ADEQUACY OF DIET AND COST OF FOOD IN AN EPILEPTIC COLONY

Thesis for the Degree of M. S.

Olive S. Henderson

1937

Home economics

ADEQUACY OF DIET AND COST OF FOOD IN AN EPILEPTIC COLONY

BY

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A THESIS

PRESENTED TO THE FACULTY

OF

MICHIGAN STATE COLLEGE

OF

AGRICULTURE AND APPLIED SCIENCE

IN

PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE

DEGREE OF MASTER OF SCIENCE

DEPARTMENT OF INSTITUTIONAL MANAGEMENT

DIVISION OF HOME ECONOMICS

1937

THESIS

ACKNOWLEDGMENT

The writer wishes to express her appreciation to Mrs. Mabelle S. Ehlers and Dr. Marie Dye for advice and helpful suggestions in the preparation of this paper. The writer is also grateful to Mr. Earl T. Smith, steward at the Michigan State Colony for Epileptics, for the privilege of making this study.

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ADEQUACY OF DIET AND COST OF FOOD IN AN EPILEPTIC COLONY

INTRODUCTION

Incidence of Epilepsy. The medical profession has given considerable time to the study of epilepsy during the last decade because it seems to be increasing in frequency. Whether there is an actual increase in number of cases or whether is it merely being more accurately diagnosed is not known; but in either case, more cases per thousand are being reported at the present time than formerly. Estimates indicate that there are four to five epileptics per thousand in the United States, but that in continental Europe, there are not more than two to three per thousand (2). Not all epileptics are housed in institutions, for if the seizures are not severe or do not occur often the patients are usually kept at home. Since there is no law in Michigan requiring that cases be reported to the State Board of Health[1], there are certainly many cases that are not receiving institutional care; therefore, the estimate of number of cases is probably too low.

Michigan is one of the eleven states in the Union which provides for institution care of epileptics, so that in this state such patients have the advantage of being treated in a situation created especially for them. The Michigan Colony for Epileptics furnished an opportunity for a nutritional and economic study of the diet of epileptic patients.

Review of Literature. There is an enormous amount written about epilepsy dealing with the causes and treatment, but only a brief review of the former will be given and only those methods that deal with diet. Some workers think that epilepsy is hereditary. In the study made by Dr. Rhodes (1) of one-third

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[1] Information received from State Board of Health - Lansing

of the patients at the New Jersey Colony for Epileptics there was a history of epilepsy on one or both sides of the family.

Epilepsy and feeble-mindedness may replace each other as equivalents in pedigrees; for example, a feeble-minded father has by an epileptic daughter two feeble-minded children and one epileptic child (2).

From Davenport's (3) experiments on guinea pigs, he found the appearance of epilepsy in the offspring when parents had been rendered epileptic by an injury to the spinal cord.

The direct cause of epilepsy according to other workers is not known, but it is generally agreed that it follows a disturbance of the nervous system (4) (5) (6) (7) (8) (9). In only three per cent of the cases, the parents had epilepsy, so that heredity seems to have little influence on the incidence of the disease. This study did not include relatives other than parents. In all patients, the calcium content of the blood is normal, so it cannot be considered a type of tetany (5).

The disease epilepsy was recognized as early as 688 - 625 B.C., and descriptions of it are similar to those found in the present day textbooks. Among the various studies made in the cure and treatment of epilepsy during recent years have been several related to foods - namely, the treatment of the disease by the use of a high fat or ketogenic diet, by dehydration, and by considering epilepsy as a type of allergy.

Early experimental work in the use of the ketogenic diet was done by Dr. Clifford J. Barbaroka twelve years ago (4). He substituted the ketogenic diet for the fasting regimen. The outline of the diet used by Dr. Barbaroka (4), given on page 4, shows that the total amount of food given must meet the total energy requirement but did not furnish adequate minerals and vitamins, while the protein was adequate. The change from a normal diet to a ketogenic diet should

be made gradually or the patient may fast from two to three days to develop a condition of acidosis before going on the diet.

The beneficial results of this diet, Barbaroka (4) states, are due to the aceto-acetic acid which has the effect of an anaesthetic and by influencing the balance of the nervous system may be able to alter the conductivity, irritability, and permability of the nerve cell. The acetone bodies in the urine indicate the functioning of the ketogenic diet. To be successful in the treatment of epilepsy, a high fat diet must develop and maintain a ketosis. Another theory is advanced by Dr. Spangler (5) regarding the reason of the success of the ketogenic diet in the treatment of epilepsy. Since the diet is high in fat, it is low in protein and many people are sensitive to the latter. He considers epilepsy as an allergy. This will be discussed later.

According to Backman (9), ketosis produced by fasting kept children free from seizures, but the seizures returned when they went back to a normal diet. Bridge and Lab (6), in their experimental work with children on a ketogenic diet, found improvement in those having petit mal type of seizures, but there is no apparent reason why the ketogenic diet would not apply to children with major convulsions.

The results of the use of the ketogenic diet for the last ten years show that the symptoms of about thirty to thirty-five per cent of the patients who follow the diet carefully for a period of six months to a year are controlled, that the condition of another thirty-five per cent improved, and that thirty to forty per cent received no benefit. Best results are obtained in children and young adults who are just beginning to have seizures before convulsive reaction has set in (4). There is usually some loss of weight due to dehydration.

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[1] See outline of Ketogenic Diet on page 4.

OUTLINE OF KETOGENIC DIET BY DR. BARBAROKA (4)

	WEIGHT IN GRAMS	SERVING
Breakfast		
5% fruit	50	1
bacon	20	4 slices
egg	50	1
muffin soy bean	25	1
butter	20	2 squares
cream 40%	60	¼ cup
Dinner		
meat	60	1 serving
5% vegetable	75	1 "
5% salad vegetable	75	1 "
oil salad dressing	15	1 tablespoon
muffin soy bean	25	1 serving
butter	40	4 squares
cream 40%	60	¼ cup
5% fruit	50	½ serving
Supper		
egg or substitute	50	1 serving
5% vegetable	75	1 "
5% salad vegetable	75	1 "
oil salad dressing	15	1 tablespoon
muffin soy bean	25	1 serving
butter	40	4 squares
cream 40%	60	¼ cup
fruit 5%	50	½ serving

From cases studied by Bridge and Iab (6), evidence is presented showing that neither ketosis or acidosis accompanying the so-called ketogenic treatment of epilepsy can be considered the sole beneficial factor for such regimen. Dehydration which is used with the diet may be of some value. Thus the problem has not been solved.

The second type of dietary treatment to be discussed is the dehydration. Some neurosurgeons (7) who are interested in the disease believe that all cases have an organic basis and that most of them, sooner or later, show evidence of accumulation of excessive amounts of fluid in the central nervous system,

especially in the sub-archnoid spaces where variable reservoirs of cerospinal fluid may occur. This abnormality is secondary to inflamatory traumatic or congenital lessions involving the absorption path of the cerobrospinal fluid. These patients show improvement following the surgical removal of obstruction to the flow of the fluid and might respond favorably to dehydration.

Dr. Irvin McQuarrie (8) carried out an experiment on a group of children suffering from severe epilepsy. The children were placed on different levels of water intake. No drugs were used, and the patients were kept in bed. Epileptic patients retain water to an abnormal degree during the active phase of the seizure and seizures seem to follow the accumulation of fluid beyond a certain point. In this experiment, it was found that the removal of excess water by restriction of fluid intake was followed by a reduction of seizures. Hypothermic conditions did arise from excessive restriction of water.

The experimental work in relation to dehydration on animals was carried out by Rowntree and his coworkers (9) in 1925. They pointed out the effects of extremely large amounts of water on animals if given by stomach tube. Water intoxication is characterized by restlessness, nausea, frothing at the mouth, convulsions, muscle twitching, and an increase in the intro-cranial pressure. Since these symptoms shown were similar to those of epileptic patients, Cammeron (9) carried out dehydration in a series of typical institutional patients but found no improvement in seizures.

The experiment done by Wilson and Limberger (7) was on patients from the Pennsylvania Epileptic Hospital and Colony Farm at Oakburn, Pennsylvania. Most of the patients were standardized as to habits of living, sedatives, drug and work. The only change made was the variation in level of fluid intake. The patients chosen had a fair degree of intelligence, so that cooperation could be obtained. There were eighteen men and five women in the group, ranging in age

from nine to fifty-five years. Most of the patients had active epilepsy and averaged from one hundred to three hundred convulsions a year. Six of the patients were used as a control group, in which only the fluid output was measured and the intake was not controlled. The rest of the group were definitely instructed as to allowance, whether high or low, and orders were carried out. Fluid intake included water, fruit juices, milk, and soup. Patients were kept in their rooms and fluid given by a nurse. Output included total urinary excretion but not perspiration. The lowest intake was ten ounces a day, but it was difficult to keep a patient on much less than sixteen ounces a day. After a month, the patients were changed or allowed to stay on the same level, according to results which had been obtained. In most of the patients there was no relation between fluid intake and number of convulsions. In some, the number increased on low intake. One case having two to five attacks a month was given one and one-half grains of phenobarbitol and allowed fluid according to his own desires. He had no attacks for ten months and the fluid intake was from two thousand one hundred to three thousand cc. a day. Another patient who was extremely dull on a generous allowance of water improved on fluid restriction of five hundred cc., but had severe attacks of seizures when sedatives of one and one-half grains of phenobarbitol and fifteen grains of sodium bromide were withdrawn. From the study of patients for the last four years, Wilson and Limberger (7) find that dehydration may help in the treatment of epilepsy if combined with some other type of therapy. Status[1] may develop in a patient on severe dehydration and convulsions do not occur regularly or frequently if large amounts of water are given after a period of dehydration. Wilson and Limberger's best results were obtained by use of sedatives.

