THE USE OF EVAPORATED MILK IN INSTITUTION COOKERY

THESIS FOR THE DEGREE OF M. S.

Florence J. Atwood

1932


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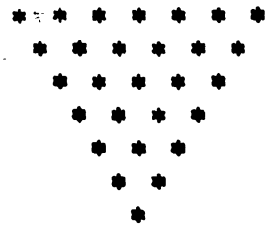

By

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THESIS

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THE USE OF EVAPORATED MILK IN INSTITUTION COOKERY

Introduction

The Present Situation. - - Institutions have considered evaporated milk an article to be kept on the shelves for use in time of emergency. The aim of this study was to show that evaporated milk may be used more extensively.

Milk is composed of 87.1 per cent water (1). Tests show this water to be normal in every respect; that it has the same properties as naturally occuring waters, From the standpoint of distribution of milk, this water is a mill stone to the producer. It is bulky, requires much handling and is of no particular value. Reducing the bulk of milk by evaporation makes possible transportation at a minimum cost, storage in smaller space, and helps to equalize supply and demand. There is usually an excess supply of milk during May and June and often a shortage in October and November. These are a few of the conditions which were an incentive to the development of evaporated milk.

Evaporated milk is a development of the nineteenth century. It is cow's milk which has been reduced in volume at a low temperature, at a ratio of about two and one-half parts of fresh milk to one part of condensed milk and preserved by sterilization in steam under pressure. "It con-

tains not less than 7.8 per cent milk fat, nor less than 25.5 per cent of total milk solids; provided, however that the sum of the percentages of milk fat and total milk solids be not less than 33.7 per cent" (2).

"Market milk is the term applied to milk consumed in its fluid state in contradistinction to milk used for manufacturing products such as butter, cheese, ice cream etc." (3). The United States Department of Agriculture Statistics show a steady increase in the amount of market milk sold since 1917. At the present time approximately 6,500,000,000 gallons are marketed annually.

Some figures on the present size of the market milk industry present an interesting picture. "In 1929 New York received a daily average of 3,832,600 quarts of milk. This milk came from points between 44 and 450 miles distant; in New York, New Jersey, Vermont, Pennsylvania, Massachusetts, Connecticut and Canada. From the country the milk was transported by ten different railroads, although 30,000 gallons a day arrived by motor truck" (3).

In 1929, the population of Detroit, Michigan was 1,368,220. That year, its inhabitants consumed daily an average of 1,250,000 pints of milk. This milk came from points between 30 to 125 miles distant with less than 15 per cent of it being produced within a radius of 30 miles. It maintains 32 milk plants and 26,00 milk wagons.

These are only two of the leading milk markets in the United States. Markets comparable in size to these mentioned are found in Boston, Philadelphia, Pittsburg, Cleveland, Chicago, Louisville, Seattle and San Fransciso. If these cities are located on a map, it will be noticed that most of them fall in the north eastern part of the United States. In this same area there are many other cities with a population of 50,000 more or less, to be supplied with their share of milk.

The market milk industry is already of great magnitude. If it continues to grow, are there railroad facilities which can transport the milk from the producer to the consumer? With the increased freight rates, will it be possible to receive a price that will justify the cost of production? As the distance between the producer and consumer increases will the price of milk be such that the average family can afford to purchase the amounts desired? Are there sanitary conditions which will cope with the time element involved between the producer and consumer? Will it be possible for the supply to be adequate at all times? Milk buyers are regular consumers the year around and demand daily service. These are some of the problems that give impetus to the possibilities in the uses of evaporated milk.

The first patent for condensing milk was granted to Gale Borden in 1856. Since that time many modifications of

the process have been invented. One of the modifications was discovered by Meyenberg, a native of Switzerland. He discovered that unsweetened condensed milk could be preserved by heat sterilization. In 1884, he was granted in this country a patent on his process. "Evaporated milk was first packed in this country on a successful basis under the Meyenberg process on June 15, 1885, at Highland, Illnois" (4). The annual production for 1931 was 1,804,930,000 pounds. Of this amount 145,922,000 pounds were canned whole evaporated milk (5).

Object of Study. - - The study chosen for investigation was threefold:

A. To determine whether evaporated milk may be used in recipes in quantity cookery with approximately the same success as with market milk,

B. To compare the general appearance, flavor and texture of foods prepared with evaporated milk with the same qualities in those prepared with market milk,

C. To compare prices of recipes prepared with evaporated milk with those prepared with market milk.

Review of Literature

The available literature on the use of evaporated milk in large quantity cookery is not extensive and consists almost wholly of recipes. There is, however, considerable literature on the nutritive value of evaporated milk.

Through studies in scientific laboratories, milk has been proven to be an indispensable food. McCollum (6) speaks of it as our most important food stuff because its composition is such that when used in combination with other food-stuffs, it corrects their dietary deficiencies. With the increasing tendency toward the use of such forms as evaporated, dried and pasteurized milk instead of raw milk, the expermental work which has been done in determining whether or not the same reliance can be placed on these forms of milk as a source of proteins, minerals and vitamins as on pasteurized milk, is of interest.

Willard and Blunt (7) made a study of the comparative influence of evaporated and commercially pasteurized milk on the calcium, phosphorous and nitrogen metabolism of four children and of three adults. To the children the diet which included evaporated milk resulted in a higher phosphorus retention in all four cases and in a higher nitrogen and calcium retention in three of the four. Their conclusion is that evaporated milk appears to be a satisfactory source of calcium, phosphorus and nitrogen, slightly superior to pasteurized milk.

In referring to canned milks which comprise evaporated milk and condensed or sweetened evaporated milks, McCollum and Simmonds (6) state, "In the heating process there is a tendency for the calcium of milk to separate as insoluble calcium phosphates, and the anti-scorbutic properties of the product are lost. The experiments of Daniels have shown that rats utilize the calcium in such milks".

Samuel and Kock (8) recently made a study on the relative quantitives of heat-stable and heat-labile fractions of vitamin B in raw and evaporated milk. Their results show that commercial evaporation of cow's milk destroys about one-sixth to one-fifth of the antineuritic heat-labile fraction, but found no identifiable destruction of heat-stable growth promoting fraction.

In a study of vitamin G values of pasteurized milk, evaporated milk and eggs, Todhunter (9) found that vitamin G values for market milk and evaporated milk diluted according to the directions on the container, are substantially alike.

Deming and Davis (10) made a bacteriogical investigation of evaporated milk and find that the milk as purchased in the local markets is not only free from pathogenic microorganisms, but may, for all practical purposes, be considered sterile.

From the results of these experiments which have been conducted by various authorities it seems reasonable to con-

clude that evaporated milk may be relied upon, when used, as a source of minerals and vitamins the same as market milk. This assurance should encourage more liberal use of evaporated milk.

Experimental Procedure

Recipes using evaporated milk in place of market milk, were prepared in the kitchen of the Women's Commons and served in the dining room. After each recipe was prepared, it was studied and critized by various members of the institution staff. The points considered were general appearance, flavor, and consistency or texture. The recipes used in this study, except those in appendix, were prepared and scored three times.

The points considered were each given a value, and then scored by judges. The results of the study were found by making a comparison of the possible score with the judges score.

The cost of each recipe was considered so that a comparison of the prices of the two types of milk could be made. This information is found in Table XVII. Unless specified diluted evaporated milk was used in these recipes. The prices were figured on the basis of evaporated milk at 52 cents per gallon and market milk at 30 cents per gallon. These were the prices which the Women's Commons paid for these commodities.

No study or comparisons were made as to the brands of milk being used. Occassionally a slight difference was noted in the color and thickness of the various cans of milk. However, these did not make any noticable difference in the final products.

The use of evaporated milk in preparing small quantity recipes is more common than for large quantity. However since cooking for a unit larger than a family involves problems vastly different from those arising when cooking for a small unit, the converting of these recipes into large quantity is not always satisfactory. The procedure used in this problem made possible an efficient approach to large quantity preparation.

