Hospital No. III	Hospital No. IV (2)
Total daily calorie requirement of patients not working---	1,555,500	2,610,500	1,374,500	406,000
Total daily calorie requirement of patients working-----	1,565,000	1,657,000	1,882,000	1,395,000
Total daily calorie requirement of employees (1)-----	453,600		410,400	
Total daily calorie requirement of institution-----	3,574,100	4,267,500	3,666,900	1,801,000
Total number of calories served first day-----	4,734,918	5,340,589	4,183,316	1,976,295
Total number of calories served second day-----	4,339,139	5,449,937	4,963,308	
Average number of calories served per day-----	4,537,028	5,395,263	4,573,312	1,975,295
Average number of calories served per person per day-----	3,227	3,074	3,175	2,868
Average number of calories required per person per day----	2,542	2,431	2,546	2,614
Total number of protein calories served first day-----	562,080	868,803	399,882	
Total number of protein calories served second day-----	542,887	1,070,311	559,801	(2)
Average number of protein calories served per day-----	552,483	969,557	479,841	242,213
% of protein calories served-----	12%	17%	10%	12%
Cost of food served first day (3)-----	\$-256.79	\$ 228.45	\$ 265.50	\$ 79.18
Cost of food served second day (3)-----	230.29	250.30	221.85	
Average cost of food per day (3)-----	243.54	239.37	243.67	79.18
Average cost of food per person per day (3)-----	.173	.136	.169	.116
Average cost of food per thousand calories (3)-----	.0536	.0443	.0532	.040

1. The food for the employees was considered only when it was prepared in the kitchen used for patients.
2. The food for the patients was prepared in three different kitchens. The investigation was only made for one day in each kitchen and was made on different days. These figures were obtained by adding the results from the three kitchens considering it equivalent to one day for all of the patients, for the purpose of the comparison.
3. This cost does not include the cost of the food produced or made on the state farm. In table the farm products have been given market value.

the highest number of calories and Hospital No. 4 served the smallest number. There was very little difference in the number served by Hospitals No. 1 and No. 3 but Hospital No. 1 served 52 more calories per person per day. Hospital No. 2 served 153 calories less than No. 1, while Hospital No. 4 served 366 calories less than No. 1. The studies made in Hospitals No. 1 and No. 3 were made more nearly uniform than the studies in Hospitals No. 2 and No. 4. This may be the similarity in the results in Hospitals No. 1 and No. 3 and the larger differences with the other two hospitals. The employees were not included in the study at Hospital No. 2 and only in one instance, in No. 4, while in the other hospitals the employees were considered so far as their food was concerned the same as the patients. If all of the food served to the employees had been calculated the total calories in Hospitals No. 1 and 3 would have been slightly higher than as indicated in ^{the} table and would have made the difference even greater.

The number of protein calories served varied from 10 percent of the total calories to 17 percent. Hospital No. 2 served the highest amount of protein calories and Hospital No. 3 served the lowest number.

Hospitals No. 1 and No. 4 were serving 12 percent. In making the studies in the hospitals serving meat only several times per week besides hash, containing meat, for breakfast and the meat for the working people, the data was collected on both the meat and meatless days. Besides the working people who were served meat from once to three times daily the tubercular patients and those in the receiving wards received more meat generally than the majority of the patients in the Hospital.

B. The adequacy of the number of calories served.

To find if the energy requirement of the patients was satisfactorily met it will be necessary to discuss the results of other similar studies made.

Atwater (1) found in studies of three of the New York State Hospitals for the insane that the amount eaten by the different classes of patients varied. He found that the infirm males consumed on the average

1. Atwater:-Dietaries for Hospitals for the Insane
State of New York State Commission in Lunacy. Thirteenth Annual Report. pp. 106-7.
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per person per day 65 grams of protein and 2,230 total calories. The male workers consumed 103 grams of protein and 2,925 total calories. The infirm female patients consumed 52 grams of protein and 1,545 total calories. The female workers consumed 51 grams of protein and 1,744 total calories.

The average daily per capita amount consumed has been determined in several insane hospitals.

In the St. Lawrence Hospital Atwater (1) determined the average daily per capita of the dietaries served to 1,463 patients and employees out of a total population of 1,750 patients. He says concerning these studies, "It will suffice to say that the average ration (total nutrients and energy per person per day in food eaten, for the total population was thus found to be 73 grams of protein, 76 grams of fat, 317 grams of carbohydrates and 2,306 calories of energy per person per day. These results we may take as representing approximately the average amount of nutrients for the population of the St. Lawrence State Hospital in 1899". He found it impractical to take the estimate of the food consumption of the population of the Long Island State Hospital or at the Willard State Hospital as a whole.

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1. Atwater:-Dietaries for Hospitals for the Insane. State of New York State Commission in Lunacy. Thirteenth Annual Report. pp. 109-16.
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He found that the results of the studies made concerning other conditions in these two hospitals agreed quite closely with corresponding studies made in the St. Lawrence hospital. So he felt that the average obtained in the St. Lawrence hospital might be representative of the amount consumed in the New York hospital system.