Experiments showed that if the high fat diet has succeeded in removing a surplus of extro-cellular tissue fluid from the body, improvement in seizures

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[1] Status is the term used in referring to a series of seizures occurring at short intervals.

is associated; but if the diet has not removed the fluid, it has not affected the course of the disease (10). In the metabolism of a low carbohydrate, high protein diet, much fluid is extracted from the tissues, which constitutes a definite form of dehydration.

Backman's hypothesis (10) is that in epilepsy there is an increased production of cerobrospinal fluid in the non-extensible cerobrospinal spaces and that the increased pressure is associated with convulsions. A strict dehydration diet would prevent the accumulation of fluid.

The third way that diet may be related to epilepsy is that of allergy. An interesting type of this work has been done by Dr. Ralph H. Spangler (5). He believes that the immediate cause of an epileptic convulsion arises from a disturbance in protein metabolism. He says attacks of epilepsy in some individuals are a result of a definite allergy and are worth considering in the treatment of symptom complex in disturbed protein metabolism. Nerve strain increases hypersensitiveness in the allergic individual and certain foods injested while under nervous strain produce sensitization manifestations which are not induced by the same food in the absence of nervous influence. The fact that the convulsive seizure may be transferred by the transfusion of blood from an epileptic to a non-epileptic individual shows the possibility of transference of an epileptic allergic sensitization in the human. Food skin tests do not give good results because the epileptic's nervous system does not react normally. It has been possible to eliminate from the diet of some patients certain foods which proved to be factors in precipitating convulsions. From Dr. Spangler's (5) study of blood chemistry in patients, he found that in epilepsy, as in other sensitization diseases, there is an increase in uric acid, lowered alkali reserves, and a calcium deficiency.

Dr. Backman (10) feels that the most important measure in the treatment of epilepsy is readjustment of the patient to his environment, because he is not

equipped to cope with a normal social existence. Epileptic patients suffer from fatigue, both of mind and body, and should have light work, be out of doors, bathe often, keep the skin in good condition, and eat nourishing food but not too much at one time.

From the review of literature, it would seem that the hydration diet is of benefit when there is a pressure on the brain area, due to accumulation of fluid. A ketogenic diet is successful in controlling the disease in about one-third of the patients and there are two theories advanced for its use: (1) the removal of extra cerobrospinal fluid, and (2) the production of acidosis, which acts as an anaesthetic. The allergy treatment owes its source to the elimination of food to which the patient is sensitized. Evidence is thus inconclusive regarding the treatment of epilepsy by diet.

The Care of Epileptics in Michigan: The Michigan State Colony for Epileptics was founded twenty years ago in Tuscola County, three miles west of the city of Caro. The fifteen hundred acre tract of land for the site was purchased from Mr. W. A. Hart. The name "Wahjamega" is not of Indian origin as one might suspect, but was made by using Mr. Hart's initials and the initial letters of the names of his children.

The land is divided by the Cass River and is not especially well adapted to agriculture. A maple woods of eighty-five acres supplies the Colony with maple syrup. About thirty-eight acres are under cultivation for gardens. Because of the high sand content of the soil, the volume of production is quite dependent on sufficient rainfall. There is a possibility that the gardens may be relocated along the river bank and a system of irrigation installed, which would greatly increase production and prevent crop failure. Oats and alfalfa are the chief farm crops grown.

When this institution was started, it had only one building, but it now consists of nine cottages, a hospital, a central heating plant, a laundry

building, a machine and carpenter shop, a dairy barn, a recreation hall, and homes for staff doctors and some of the employees. Cottages are one and one-half story structures built of stucco and are all similar in design. Brick was used for the hospital, which has two floors and a basement. The patients are housed in cottages, with the exception of those requiring hospitalization.

There are usually about one thousand patients; some very young, others advanced in years; both sexes are included, and many nationalities and all strata of society are represented. About one-third of the patients are able to do some type of work. The men are employed at the dairy, on the farm, at the power plant, in the laundry, and in the maintenance of buildings and grounds. The women assist in food preparation, with the sewing, laundry, and general cleaning. Men and women patients assist in caring for those of their number who are physically and mentally unable to work.

Object of the Study. At the request of an official of Wahjamega, the writer spent three months at the institution for the purpose of measuring the amount and type of foods used, in order to determine the nutritional adequacy of the diet furnished the patients and studying the possibility of reducing food costs without decreasing the nutritive value.

A secondary object, due to a request of the institution, was to determine the portions of food obtainable per unit purchased.

At Wahjamega, the people in charge of each cottage had been there for about fifteen years and were especially interested in the group over which they had supervision. The patients were not treated as a group but as individuals, in regard to their care. Each cottage was considered as a large family.

The need for variation in combinations of food was evident from the management's use of old menus. There was also a need for standardized recipes of a type suitable for use in this institution, with reference to materials

available and low food cost.

The most important objects in view in making the study were, therefore; first, to determine the adequacy of the diet in use, and make suggestions to improve the adequacy; second, to discover ways and means for reducing costs without loss of adequacy.

Supplementary and less important objects were the making of menus to supply variation in the diet and the providing of standardized recipes.

THE STUDY

Methods Used in Making the Study. During the residence of the writer at the Institution, a study was made of methods of buying, production, distribution, preparation, and service of the food.

To determine the adequacy of the diet, a daily record of the food used for all the patients was kept for one month. This was done in the following manner: At each cottage and at the hospital, an inventory was taken of the amount of staple supplies on hand at the beginning of the month and another was taken at the end of the month. The record of supplies sent to each cottage and the hospital was obtained from the steward's office. This included dairy products, meat, staple supplies, and baked goods. To these supplies, the inventory taken at the first of the month was added and the second one, taken at the end of the month, was substracted, which gave the total amount of supplies used. Then computations for the total calorie and mineral content was made, using the Hawley Tables (11), described later. The results were divided by the average total population to give the per capita consumption. There is a possibility of a slight error in records of amounts of food used, because it was necessary to depend on the accuracy of the people in charge of each cottage.

The cost of all food supplies was obtained from inventory cards and represents the actual purchase price of commodities not produced at the Colony.

Home canned goods which were used were recorded by the people in charge of food service in each building, and market price was allowed for these goods. Other commodities produced at the Colony, such as milk, meat, and eggs, were estimated at market price.

To determine how savings could be effected, a study was made of unit sizes and kinds of commodities bought, cuts of meat, and possible substitutes. An investigation was also made of the recipes used and inquiry was made as to whether they were followed so that a standard product could always be obtained. The methods of food preparation were considered as to type of fuel used and the possibility of a central kitchen, instead of food preparation in each cottage. An investigation into the use of left overs was made. A study was carried out of the methods of production of milk, vegetables, and fruit, to determine whether the amount produced could be increased without increase in cost per unit.

Experimental studies made relative to food costs included the comparison of the spreading quality of peanut butter with oleomargine; and the cost of canned succotash with that prepared at home, using dried lima beans and canned corn.

A wholesale grocer[1] was interviewed to obtain prices of the same grade of vegetables in Number 10 and Number 2 cans. The cost of the same quantity purchased in Number 2 cans was compared with that purchased in a Number 10 size.[2]

A milling company[3] quoted the prices on cracked wheat which might be substituted in part for oatmeal as a breakfast cereal[4]. Inquiry was also made

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[1] Mr. R. DeWitt, Manager of Lansing branch of Lee & Cady, the largest wholesale grocery house in the state.

[2] See Table XVIII.

[3] Thoman Milling Company.

[4] See Food Cost Study, page 42.

as to the number of wholesale grocery houses[1] that sold succotash in Number 10 cans.

Letters were written to the ten other institutions for the care of epileptics in the United States to get information on per capita food cost. Replies were obtained from two.

In the next section of this paper is given a description of methods used in purchasing, producing, and distributing the foods and in their preparation.

DESCRIPTION OF WAHJAMEGA

Administration of Food Department. The staple supplies are received by truck and kept in the stores building, which is an oblong structure measuring about sixty by two hundred feet. In the basement clothing, furniture, tools, and all types of supplies used in the Colony are kept. There are two full-time employees at the stores' building who keep a perpetual inventory of the goods on hand. Orders for supplies are issued three months in advance--food orders the first month, clothing the second, and supplies the third. The food orders are made out in the steward's office, sent to and approved by the Administration Board of State Institutions at Lansing, and orders are placed by the latter with wholesale dealers within the state. Jackson State Prison furnishes some of the canned goods.

Requisitions for food supplies for the cottages are made out each month by the cooks in charge, sent to the office to be approved by the steward, then taken to the stores to be filled. The supplies are put up at the stores building and taken by Colony truck to each cottage, where they are checked by the man in charge against the requisition. Goods not on hand at the time are sent out as soon as received if a special requisition is sent in by cooks at the cottages.

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[1] Interviews with representatives of the John S. Sexton Company, the George S. Daugherty Company, and Steele-Wedeles.

Each cottage plans to order enough food and other supplies to last through the entire month but in case of shortage, more can be secured.

The office is located in the hospital and is in charge of the steward. All invoices for food supplies are received at the office by the steward and checked with shipment of goods. Any necessary adjustments as to price, quality, or quantity are made through the office with the Department of State Institutions at Lansing.

Invoices are signed by the steward, and payment is made within a specified time.

Food administration in the hospital is supervised by the hospital superintendent. The cooks, a man and his wife, have charge of the menus and cooking of food. They are assisted by two employees and eight patients. Of the two employees, one serves the staff, and the other has charge of the patients' dining room. There is a large storeroom in the basement for staple supplies, such as canned goods, cereals, sugar, coffee, tea, and dried fruit. They are brought up to the kitchen by means of a dumb waiter and small amounts are kept in the pantry just off the kitchen. Eight patients help with the preparation of vegetables, the washing of pots and pans, the drying of dishes, and the operating of the dish-washing machine. Most of them are very dependable and have few epileptic seizures while on duty, since the ones who have fewest seizures are the ones chosen for this work. Food for night attendants is prepared during the day and left in the kitchen for easy access.