Serving the foods which had been prepared with evaporated milk, to the girls eating in the dining room of the dormitory, offered a field of unusual opportunity because of the more or less critical attitude of this type of a group. Their meals are paid for in advance, they are accustomed to the flavor of home cooked foods, to the flavor of fresh market milk, and to their mother's catering to their likes and dislikes. However, it was not noticable at any time, that the girls discriminated against foods in which evaporated milk was used.

Since this problem extended over a period of nine months, it gave ample opportunity to repeat the recipes a

a number of times. This made it possible to standardize the recipes to such an extent that they may be reproduced by others with a high degree of success. Many additional recipes using evaporated milk, other than those included in this study were also prepared and served in the dining room of the Women's Commons. These recipes are found in the appendix.

Discussion of Results

In scoring these recipes each quality was given a value in points. General appearance and flavor were given equal value because the appearance of the food is often as much of a selling factor as the flavor. A copy of the score card which was used, is given below.

	Possible Score	Judge's Score
General appearance	4	
Flavor	4	
Consistency	2	

Creamed Soups. - - The Soups prepared for this study were celery, corn, duchess, onion and pea. The data (Table I & II) show that the general appearance, flavor and consistency of the soups made with evaporated milk were superior to those made with market milk. The smooth, creamy, velvet texture of soups made with evaporated milk could not be duplicated in soups made with market milk. The cooked

flavor of evaporated milk which is easily detected and to some people objectionable, was masked by the flavors of the other foods which were used in the soups.

The Le Petit Gourmet of Chicago, which is a high class restaurant serving a critical clientele, has established a reputation for serving excellent creamed soups. Market milk as purchased, is placed on the back of the range and simmered until it is comparatively thick. This is then used for making the various soups without the addition of other thickening. This process gives to the milk a consistency similiar to that of evaporated milk since it is actually a reduced milk. The result is that the smoothness and creaminess of the soups is comparable to that made with evaporated milk. It seems that both time and expense would be saved by using evaporated milk instead of this process.

TABLE I

SCORES FOR CREAM SOUPS USING EVAPORATED AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Score
Celery - Evaporated Milk						
General appearance	4	3.8	3.8	3.9	12	11.3
Flavor	4	3.7	3.8	3.8	12	11.1
Consistency	2	1.8	1.7	1.9	6	5.4
Celery - Market Milk						
General appearance	4	3.0	2.8	3.2	12	9.0
Flavor	4	3.0	2.8	4.1	12	9.9
Consistency	2	0.8	0.8	0.7	6	2.3
Corn - Evaporated Milk						
General Appearance	4	3.9	3.9	3.8	12	11.6
Flavor	4	3.7	3.7	3.8	12	11.2
Consistency	2	1.8	1.8	1.9	6	5.6
Corn - Market Milk						
General appearance	4	2.8	3.0	3.0	12	8.8
Flavor	4	3.6	3.6	3.7	12	10.9
Consistency	2	0.7	0.6	0.7	6	2.0
Duchess - Evaporated Milk						
General appearance	4	4.0	3.9	3.9	12	11.8
Flavor	4	3.8	3.8	3.7	12	11.3
Consistency	2	1.8	1.8	1.9	6	5.5
Duchess - Market Milk						
General appearance	4	2.2	2.4	2.5	12	7.1
Flavor	4	3.2	2.0	2.4	12	7.6
Consistency	2	0.8	0.7	0.8	6	2.3
Onion - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	3.9	3.8	12	11.7
Consistency	2	1.8	2.0	1.9	6	5.7
Onion - Market Milk						
General appearance	4	3.0	2.8	2.8	12	8.6
Flavor	4	3.1	3.0	3.1	12	9.2
Consistency	2	0.8	0.7	0.6	6	2.1
Pea - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	3.7	3.8	3.8	12	11.3
Consistency	2	2.0	2.0	2.0	6	6.0
Pea - Market Milk						
General appearance	4	3.5	3.2	3.3	12	10.0
Flavor	4	2.8	2.7	2.8	12	8.3
Consistency	2	0.8	1.0	0.8	6	2.6

TABLE II

COMPARISON OF CREAM SOUPS USING EVAPORATED AND MARKET MILK

	Celery		Corn		Duchess		Onion		Pea		Total Score		
	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Possible Scores
General appearance	11.3	9.	11.6	8.8	11.8	7.1	12.0	8.6	12.0	10.0	58.7	41.5	60
Flavor	11.1	9.9	11.2	10.9	11.3	7.6	11.7	9.2	11.3	8.3	56.6	45.9	60
Consistency	5.4	2.3	5.6	2.0	5.5	2.3	5.7	2.1	6.0	3.4	28.2	12.1	30

Meat Dishes. - - Milk curdled when pork chops were baked in it regardless of whether it was market or evaporated milk. Because of this no points were given for general appearance. Table III presents these results. This same table shows that the general appearance was satisfactory when undiluted evaporated milk was used. The milk and the bread crumbs formed a dressing over the chops which browned to a beautiful color without curdling.

The results (Table IV) show that there is no appreciable difference in the flavor of the products when the different milks are used. The general appearance and consistency of the products using evaporated milk are slightly superior.

The Chicken a la King recipe gives a most satisfactory product. The Ham en Panier is a good way to serve left over ham scraps. The green and red peppers used in this dish gives pleasing colors which add to the attractiveness.

Table III

SCORES FOR MEAT DISHES USING EVAPORATED AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Score
Chicken a la King - Evaporated Milk						
General appearance	4	4.0	3.9	4.0	12	11.9
Flavor	4	3.9	3.8	3.8	12	11.5
Consistency	2	1.8	2.0	2.0	6	5.8
Chicken a la King - Market Milk						
General appearance	4	3.5	3.3	3.5	12	10.3
Flavor	4	3.7	3.8	3.6	12	11.1
Consistency	2	1.7	1.6	1.7	6	5.0
Ham En Panier - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	3.8	3.7	3.8	12	11.3
Consistency	2	2.0	1.8	1.8	6	5.6
Ham En Panier - Market Milk						
General appearance	4	3.8	3.7	3.6	12	11.1
Flavor	4	3.7	3.8	3.8	12	11.3
Consistency	2	1.8	1.7	1.8	6	5.2
Meat Loaf - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Consistency	4	4.0	4.0	4.0	12	12.0
Meat Loaf - Market Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Consistency	2	2.0	2.0	2.0	6	6.0
Pork Chops - Evaporated Milk						
General appearance	4	0	0	0	12	0
Flavor	4	3.5	3.5	3.5	12	10.5
Consistency	2	1.5	1.0	1.3	6	3.8
Pork Chops - Market Milk						
General appearance	4	0	0	0	12	0
Flavor	4	3.5	3.5	3.5	12	10.5
Consistency	2	1.2	1.4	1.0	6	3.6
Pork Chops - Undiluted Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Consistency	2	1.8	1.8	1.8	6	5.4

TABLE IV

COMPARISON OF MEAT DISHES USING EVAPORATED AND MARKET MILK

	Chicken a la King		Ham En Panier		Meat Loaf		Pork Chops		Total Score		
	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Possible Score
General appearance	11.9	10.3	12.0	11.1	12.0	12.0	0	0	35.9	33.4	48
Flavor	11.5	11.1	11.3	11.3	12.0	12.0	10.5	10.5	45.3	44.9	48
Consistency	5.8	5.0	5.6	5.2	6.0	6.0	3.8	3.6	21.2	19.8	24

Vegetable Dishes. - - Creamed and escalloped vegetables in which both types of milk were used, were compared. The scores for these dishes are given in Table V.