As has been referred to before on Page 11 Atwater considers that 85 grams of protein and a total of 2,500 calories is sufficient and even ample for the amount consumed per person per day by the insane. This amount is computed by the factors proposed by Rubner (1), calculated by the new factors which have been more recently advocated the total calories would be 2,425 calories instead of 2,500.

Investigation (2) were carried on in the Government Hospital for the Insane in Washington, D. C., in 1902-3. This work was done by Pratt and Milner under

1. Ibid: p. 52

2. Pratt and Milner: Dietary Studies at the Government Hospital for the Insane, Washington, D. C., U. S. Dept. of Agr., Office of Exp. Sta. Bulletin No. 150. pp. 12, 80.

the direction of Atwater. In this study the average per capita consumption of the patients was found to be very much the same as in the New York hospital.

Of the 1,500 and more patients in the Government Hospital, the average consumption per day was 90 grams of protein and 2,704 total energy calories per man per day. Assuming the ratio (4) per man per person, per woman, to be 10:9:8 the average grams of protein per person per day would be 81 grams of protein and 2,433 calories of energy per day. This was slightly higher than the 73 grams of protein and 2,305 calories consumed per person per day the New York State Hospitals where the food seemed abundant.

Pratt also carried on a series of studies (1) at Bayview Asylum, Baltimore, Maryland, in 1905, which cared for insane people and aged people. The percent of insane was less than half of the total population. The results from this investigation, of course, could not be compared directly with the studies in the hospitals

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1. Knight, Pratt and Langworthy:-Dietary Studies in Public Institutions in Baltimore, Maryland. U. S. Dept. of Agr., Office of Exp. Sta. Bulletin 223. pp. 36, 37.
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exclusively for the insane, but it is interesting to compare one phase of this study with those already discussed.

The quality of nutrients and energy of the diet was estimated from the kind and amount of food purchased and farm products raised for the patients for a year. The results showed, that the amount of food supplied was 96 grams of protein and 2,398 calories of fuel value. The average waste during the time when the studies were made, was not more than 3 percent, which, would decrease the amount of nutrients slightly.

The consideration of the waste is necessary before the amount of food necessary to serve is known.

In the Government Hospital, in Washington (1) the "dining room" waste, included the table waste and the excess food which was sent to the dining room and not served but was added to the plate waste. This averaged for the patients 16 percent of the total served and 24 percent of that provided for the employees. In

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1. Pratt and Milner: Dietary Studies at the Government Hospital for the Insane. Washington, D. C., U. S. Dept. of Agr., Office of Exp. Sta. Bulletin No. 150, pp. 84-7.
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the average of all of the studies made the amount of food returned to the kitchen, from the dining rooms, and used again averaged 100 calories of energy per man per day, and the food wasted amounted to 54 calories. This amount does not include the kitchen waste. The kitchen waste was figured as accurately as possible and was found to be sufficient to supply 11 grams of protein and 704 calories of energy per man per day. Adding the dining room waste to kitchen waste there appeared to be about 25 percent loss to the hospital. In the New York hospitals this loss was about 30 percent of the total food. On the other hand the study (1) made by Pratt in Bayview Asylum the average amount wasted in the dining rooms for the men was only 2 percent. He considered this unusually low as 8 to 10 percent waste was considered small. He states that the small waste was due to care in selection and preparation of the food provided and good judgment in apportioning it to the various dining rooms. These studies, of course, were limited

1. Knight, Pratt and Langworthy:-Dietary Studies in Public Institutions in Baltimore, Maryland. U. S. Dept. of Agr., Office of Exp. Sta. Bulletin 223. pp. 35-6.

in number and as the institution was not entirely an insane hospital the amount of waste would not be so great.

Atwater made a table giving "proposed ration allowances per person per day, based upon the suggested dietary standard for the insane with different margins for shrinkage, waste, etc. The table (1) given is as follows:-

Rations	Protein	Fuel Value
	grams	calories
Basal amount no margin	85	2,500
Ration allowance on basis of 15 per cent margin	100	2,950
Ration allowance on basis of 20 per cent margin	106	3,125
Ration allowance on basis of 25 per cent margin	113	3,350
Ration allowance on basis of 30 per cent margin	121	3,575

1. Atwater:-Dietetics in Relation to Hospitals for the Insane. U. S. Dept. of Agr., Office of Exp. Sta. Ann. Rpt. for the year ended July 30, 1904. p. 485.

It was found, in the Missouri State Hospitals for the insane, that the total energy requirement per person per day, worked out on the basis of the amount necessary for normal persons, was comparatively uniform in the four hospitals. Since this amount was near the basal diet worked out by Atwater from his investigations, it seems reasonable that the adequacy of the diets in the studies in Missouri might be determined in a measure from his results.