Food administration in the cottages is very similar to that in the hospital. A man and his wife are in charge of each cottage and do the cooking, being assisted by some of the patients. The menus used were made out several years ago, but are varied according to whatever supplies are available. The two relief cooks have charge of the food preparation in the various cottages and hospital

during the two days which the cooks are allowed off each month. Each cottage has a small dining room for attendants and a large one for patients. Breakfast is served at six thirty, dinner at eleven thirty, and supper at five o'clock.

Type of Food Service in Hospital and Cottages. Chiefly because of the fact that the hospital is only two years old, the kitchen is much better equipped than the kitchens in the cottages. The floors are of red quarry tile and the walls are finished in cream-colored salt glazed tile with a blue trim.

The hospital equipment consists of a dish-washing machine, broiler, range, toaster, coffee urn, tables for storing patients' dishes and for serving, steamers, bain marie, sinks, potato peeler, mixer, slicer, meat block, and two cook's tables, one of which has a rack above it for pots, pans, and spoons. There are two sinks, one for washing pots and pans and the other for vegetables. They are conveniently located in the back part of the kitchen[1]. The mixer is an electrically operated Hobart. The potato peeler is also electrically operated. The slicer is a hand operated machine and is used for slicing both bread and meat, especially bacon. The two cook's tables have maple tops. These tables and the meat block together allow plenty of working surfaces. Natural gas from the Mount Pleasant field is used in the three-section range and broiler. The toaster is built at one end of the range and the broiler at the opposite end. Directly back of the range is a three-section steamer for vegetables, a large steam-jacketed kettle, and cereal cooker. A lighted hood covers all of the cooking units, including the range and steamers and it is equipped with a fan to carry off odors and moisture from the bain marie. An ammonia system is used for all of the refrigeration. There is a two-compartment refrigerator in the kitchen. The one with the lower temperature used for meats and dairy products, the other for fruits and vegetables used in the day's menus. A

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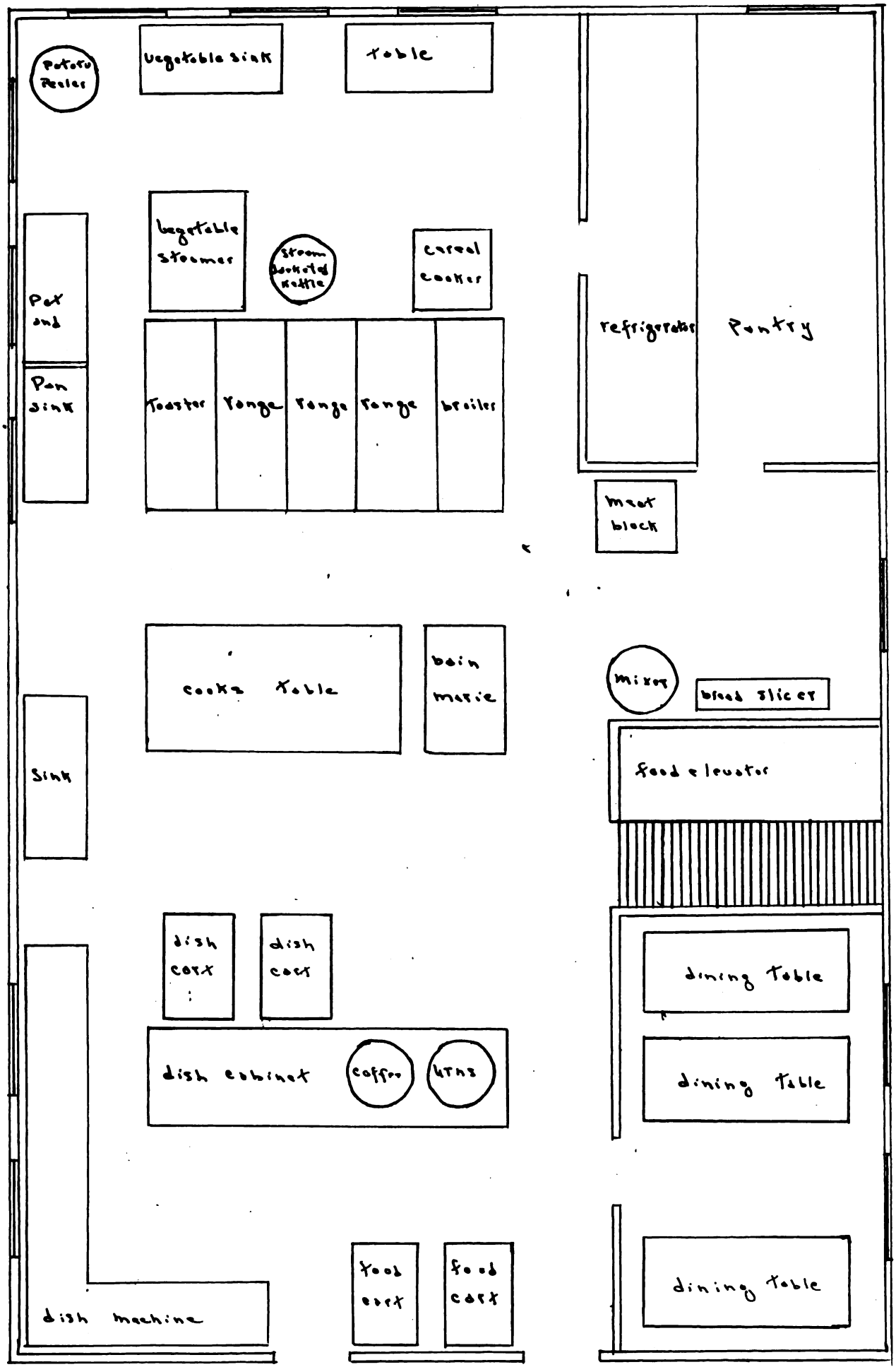
[1] See Floor Plan on following page.



FLOOR PLAN OF HOSPITAL KITCHEN

machine for making ice cubes is located in the basement but it is seldom used, since circulating ice water is available in the kitchen and on all floors of the hospital. The water is cooled by piping it through the regrigerator unit in the basement.

There are three dining rooms, furnished with substantial stained oak tables with linoleum tops. The chairs are also stained oak. The floors and walls are like those in the kitchen. Dish cupboards with steel doors and shelves are built in the walls of the staff and attendants' dining rooms. The staff dining room seats twenty-four, and meals are served by a waitress. The attendants' dining room, which is about the same size, is near the kitchen. Because some attendants are always on duty, they have two meal hours, thirty minutes apart. Food is served by one of the cooks, and family-style service is used in the attendants' dining room. Each dining room has its own pattern of china. The patients' dining room will seat about sixty. All patients who are not confined to their rooms because of frequent seizures eat in this dining room. Trays are served from heated food carts to patients who are not able to come to the dining room. There are a few cell blocks in the hospital to be used in case of emergency, because some of the patients are very difficult to manage during a series of seizures and they have unusual strength when they are disturbed. Trays are served to the patients in the cell blocks. These hospital cell blocks are seldom used.

Kitchens in the cottages are not as well equipped because they are older and there is little money to buy new equipment. Floors are of concrete and walls of glazed tile or painted plaster. Coal ranges are used, which are quite satisfactory in winter because they can keep a fire in them during the night, but they are difficult to regulate in summer. A pantry, which includes plenty of refrigerator space, is a feature of each cottage. These refrigerators are operated by electricity. Cast aluminum utensils are used for cooking on top of

the stoves, and the roasting pans are of sheet iron. The same type of china is used in the cottages as in the hospital--heavy china plates, aluminum soup bowls, sauce dishes,and cups. Cell blocks are also provided in each cottage. These cell blocks are frequently used, and tray service is utilized for the occupants.

System of Keeping Food Costs. Inventory cards are kept in the office for all supplies used at the Colony. There is a separate card for each item, which shows the amount on hand at any time and the unit cost. When food is requisitioned out, the amount is deducted from the total amount on the card so that a perpetual inventory is kept which balances with the one at the store. One employee has charge of the card system, which avoids any confusion as to price or amounts.

The cost of all recipes is kept, using cards indicating quantities and ingredients used, and cost of each. As prices change, the cost of recipes is adjusted. There is very little variation in some material, while the price of eggs and flour may fluctuate considerably. The possible value of this system would be to eliminate certain of the baked goods when prices were too high. This is not done, however, as the constant recalculating of prices on these recipe cards is considered a waste of time.

Inventory cards are used for keeping a record of all food produced at the Colony, as well as for goods purchased. Food produced on the premises includes dairy products, fruits, vegetables,and eggs. The wholesale market price is allowed for fruits, vegetables, and eggs; while milk is credited at the cost of production.

The man in charge of the garden at each cottage sends a report to the office of the amount of produce grown. There is an exchange of vegetables among the cottages during the winter months because, due to soil conditions and other variables, some cottage gardens produce a larger crop than others.

Table I shows the amount of farm commodities produced at the Colony during 1933 and the cash value assigned each. There is no excess production of milk, for the 1,462 quarts produced is the average daily amount used by patients and employees. Cottage cheese is made in case there is a surplus supply. The average amount of eggs used per month is 200 dozen. The number purchased locally varies with the season of the year.