Results (Table VI) show the comparison of creamed asparagus, creamed carrots and creamed onions, and escalloped celery, corn and potatoes. The escalloped celery, corn and potato results show that the flavor is superior when market milk is used but that there is practically no difference in general appearance and consistency. It is reasonable to suppose that the same results would be obtained if other vegetables were prepared by these methods.

Table V

SCORES FOR CREAMED VEGETABLES USING EVAPORATED AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Scores
Asparagus - Evaporated Milk						
General appearance	4	4.0	3.8	4.0	12	11.8
Flavor	4	3.8	3.3	3.8	12	10.9
Consistency	2	2.0	1.8	2.0	6	5.8
Asparagus - Market Milk						
General appearance	4	3.9	4.0	3.9	12	11.8
Flavor	4	3.8	4.0	3.7	12	11.5
Consistency	2	1.9	1.7	1.9	6	5.5
Carrots - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	3.7	3.7	3.8	12	11.2
Consistency	2	2.0	1.9	2.0	6	5.9
Carrots - Market Milk						
General appearance	4	3.9	3.9	3.9	12	11.7
Flavor	4	3.8	3.8	3.9	12	11.5
Consistency	2	1.9	1.8	1.9	6	5.6
Onions - Evaporated Milk						
General appearance	4	3.1	3.9	3.1	12	10.1
Flavor	4	4.0	4.0	4.0	12	12.0
Consistency	2	2.0	2.0	2.0	6	6.0
Onions - Market Milk						
General appearance	4	2.7	2.6	2.6	12	7.9
Flavor	4	3.8	3.7	3.8	12	11.3
Consistency	2	1.9	1.9	1.8	6	5.6
Escalloped Celery and Eggs- Evaporated milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	3.9	4.0	3.9	12	11.8
Consistency	2	2.0	2.0	2.0	6	6.0
Escalloped Celery and Eggs- Market Milk						
General appearance	4	3.9	3.9	3.9	12	11.7
Flavor	4	3.8	3.9	3.9	12	11.6
Consistency	2	1.9	1.9	1.9	6	5.7

TABLE V - Continued

SCORES FOR CREAMED VEGETABLES USING EVAPORATED AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Scores
Escalloped Corn - Evaporated Milk						
General appearance	4	3.9	3.9	4.0	12	11.8
Flavor	4	3.8	3.8	3.9	12	11.5
Consistency	2	2.0	2.0	2.0	6	6.0
Escalloped Corn - Market Milk						
General appearance	4	3.8	3.8	3.9	12	11.5
Flavor	4	3.7	3.7	3.9	12	11.3
Consistency	2	1.9	1.9	2.0	6	5.8
Escalloped Potatoes - Evaporated Milk						
General appearance	4	3.9	4.0	4.0	12	11.9
Flavor	4	3.5	3.5	3.4	12	10.4
Consistency	2	1.8	1.9	1.9	6	5.6
Escalloped Potatoes Market Milk						
General appearance	4	3.8	3.9	3.9	12	11.6
Flavor	4	3.8	3.9	3.8	12	11.5
Consistency	2	1.8	1.8	1.9	6	5.5

TABLE VI

COMPARISON OF CREAMED AND ESCALLOPED VEGETABLES USING EVAPORATED AND MARKET MILK

	Creamed Asparagus		Creamed Carrots		Creamed Onions		Escalloped Celery		Escalloped Corn		Escalloped Potatoes		Total Score		
	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Possible Score
General appearance	11.8	11.8	12.0	11.7	16.1	7.9	12.0	11.7	11.8	11.5	11.9	11.6	69.6	67.2	70
Flavor	10.9	11.5	11.2	11.5	12.0	14.3	11.8	11.6	11.5	11.3	10.4	11.5	67.8	68.7	70
Consistency	5.8	5.5	5.9	5.6	6.0	5.6	6.0	5.7	6.0	5.8	5.6	5.5	35.3	33.7	36

Mashed Potatoes. - - The mashed potatoes using both types of milk were scored at different times. The results are found in Table XII. The results on Table VIII show that mashed potatoes in which evaporated milk was used, were superior. The quality of the potatoes used was poor, but nevertheless the results were satisfactory. It gave to the potatoes a superior flavor, more body and a creamier, fluffier consistency than when whole milk and butter were used. Although mashed potatoes have a bland flavor, the characteristic flavor of evaporated milk, which is disliked by some individuals, is not objectionable. Since the flavor and mashing qualities of potatoes vary with the season and age of potatoes, a check was made at different times during the year, therefore these results may be regarded as average.

TABLE VII

SCORES OF MASHED POTATOES USING EVAPORATED* AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Score on Product
Mashed Potatoes - Evaporated Milk						
General appearance	4	4.0	3.9	4.0	12	11.9
Flavor	4	4.0	4.0	4.0	12	12.0
Body	3	3.0	3.0	3.0	9	9.0
Texture	3	2.8	3.0	3.0	9	8.8
Mashed Potatoes - Market Milk, Butter						
General appearance	4	2.5	2.5	2.4	12	7.4
Flavor	4	1.0	0.9	0.8	12	2.7
Body	3	1.4	1.3	1.2	9	3.9
Texture	3	1.4	1.3	1.2	9	3.9

* Undiluted

TABLE VIII

COMPARISON OF MASHED POTATOES USING EVAPORATED AND MARKET MILK

	Evaporated Milk	Market Milk	Possible Score
General appearance	11.9	7.4	12
Flavor	12.0	2.7	12
Body	9.0	3.9	9
Texture	8.8	3.9	9

Bread and Quick Breads. - - Tables IX and X give the results of the various scorings of breads and quick breads. Table XI shows that no difference could be found in these products when the two milks were used. At various times individuals, other than the judges, were shown these products But they were never able to detect any differences

TABLE IX

SCORES OF YEAST BREADS USING EVAPORATED AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Scores
Bread - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	2.0	2.0	2.0	6	6.0
Bread - Market Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	2.0	2.0	2.0	6	6.0
Rolls - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	2.0	2.0	2.0	6	6.0
Rolls - Market Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	2.0	2.0	2.0	6	6.0

TABLE X

SCORES OF QUICK BREAD USING EVAPORATED AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Scores
Muffins - Evaporated Milk						
General appearance	4	3.9	4.0	4.0	12	11.9
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	1.8	2.0	2.0	6	5.8
Muffins - Market Milk						
General appearance	4	3.9	4.0	4.0	12	11.9
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	2.0	1.8	2.0	6	5.8
Baking Powder Biscuits - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	2.0	2.0	2.0	6	6.0
Baking Powder Biscuits - Market Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	2.0	2.0	2.0	6	6.0

TABLE XI

COMPARISON OF YEAST BREADS AND QUICK BREADS USING EVAPORATED AND MARKET MILK

	Bread		Rolls		Muffins		Biscuits		Total Score		
	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Possible Score
General appearance	12.0	12.0	12.0	12.0	11.9	11.9	12.0	12.0	47.9	47.9	48
Flavor	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	48.0	48.0	48
Texture	6.0	6.0	6.0	6.0	5.8	5.8	6.0	6.0	23.8	23.8	24

Puddings. - - The results in Table XII show that grapenuts pudding prepared using the evaporated milk undiluted, was superior to that prepared with diluted evaporated milk and also to that prepared with market milk.

The results in Table XIII show that there were no appreciable differences in the general appearance, flavor and consistency of the deserts used in this study. These deserts were Baked Custard, Grapenuts Pudding, Peach and Rice Pudding and Chocolate Pudding.