As the amount of food served more than met the average energy requirement of the patients per person per day, the determining factor of the adequacy of number of energy calories served, would be the amount of waste. The margin for waste above the basal diet given on page 94 gives each hospital the following percentage allowed for waste:- Hospital No. 1 a margin of over 20 percent, Hospital No. 2 not quite 20 percent, and Hospital No. 3 a little over 20 percent, and Hospital No. 4 a margin of not quite 15 percent. Nothing was determined about the waste in the hospitals except in No. 3 and No. 4 where it was estimated to be small and certainly within their margin allowed. With the exception of Hospital No. 2 the hospitals all had a larger margin for

waste of total energy calories than protein calories. But as Atwater's basal diet gives an ample amount of protein the patients were undoubtedly being served sufficient protein. Hospital No. 3 was giving the least protein but considering the fact that a large amount of their protein was obtained from milk, in a form easily available, and that the waste was small, they were probably receiving more protein than was really necessary but not too much to be sure of a sufficient amount. If the average weights of the patients are indicative of adequate total calories and protein calories the patients in Hospital No. 4 were being exceptionally well fed.

In summarizing it can be said that the hospitals were found to be serving a sufficient amount of food to meet the average energy requirements of the patients and that each hospital was serving enough food to allow for a reasonable margin of waste.

3. The selection of the food.

Besides supplying the protein and total calories of the diet the following points must be also borne in mind.

All forms of protein are not equally efficient in supplying body needs. Recent investigations have pointed to the efficiency of the milk proteins for this purpose so we cannot urge too strongly the use of milk, skimmed milk and cheese in these dietaries. An examination of the above dietaries shows the following daily per capita consumption of milk and milk products:

	Hospital No. 1	Hospital No. 2	Hospital No. 3	Hospital No. 4 Receiving and Infirm- ary Wards	Tuber- culosis and Hall Wards	Gen- eral Wards
Whole Milk	18 oz.	2.6 oz.	27 oz.	4.4 oz.	4.5 oz.	
Skimmed & Butter Milk	9 oz.	19.8 oz.	1.9 oz.	15.6 oz.	12.9 oz	6.4

Skimmed milk could be used to a greater advantage than the above would indicate. The generous use of milk at Hospital No. 3 seems to account for the efficiency of the diet.

The danger of the excessive use of beans has been pointed out by McCollum (1) ^{he states} that they are injurious to the intestine. For this reason, he concludes, they should not form a large part of a relatively monotonous diet such as institutions in this country frequently served their patients.

Next we must be sure that the necessary mineral constituents are properly represented. These must be present in the food materials used and must be retained in their preparation.

Forbes (2) says that a high ash is valuable not only from the nutritive consideration but that a deficiency of these substances may cause a diet to be constipating. These mineral substances which are acid and basic elements, should preferably be predominatingly basic, or yeild a basic ash on burning in the body.

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1. McCollum, Simonds and Pitz:-The Dietary Deficiencies of the White Bean. Phaseolus Vulgaris. Jr. Biol. Chem., April 1917. p. 526.
 2. Forbes:-The Mineral Nutrients in Practical Human Dietetics. Journal of Home Economics, March 1916, p. 129.
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Those foods giving the acid ash are meats, eggs, cereals and those giving the basic ash are vegetables, milk and most fruits.

Forbes (1) discusses diets as follows:- "The diets which are most likely to supply enough of each of the minerals are those characterized by liberality and diversity..... The central features of improperly chosen diets are usually an undue dependence upon meats and foods made from finely milled cereals or other foods lacking the outer seed coats, and the too little use of milk and vegetables".

The necessary vitamins (1) or food accessories must be present. Not a great deal is known about these substances except where they are found. One, the fat soluble vitamin, is especially abundant in milk, is found in smaller quantities in leaves of plants but is found only in small amounts in cereals. Besides being found in milk fat it is found in egg fat and these two foods make excellent sources of it.

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1. Forbes:-The Mineral Nutrients in Practical Human Dietetics. Journal of Home Economics, March 1916, p. 129.
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The second unknown, the so-called water soluble, is found everywhere abundantly except in polished rice, animal or vegetable fats, sugars and starches.

The foods which will render a seed diet adequate are, milk, leaves of plants, such as cabbage, lettuce, spinach and other leaves which can be used for food. The potatoes and sweet potatoes are corrective in a measure but not so much so as plant leaves. A nutritional disease affecting the eyes results when the diet consists of too much of the seed foods with a deficient amount of milk and leaf foods containing the necessary fat soluble compound.

McCollum (1) sums the problem in practical dietetics and animal production as follows:

To secure a "satisfactory adjustment among (1) the digestion products of the proteins of the diet (amino acids), (2) an adequate supply of the fat soluble A and (3) more important even than a high average of the protein mixture of the ration, a content of the essential inorganic elements suitable in amount and proportions".

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1. McCollum, Simonds and Pitz:-The Dietary Deficiencies of the White Bean. *Phaseolus Vulgaris*, Jr. Biol. Chem., April 1917. p. 526.
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Vedder (1) gives the following rules for the prevention of deficiency diseases having special reference to institution feeding:-

"1. In any institution where bread is a staple article of diet, it should be made from whole wheat flour. 2. If much rice is used/^{use} unmilled. 3. Some fresh fruit or vegetable should be given at least once a week or preferably twice. 4. Legumes not canned should be served once a week. 5. Barley, a known preventative of beri-beri should be served in all soups. 6. Cornmeal if used extensively should be made from the whole corn. 7. White potatoes and fresh meat should be served once a week and preferably once daily. 8. Too exclusive use of canned goods should be avoided".