The commodities purchased at the Colony during 1933 were as follows:

PRODUCT	AMOUNT	PRODUCT	AMOUNT
Applebutter	1,530 pounds	Molasses	12 pounds
Asparagus	40 "	Macaroni	117 "
Beans (dried)	1,735 "	Oatmeal	795 "
Butter	1,316 "	Prunes	688 "
Beef	1,578 "	Pumpkin	770 "
Cheese	126 "	Pork	1,589 "
Cherries	128 "	Peanut butter	1,275 "
Cornstarch	204 "	Peaches (evaporated)	450 "
Cornmeal	607 "	Peas (canned)	264 "
Crackers	634 "	Potatoes	23,740 bushels
Corn	412 "	Raisins	50 pounds
Cocoa	50½ "	Rice	285 "
Farina	825 "	Shredded wheat	48 "
Flour (white)	1,884 "	String beans	42 "
Fish	326 "	Sugar	378 "
Ham (smoked)	1,320 "	Tapioca	130 "
Lard	460 "	Tomatoes	691 "
Lima beans	156 "	Veal	1,487 "

Food Sources. The Colony owns an especially fine herd of one hundred twenty-five Holstein cows. Forty-five is the average number milked. The cattle are housed in a well built barn, and the building for handling milk is located near-by. A machine is used for milking, and the cows are milked three times a day. The man who has charge of the dairy keeps a complete record of milk produced and

Table I

Farm Products, Season of 1933

Product	*Credit Allowed Price Per Unit	Amount		Total Value
Apples	.60	1,467	bushels	$ 1,080.20
Asparagus	.08	118	pounds	9.44
Beans (green)	.60	1,515	bushels	909.00
Beets (table)	.50	378¼	"	189.12
Beets (stock)	.20	60	"	12.00
Blackberries	.11	29½	quarts	3.25
Cabbage	.02	6,272	pounds	156.80
Celery Cabbage	.05	1,077½	"	53.88
Carrots (table)	.50	47½	bushels	235.75
Carrots (stock)	.30	99	"	29.70
Cauliflower	.10	51	heads	5.10
Corn (sweet)	.10	829	dozen	82.92
Corn (pop)	1.00	34	bushels	34.00
Cucumbers	.02	7,388	pounds	147.76
Dill	.10	40	"	4.00
Cucumbers (table)	.05	499	dozen	24.94
Greens (spinach)	.05	232	pounds	11.60
Greens (chard)	.05	887	"	44.35
Greens (beet)	.05	930	"	46.50
Lettuce	.03½	1,188	"	41.58
Melons (musk)	.06	2,110	"	126.60
Melons (water)	.10	2,037	"	203.70
Milk	.02½	533,630	quarts	13,340.75
Onions (green)	.05	1,985	pounds	99.25
Onions (dry)	.02	19,172	"	383.44
Parsley	.10	53	bunches	5.30
Peas (green)	.06	1,101	quarts	66.06
Peppers	.10	180 1/6	dozen	19.02
Potatoes (baking)	1.25	20	bushels	25.00
Potatoes	.97	2,209	"	2,142.73
Radishes	.05	2,094	bunches	104.70
Raspberries	.15	928	quarts	139.20
Rutabagas	.50	91	bushels	45.50
Rhubarb	.05	352	pounds	17.60
Squash (summer)	.20	414 1/3	dozen	82.87
Squash (green)	.03	2,064	pounds	61.92
Strawberries	.10	1,062	quarts	106.20
Tomatoes	.46	450	bushels	186.60
Turnips	.50	132	"	66.00

*This credit represented the wholesale market price at the time.

ration fed. The milk is of very good quality, testing four per cent butterfat. It is not pasteurized, but is cooled thoroughly and immediately after milking. A portion of it is skimmed so that all the cottages are supplied with coffee and whipping cream. There is enough milk so that patients may have it to drink at least once a day. The cost of production is two and one-half cents per quart.

Patients help to distribute milk to the cottages and hospital. It is carried in three-gallon containers to those near-by the dairy, while the truck takes the rest in ten-gallon cans to the three cottages across the river and to those farther from the dairy. Milk is distributed at seven in the morning and at three in the afternoon. There is very little spoilage, because all cottages have sufficient space in their refrigerators for storage.

The meat shop is located in the south end of the stores building. There are two main rooms--one is equipped with refrigeration and is used for storage, while the other contains meat blocks, grinding machine, and scales. This room is used for putting up orders and cutting or preparing meats.

Beef is received in hind and forequarters, also frozen shank meat packed in barrels. Ground beef for meat loaves is prepared on the premises. Calves raised on the farm are used for veal. About half the pork is bought from farmers in the neighborhood and butchered locally.

The man who has charge of the meat, prepares both bacon and smoked ham, but not enough to supply the entire Colony. Sausage is ground in the meat shop. Due to a fire, the hog house had been destroyed, so the Colony was not raising its own pork at the time the study was made.

The patients receive meat three times a week; and the attendants, every day. Each cottage receives a definite number of pounds, according to the population of the cottage and the type of meat. Meat is taken to the cottage by truck early in the morning or the day before it is to be served.

The size of the gardens varies with the population of the cottage, but the total amount under cultivation is about thirty-eight acres. An attendant from each cottage is responsible for the cultivation of the garden belonging to his cottage. Part of the work of cultivation is done by patients. The three cottages across the river have a joint garden. It is planned to grow mostly green vegetables and root types,other than potatoes, in large enough amounts to be stored for winter use. Whenever more vegetables are produced than can be consumed immediately, the cooks at the cottages can them by the cold-pack or open-kettle method. The average amount canned is a thousand quarts for each cottage. Root vegetables are stored in the outside cellars built in a sandhill. These cellars are lighted with electricity. There is an aisle through the center and bins are built on each side. They are shallow enough to allow for good circulation of air, made possible by ventilators in the roof of the building. There is little trouble with food spoilage. The winter of 1933-34, which was an unusually cold one, was the first time that any food had ever frozen in the cellars.

The supply of home-made dill pickles and sauerkraut is also stored in the cellars. Few potatoes are grown, because it is felt that they can be bought more cheaply than they can be produced.

There is a young apple orchard of about thirty acres, which produces fairly well but needs more attention as to spraying and pruning. Apples will keep firm until spring when stored in the vegetable cellars, but most of the apples grown are of a fall variety and are consumed fairly soon after harvesting. Small fruits,such as strawberries, raspberries, and currants are grown in individual cottage gardens. Some of the gardens have grapevines. The fruit produced during the summer months is consumed immediately, except that some apples are stored for future consumption.

The poultry is taken care of by attendants at cottage five. One thousand young chicks are bought from a hatchery in the spring and are kept to produce eggs during the following year. The poultry house is not adequate to take care of a large enough flock to supply all the eggs used. White Leghorns are chosen because they are heavy producers. The well-balanced ration which they receive is equite essential to keep them in good condition for laying. Eggs which are not supplied by the Colony are purchased locally.

Fowls are not produced for meat, except that as the hens grow too old for egg laying they are killed and eaten. Since the chicks are seldom more than a week old when purchased, it is impossible to determine the sex, hence there are always some roosters among them. These roosters are sold or consumed. The total amount of fowls consumed at the Colony is very small.

RESULTS

Adequacy of Diet. To determine the adequacy of the diet, the food was grouped according to the tables designed for food calculation by Edith Hawley (11). She groups the foods according to composition, using analyses of Atwater, Bryant, Rose, and Sherman. She finds the amount of nutrients yielded by each pound of foodstuff and places food having approximately the same amount of certain nutrients in the same group. These nutrients are: protein, phosphorus, calcium, and iron. There are ten groups, and these are shown in Tables III, IV, V, VI, VII, VIII, IX, and X.

Miss Hawley's method may be illustrated as follows: One pound of carrots yields 159 calories. This figure is then divided by 300, the energy value assigned to Group One, in which carrots occur, and gives 0.5 the calorie factor by which the number of pounds of carrots consumed is multiplied (See Table III, Group One). One pound of carrots also yields 4.1 grams of protein, 0.197 grams

of calcium, 0.161 grams of phosphorus, and 0.0021 grams of iron. Since the protein and mineral values of Group One are similar, being 4 for protein, 0.20 for calcium, 0.16 for phosphorus, and 0.002 for iron, the protein-mineral factor for carrots is 1. The quantities in pounds of the various foodstuffs consumed at the Colony are inserted under the heading "Quantity Consumed". For carrots,this quantity was 650 pounds. Therefore, multiplying 650 by .5 gives 325, the calorie pounds for carrots. Multiplying 650 times 1 gives the protein-mineral factor 650 for carrots. The totals in Table III, Group One, therefore, show the total calorie pounds and total protein-mineral pounds of all the foods in Group One consumed at the Colony for one month. Similarly, the totals in Table XIV show the total calorie pounds and total protein-mineral pounds for their specific groups.

The column "Calorie Pounds" for each group is totaled and entered in the column headed "Equivalent Weight, Calorie Pounds" and in the section "Nutritive Value of Diet" (See Table XIV). Each of these group totals is then multiplied by the energy value for the respective group. The results represent the number of calories in each group of food in the diet and are entered in the "Energy" column in the section "Nutritive Value of Diet". The same procedure is used for the remaining ingredients by multiplying the group totals by protein, phosphorus, calcium, and iron values. Totals are struck and total calories and grams of phosphorus, protein, calcium, and iron furnished by the diet are obtained.

After finding the total amounts of protein, minerals, and calories in the food used, these results were divided by the number of patients and employees served to determine the per capita consumption. For example, the total protein, 2,837,811.5 grams, as shown in Table XIV, was divided by 100.2, the number of people fed, to obtain the protein per capital for one month. This amount, 2598.73 grams,was divided by thirty, which gives 80.662 grams, the daily per capita consumption of protein.

Table II

Food Groups

Group	Name	Content
I	Calcium	Foods relatively higher in calcium than in protein, phosphorus, and iron.
II	Equivalents	Foods in which all nutrients are of about the same importance.
III	Iron	Foods in which iron is of relatively more importance than other nutrients.
IV	Low Ca[1], high P[2], Ph[3], and Fe[4]	Foods in which calcium is low and other three nutrients high.
V	Deficient in Ca, P, Ph, and Fe	Foods that are lacking in the four nutrients.
VI	Low Ca, high P, medium Ph and Fe	Animal foods in which calcium is low, protein high, phosphorus and iron intermediate.
VII	High Ca, low Fe, medium P and Ph	Foods in which calcium is high, iron low, protein and phosphorus intermediate.
VIII	High P and Ph, low Ca and Fe	Foods in which protein and phosphorus are high, and calcium and iron low.
IX	Low Ca, high P, medium Ph and Fe	Vegetable foods in which calcium is low, protein high, phosphorus and iron intermediate.
X	High P	Foods in which protein is higher than the other three nutrients.