TABLE XII

SCORES OF PUDDINGS USING EVAPORATED AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Scores
Baked Custard - Evaporated Milk						
General appearance	4	3.7	3.6	3.7	12	11.0
Flavor	4	3.5	3.5	3.6	12	10.6
Consistency	2	1.8	1.8	1.9	6	5.5
Baked Custard - Market Milk						
General appearance	4	3.8	3.7	3.7	12	11.2
Flavor	4	3.6	3.5	3.6	12	10.7
Consistency	2	1.6	1.7	1.7	6	5.0
Grapenuts Pudding - Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	3.8	3.7	3.6	12	11.1
Consistency	2	2.0	1.8	1.8	6	5.6
Grapenuts Pudding - Market Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	3.7	3.6	3.6	12	10.9
Consistency	2	1.8	1.8	1.7	6	5.3
Grapenuts Pudding-Undiluted Evaporated Milk						
General appearance	4	4.0	4.0	4.0	12	12.0
Flavor	4	4.0	4.0	4.0	12	12.0
Consistency	2	1.9	2.0	2.0	6	5.9
Peach and Rice Pudding - Evaporated Milk						
General appearance	4	3.8	3.9	3.8	12	11.5
Flavor	4	3.6	3.7	3.7	12	11.0
Consistency	2	1.8	2.0	1.8	6	5.6
Peach and Rice Pudding - Market Milk						
General appearance	4	3.9	3.7	3.8	12	11.4
Flavor	4	3.8	3.7	3.6	12	11.1
Consistency	2	1.7	1.7	1.6	6	5.0
Chocolate Pudding - Evaporated Milk						
General appearance	4	3.8	3.9	3.8	12	11.5
Flavor	4	3.8	3.8	3.6	12	11.2
Consistency	2	1.7	1.7	1.6	6	5.0
Chocolate Pudding - Market Milk						
General appearance	4	3.9	3.9	3.8	12	11.5
Flavor	4	3.8	4.0	3.9	12	11.7
Consistency	2	1.8	1.9	1.8	6	5.5

TABLE XIII

COMPARISON OF PUDDINGS USING EVAPORATED AND MARKET MILK

	Baked Custard		Grapenuts Pudding		Peach & Rice Pudding		Chocolate Pudding		Total Score		
	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Evaporated Milk	Market Milk	Possible Score
General appearance	11.0	11.2	12.0	12.0	11.5	11.4	11.5	11.5	46.0	46.1	48
Flavor	10.6	10.7	11.1	10.9	11.0	11.1	11.2	11.7	43.9	44.4	48
Consistency	5.5	5.0	5.6	5.3	5.6	5.0	5.0	5.5	21.7	20.8	24

Butter Cakes. - - The results on scoring butter cakes is found in Table XIV. A comparison of the cakes scored, using the two kinds of milk, is found in Table XV. The results show that there are no noticeable differences in the results in butter cakes when using the two types of milks. After individuals were told the kind of milk that had been used, they still were unable to detect any differences.

TABLE XIV

SCORES OF BUTTER CAKES USING EVAPORATED AND MARKET MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Scores
Butter Cake - Evaporated Milk						
General appearance	4	3.9	3.7	3.9	12	11.5
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	1.7	2.0	2.0	6	5.7
Butter Cake - Market Milk						
General appearance	4	3.9	3.7	3.9	12	11.5
Flavor	4	4.0	4.0	4.0	12	12.0
Texture	2	2.0	2.0	2.0	6	6.0

TABLE XV

COMPARISON OF BUTTER CAKES
USING EVAPORATED AND MARKET MILK

	Evaporated Milk	Market Milk	Possible Score
General appearance	11.5	11.5	12
Flavor	12.0	12.0	12
Texture	5.7	6.0	6

Whipped Evaporated Milk. - - Table XVI gives the results on whipping evaporated milk. Market milk cannot be whipped, therefore no comparison was made with reference to this quality.

Chilled evaporated milk permits the incorporation of considerable amount of air so that it nearly trebles in volume during the whipping process. However if used for whips, it is necessary to serve the dessert within a few hours as it does not stand up even when placed in a refrigerator. An attempt was made to use it with Jelsert, a gelatine dessert similiar to Jello. The Jelsert was first whipped and then the whipped milk folded in when the Jelsert was setting. This did not improve the holding qualities.

TABLE XVI

SCORES OF WHIPPED EVAPORATED MILK

	Possible Score	Judge's Score	Judge's Score	Judge's Score	Total Possible Score	Total Judge's Scores
Evaporated Milk Whipped						
Flavor	5	1.0	1.0	1.0	15	3.0
Whipping Quality	5	4.0	4.0	4.0	15	12.0
Holding Quality	5	0.5	0.4	0.4	15	1.3
Evaporated Milk Whipped - Jelsert added						
Flavor	5	4.0	4.0	4.0	15	12.0
Whipping Quality	5	4.0	4.0	4.0	15	12.0
Holding Quality	5	2.0	2.0	2.0	15	6.0

TABLE XVII

COMPARISON OF PRICES OF RECIPES

	Evaporated Milk	Market Milk	Differences in Costs θ	Portions or Amounts
Cream Soups				
Celery	$1.239	$1.319	$.08	12qt
Corn	1.643	1.703	.06	17qt
Duchess	.865	.965	.10	10qt
Onion	1.553	1.697	.144	12qt
Pea	2.106	2.186	.08	15qt
Meats				#
Chicken a la King	13.973	14.00	.027	150p
Ham En Panier	₽.98	3.003	.023	40p
Meat Loaf	1.67	1.68	.01	50p
Pork Chops	8.222	8.422	.20	192p
Creamed Vegetables				
Asparagus	1.758	1.768	.01	50p
Carrots	1.064	1.124	.06	170p
Onions	.638	.658	.02	45p
Escalloped Vegetables				
Celery and Eggs	1.775	1.795	.02	60p
Corn	2.247	2.262	.015	75p
Potatoes	.77	.84	.07	125p
Mashed Potatoes	.329	.238	*	**
Breads and Quick Breads				
Biscuits	.214	.235	.021	120***
Muffins	.78	.794	.014	125****
Puddings				
Baked Custard	.83	.874	.044	45p
Chocolate Pudding	1.078	1.113	.035	140p
Grapenuts Pudding	.709	.731	.022	50p
Peach&Rice Pudding	1.30	1.315	.015	45p
Butter Cakes	.704	.714	.01	60p

θ Figures in column show the amount more for preparation of recipes using market milk.

Individual portions

₽ This recipe cost $.091 more using evaporated milk than when using market milk but because it gives a superior product this is not objectionable.

** Servings not recorded.

*** 2" biscuits.

**** Muffins.

Recipes Used in Study

The recipes which were used in the problem are given below. The cost of each recipe using the two kinds of milk was computed.

CREAM OF CELERY SOUP

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Celery (diced)	2 qt	12qt	$1.239	$1.319
Onions	¼ qt			
Evaporated milk	4 qt			
Water	4 qt			
Salt	4 T			
Pepper	¼ t			
Flour	4 c			
Fat	2 c			

Parboil onions and celery, using some of the leaves, in about three quarts of water. Make a white sauce of the fat, flour, milk, water and seasoning. Add the celery and stock to the white sauce.

CORN SOUP

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Corn	6qt	17qt	$1.643	$1.703
Water	1½gal			
Onions	½#			
Green Pepper	1½			
Pepper	¼t			
Salt	3T			
Thin White Sauce	1½gal			

Simmer the chopped onions and green peppers for twenty minutes. Drain and add the liquid to the corn. Combine corn, white sauce and seasoning. Heat and serve.

DUCHESS SOUP

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Evaporated Milk	5qt	10qt	$.865	$.965
Water	5qt			
Tapioca	1¼c			
Parsley (chopped)	1c			
Onions (chopped)	¾c			
Cheese (grated)	½qt			
Salt	1½T			

Scald milk and onions together. Add the tapioca and salt and cook until the tapioca is clear. Add cheese and cook until melted. Add the parsley just before serving.

CREAM OF ONION SOUP

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Medium Sized Onions	30	12qt	$1.553	$1.697
Evaporated Milk	6¼qt			
Water	5qt			
Butter	2#			
Prepared Mustard	¾c			
Cheese	½#			
Salt	6T			
Pepper	¼t			

Chop onions fine and cook in butter but do not let brown. Make a white sauce of flour and water. Add the onions and seasonings. Serve with grated cheese on top.