Vedder believed a strict application of the above rules would eradicate scurvy, beri-beri, and pellagra from the United States. These rules are very reasonable and should be applicable to all institutions. He does not make any statement concerning the use of milk and green leaves which McCollum so heartily advocates. With the addition of the leaf vegetable once

1. Vedder:-The Relation of the Diet and Beri-Beri.
Journal American Medical Association. Nov. 18, 1918.
pp. 1494-97.
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or twice a week with a sufficient amount of milk every day, it would seem that a diet would be adequate according to both McCollum and Forbes.

The dietaries served in the Missouri State Hospitals for the Insane can be compared to the requirements of a good diet^{by} referring to Table VIII. This table gives the amount of the different food materials served per capita during the day's on which the studies were made.

There were considerable differences noted in the dietaries studied. A number of the hospitals were depending largely upon a diet of farinaceous foods, namely; oatmeal, hominy, rice, cornmeal, farina and legumes. As the amount of milk served was small in several of the hospitals and no fresh vegetables or leaf vegetables were used, there seemed to be danger in several of the hospitals of serving a diet lacking in some of the important food constituents.

Hospital No. 3 besides serving a generous amount of whole milk served butter, fresh cabbage, lettuce and radishes. If all hospitals or institutions would maintain a diet as good as this or even use oleo instead of butter as this hospital had to do later, there could be

Table VIII Showing Oz. of Different Food Material Served / Capita.

Food Material	Hospital No. I		Hospital No. II		Hospital No. III		Hospital No. IV		
	Apr. 6	Apr. 7	Apr. 27	Apr. 28	May 10	May 11	Mar. 17 Rec. & Infir. Wards	Mar. 19 Halls & Tb. Wards	Mar. 20 General & Dining Room
	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.	Oz.
Meat & Fish A.P.	8.6	8.6	7.6	7.9	5.	.78	5.6	2.06	4.6
Cereals	3.6	3.58	1.36	1.25	2.7	2.06	2.69	3.3	2.3
Bread & Rolls	13.1(2)	13.1(2)	17.3	17.3	11.6	13.(3)	13.5	7.3(1)	14.8
Oleomargarine	1.02	1.	.839	.84			.88	.71	.75
Butter					.92	1.1			
Cheese									
Coffee	.45	.45	.18	.18	.56	.56	.27	.26	.33
Tea	.02	.02	.036	.03	.22	.22	.13	.13	.094
Milk									
a) whole	18.	18.	2.6	2.6	27.	27.	4.4	4.5	
b) skimmed and butter-milk	.9	.97	19.8	19.8	1.9	1.9	15.6	12.9	6.4
Eggs	.16	.29	.22	.22	.14	.64	.86	.54	
Dried Fruit	1.7		1.7	1.9		1.6	2.2	3.1	1.7
Fresh Fruit	.44	.44				.05			
Canned Fruit							5.2		
Sugar	2.5	2.5	1.85	1.7	2.6	2.6	1.3	1.6	.33
Syrup & Molasses	1.9	1.9	2.5	2.5	1.76	2.2	5.7	4.3	5.1
Potatoes	7.5	7.5	.27		13.	11.			3.3
Dried Legumes	1.4	1.48	2.3	2.3		1.6	1.6	1.9	1.8
Cakes						(2)		2.1	
Vegetable	4.8	.37			8.6	3.9			

1. Does not include cornbread for dinner. 2. Calculation made from recipes used. 3. Includes bread used in bread pudding.

no question about the adequacy of the selection of the foods.

Hospital No. 1 served more meat than No. 3 but not so much milk and potatoes. They were serving a good quality of kraut which made the valuable addition of a leafy vegetable in the diet.

Hospital No. 4 was using shorts flour which was a good addition to the diet although many of the patients did not realize its value and objected to eating it.

Hospital No. 2 frequently served parsnips and onions which are not given on the table because they were not served during the days the studies were made. If the hospitals were not serving a number of foods the value of which cannot be measured by calories, it was either because they thought they could not afford it, or perhaps did not realize the necessity of having them in the dietaries.

4. The cost of the food.

The cost of the food served in the hospitals was figured for the average cost per person per day and the cost per 1000 calories. Table VII gives the cost of the food purchased direct and does not include the

food produced on the farm. Table No. IX gives the total cost of the food issued to the kitchen including that produced on the farm. These foods were given the estimated average market value at that time. This value was made uniform throughout the four hospitals.

As calculated in Table No. VII the lowest cost of food per person per day was paid in Hospital 4, \$0.116, the highest in Hospital No. 1, \$0.173, Hospital No. 3, \$0.169, second highest and Hospital No. 2, third highest at \$0.136. In Table No. IX, Hospital No. 4 was again paying the lowest amount at \$0.138 per person per day, Hospital No. 2 next at \$0.191, Hospital No. 1 third at \$0.223 and Hospital No. 3 the highest at \$0.257.