[1]Ca = Calcium

[2]P = Protein

[3]Ph = Phosphorus

[4]Fe = Iron

Table III

Group One	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Carrots	.5	1.0	650	325	650
Strawberries	.5	1.0	6	3	6
Turnips	.5	1.0	15	7.5	15
Rutabagas	.5	1.0	255	147	255
Rhubarb	.2	.6	30	6	18
Total				488	944

Table IV

Group Two	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Cherries	1.7	.8	728	1237.6	582.4
Onions	1.0	1.2	1302	1302	1562.4
Apples	1.0	.4	780	780	312
Beets	1.0	1.0	615	615	615
Tomatoes	.5	.8	691	345.5	552.8
Pumpkin	.3	.8	770	231	616
Total				4511	4240

Table V

Group Three	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Prunes (dried)	1.0	1.0	688	688	688
Raisins	1.0	1.0	50	50	50
Tapioca	1.0	.6	130	130	78
Potatoes	.3	.5	25740	7722	12870
Beans (string)	.1	1.0	42	4.2	42
Asparagus	.1	.4	40	4	16
Total				8598	13744

Table VI

Group Four	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Beans (dried)	1.0	2.0	1735	1735	3470
Eggs	.4	.9	710	284	639
Corn	.1	.1	412	41	41
Total				498.5	4150

Table VII

Group Five	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Lard	1.2	.0	460	552	0
Butter	1.0	1.0	1316	1316	1316
Jelly	.5	1.0	1	.5	1
Sugar	.5	.0	378	1899	0
Total				2767.5	1317

Table VIII

Group Six	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Ham (smoked)	1.6	.9	1320	2112	1188
Pork	1.2	.8	1589	1906	1271
Beef	.9	1.3	1578	1420	2051
Veal	.5	1.0	1487	743	1487
Total				6181	5997

Table IX

Group Seven	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Cheese (American)	6.0	7.0	126	756	882
Cream (18.5% Fat)	3.0	.8	754	2268	603
Milk (whole fresh)	1.0	1.0	88512	88072	88072
Total				91090	89557

Table X

Group Eight	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Fish	1.0	.4	326	326	130

Table XI

Group Nine	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Cocoa	1.5	1.7	50.5	75.7	85.8
Oatmeal	1.0	1.0	795	795	795
Wheat (Shredded)	1.0	.9	48	48	41.2
Cornmeal	1.0	.5	607	607	303.5
Total				1525.7	1226

Table XII

Group Ten	Factors		Quantity Consumed (Pounds)	Equivalent Weight	
	Calorie	Protein Mineral		Calorie Pounds	Protein Mineral Pounds
Macaroni	1.0	1.2	117	117	140.4
Flour (white)	1.0	1.0	1884	1884	1884
Crackers	1.0	1.0	634	634	634
Farina	1.0	1.0	825	825	825
Rice	1.0	.9	285	285	256.5
White Bread	.7	.9	7207	5044.9	6480.3
Total				8789.9	10220.2

Table XIII

Foods Not Included In Other Groups

	Quantity (Pounds)	Calories	Protein (Grams)	Calcium	Phosphorus	Iron
Cornstarch	240	332,328				
Peaches (evaporated)	450	14,130	1,426	15.3	65.7	.54
Peas (canned)	264	66,264	4,303	6.86	31.68	.436
Lima beans (canned)	156	54,600	2,708	4.36	20.54	.31
Peanut butter	1,275	3,494,075	169,447	90.2	538.72	2.54
Molasses	12	15,612	129	2.53	.52	.087
Apple butter	1,530	6,350,080	8,568	21.42	12.24	.45
Total		10,327,089	186,582	140.67	669.4	4.363

Table XIV

Total Nutritive Value of Colony Diet

Group	Equivalent Weight Calorie Pounds	Energy (Calories)	Equivalent Weight Protein Mineral Pounds	Protein (Grams)	Calcium (Grams)	Phosphorus (Grams)	Iron (Grams)
1	488	146,400	944	3,766	188.8	151.04	1.888
2	4,511	9,022,000	4,240	23,320	318	678.4	8.05
3	8,598	8,598,000	13,744	206,160	1,374.4	5,497.6	123.6
4	485.5	776,800	4,150	249,000	1,245	3,320	58.1
5	2,767.5	96,982,500	1,317	5,926.5	95.1	95.1	1.31
6	6,168	6,168,000	5,997	419,790	245.8	4,497.7	65.9
7	91,096	27,328,800	89,557	1,323,355	49,256	37,614	89.5
8	326	163,000	130	11,700	26	132.6	.65
9	1,525.7	2,441,120	1,226	73,560	368	2,084	30.8
10	8,798.9	14,063,840	10,220.2	521,230	988	4,149.6	44.46
Total	126,764.1	160,680,460	135,525.2	2,857,817.5	54,164.3	58,219.34	322.048

Table XV[1]

Nutritive Value of Groups Per
Calorie-Pounds and Protein-Mineral-Pounds

Group	Energy (Calories)	Protein (Grams)	Calcium (Grams)	Phosphorus (Grams)	Iron (Grams)
1	300	4.0	0.200	0.16	0.0020
2	2,000	5.5	.075	.16	.0019
3	1,000	15.0	.100	.40	.0090
4	1,600	60.0	.300	.80	.0140
5	3,500	4.5	.070	.07	.0010
6	1,000	70.0	.041	.75	.0110
7	300	15.0	.550	.42	.0010
8	500	90.0	.200	1.02	.0050
9	1,600	60.0	.300	1.70	.0170
10	1,600	51.0	.100	.42	.0045

[1]This is a copy of the Hawley Table.

Table XVI

Comparison of Colony Diet With Standard

	Calories	Protein (Grams)	Calcium (Grams)	Phosphorus (Grams	Iron (Grams)
Sherman Standard	3,000	75	.68	1.30	.015
Colony Diet	2,999	80.7	1.81	1.78	.014

In measuring the adequacy of diets, the standard proposed by Sherman (13) (the one most commonly used) and the results of the writer's calculations were compared. The Sherman standards require for a man of 154 pounds in weight, 3,000 calories, 75 grams of protein, 0.68 grams of calcium, 1.30 grams of phosphorus and .015 grams of iron per day. This is called the safe minimum standard for judging the adequacy of the diet. These figures for protein, calcium, phosphorus,and iron make an allowance of fifty per cent above the average amount needed to maintain the metabolic balance within the human organism.

As may be seen by comparing the Colony diet with the Sherman standard in Table XVI, the food furnished the necessary amounts of all material except iron, which is only slightly below standard. The calcium and phosphorus are high because the patients receive more milk than the average person uses in his diet. Protein from milk, eggs, cheese, and meat is of higher biological value for optimum vigor and health so that furnished by the Colony diet is adequate because it includes 1.35 quarts of milk per day, one-third pound meat three times a week, and one-fourth pound of cheese once a week.

Because of the fact that the study was made during the month of May when the supply of garden produce was low, the average iron content of the diet for the year may be higher.

Since seventy-five per cent of the patients are active, the calorie content of the diet is not too high and there are only a few patients who are overweight and this might not be the result of too much food.

The average number of women patients is five hundred and one hundred children under fourteen years. About twenty-five children are kept in bed and the rest are very active. The patients are always hungry and do not leave any food on their plates. The food looks and tastes good, but the use of some aluminum serving bowls detracts from its appearance after it is served.

Each month the Colony uses an average of 44,123 quarts of milk or 1,250 quarts per day, which allows for 1.35 quarts per capita per day. Eggs are used for cooking purposes, and the amount used for one month was 710 pounds or 5,680 eggs, which gives an average of 5.19 eggs per capita per month. This includes the eggs used in the baked goods.

The vitamin content of the diet was not determined experimentally, but an estimation of it can be made.

According to recent investigations (12), vitamin A, which is closely associated with carotene,is found in both yellow and green plant material and is transferred into vitamin A within the animal body. Milk, milk products, egg yolks, and yellow and green vegetables are the chief sources of vitamin A. The patients received their best supply from milk, because the diet was low in green vegetables and eggs.

Vitamin B is found in whole grain cereal products, fruits, and vegetables, while wheat germ and yeast are the richest source of this vitamin. It is destroyed at a high temperature; therefore, it is essential that raw fruits and vegetables be included in the day's food supply. The vitamin B content of the diet was higher during the summer months when a large part of their food supply was obtained from the gardens and orchard, but low the rest of the year.

Foods containing vitamin C are citrous fruits, tomatoes, cabbage, cooked potatoes, and raw fruits. This vitamin is lost by cooking foods at a high temperature,and throwing away the liquid in which the food was cooked.

From a feeding experiment made at Columbia University, under the direction of Dr. Walter Eddy and Dr. E. F. Kohman (14), it was found, because of improved methods which prevent oxidation, that commercially canned vegetables have a higher vitamin content than those canned at home (14) (15) (16) (17). Since each cottage at the Colony cans a large amount of vegetables by the open-kettle method, undoubtedly the vitamin C content is not as good in these products as in commercially canned commodities. In general, the diet must have been low in this vitamin.

Vitamin D is effective in mobilizing of calcium and phosphorus in the body. The chief source of vitamin D is cod liver oil, which was not given to the patients, but eggs and milk contain small amounts. Adults need very little of this vitamin, so the diet was probably adequate for them. However, the young children did not have enough vitamin D in the food, and unless they received sun baths or were outdoors a great deal, their supply was low.

Food should furnish from three to four times as much vitamin G as needed to prevent the appearance of any specific sign of deficiency. Milk and meat are important sources of vitamin G. Leaves are richer than tubers and eggs furnish a good supply of vitamin G. The liberal use of milk would help to provide vitamin G, but the amount of leafy vegetables provided was too small to be considered as a source of supply.