CREAM OF PEA SOUP

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Peas	2 No. 10 cans	15qt	$2.106	$2.186
Onions	½#			
Evaporated Milk	4qt			
Water	4qt			
Butter	1#			
Flour	2c			
Salt	3T			
Paprika	½t			
Sugar	6T			

Drain liquor from peas and measure. Add enough water to make four quarts. Put peas through food grinder and then sieve them. Cook onions in small amount of water and add liquid to the peas. Make a white sauce of the butter, flour, pea liquor, milk and seasonings. Add pea pulp and heat until well blended.

CHICKEN A LA KING

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Butter	3¾#	150 Portions	$13.973	$14.00
Flour	7c			
Evaporated Milk	1½qt			
Water	1½qt			
Broth	6-8qt			
Green Peppers	9			
Pimentoes	9			
Mushrooms	4½#			
Salt	¾c			
Chicken	11qt			

Cook peppers and mushrooms in some of the butter. Make a white sauce with the remaining butter, and the flour, broth and milk. Add the rest of the ingredients, heat thoroughly and serve hot.

Ham En Panier

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Ham Scraps	4#	40 Portions	$2.98	$3.003
Eggs (hard cooked)	44			
Salt	2t			
Pepper	1t			
Evaporated Milk	1qt			
Hot Water	1qt			
Flour	½c			
Butter	½c			
Prepared Mustard	½c			
Pimento	1 small can			
Green Pepper	2			

Steam or hard cook eggs. Make a white sauce of butter, flour, seasoning, water and milk. Chop 32 eggs, reserving 12 for garnish. Chop ham, and add mustard. Mix white sauce with the ham and eggs. Put in pan, garnish the top with chopped green peppers, pimento and 12 eggs chopped. Bake in moderate oven about 25 minutes.

Meat Loaf

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Hamburger	10#	50 Portions	$1.67	$1.68
Bread Crumbs	1 1/3qt			
Salt	¼c			
Eggs	3			
Onions	1/3#			
Evaporated Milk	1qt			

Mix seasoning, chopped onions, and eggs with the ground meat. Shape into loaves. Bake one and one-half hour in moderate oven. (350 degrees)

PORK CHOPS IN MILK

Ingredients	Amounts	Yield	*Cost Using Evap. Milk	Cost Using Market Milk
Pork Chops	34#	192 Portions	$9.522	
Bread Crumbs	5#			
Pepper	2t			
Salt	½c			
Bacon Fat	1#			
Evaporated Milk	4cans			

Place layer of crumbs in greased pans. (Use bacon fat) Lay in chops, add salt and pepper, then pour milk over chops. Bake in oven until chops are thoroughly cooked.

* $9.522 Cost using undiluted evaporated milk
8.222 Cost using diluted evaporated milk.
8.42 Cost using market milk.

CREAMED ASPARAGUS ON TOAST

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Butter	¾#	50 Portions	$1.758	$1.768
Flour	1c			
Evaporated Milk	1¼qt			
Water (asparagus liquor)	1¼qt			
Salt	1T			
Asparagus	1 No.10 Can			

Make a white sauce of the butter, flour, liquor of asparagus and salt. Heat asparagus, and combine with hot white sauce. Serve on toast.

CREAMED CARROTS

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
		170		
Carrots	¾bu.	Portions	$1.064	$1.124
Butter	¾#			
Flour	3c			
Salt	4T			
Evaporated Milk	3qt			
Water	3qt			

Wash, pare and dice the carrots. Cook until tender. Mix with the white sauce which has been prepared with the butter, flour, water, evaporated milk and salt.

CREAMED ONIONS

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
		45		
Onions	11#	Portions	$.6383	$.6583
Butter	½c			
Flour	1c			
Evaporated Milk	1qt			
Water	1qt			
Salt	2T			

Cook the onions. Make a white sauce of the rest of the ingredients and combine with onions about twenty minutes before serving.

ESCALLOPED CELERY AND EGGS

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Celery (diced)	3qt	60 Portions	$1.775	$1.795
Eggs	5doz.			
Butter	½#			
Flour	2c			
Evaporated Milk	2qt			
Water	2qt			
Salt	3T			

Steam eggs until hard and remove the shells. Dice celery and par boil. Make a white sauce of butter, flour, water, milk and salt. Chops the eggs and place in baking pan, cover with the celery and then add the white sauce. Cover with some buttered crumbs and bake.

ESCALLOPED CORN

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Corn	2 No.10 cans	75 Portions	$2.2466	$2.2616
Butter	1#			
Evaporated Milk	¾qt			
Water	¾qt			
Salt	4T			
Pepper	½t			
Bread Crumbs	4qt			

Mix part of the crumbs with corn, reserving enough to butter and cover tops of pans. Put the corn into a long baking dish. Cover with buttered crumbs and bake in moderate oven.

ESCALLOPED POTATOES

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Potatoes	18#	125 Portions	$.77	$.84
Butter	1¼c			
Flour	¾qt			
Evapor ated Milk	3½qt			
Water	3½qt			

Pare potatoes, slice and place in pan. Pour white sauce over potatoes. Bake in oven. A few diced onions make a nice variation.

BISCUITS

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Flour	3#	120 Bis-cuits 2" dia-meter	$.214	$.235
Baking Powder	3oz			
Salt	1oz			
Fat	1#			
Evaporated Milk	1¼c			
Water	1½c			

Blend fat with dry ingredients until mixture has appearance of coarse corn meal. Add diluted milk. Mix quickly. Knead until there is a smooth surface. Roll dough to ½ inch thickness, cut with 2 inch cutter. Bake in hot oven.

PLAIN MUFFINS

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Flour	7#	125 muffins	$.78	$.794
Baking Powder	7½oz			
Sugar	15oz			
Salt	5/6oz			
Evaporated Milk	5 5/8c			
Water	5 5/8c			
Butter	1#			

Sift dry ingredients into mixing bowl. Beat eggs and add diluted milk. Stir this quickly into the dry ingredients and mix just long enough to wet dry ingredients. Add melted fat and pour into oiled tins. Bake in hot oven.

BAKED CUSTARD

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Evaporated Milk	2qt	45 portions	$.83	$.874
Water	2qt			
Eggs	2doz			
Sugar	1#			
Salt	1t			
Vanilla	1t			
Nutmeg	1t			

Beat the eggs, add sugar, milk and water. Beat and add vanila. Pour into custard cups, sprinkle with nutmeg. Set cups in pan of water and bake in moderate oven.

CHOCOLATE PUDDING

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Sugar	3qt	140 portions	$1.078	$1.1138
Flour (pastry)	1½qt			
Evaporated Milk	3qt			
Water	3qt			
Salt	1½T			
Eggs	24			
Cocoa	¾#			
Vanilla	2½T			
Butter	½#			

Scald the milk and add hot water. Thoroughly mix the dry ingredients and sift into hot diluted water, stirring constantly. When the mixture thickens stir some of it into the eggs yolks which have been previously beaten. Add the egg yolk mixture to the hot mixture and cook a few minutes, then add butter. Remove from the heat, add vanilla and lastly fold in the egg whites.

GRAPENUTS PUDDING

Ingredients	Amounts	Yield	*Cost Using Evap. Milk	Cost Using Market Milk
Grapenuts	3c	50 portions	$.856	_____
Eggs	12			
Raisins	2#			
Evaporated Milk	2¼qt			
Sugar	1½#			

Soak grapenuts in a little cold water, then add beaten egg yolks, sugar, raisins and milk. Cook in a double boiler until thick. Put into custard cups. Whip egg whites, add ½ cup of sugar and brown in slow oven

* Cost using undiluted evaporated milk. $.856.
Cost using diluted evaporated milk $.7095.
Cost using market milk $.7315.