There were a number of reasons for differences in the amount paid for food by the hospitals. The prices of the food materials were obtained at the time each study was made. In those hospitals studied last a number of articles of food had risen in price after the earlier studies were made. A number of the 1916 contracts had expired during the Spring unless the hospital had made their contracts late in 1916. The quality of the food purchased varied in the different

Table No. IX showing the comparative cost of meals served in the State Hospitals giving the food produced on the farm the following values:

whole milk, 4¢/#; skimmed milk and butter milk, 2¢/#;
butter, \$17.74/100#(1); eggs, 19¢/#(or 28¢ doz.);
pork 20¢/#; lard, 25¢/#; apples, \$1.60/bu.

	Hospital Number I	Hospital Number II	Hospital Number III	Hospital Number IV
Cost food--1st day	\$ 326.49	\$356.98	\$387.17	\$95.68
Cost food--2nd day	302.17	314.83	355.41	
Average cost food-- 1 day	314.33	335.90	371.29	95.68
Average cost food-- person day	.223	.191	.257	.138
Average cost food/ 1000 cal.	.0692	.0622	.0809	.0483

1. Since the butter was made on the farm from cream purchased, it is given the price which was being paid for oleomargarine in that institution.

hospitals as well as the types of menus served. The prices of food were rising so rapidly that the cost of the food was about to be made more important than the adequacy of the diets. Another factor varying the cost of the food was the proximity of the hospital to the markets or distributing station. This influenced not only the cost of the food but probably the quality as well.

In the following table the cost of the food in the Missouri hospitals is given with the average price for food paid by 13 New York State Hospitals (1) for nine months ending June 30, 1916.

	13 N. Y. State(1) Hospitals 9 mos.End- ing June 30,1916	13 N. Y. State(1) Hospitals 12mos.End- ing June 30,1917	Miss- ouri State Hospi- tal No.1	Miss- ouri State Hospi- tal No.2	Miss- ouri State Hospi- tal No. 3	Miss- ouri State Hospi- tal No. 4
Average daily cost per person fed	\$0.171	\$0.1995	\$0.223	\$0.191	\$0.257	\$0.138
Average cost per 1000 cal- ories	\$0.056	\$0.069	\$0.069	\$0.062	\$0.080	\$0.048

1. Report of the Committee on Dietary and Food Supplies.in the New York State Hospitals. The State Hospital Quarterly, Nov. 1916 *and* Nov. 1917.

In making the comparisons it must be remembered that the average for the Missouri State Hospitals is for only several days during that part of the year when food was the highest while in the New York hospitals the average was for nine months and one year, The one year period including the summer months when food is produced on the farm making it cheaper. The total amount of food purchased in the nine months ^{in 1916} was \$1,612,281.10, ^{the year} in 1917 the amount was \$2,520,528.34. The farm products amounted to \$229,598.81 in 1916 and \$394,225.89 in 1917. This made the food produced on the farm 14 per cent and 15 per cent respectively.

	13 N. Y. State Hospitals	Miss- ouri State Hospital No. 1	Miss- ouri State Hospital No. 2	Miss- ouri State Hospital No. 3	Miss ouri State Hospital No. 4
Average daily cost per person fed	\$0.171	\$0.223	\$0.191	\$0.257	\$0.138
Average Cost per 1000 calories	\$0.056	\$0.069	\$0.062	\$0.080	\$0.048

A price list is given in Table X of the articles of food used in the dietaries, during the time the studies

Table X

Price List of a number of articles of food of the State Hospitals used during the investigation.

	Hospital No.I Fulton	Hospital No.II St. Joseph	Hospital No. III Nevada	Hospital No. IV Farmington
Apples, dried			.1075/#	.065/#
Apples, canned				2.75/case
Bacon, 2 grades 1	18.46/100#	19.50/100#	34.98/100#	18.46/100#
2	17.10/100#		28.48/100#	
Beef	10.18/100#	11.75/100#	12.96/100#	10.45/100#
Beans				
Navy	.117/#	.12/#	.17/#	.065/#
Pinta	.075/#			.065/#
Lima			.1450/#	.065/#
Soy			.0695/#	
Cabbage			.085/#	
Coffee	.13/#	.13/#	.15/#	.15/#
Crackers	.08/#			
Corn Meal	3.00/100#	3.10/100#	4.00/100#	1.90/100#
Corn Syrup	.37/gal.	.47/gal.	.60/gal.	.32/gal.
Cheese			25.94/100#	
Eggs	.28/doz.	.33/doz.	.30/doz.	.25/doz.
Farina			.07/#	
Fat-Oleo	19.74/100#	14.50/100#	17.74/100#	17.23/100#
Butter				
Cooking	18.96/100#		11.72/100#	17.34/100#
Flour	5.30/100#	6.23/100#	6.55/100#	7.40/100#
Ginger			.27/#	.35/#
Hominy, Flake	4.50/100#	3.10/100#		3.50/100#
Pearl			4.60/100#	2.75/100#
Kraut	6.25/cask			
Lemons			5.00/box	
Liver		3.50/100#	8.98/100#	
Macaroni			.08	
Molasses				.35/gal.
Onions				.10/#
Potatoes, Irish	2.67/bu.	2.69/bu.	3.10/bu.	2.22/bu.
Peaches, dried	.0575/#	.875/#	.10/#	.0925/#
Pickles, sour			.30/gal.	
Prunes		.085	.11	
Rice		.	.08/#	.05/#
Rolled Oats	7.25/100#		5.05/100#	2.75/90#
Sage				.45/doz.pk
Spaghetti				.055/#
Shorts flour				2.25/100#
Sugar gran.	7.47/100#	7.58/100#	7.95/100#	7.66/100#
Tomatoes canned	.28/gal.			
Tea	.23/#	.135/#	.23/#	.23/#
Wienerwursts		9.50/100#	15.98/100#	
Yeast	.25/#	.25/#	.25/#	.25/#