Table XVII shows typical menus for one week. They are varied according to supplies on hand and season of the year. In the summer and fall, fresh vegetables are served and fruits from the gardens, while the root and canned vegetables are used during the winter and early spring. If the market price

Table XVII

Types of Menus Used

Day	Breakfast	Dinner	Supper
Monday	Cornmeal mush Bread Peanut butter Milk Coffee	Boiled potatoes Gravy Buttered carrots Bread Butter Chocolate Pudding Milk	Vegetable soup with macaroni Crackers Bread Applebutter Prunes Tea
Tuesday	Oatmeal Bread Peanut butter Milk Coffee	Mashed potatoes Roast pork Succotash Bread Butter Rice pudding Milk	Boiled potatoes Gravy Bread Applebutter Plums Tea
Wednesday	Cornmeal mush Bread Peanut butter Milk Coffee	Baked beans,catsup Beets Bread Butter Pumpkin pie Tea	Bean soup Crackers Bread Applebutter Stewed peaches Tea or milk
Thursday	Oatmeal Bread Peanut butter Milk Coffee	Mashed potatoes Hamburger Tomatoes Bread Tapioca pudding Milk or tea	Roast potatoes Gravy Bread Applebutter Applesauce Milk or tea
Friday	Farina Bread Butter Peanut butter Milk Coffee	Boiled potatoes Gravy Salmon Buttered beets Bread Butter Cherry pie	Mashed potatoes Gravy Bread Applebutter Prunes Milk or tea
Saturday	Oatmeal Bread Peanut butter Milk Coffee	Baked beans,catsup Succotash Bread Butter Rice pudding Milk or tea	Bean soup Crackers Bread Applebutter Peaches Milk or tea
Sunday	Milk toast Cookies Coffee	Mashed potatoes Roast pork,dressing Gravy Buttered peas Bread Butter Tapioca pudding Milk or tea	Prunes Applebutter Bread Cake Milk or tea

*Note: Peanut butter used in place of butter or oleomargine.

of a certain type of meat which they had planned to use should suddenly increase, a less expensive meat would be used. These menus were made out by cooks in charge of food preparation and were followed for baked goods more than for other foods, because the baker works on a schedule.

While in general the diet is adequate, except for vitamins, there are certain modifactors that can be made which will increase the vitamin and mineral content and improve the palatability without increase in cost:

1. The addition of more whole wheat products to the diet to increase the vitamin B content.

2. Providing more raw fruits and vegetables would add variety to the menus and keep the supply of vitamins A and C higher, especially during the winter months. This could be carried out by greenhouse production of tomatoes and leaf lettuce. Greenhouses for the production of vegetables are not as expensive to construct or maintain as greenhouses for flowers[1], and probably would not be prohibitive in price.

3. The possibility of a central canning plant for the Colony using commercial methods has been considered, and this would undoubtedly be a means of improving the vitamin content of the diet.

4. Increased acreage of gardens and orchards.

5. Standard and approved methods of food preparation that will maintain the vitamin and mineral content, especially of vegetables.

Food Costs. Food costs were obtained from the Steward's office and represent actual purchase price of staple goods, market estimate, or garden produce, and actual cost of production of dairy products. The food used for

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[1]Interview with Mr. Frost, Horticulture Department, Michigan State College.

one month was grouped into six different classes, as follows:

	Total Cost	Percentage Cost
Staple supplies	$1,544.96	38.00
Meat	413.17	10.12
Baked goods	515.64	12.26
Fruits and vegetables	474.79	10.01
Dairy products	1,103.34	26.70
Home canned goods	13.52	3.30
	$4,065.57	100%

The average number of patients and employees for the month was 1092, and the daily per capita food cost was, therefor, .1244.

Craig Colony[1] in New York State, an institution similar to Wahjamega, has an average daily population of 2171 and has a daily per capita food cost of .1306 for the year ending June 30, 1935.

At the Colony at Parsons, Kansas[2], with an average population of 787, the daily food cost was .131 in 1935.

It would seem, therefore, that a daily food cost of .1244 is not too high for this type of institution.

The cost of dairy products is small in proportion to the amount used because they were produced at the Colony farm and there was no expense charged for labor.

In the use of fats for frying, experiments (18) show that fats with a low smoking temperature burn readily and give an unpleasant odor to food. Fats which have a high percentage of free fatty acids have low smoking points. The

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[1] T. H. Hitchcock, steward at Craig Colony.

[2] C. S. McGinnis, steward at Parsons Colony.

smoking point of butter is 208° C., while that of Snowdrift is 238° C. At the Colony, because of the fact that there were not enough drippings from bacon, butter was used for a great deal of frying.

From the Iowa experiments mentioned above and from others elsewhere, it can be seen that butter is not a satisfactory fat for frying; and since butter is more expensive than a hydrogenated fat, this procedure at the Colony increased the food cost with no improvement in the product or in the adequacy of the diet.

Table XVIII shows the comparative cost of canned goods in number ten and number two cans, the grades of the two sizes being the same. Other years might not show the same percentage variation. All of the wholesalers interviewed state that the price differential is practically always in favor of the number ten can. The average number of servings in a number ten can is thirty; and since the population of all the cottages except number three is from sixty to one hundred fifty, there would be little waste from left overs by using the number ten can. For the cottage housing thirty-three, a combination of number ten and number two cans could be used. The table shows that a saving would result from this procedure.

Fruits were not listed because little commercially canned fruit was used, due to home canning of garden surplus and storage of apples in fruit cellars. Evaporated prunes and peaches were supplied throughout the year to the hospital and cottages.

Referring to the menus in Table XVII, it will be noted that peanut butter was used for breakfast and no butter was allowed at that meal. In comparing the spreading qualities of oleomargine with peanut butter, it was found that oleomargine would spread two and one-half times as much bread as peanut butter[1].

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[1] Experiment made at Mary Mayo Hall.

Table XVIII

Cost of Canned Goods in No. 10 and No. 2 Cans

Canned Goods	No. 10 Can	No. 2 Can	Cost Per Ounce No. 10 Can	Cost Per Ounce No. 2 Can	Cost of Same Amount Bought in No. 2 Can	Cost of Same Amount Bought in No. 10 Can
	(Ounces)	(Ounces)				
Tomatoes	106	20	.004127	.004585	.486	.437
Peas	106	20	.0054009	.005433	.575	.562
Corn	106	20	.0049135	.0070825	.7506	.5208
String beans	106	20	.0045003	.0047916	.5079	.4791

The cost of oleomargine was .13 per pound and the cost of peanut butter was .15 in January 1936. In view of the fact that oleomargine will spread a greater expanse of bread, the acutal cost of peanut butter would be greater than the price per pound indicates. The substitution of oleomargine part of the time would add variety to the diet without increasing the cost.

At the institution, canned succotash was bought instead of making succotash from dry lima beans and canned or dried corn. In canned succotash, there is a much larger proportion of corn than lima beans--six parts of corn to one part of lima beans[1]. If the succotash were prepared in the institution with dried lima beans and canned corn, the cost would be 0.85 per pound, using 1936 prices. This contrasts with .12 per pound when equal parts of corn and lima beans were used. Canned succotash in Number 2 cans in retail stores in East Lansing in 1936 was .15 for twenty ounces. Retail prices in succotash were used because, from an interview with the manager of one of the branches of the largest wholesale grocery house[2] in Michigan, it was found that there is no demand for succotash in Number 10 cans, which would indicate that institutions are preparing their own with dry lima beans and canned corn.

The most economical method of cooking meat is important from the standpoint of fuel cost and amount of shrinkage. Cooking losses are of two types--evaporation loss or loss of moisture, and dripping loss, which is the fat and liquid in the pan and cannot be considered as a total loss if used in gravy or other food prepartion. The two factors affecting the volume of losses in meat are degree of doneness, and oven temperature used. Since these factors can be controlled, it is important to know the effect of different temperatures used in roasting and different degrees of doneness on the finished product.

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[1] Experiment made at Mary Mayo Hall.

[2] Lee and Cady, wholesale grocers.

In experimental work done by the National Livestock and Meat Board (21), roasts which were cooked at a higher temperature showed increased cooking losses and the dripping losses are greater than those by evaporation. The cooking losses are greater in meats that are well done, because the cooking time must necessarily be longer. Palatability, another important factor, which includes tenderness, juiciness, and flavor of the lean, shows a decrease when the meat is cooked at a high oven temperature.

In comparing the amount of shrinkage of meat when coal and steam are used, it is found that there is a third less shrinkage when steam is used (22). One of the advantages in using steam is that it is more easily controlled than coal, but it is difficult to make a comparison of costs because it depends on the type of coal used, whether bought by the ton or in car loads lots or not, and whether the steam is exhaust or high pressure. It has been estimated[1] that one ton of coal will produce 10,000 pounds of exhaust steam. Steam would, therefore, be a cheaper cooking medium than heat produced in a coal range. The installation of steam roasters, which would be possible due to a central heating plant which supplies steam heat to the hospital and cottages, would undoubtedly effect a decided savings in fuel cost and shrinkage in meat.

Suggested Changes:

1. The use of another fat besides peanut butter when the cost of butter is high.

2. Cracked wheat as a breakfast cereal compared favorably with oatmeal in price[2].

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[1] Lansing Board of Water and Lights.

[2] Cracked wheat .03½ per pound, Thoman Milling Company; Oatmeal .03 per pound, Lee and Cady.

3. A central kitchen would reduce cost, since the supervision would be concentrated there and there would be less waste of food. A truck which the Colony owns could take the food in heated carts to the cottages. This system is used successfully at Northville, an institution similar in size.

4. The use of steam for cooking would be less expensive than coal, which is being used at the present time, and would prevent losses in food shrinkage, especially meat.

5. The making of succotash instead of buying canned succotash.

6. The use of number ten cans instead of number two.

SUMMARY

As a result of the study of the food provided for the patients at the Michigan Colony for Epileptics, it was found that the diet was adequate in calories, phosphorus, iron, and calcium; but higher in protein than is advisable for epileptic patients.