PEACH AND RICE PUDDING

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Rice	2½c	45 portions	$1.30	$1.315
Water	8c			
Evaporated Milk	3c			
Sugar	5c			
Eggs	10			
Peaches	1 No.10 can			
Sauce				
Butter	2T			
Brown Sugar	4T			
Egg Yolk	2			
Peach Juice	From peaches in No.10 can			
Cinnamon				

Cook the rice in double boiler in water, then add the milk as the rice thickens and continue cooking for about thirty minutes. Mix the sugar and beaten eggs with the rice. Alternate layers of rice and peaches in a baking dish and bake about twenty minutes. Same with the sauce.

Sauce - Heat the peach juice, add the butter, then whipped egg yolks, sugar and cinnamon. Cook until thick.

SILVER CAKE

Ingredients	Amounts	Yield	Cost Using Evap. Milk	Cost Using Market Milk
Sugar	2#	60 Portions	$.705	$.715
Butter	1#			
Egg Whites	1pt			
Evaporated Milk	½pt			
Water	½pt			
Flour	2#			
Baking Powder	2oz			
Lemon Extract	4t			
Almond Extract	1t			

Cream butter on power mixer, add sugar, then about one third of the flour to which the baking powder has been added. Mix just long enough to incorporate flour and then add one half of the milk. Continue adding ingredients in the order until all are added. Add flavoring and beat in egg whites which have been whipped in power mixer.

Comparison of Prices. - - The data in Table XVII on the comparison of prices of recipes using the two types of milk shows only a slight variation. While this is negligible, yet the difference is in favor of evaporated milk.

Discussion

The importance of well selected and properly prepared foods, as a means of obtaining satisfaction among the clientele as well as promoting health and efficiency is worthy of consideration. The preparation of food is too vital a process to leave in the hands of the unskilled or untrained. Such methods means waste of time, food and money besides dissatisfaction among patrons.

Scientific preparation is a prequisite for wholesome foods. This means standardized methods of preparation and standardized recipes. Many institutions have become popular by gaining a reputation in the preparation of certain dishes as ginger bread, muffins, chicken a la king etc., while other institutions do not gain such worthwhile recognition. Expermental work such as that done in this problem helps to formulate recipes that will aid in establishing such popularity.

Standardizing recipes are of paramount importance for having a product the same from time to time. They eliminate failures and are the back ground of quality. The practice of making the home unit over into a larger unit is often unsatisfactory. Instead of cupfuls, tablespoonfuls and teaspoonfuls, measurements for quantity cookery are stated in larger units such as pounds, ounces, quarts and even gallons. These larger units not only make manipulations easier but they save time and help to insure

accuracy. Then, too, the use of measurements in the same units as purchased, makes it easier to figure the cost of each recipe.

In this study an attempt was made to follow rules which had not been standardized. A recipe for salmon croquettes was prepared and placed in the ice box to be used the following day. When the croquettes were put in the deep fat to cook, they exploded throwing a large portion of the hot fat out of the pan. After increasing the amount of the flour the trouble was overcome. No doubt this was caused by using too large an amount of liquid in proportion to the thickening agent. This excess liquid seemed to create enough steam to cause the explosion. The same difficulty was encountered with egg cutlets when a small amount of thickening agent was used. Such difficulties often arise when the home recipe is enlarged for quantity work. These illustrations help to emphasize the importance of standardized recipes.

In considering the possibility of the utilization of evaporated milk, it must be remembered that it contains the same valuable food elements as market milk. The principle difference is that approximately one half of the water has been removed which may be added when the milk is used. When evaporated milk is diluted by adding an equal volume of water, its chemical composition is practically the same as before the evaporation process. This makes it

possible to substitute diluted evaporated milk for market milk in practically any large quantity recipe. When it is used undiluted or with less than an equal volume of water, the creaminess as well as the food value of the product increases.

Samuel and Kock (8) give the analyses of milk and and diluted evaporated milk as follows:

	Raw	Diluted Evaporated
	%	%
Lactose	5.10	5.05
Protein	3.48	3.50
Calcium	0.129	0.130
Phosphorus	0.093	0.100
Fat	3.81	Undetermined

Evaporated milk is subject to curdling during cooking processes, just as market milk, hence the same precautions must be taken as with ordinary milk. If sour milk is desired, vinegar is added to the milk in the proportions of one tablespoon of vinegar to one cup of milk.

Evaporated milk keeps well in sealed cans but after opening it requires the same care as any other perishable food.

In the past evaporated milk has usually been considered an article for emergency supplies but this study shows that its field is much larger. Its use will help to equalize supply and demand, as well as insure a more wholesome diet for people living in countries in which climatic con-

ditions are not suited to the market milk industry. Institutions that have difficulty in securing or storing market milk may use evaporated milk with the same assurance of success in cooking as with market milk. In some places fresh milk is scarce, in others its purity cannot be guranteed, while on high seas and in some other situations the supply of fresh milk is out of the quiestion. The use of evaporated milk solves such problems. Its use may help the dairy industry to meet the increasing demand for the large amount of milk required in congested places as well as being able to supply milk to remote territories which are far from the center of civilization.

At the present time only about 1½ per cent of all the milk produced in the United States is marketed as evaporated milk. No doubt this will increase as the consuming public becomes acquainted with the possibilities of the use of evaporated milk.

Conclusion and Summary

1. A study was made on the uses of evaporated milk in quantity cookery to learn whether or not diluted evaporated milk may be used satisfactorily instead of market milk.
2. Dishes in which evaporated milk was used, were prepared and served to the girls eating in the dining room of the Women's building. The girls did not discriminate against the dishes prepared with evaporated milk.

3. Creamed soups made with evaporated milk were superior to those made with market milk.

4. The general appearance and consistency of meat dishes prepared with evaporated milk was superior to those prepared with market milk. There was no apparent difference in the flavor.

5. The flavor of creamed vegetables prepared with market milk was more desirable than the flavors of those prepared with evaporated milk.

6. There was no appreciable difference in the escalloped vegetables when the different milks were used.

7. Undiluted evaporated milk was superior for mashed potatoes to market milk with butter.

8. Practically no difference was noticed when the different milks were used in quick breads, breads, butter cakes, and puddings.

9. The cooked flavor which is characteristic of evaporated milk either was not detected when used in cooked foods or if it was noticable it was not objectionable.

10. The difference in price in the use of the two milks is practically negligible.

11. Evaporated milk is practically valueless for whipping purposes. It will whip at a low temperature but does not stand up. The use of gelatine powder did not improve the holding qualities.

12. When used in fruit whips, they must be served within a

few hours after preparation because the results are only temporary.

13. It seems that it will be worthwhile for institutions to study the possibilities of the uses of evaporated milk not only as a convenience where fresh milk is not readily available but as a means of improving the qualities of some of the foods.

APPENDIX

Clam Chowder

Ingredients

1½ qt. diced cooked potatoes	1¼ # butter
10 cans clams	2½ c flour
5/6 c onions	3 T salt
1½ gal. water	1 t pepper
1½ gal. evaporated milk	

Method

Make a white sauce of butter, flour, water and milk. Cook onions in small amount of water. Drain and add water to the white sauce. Heat clams and potatoes and combine with white sauce.

Cost using		Yield
Evaporated Milk	$3.719	16 qt.
Market Milk	3.839	

Corn Chowder

Ingredients

2 No. 10 cans corn	5 qt. milk
7 qt. potatoes (diced)	5qt. water
4½ qt. boiling water	¼ cup salt
1 cup flour	1½ t flour
1 cup butter	5 slices salt pork
¼ # onions	

Method

Cut pork in small cubes and cook until light brown and crisp. Add onions and cook for five minutes. Put potatoes, pork and onions in 4½ quart of boiling water and

cook until potatoes are soft. Stir flour into fat, add milk and water, then combine with the potato mixture, add corn and cook until of desired consistency.