SUMMARY.

- I. Dietary studies were made of the diets served in the four Missouri State Hospitals for the Insane.
- II. The calorie requirement.

1. The average weights of the patients in all the hospitals were 139.2 pounds for the men and 120.9 pounds for the women. The average weight of the men in three of the hospitals varied only from 141 pounds to 143 pounds. In the remaining hospitals the average weight of the men was 131 pounds. The weight of the women in two of the hospitals averaged above the average weight of normal women, 123 pounds. Those averages were 125 and 131 pounds. The weights for the women averaging below normal were 115 and 112 pounds.

2. The patients doing work were classed as working patients and those performing no work were classed as non-working patients. The number of patients working in hospital during the period of the study varied widely. The percentage of patients working in the different hospitals were as follows;-

Hospital No. 1-----44%

Hospital No. 2-----33%

Hospital No. 3-----52%

Hospital No. 4-----75%

3. The total number of calories required were estimated on the assumption that the patients required the same amount as the average normal person. The average daily per capita requirement for all of the institutions was found to be 2,533 calories.

III. The amount of food served.

The number of food calories served in each hospital more than meet the energy requirements. According to Atwater's proposed dietary standard for the insane of 2,500 calories per person per day the margin for waste was in each hospital as follows:-

Hospital No. 1, over 20% margin

Hospital No. 2, not quite 20% margin

Hospital No. 3, over 20% margin

Hospital No. 4, not quite 15% margin

The percent of the total calories served in the form of protein calories were 12% in Hospital No. 1, 17% in Hospital No. 2, 10% in Hospital No. 3, and 12% in Hospital No. 4.

IV. The selection of food.

In several instances the hospitals were depending largely upon cereal foods and legumes and dried fruit in their dietaries. The majority of the hospitals were not serving many if any vegetables other than dried beans and dried peas and occasionally a few potatoes. Those hospitals serving the greatest variety of vegetables also were serving an ample amount of whole milk. These menus were satisfactory in every respect. In a number of the sample menus a lack of variety is shown both in the food material used and the method of preparation. The food was prepared well as a general rule and care was used in serving it.

V. The cost of the food.

During the days of the study the average cost of the food per person per day as issued to the kitchen was as follows:-

Hospital No. 1-----	\$0.223
Hospital No. 2-----	\$0.191
Hospital No. 3-----	\$0.257
Hospital No. 4-----	\$0.138

The difference in the cost of the food was due to (1) a difference in the quality of the menus served and used, (2) the time of the year in which the contracts expired, (3) the continued rise in prices and the difference in the months in which the studies were made, (4) the proximity to distributing stations.

RECOMMENDATIONS FOR IMPROVEMENT.

By securing a capable dietitian as Hospital No. 3 has done, the majority of the institutions feeding problem; will be solved. The adequacy of the diet in this hospital could not be questioned and cost per person per day must have been the minimum knowing what was paid per 1000 calories.

The adequacy of the diet must be determined first and the price made to meet it. Each foodstuff, protein, fat, carbohydrates, mineral substances, the fat soluble A, and water soluble B, is just as important for the body of the patient as shoes, stockings, underclothing, outside garment and a bed on which to sleep. If these last mentioned necessities rise in price they are purchased so why eliminate certain required foods when the price is increased? It is because we have known more about the value of money than food but we cannot deny the value of certain foods any longer. Knowing these food values and the cost the dietitian can serve adequate dietaries for the minimum amount of money.

If it is thought the services of a dietitian cannot be afforded, which Dr. Bradley says is not true,

several closely lo^cated institutions might employ one dietitian to spend a part of her time in each hospital leaving the work in charge of the matron during her absence.

The matrons with their housekeeping duties cannot be expected to keep in touch with all of the information concerning the food problem and her practical experience with the local problems would be valuable help to the dietitian.

The institutions are more or less standardized and the dietitian would find that often methods, menus, etc., applied to one hospital would be applicable to another hospital with a little if any modifications.