Although the vitamin content was not determined experimentally, the diet was probably somewhat deficient in vitamins A, B, and C, especially during the winter months when citrous fruits and green vegetables are not available. The children who are strong enough to play out of doors are dependent upon sunshine for vitamin D. There is undoubtedly a fair amount of vitamin G, because the diet includes a good supply of milk and adequate muscle tissue.

There was a lack of uniformity in the food prepared because standard recipes were not used. Food costs were increased by using an expensive fat for frying and the use of canned vegetables instead of dried ones which could have been easily prepared.

The diet was monotonous due to the repetition of old menus.

The equipment and layouts in the kitchens of the cottages and hospital should be surveyed to determine the possibility of improving the facilities, because efficiency of food preparation and meal service is dependent on equipment and arrangement.

The yearly requirement of garden produce needed should be estimated and the acreage planned with allowance for crop shortage. A study of soil conditions with regard to increased crop production should be carried out.

New menus should be provided to replace the old ones; and standardized recipes used which would give a better and more uniform product.

Costs could be reduced by: the use of a fat other than butter for frying; the use of number ten cans instead of number two; the making of succotash from canned corn and dry lima beans instead of buying canned succotash; the use of steam for cooking, especially for meats; and the preparation of food in a central kitchen instead of the kitchen of the various cottages.

The use of new menus which include different combinations of food materials would make the diet less monotonous. Menus designed for this purpose are given in Table XX in the appendix.

The recipes given in Table XXI, also found in the appendix are of a type that can be easily prepared and which use ingredients that are available in institutions that operate on a low food budget. Each recipe gives the cost, as well as number of servings,and the size of the recipe could be adjusted according to the population of each cottage.

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APPENDIX

Table XIX [1]

Number of Servings Per Unit of Weight or Measure

Food	Servings Per Pound	Measure Per Pound
Apples	4	4 c.
Apricots	9	3 c.
Bananas	4	3 Medium
Beans (Lima)	12	2 1/4 c.
Beans (Navy)	12	2 1/4 c.
Butter	32	2 c.
Cabbage (shredded)	10	5 c.
Cottage Cheese	8	4 c.
Cocoa	128	4 c.
Coffee	50	5 1/2 c.
Corn (Canned No. 2)	6	2 c.
Corn (Canned No. 10)	30	14 c.
Crackers (white)	32	128
Hamburger	6	2 c.
Macaroni	12	3 1/3 c.
Oatmeal	15	5 1/2 c.
Onions	3	5 Medium
Peaches (dried)	10	2 1/2 c.
Peas (canned)	6	2 2/3 c.
Pineapple	4	4
Potatoes	4	3-4
Prunes	10	2 1/2 c.
Pumpkin	4	2 c.
Raisins	12	3 c.
Rice	12	2 c.
Salmon	4	2 c.
Spinach	4	2 c.
String beans	4	2 c.
Tapioca	12	2 2/3 c.
Tea	400	6 1/2 c.
Tomatoes	3	1 3/4 c.

[1] One of the objects of the study was to determine the number of servings per pound so that the management would know whether quantities sent out to the cottages were ample. The above table was developed for this purpose and includes the type of food which was used at the Colony.

Table XX

Suggested Menus

Day	Breakfast	Dinner	Supper
Monday	Oatmeal Milk Bread Jelly Coffee	Baked potatoes Breaded tomatoes Bread Butter Rice pudding Tea or milk	Corn chowder Crackers Whole wheat bread Applebutter Apricots Tea
Tuesday	Cracked wheat Milk Applebutter Bread Coffee	Creamed potatoes Hamburger Buttered carrots Bread Butter Chocolate pudding Tea or milk	Macaroni au gratin Cole slaw Bread Peanut butter Applesauce Tea
Wednesday	Cornmeal mush Milk W. W. bread Applebutter Coffee	Spanish rice Bread Butter Pumpkin pie Tea or milk	Potatoe soup Crackers Bread Butter Prunes Cookies Tea
Thursday	Oatmeal Milk Applebutter Bread Coffee	Shepherds pie Roast potatoes Whole wheat bread Butter Peach tapioca Tea or milk	Succotash Bread Applebutter Pears Tea
Friday	Cracked wheat Milk Bread Honey Cocoa	Scalloped potatoes Salmon Green beans Bread Butter Cherry pie Milk	Vegetable soup Crackers Peanut butter Bread Applesauce Tea
Saturday	Ralstons Milk Bread Jelly Coffee	Baked hash Creamed peas Butter Bread Suet pudding Tea or milk	Italian Spaghetti Whole wheat bread Applebutter Raisins Tea
Sunday	Oatmeal Bread Honey Doughnuts Cocoa	Mashed potatoes Roast pork Creamed cabbage Bread Butter Cocoanut Tapioca Milk	Tomato rice soup Crackers Peanut butter Whole wheat bread Cake Tea

Table XXI

Recipes

Creole Soup

Ingredient	Measure or Weight	Total Cost	No. of Servings
Brown soup or stock	4 gal.		
Tomato puree	2 No. 10 Cans		
Onion, finely chopped	2 cups		
Green pepper	2 cups		
Flour	5½ cups		
Macaroni, cut fine	4 cups		
Salt	¼ cup		
Pepper	1 tsp.		
Paprika	½ tsp.		
Grated Horseradish	¼ cup		
		$1.01	80

1. Cook macaroni, onion, and green pepper separately in boiling salted water.
2. Mix paste of flour and cold liquid.
3. Heat stock and puree in stock pot. Thicken with flour pasts. Add other ingredients and seasonings.

Cream of Corn Soup

Ingredient	Measure or Weight	Total Cost	No. of Servings
Corn	1½ No. 10 Cans		
Boiling water	3 qts.		
Milk	7 qts.		
Onions	2 small		
Oleo or butter	1½ cups		
Flour	1½ cups		
Salt	4 Tbsp.		
Pepper	½ tsp.		
		$1.01	80

1. Chop onion fine, add water and corn, simmer 20 minutes. Stir often.
2. Make a white sauce of the milk, flour, and fat.
3. Just before serving combine the two mixtures, bring to a boil, add seasonings and serve.

N.B. The corn mixture may be sieved before adding to the white sauce. A spoonful of whipped cream or popped corn may be added to each serving.

Bean Soup

Ingredient	Measure or Weight	Total Cost	No. of Servings
Navy beans	½ gal.		
Water	1¼ gal.		
Bacon ends	½ lb.		
Bacon fat	½ cup		
Flour	1 cup		
Onions	½ cup		
Salt	3 Tbsp.		
Pepper	¼ tsp.		
Ham stock	1 gal.		
Top milk	2 qts.		
		$0.44	75

1. Cook beans in stock pot till tender. Put through power grinder.
2. Make roux of fat and flour.
3. Heat ham stock and add roux to thicken.
4. Add bean puree and milk.

Corn Chowder

Ingredient	Measure or Weight	Total Cost	No. of Servings
Salt pork or bacon	½ lb.		
Onions, sliced	½ lb.		
Potatoes, diced	5 qts.		
Boiling water	3 qts.		
Flour	½ cup		
Milk	7 qts.		
Corn	1 No. 10 Can		
Salt	2 Tbsp.		
Pepper	1 tsp.		
Butter	¾ cup		
		$1.05	100

1. Cut salt pork or bacon in ½" cubes and cook till light brown and crisp (should be done slowly).
2. Add onion and cook slowly five minutes.
3. Put potatoes, pork cubes, onions, and boiling water in kettle and cook until potatoes are soft.
4. Make roux of butter and flour and stir into hot milk. Cook 20 minutes.
5. Add corn, potato mixture, and seasonings.

Cream of Pea Soup

Ingredient	Measure or Weight	Total Cost	No. of Servings
Peas	2 No. 10 Cans		
Water	3 qts.		
Milk	10 qts.		
Sugar	6 Tbsp.		
Onion, sliced	¼ lb.		
Oleo	1½ cups		
Flour	1¼ cups		
Salt	3 Tbsp.		
Paprika	¼ tsp.		
		$1.40	100

1. Drain liquor from peas and measure. Add enough water to make three quarts.
2. Run peas through power grinder.
3. Cook onion in small amount of water and add liquid to the peas. If stronger flavor is desired add sliced onions to the peas and cook with them.
4. Scald milk and pea liquor. Make roux of flour and fat and add to scalding liquid. Cook.
5. Add pea pulp and seasonings and cook till well blended.

Cream of Potato Soup

Ingredient	Measure or Weight	Total Cost	No. of Servings
Potatoes	8 lbs.		
Milk	10 qts.		
Water or stock	2 qts.		
Flour	1½ cups		
Oleo	2 cups		
Onions	2 medium		
Parsley, chopped	¼ cup		
Salt	2 Tbsp.		
Celery salt	1 Tbsp.		
Pepper	1½ tsp.		
Cayenne	1 tsp.		
		$0.65	85

1. Steam potatoes and run through ricer or power grinder.
2. Chop onions finely and cook in 2 cups water till tender.
3. Scald milk and remainder of water.

Cream of Tomato Soup

Ingredient	Measure or Weight	Total Cost	No. of Servings
Milk	6 gal.		
Water	1½ gal.		
Flour	12½ cups		
Salt	1 cup		
Sugar	1 cup		
Tomato puree	4 No. 10 Cans		
Bay leaves	15		
Onions	½ lb.		
Soda	2 Tbsp.		
		$2.34	160

1. Heat tomato puree, onions and bay leaves together. Strain.
2. Add soda to tomato mixture.
3. Heat milk in stock pot.
4. Mix flour, sugar, salt into paste with water and add to scalded milk.
5. Combine just before serving by adding tomato mixture to white sauce, beating constantly while adding.