Cost using		Yield
Evaporated milk	$2.475	22 qt.
Market milk	2.575	

Potato Soup

Ingredients

8 # potatoes	1½ c flour
½ # onions	3 T salt
5 qt. evaporated milk	3 t celery salt
5 qt. water	1 t pepper
2 c butter	1/8 t cayenne

4 T Chopped Parsley

Method

Dice potatoes and onions and cook in at least two quarts of water until soft, then put through strainer without draining. Make a white sauce of the butter, flour, water and milk. Add sauce and seasoning to potatoes, bring to boiling point, sprinkle with parsley and serve

Cost using		Yield
Evaporated Milk	$1.025	12 qt.
Market Milk	1.125	

Cream of Tomato Soup

Ingredients

1 2/3 No. 10 cans tomato puree
1 large onion
1½ gal. evaporated milk
2 gal. water
1 # butter
1/3 c salt
4 1/6 c flour
1/3 c sugar
3 bay leaves

Method

Make a white sauce of butter, flour, water, milk, salt and sugar. Cook onions and bay leaves in small amount of water. Strain and add liquid to tomatoes. Heat tomatoes, add soda and combine with white sauce.

Cost using

Evaporated milk $1.678
Market milk 1.828

Yield

22 qts.

Cheese Fondue

Ingredients

2 qt. evaporated milk
2 qt. water
5 qt.* soft bread pieces
3½ # cheese
½ c butter
3 doz. eggs
2 T salt
1 T mustard
1 T paprika

* Not packed. About 4 one pound loaves.

Method

Grate cheese. Add bread crumbs, salt, mustard and paprika. Scald the milk, combine with the cheese and crumb mixture. Add the butter. Cool slightly, add egg yolks which have been well beaten. Lastly fold in the stiffly beaten egg whites. Pour into buttered steam table pans and bake about one hour in slow over. (350 degrees F)

Cost using		Yield
Evaporated milk	$1.50	70 portions
Market milk	1.54	

Chinese Omelet

Ingredients

3½ # rice (cooked)	3½ c water
1½ # cheese	3½ doz. eggs
1 # butter	5 T salt
1½ c flour	3 T paprika
3½ c evaporated milk	3 T mustard

Method

Make white sauce of butter, flour, water and milk. Add rice, grated cheese, paprika, salt and beaten egg yolks. Lastly fold in beaten egg white and bake in oven 350 degrees F, for 45 minutes.

Cost using		Yield
Evaporated milk	$1.284	50 portions
Market milk	1.301	

Egg Timbles

Ingredients

½ c butter
½ c flour
1¼ qt. evaporated milk
1¼ qt. water
37 eggs
½ T salt
½ t celery salt

Method

Make a white sauce of the butter, flour, water and milk. Add eggs which have been beaten just enough to break them up well. Add the seasonings and bake in cups surrounded by water in oven 300 degrees F. Serve with cheese sauce.

Cost using		Yield
Evaporated milk	$.7374	60 cups
Market milk	.7624	

Cheese Sauce

Ingredients

1 c flour
1 c butter
1 1/3 qt. evaporated milk
1 1/3 qt. water
1 1/3 # American cheese

Method

Make a white sauce of the butter, flour, water and milk. When thick remove from fire and add grated cheese

Cost using		Yield
Evaporated milk	$.493	3 quart
Market milk	.52	

Salmon Wiggle

Ingredients

8 # salmon	5 T salt
¾ c butter	3 T lemon juice
1 c flour	1 No. 10 can peas
½ gal. evaporated milk	Dash cayenne
½ gal. liquid from salmon and water	

Method

Make a white sauce of butter, flour and liquids. Remove the bones and skin from the fish and flake. Add lemon juice and seasoning. Add salmon and peas to white sauce and serve on toast.

Cost using		Yield
Evaporated milk	$3.61	125 portions
Market milk	3.63	

Salmon Croquettes

Ingredients

1¼ c butter	2 T salt
1 7/8 c flour	10 # salmon (canned)
3 1/3 c evaporated milk	7 T lemon juice
3 1/3 c liquid from salmon	10 eggs

Method

Prepare a white sauce of the first five ingredients. Cool. Remove bones and skin from salmon. Flake, add lemon juice, eggs and white sauce. Let get thoroughly

cold so as to be stiff. Shape into croquettes. Dip into evaporated milk and bread crumbs. Fry in deep fat. If this is used before entirely cold, one to two quarts of bread crumbs will need to be added.

Cost using		Yield
Evaporated milk	$3.146	60 portions
Market milk	3.164	

Biscuit Short Cake

Ingredients

3 # pastry flour	8 oz. sugar
3 oz. baking powder	20 oz. fat
1 oz. salt	1 pt. water

1 pt. evaporated milk

Method

Combine dry ingredients. Blend in the fat. Add the diluted milk. Mix lightly and quickly. Roll or pat out to ½ inch thickness, cut with two inch cutter. Spreads tops of half of the biscuits with butter. Place another biscuit on this and bake in hot oven. Split open and serve with fresh sweetened fruit or with canned fruit.

Cost using		Yield
Evaporated milk	$.306	40 double biscuits
Market milk	$.307	

Nut Bread

Ingredients

3 qt. graham flour	1 qt. water
1 qt. white flour	1 qt. raisins
¼ c baking powder	1 qt. nuts
4 t soda	½ c vinegar
1 qt. evaporated milk	1 qt. sugar

Method

Sift flour and measure, add dry ingredients, then the chopped raisins and nuts. Stir in the milk and water. Pour into greased pans and bake in moderate oven for 40 minutes.

Cost using		Yield
Evaporated milk	$2.089	8 loaves 9"x3"x2½"
Market milk	2.109	

Orange Bread

Ingredients

6 qt. flour	1 qt. water
6 T baking powder	16 eggs
2 qt. orange rind (cooked)	6 qt. sugar
1 qt. orange juice	½ c butter
1 qt. evaporated milk	2 t salt

Method

Grind orange rinds, then cook in about 2½c water and 2c sugar. Cool. Sift dry ingredients. Beat eggs, add

milk, water, orange juice and cooked rind. Stir into the dry ingredients. Bake 50 minutes in oven at 350 degrees F.

Cost using

Evaporated milk	$.845	Yield
Market milk	.865	14 loaves 9"x3"x3"

Steamed Brown Bread

Ingredients

3 c *sour evaporated milk	1½ qt. cornmeal
3 c sweet evaporated milk	3 c molasses
6 c water	6 eggs
1½ c white flour	2 T soda
3 qt. graham flour	2 T salt
	2 T baking powder

Method

Mix dry ingredients. Beat eggs, add liquids and combine with dry ingredients. Put into greased brown bread pans. Place in steamer and steam 1 hour. Dry off in oven after removing from steamer.

Cost using		Yield
Evaporated milk	$.7933	8 loaves (# pans)
Market milk	.808	

* 3 T vinegar added to milk.

Doughnuts

Ingredients

1 c evaporated milk	22½ oz. mashed potatoes
7/8 c water	5 5/8 T baking powder
2¼ T butter	2 1/16 qt. flour
3 c sugar	1½ t mace
1 1/8 c egg yolks	2 t salt

Method

Put potatoes, sugar and mace through a sieve, add water, milk and eggs, then the dry ingredients. This is a very soft dough. Pat out to the desired thickness, cut and fry in deep fat.

Cost using		Yield
Evaporated milk	$.3793	100 doughnuts
Market milk	.382	

Dumplings

Ingredients

5 1/3 qt. flour	1 qt. water
½ c oleo	3 T salt
1 qt. evaporated milk	7/8 c baking powder

Method

Mix dry ingredients. Melt fat in water and milk. Stir into dry ingredients. Drop with No. 16 dipper into hot stock and cook, uncovered, for 12 minutes.