Each hospital has its specialties or hobbies which another hospital would be glad to know about. If there is a dietitian in each hospital they should organize and meet perhaps annually or semi-annually. Cooperation among them would not only help them in solving their own problems but add interest to their work which might become monotonous.

Each hospital should standardize their food tables and know the amount necessary of each food material used.

An extensive table(1) had been made for the

1. Dept. of Pub. Charity, New York; Basic Quantity Food

Tables. p. 5.

use of institutions in New York by the Department of Public Charities. The tables are following the form used by Charles S. Pitcher, Steward of King's Park State Hospital, New York. The per capita portions are based "upon experience in the institution Department of the Public Charities and concurred in and by the Departments of Health, Correction and Bellevue and Allied Hospitals." The table has been worked out for officers and staff, nurses, other employees, hospital patients and inmates of homes for the aged tubercular patients, feeble minded and epileptics, children in hospitals, and lodgers at municipal lodging houses, and industrial workers at municipal lodging houses. For the patients and inmates the table appears in the following form:-

Article	No. issues in each 28 day period	Daily per cap- ita al- lowance	For 3,680 per- sons	For 3,690 per- sons	For 3,710 per- sons	etc.
		oz.	Lbs.	Lbs.	Lbs.	
Meats fresh roast beef	6	8	1,840	1,845	1,850	

The waste is checked up after each meal and if it is too great the amount issued next time is reduced to the amount in the column on the left of the last one used. A waste accounting system should be used to know if the institution as a whole is having the correct amount issued to them and also to serve as a guide in distributing the food to the different dining rooms, one dining room may be receiving too much of one kind of food and not enough of another. This means cooperation of attendants, kitchen employees and the dietitian. Such a system (1) is described in section nine, Food Consumption Report of the Committee on Inquiry into the Department of Health, Charities and Bellevue and Allied Hospitals, Board of Estimate and Apportionment, City Hall, New York City, New York.

Mr. Pitcher, who first used the form the basic dietary tables are based on, has added (2) the protein calories besides the per capita allowance, and in another

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1. Pitcher:-Kitchen Organization and Administration. p. 54
 2. Pitcher:-The Dietary Automobile. The State Hospital Quarterly, February, 1918.
-

column gives the total calories found in each per capita allowance. The Military Hospitals Commission (1) of the Dominion of Canada uses a form which gives the per capita food issued, the protein calories and the total calories for each day. These dietary sheets are then kept for reference..

Food should be purchased by the calorie unit rather than by the pound. In Table X the foods have been arranged in groups of meat and meat substitutes, carbohydrates, oils and fats, vegetables and fruit, in the order of their diminishing total calorie value. Columns are left on the table for arranging the cost per 1000 calories after the cost per pound has been obtained. This can be easily done by using the formula,

$$\frac{\text{cost per pound} \times 1000 \text{ calories}}{\text{number of calories in 1 pound}} = \text{cost per 1000 calories.}$$

For example, cheese at .35 per pound would cost $\frac{.35 \times 1000 \text{ calories}}{1994 \text{ calorie in one pound}}$ or .175 per 1000 calories.

Round beef at .25 per pound would cost $\frac{.25 \times 1000 \text{ calories}}{867 \text{ calories in 1 lb.}}$ or .288 per 1000 calories.

One food in each group in the table must be represented in a certain number of times in the dietaries per week or month. After the cost has been figured per thousand calories the foods giving the greatest number

of calories for the money can be seen at a glance in the cost per thousand calorie column. Since fruit or fresh vegetables must be in the dietary preferably twice a week at the minimum the cheaper ones will have to be used no doubt and this will be a ready means of determining which ones will be available.

If the institutions could raise larger gardens and preserve their food by drying or canning in a well-equipped establishment the vegetable and fruit problem in the winter would be partially solved.

FRUITS

	Total Calories	Cost per thousand Calories	Cost per Pound
Cocoanut prep.	3125	.09	.30
Currants A. P.	1459	.20	.30
Figs A. P.	1437	.13	.20
Dates A. P.	1416	.12	.17
Cocoanut A. P.	1413		
Raisins E. P.	1407	.10	.15
Peaches dried	1399	.10	.15
Apples dried	1318	.12	.17
Apricots dried A. P.	1260	.19	.25
Prunes dried A. P.	1161	.12	.15
Blackberries canned A. P.	1124	.16	.18
Olives green A. P.	993	.46	.46
Olives ripe A. P.	946	.43	.41
Pineapple canned	696	.29	.20
Cherries canned A. P.	407	.49	.20
Plums fresh A. P.	363		
Pears canned A. P.	344	.36	.12
Cherries fresh A. P.	338		
Grapes fresh A. P.	328	.38	.12
Rasberries fresh A. P.	300		
Bananas fresh A. P.	290	.22	.06
Blackberries fresh	262		
Pears fresh A. P.	256		
Apricots fresh A. P.	247		
Apples fresh A. P.	214	.21	.06
Peaches canned	213	.56	.025
Cranberries fresh	211	.71	.15
Oranges fresh A. P.	169	.29	.05
Strawberries fresh A. P.	168		
Lemons fresh A. P.	140	.59	.083
Muskmelons fresh	88		
Rhubarb fresh A. P.	62		
Watermelons A. P.	57		