Vegetable Soup

Ingredient	Measure or Weight	Total Cost	No. of Servings
Stock	10 qts.		
Celery, diced	2½ cups		
Potatoes, diced	2½ cups		
Onions, sliced	2½ cups		
Carrots, julienne	2½ cups		
Cabbage, shredded	2½ cups		
Rice	1½ cups		
Tomatoes	1 No. 10 Can		
Pepper	1 tsp.		
Salt	3 Tbsp.		
		$0.66	85

1. Cook vegetables in 4 qts. of water.
2. Cook rice in steamer.
3. Heat stock in stock pot and combine ingredients before serving.

Tomato Rice Soup

Ingredient	Measure or Weight	Total Cost	No. of Servings
Stock	2 gal.		
Tomatoes	2 No. 10 Cans		
Rice	1 lb.		
Onion, chopped	1 cup		
Celery, chopped	2 cups		
Salt	to taste		
Pepper	to taste		
		$1.09	120

1. Add celery, onion, and rice to stock and simmer till rice is tender.
2. Add water to replace the stock that has boiled away.
3. Add tomatoes either strained or unstrained.

Macaroni and Cheese

Ingredient	Measure or Weight	Total Cost	No. of Servings
Macaroni	3 lbs.		
Butter	1 cup		
Flour	2 cups		
Milk	4 qts.		
Salt	1 Tbsp.		
Paprika	1 Tbsp.		
Mustard	2 Tbsp.		
Worchestershire Sauce	1 Tbsp.		
Dry Crumbs	1 cup		
Cheese	2 lbs.		
		$0.81	40

1. Cook macaroni in boiling salted water; drain, blanch with cold water.
2. Make a cream sauce of butter, flour, and milk. Add seasonings and cheese. Stir till cheese is melted
3. Combine sauce and macaroni and pour into baking pans.
4. Cover with crumbs. Bake in moderate oven 350 f. till crumbs are brown. 20-30 minutes.

Ragout of Beef

Ingredient	Measure or Weight	Total Cost	No. of Servings
Beef	20 lbs.		
Salt	4 oz.		
Pepper	½ oz.		
Flour	1½ lbs.		
Diced potatoes	4 qts.		
Carrots and onions	2 qts.		
Fat	8 oz.		
Worcestershire sauce	¼ cup		
		$3.24	85

1. Cut meat in cubes, dredge with flour, and saute with a few of the vegetables on top of the stove.
2. Put in the oven and add water as it cooks down. After the meat is cooked add rest of the vegetables.

Hamburgers

Ingredient	Measure or Weight	Total Cost	No. of Servings
Beef	20 lbs.		
Pork	7 lbs.		
Milk	6 qts.		
Eggs	12		
Bread	2 loaves		
		$6.09	200

1. Grind beef and pork.
2. Add beaten eggs, milk and bread crumbs.
3. Form into patties and fry or bake.

Shepherds Pie

Ingredient	Measure or Weight	Total Cost	No. of Servings
Diced cooked meat	6 qts.		
Salt	2 Tbsp.		
Pepper	1½ tsp.		
Flour	2 cups		
Water	4 qts.		
Onion juice	½ cup		
Mashed potatoes	6 qts.		
		$1.24	75

1. Make sauce of fat, flour, and liquid. Add seasoned meat and heat thoroughly. Season well
2. Put in baking dish or casserole. Cover with mashed potatoes and brown in oven.

Spanish Lima Beans

Ingredient	Measure or Weight	Total Cost	No. of Servings
Chopped onion	1½ cups		
Chopped green pepper	2 cups		
Bacon drippings	1 cup		
Thick strained tomatoes	3 qts.		
Salt	4 tsp.		
Pepper	½ tsp.		
Worcestershire Sauce	3 Tbsp.		
Cooked lima beans	8 qts.		
American cheese	3 lbs.		
		$1.32	85

1. Fry onions and peppers in bacon drippings; add strained tomatoes and cook slowly 10 minutes.
2. Add seasonings and beans (thoroughly drained) and simmer slowly 20 minutes.
3. Put beans and grated cheese in baking pan in alternate layers and bake in moderate oven 15 minutes.

Spanish Rice

Ingredient	Measure or Weight	Total Cost	No. of Servings
Rice	5 cups		
Bacon	1¼ lbs.		
Salt	3 Tbsp.		
Green peppers	3		
Red peppers	1		
Onions	2		
Tomatoes	4 qts.		
		$0.84	65

1. Cook rice in 4 qts. water. Blanch.
2. Chop salt pork or bacon and cook but do not brown. Add onion and pepper; cook till slightly brown. Combine all ingredients with rice and cook 30 minutes.

Italian Spaghetti

Ingredient	Measure or Weight	Total Cost	No. of Servings
Spaghetti	5 qts.		
Fat	1 cup		
Onions	2 small		
Cheese	2 lbs.		
Salt	6 Tbsp.		
Tomatoes	2 No. 10 Cans		
Green peppers	2		
		$1.61	80

1. Cook spaghetti in boiling salted water. Blanch.
2. Saute onions and green peppers in fat. Add tomatoes and cook. Add to spaghetti, add seasonings and mix thoroughly.
3. Sprinkle cheese over the top and bake.

Vegetable Pie

Ingredient	Measure or Weight	Total Cost	No. of Servings
Carrots, diced	2½ qts.		
Potatoes, diced	2½ qts.		
Celery, diced	2½ qts.		
Peas	1 No. 10 Can		
Tomatoes	½ No. 10 Can		
Salt	¼ cup		
Fat	1 cup		
Onions, chopped	1½ cups		
Flour	2 cups		
Meat stock	2 qts.		
		$1.45	60

1. Cook carrots, celery, and potatoes in steamer till tender.
2. Saute onions in fat. Add flour.
3. Heat stock and strained tomatoes.
4. Stir in flour and fat mixture and seasonings.
5. Combine vegetables, tomato stock mixture; pour into baking pans and cover with baking powder biscuits.
6. Bake in hot oven till biscuits are done.

Macaroni Neopolitan

Ingredient	Measure or Weight	Total Cost	No. of Servings
Macaroni	4 lbs.		
Ham scraps chopped	2 lbs.		
Onion	1 lb.		
Oil	½ cup		
Tomato puree	2 qts.		
Gravy or stock	2 qts.		
Flour	¾ qt.		
Worcestershire Sauce	1 Tbsp.		
Horseradish	4 Tbsp.		
Salt	2 oz.		
Grated Cheese	6 oz.		
		$0.93	72

1. Cook macaroni in boiling salted water till tender. Blanch with cold water.
2. Thicken puree with flour and add with gravy to cooked macaroni.
3. Saute onions and ham scrpas in oil. Add to macaroni with rest of seasonings.
4. Sprinkle grated cheese over top.
5. Bake in moderate oven.

Chocolate Blanc Mange

Ingredient	Measure or Weight	Total Cost	No. of Servings
Milk	10½ qts.		
Cornstarch	1 lb.		
Granulated sugar	4 lbs.		
Cocoa, dark	3 cups or 12 oz.		
Vanilla	2 Tbsp.		
Salt	1½ oz.		
		$0.70	68

1. Scald milk. Mix sugar, cornstarch, and cocoa, and add to milk.
2. Let cook till it thickens; add salt and vanilla.
   Does not crack on standing.

Chocolate Bread Pudding

Ingredient	Measure or Weight	Total Cost	No. of Servings
Bread	1½ lbs.		
Eggs	6		
Milk	2 qts.		
Sugar	1 lb.		
Butter	2 oz.		
Vanilla	2 tsp.		
Cocoa	3 oz.		
		$0.33	24

1. Cut bread in one-half inch cubes.
2. Make custard of eggs, milk, sugar, butter, and vanilla.
3. Pour over bread and bake.

Cocoanut Tapioca

Ingredient	Measure or Weight	Total Cost	No. of Servings
Tapioca	4 cups		
Milk	6 qts.		
Sugar	6 cups		
Salt	3 tsp.		
Egg white	12		
Cocoanut	6 cups		
Vanilla	6 Tbsp.		
Egg yolks	12		
		$1.77	90

1. Heat milk in double boiler.
2. Add tapioca (minute) cook until clear.
3. Add beaten yolks, sugar and salt, cook five minutes.
4. Fold in beaten whites, cocoanut and vanilla.

Cornstarch Pudding

Ingredient	Measure or Weight	Total Cost	No. of Servings
Milk	10 qts.		
Cornstarch	5 cups		
Sugar	10 cups		
Salt	2 Tbsp.		
Eggs	8		
Vanilla	3 Tbsp.		
		$0.68	60

1. Mix sugar and cornstarch in some cold milk, add to heated milk, stir constantly, cook 20 minutes.
2. Add beaten egg yolks and salt, cook five minutes.
3. Remove from fire, fold in beaten whites.

Butterscotch Cornstarch Pudding

Ingredient	Measure or Weight	Total Cost	No. of Servings
Milk	6 qts.		
Cornstarch	9 oz.		
Butter	1 lb.		
Brown sugar	3 lbs.		
Eggs	1 pt.		
Salt	1 tsp.		
		$0.85	45

1. Reserve enough milk to moisten cornstarch.
2. Scald remainder of milk in steamer.
3. Melt sugar and butter.
4. Moisten cornstarch with cold milk, add to scalded milk, add butterscotch mixture and cook till done.
5. Add slightly beaten eggs and cook three minutes.

Apple Betty

Ingredient	Measure or Weight	Total Cost	No. of Servings
Apples, pared and sliced	6 qts.		
Crumbs	1½ qts.		
Sugar	1 qt.		
Cinnamon	1 tsp.		
Nutmeg	½ tsp.		
Fruit juice	1 qt.		
Lemon juice	¼ cup		
Butter	½ cup		
		$0.46	40

1. Mix cinnamon, sugar, and nutmeg.
2. Arrange ingredients in greased baking pan; layer of apples, then layer of crumbs, sugar and spice mixture, etc.
3. Pour fruit juice over top and dot with butter.
4. Bake in moderate oven.

ROOM USE ONLY