Cost using		Yield
Evaporated milk	$.33	100 dumplings
Market milk	.34	

Bran Muffins

Ingredients

5 c sugar	5 qt. flour
2½ c butter	2½ qt. evaporated milk
20 eggs	2½ qt. water
2½ pkg. bran (Kelloggs all bran)	2½ c baking powder

Method

Mix dry ingredients. Beat eggs slightly, add water and milk. Mix lightly and quickly with dry ingredients. Add butter last. Bake in muffin tins.

Cost using

Evaporated milk	$1.915	Yield
Market milk	1.923	172 muffins

Ralston Muffins

Ingredients

4 # pastry flour	4 oz. salt
4 # ralston	12 eggs
8 oz. baking powder	1 # fat
1 # sugar	1½ qt. water
	1½ qt. evaporated milk

Method

Combine dry ingredients. Beat the eggs, add the milk and water. Combine the liquid and dry ingredients. As soon as the dry ingredients are wet add the melted fat. Stir in gently. Put into muffin tins quickly. Bake 20

to 25 minutes in oven 380 degrees F.

Cost using		Yield
Evaporated milk	$.9994	108 muffins
Market milk	1.08	

Yorkshire Pudding

Ingredients

2 qt. evaporated milk
2 qt. water
16 eggs
4 t salt
4 qt. flour

Method

Mix dry ingredients. Beat eggs, add milk and water, and stir into dry ingredients. Beat with power mixer for two minutes. Cover bottom of pans with hot beef drippings, pour in batter to depth of one half inch. When brown baste with hot beef drippings.

Cost using		Yield
Evaporated milk	$.52	300 portions
Market milk	.54	

Chocolate Quaking Pudding

Ingredients

8 qt. evaporated milk
4 qt. water
3 # sugar
6 t vanilla
1½ # cocoa
24 eggs
6 oz. gelatine

Method

Soak gelatine in 1 pint of water, mix sugar and cocoa, and eggs together, pour scalded milk over this mixture. Add gelatine and cook over steam about 15 minutes. Pour into flat pans. Cool and cut in squares. If desired the gelatine may be added after the scalded milk.

Cost using		Yield
Evaporated milk	$1.902	198 portions
Market milk	1.932	

Dutch Apple Cake

Ingredients

- 3 qt. flour (pastry)
- 1 T salt
- 6 T baking powder
- 1½ c sugar
- 1½ c fat
- 6 eggs
- 1½ c evaporated milk
- 3 c water
- 18 cooking apples
- ¾ c sugar (mixed)
- 1 T cinnamon (mixed)

Method

Pare and core apples and slice thin. Place in bottom of greased baking pan. Sift dry ingredients. Rub fat into the flour mixture until appearance is like coarse corn meal. Beat eggs and add milk and water. Stir liquid into dry ingredients. Pour over apples spreading dough to one inch thickness. Bake in a moderate oven (375 degrees F.) until done. Remove from

oven, turn bottom side up, sprinkle with cinnamon and sugar mixture and return to oven, just long enough to melt sugar. Serve with a lemon sauce.

Cost using

Evaporated Milk $.8872
Market Milk .9032

Yield

75 portions

Ice Cream

Ingredients

2¼ qt. evaporated milk
2¼ qt. water
40 egg yolks
1 1/8 t salt
4 # sugar
4½ qt. cream (18%)
5½ t vanilla

Method

Scald the milk and water. Beat the egg yolks and sugar. Add the hot milk to the egg mixture and heat in double boiler until it begins to coat on the spoon. When cold add cream and vanilla and then freeze.

Cost using

Evaporated milk $2.93
Market milk 3.025

Yield

3 gallon

Noodle Custard

Ingredients

20 oz. egg noodles
1 qt. sugar
2 t salt
1 qt. evaporated milk
1 qt. water
16 eggs
4 t lemon extract
4 oz. candied ginger
4 oz. candied orange
½ c nuts

Method

Cook noodles until tender. Drain. Beat egg yolks, add milk, water and sugar and stir over noodles. Fold in stiffly beaten egg whites. Put into custard cups and place in a pan and surround with water. Bake in oven. When ready to serve sprinkle tops with the candied ginger, orange and nut meats.

Cost using
Evaporated milk $.6816
Market milk .6916

Yield
75 portions

Pineapple Fritters

Ingredients

4 qt. flour
1½ c sugar
2/3 cup melted butter
3 t salt
1 qt. evaporated milk
1 qt. water
1 No. 10 can pineapple

Method

Drain pineapple. Cut slices into six pieces. Mix and

sift dry ingredients. Beat eggs, add, milk, water, and butter and combine with the dry ingredients. Add the diced pineapples. With a number 10 dipper drop into deep hot fat and fry until a golden brown. Drain. Serve with a pineapple sauce.

Sauce. Heat four and one-half quarts of pineapple juice. Sift three-fourths cup of sugar and three-fourths cup of cornstarch into hot juice. Cook until thick.

Cost using		Yield
Evaporated Milk	$.9668	100 portions
Market Milk	.98	

Hot Chocolate Sauce

Ingredients

½ # butter
1 c evaporated milk
4 c powdered sugar
½ # baker's chocolate
1 T vanilla

Method

Cream butter and sugar. Melt the chocolate and add the milk and creamed butter and sugar. Cook in double boiler 15 or 20 minutes. May be served over ice cream, cake or with cream puffs.

Cost using		Yield
Evaporated Milk	$.382	25 portions

Date Sauce

Ingredients

1 c butter
3 qt. 4x sugar
2 2/3 c evaporated milk
1 1/3 T vanilla
1 qt. dates
¼ t salt

Method

Cream butter, then gradually add the sugar and milk. Add chopped dates, salt and vanilla.

Cost using
Evaporated milk $.9531

Yield
150 portions

Filled Cookies

Ingredients

1¼ qt. sugar
2½ # butter
5 eggs
1 2/3 T vanilla
1½ qt. evaporated milk
¼ qt. water
3¾ qt. flour
1/3 c baking powder
2 qt. jam

Method

Cream butter, add sugar and continue to cream, then add eggs. Alternate sifted dry ingredients with liquids. Chill dough. Roll and cut. Use jam to place between cookies. Bake in moderate oven.

Cost using
Evaporated milk $1.227
Market milk 1.236

Yield
250 three inch diameter cookies

Oatmeal Cookies

Ingredients

2½ # butter	2 qt. flour
2 qt. brown sugar	2 qt. nuts
16 eggs	2 t salt
1 c evaporated milk	2 t soda
1 c water	2 t cinnamon
4 qt. rolled oats	2 t nutmeg
2 qt. currants	2 t cloves

Method

Cream butter, add sugar and continue the creaming, then add the eggs. Sift dry ingredients together, add the rolled oats, nuts and currants. Alternate adding flour and milk to the creamed mixture. Drop from teaspoon onto greased tins and bake in a moderate oven.

Cost using		Yield
Evaporated milk	$2.81	325 cookies
Market milk	2.815	

Horseradish Sauce

Ingredients

1 c butter	1 qt. water
1 c flour	4 t salt
1 qt. evaporated milk	3 c horseradish

Method

Make a white sauce of the milk, water, flour, butter and

seasonings. Add horseradish. Serve on tongue or other meats either hot or cold.

Cost using		Yield
Evaporated milk	$.321	3 quarts
Market milk	.341	

White Sauces

Ingredients	Thin	Medium	Thick
Butter	1 c	1 c	¾ c
Flour	1c	2 c	1 c
Water (boiling hot)	2 qt.	2 qt.	1 pt.
Evaporated milk	2 qt.	2 qt.	1 pt.
Salt	3 T	3 T	2 t
Pepper	¼ t	¼ t	1/8 t
Approximate yield	1 gal.	1 gal.	1 qt.
Prices			
Evaporated milk	$.368	$.369	$.144
Market milk	.408	.409	.154

Melt butter, add flour, then hot water. Cook until thick then add milk and seasonings.

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