CARBOHYDRATES (continued)

	Total Calories	Protein Calories	Cost per 1000 Calories	Cost per Pound
Zwiebach	1916	177	.15	.30
Crackers graham	1904	181	.07	.15
Crackers soda	1875	177	.06	.12
Popcorn	1826	194	.04	.07
Sugar Gran.	1814		.05	.10
Rolled Oats	1803	303	.05	.10
Sugar brown	1724		.05	.10
*Puffed wheat	1696	292	.35	.60
*Royal Health	1685		.02	.05
Grape Nuts	1683	209	.10	.17
*Puffed Rice	1680	129	.29	.48
*Pettijohn	1672	241	.08	.13
*Crumbles	1658		.09	.16
*Hominy flaked	1608		.04	.07
Biscuit	1657	219	.12	.20
Wheat shredded	1657	219	.12	.20
Wheat flaked	1648	243	.10	.17
Wheat flour entire	1633	250	.03	.06
Cornstrach	1632		.06	.10
Cornflakes	1631	100	.10	.17
Flour graham	1627	241	.04	.07
Macaroni	1624	243	.08	.13
Cornmeal	1613	166	.03	.06
Hominy	1608	151	.04	.07
Tapioca	1608	7	.08	.14
Flour wheat bread	1603	203	.03	.05
Rice	1591	154	.07	.12
Flour rye	1588	124	.04	.06
Honey	1480	7	.15	.22
Molasses cane	1301	44	.05	.07
Shorts	1256	243	.02	.02
Bread white--14 slices	1174	169	.05	.06

Protein calories are not quoted for all of the cereals.

FATS AND OILS

Wesson Oil A. P.	4082	.07	.30
Cottolene A. P.	4082	.08	.34
Olive Oil A. P.	4082	.19	.80
Lard A. P.	4082	.09	.37
Beef marrow A. P.	3828		
Pork Clear Fat A. P.	3555	.11	.40
Butter A. P.	3488	.14	.50
Beef Suet A. P.	3425	.05	.20
Oleomargerine	3410	.09	.31
Chocolate	2772	.10	.30
Bacon	2597	.23	.60
Cream 40%	1727	.34	.60

*Bulletin No. 168. Breakfast Foods and Their Relative Value.

VEGETABLES (continued)

	Total Calories	Cost per thousand Calories	Cost per Pound
Sweet Pot. A. P.	447	.08	.036
*Corn canned, 4 small A. P.	445	.35	.16
*Potatoes Irish, 3 med. A.P.	304	.13	.04
Dandelions A. P.	277		
Spinach cooked	260		
*Peas canned (French)	251	.70	.17
Parsnips A. P.	236		
Onions A. P.	199	.37	.07
*Corn green A. P.	178		
*Beans string fresh	176		
Beets A. P.	167		
Carrots	159	.47	.075
Cauliflower	138	1.20	.175
Turnip	124	.40	.05
Cabbage	120	.41	.05
Spinach	108		
Squash	103	.63	.065
Tomatoes canned or fresh A. P.	103	1.21	.125 fresh
Asparagus fresh A. P.	101	1.41	.15
Radishes fresh A. P.	93	1.61	.15
Asparagus canned A. P.	82	3.41	.28
Lettuce A. P.	72	2.77	.20
Celery A. P.	68	1.91	.13
Cucumbers	68		

* Contain approximately 10% of protein

MEAT AND MEAT SUBSTITUTES (continued)

	Total Calories	Protein Calories	Cost per 1000 Calories	Cost per pound
Lamb leg med. fat A.P.	844	288	.29	.25
Veal Flank A. P.	797	372		
Beef rump lean A. P.	796	365	.25	.20
Walnuts black A. P.	781	131		
Beef loin lean A. P.	763	310	.26	.20
Beef salted dried A. P.	760	479	.65	.50
Milk condensed Unsweet	757	174	.15	.12
Chicken A. P.	751	249	.26	.20
Beef ribs lean	655	275	.30	.20
Beef neck med. fat A.P.	749	263	.20	.15
Eggs whole A. P.	595	216	.55	.33
Beef liver E. P.	584	370	.42	.25
Beef navel lean A. P.	565	540	.35	.20
Pigs feet A. P.	565	185	.17	.10
Veal breast A. P.	538	384	.27	.15
Shrimp canned	520	460	1.72	.56
Cottage Cheese A. P.	498	379	.25	.12
Beef Shank med.fat A.P.	391	174	.12	.05
Veal Chuck A. P.	368	303		
Cod Salt A. P.	361	345	.80	.28
Milk Whole A. P.	314	60	.15	.05
Chicken broiles A. P.	289	232	1.21	.35
Peas Canned	251	65	.80	.22
Peas fresh A. P.	251	65		
Beans lima fresh A. P.	250	58		
Oysters fresh A. P.	229	113		
Beans String Fresh A. P.	176	38		
Milk, Skimmed	166	61	.14	.025

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