MILK
Milk Foods and Dairy Products
Helpful Lesson Material for Educators
FOREWORD

Knowledge of the basic nutritional values of milk and milk foods is an essential in all health education. No study of physiology, home economics, or physical education would be complete without it.

In preparing this booklet on milk for the use of educators, we have consulted much recent authoritative literature reporting the results of current research on milk.

This material has been coordinated and organized in a form which should be especially helpful to educators. It is our hope that it will make the facts about milk and milk products so interesting that students will make use of them in choosing their daily diets, and in forming their own habits of living.

"JUNKET" Rennet Tablets and "JUNKET" Rennet Powder have been tested and approved by leading domestic science authorities and institutes, including Good Housekeeping, Delineator, Child Life, and many others. They have the seal of acceptance of the Committee on Foods of the American Medical Association.

"JUNKET" and "Little Miss Muffet" are trademarks of Chr. Hansen’s Laboratory, Inc. for its rennet and other food preparations.

This book has been compiled by the Educational Department, Chr. Hansen’s Laboratory, Inc., Little Falls, N. Y.

"THE ‘JUNKET’ FOLKS"
Chr. Hansen’s Laboratory, Inc.
Little Falls, N. Y.

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MILK

A BIT OF HISTORY

"Back into the night of history, when the orphan child waked and cried from hunger, a cow outside was tied to a stake waiting to be milked."

Milk is the original diet of the race, the first nutriment of man. Food authorities say that milk is the only article of diet whose sole function in Nature is to serve as a food. Everything else which we eat was intended (evolved) by Nature for some other purpose.

The oldest records, written in Sanskrit and preserved in India, reveal that milk was an important food 6,000 years ago; that domestication of cattle began somewhere between 6,000 and 10,000 years ago. In 2,000 B.C. cows were worshipped in Babylonia, and Hathor, the goddess who watched over the fertility of land in Egypt, was shown as a cow. The "Promised Land" of the Old Testament is

The cow and her infant calf
described as "a land flowing with milk and honey." There are over 50 references to milk and cows in the Old Testament alone! Wall panels and mural paintings from excavated ruins tell stories of milk and dairy products.

Civilization has brought us many other foods, but milk is more popular today than 10,000 years ago, and much more sanitary. Chemists have given us the composition of milk. Louis Pasteur showed us how to keep milk pure and sweet for a longer time by developing the process named after him—"pasteurization." Educators are everywhere teaching the importance of this economical beverage-food which has been called "Nature's most nearly perfect food."

COWS AND CALVING

The milk given by cows varies considerably in amount and in butterfat content. Some breeds are much more productive than others. For example, the black and white Holstein Friesans are known for large production, but their milk is not very rich. Guernseys and Jerseys on the other hand give milk which is richer in butterfat.

Cows are usually milked two and sometimes three times a day. For five days after birth of a calf, the milk, called colostrum, cannot be used for human consumption.

The yield of milk is greatest after calving, gradually declining until the cow goes dry about six weeks before the next calving.

COMPOSITION AND FOOD VALUE

Composition of Milk. Milk is a thin opaque white liquid, manufactured within the cow's body. Just what goes on inside this living "laboratory" or "food factory" is as much a mystery as life itself.
Cow's milk contains on the average in 100 lbs.:
Water ......................... 87 lbs.
Butterfat  ...................... 4 lbs.
Protein (Casein & Lact-albumin) 3¾ lbs.
Carbohydrate (Milk sugar) ...... 5 lbs.
Ash (Mineral Matter) ............ ¾ lbs.

Total ......................... 100 lbs.

The casein is suspended in an emulsion with the fat, both of which separate out from the whey when curdled with rennet or acids. The soluble milk sugar, albumins, and mineral salts remain in the liquid portion called whey.

A quart of milk weighs about two pounds and is a little heavier than a quart of water.

Nature's Most Nearly Perfect Food. Milk is one of the most wonderful of all foods because it contains so many of the nutrients which our bodies need, and supplies them in such easily available form. For example, it contains proteins, carbohydrates, and fats which furnish food energy for supporting the energy demands of the body for work and play. It is rich in calcium and phosphorus from which our bones and teeth are formed. And it is one of the best sources of Vitamins A and G, and a good source of Vitamin B. No wonder we need a quart of milk each day!

Milk Proteins Complete and of High Biologic Value. Proteins occur in many different forms and in many different foods, but the proteins in milk are especially valuable because they furnish a complete assortment of amino acids, the "building blocks" needed for the construction of body protein. Thus the proteins in milk are readily available to aid in the repair of our muscles and tissues as they are worn out day by day, and to build new muscles and tissue. It is the casein and a small amount of lact-albumin in milk which are the proteins. Casein is white in color, and its suspension in whey gives milk its opaque white color.

Milk Sugar or Lactose is an easily digestible carbohydrate. While milk sugar is not as sweet as cane sugar, it is nevertheless a most important fuel for our bodies.
When milk sours, it is because lactic acid bacteria change this lactose to lactic acid.

**Butterfat in Milk** is suspended in the form of minute globules. When milk stands at rest, the fat globules gradually rise and form a layer of cream, which may be skimmed off from the milk. Butterfat is one of the most easily digested fats and a rich source of Vitamin A. Commercially the fat in milk is its most important constituent, as it is used in the making of butter.

**See how much Food Energy there is in Milk!** One quart of milk supplies approximately 625 calories or about the same amount of fuel energy as nine eggs, or three-fourths of a pound of beefsteak, or four-fifths of a pound of chicken, or six and one-half oranges, or two pounds of potatoes, or three pounds of string beans.

The food requirements for adequate nutrition vary for the two sexes. Age and body composition play a part; occupation and activity must also be considered. Under normal conditions, the average adult needs 2000-3000 calories per day.

A calorie is a heat or energy unit equivalent to the amount of heat required to raise a gram of water one degree centigrade.

Fat furnishes more fuel energy per gram of weight than either proteins or carbohydrates. The estimated number of calories obtained from these constituents of foods is as follows:

- Fat \(1\) gram = 9 calories
- Protein \(1\) gram = 4 calories
- Carbohydrates \(1\) gram = 4 calories

Mineral matter and vitamins in foods provide no fuel value, but are nevertheless indispensable to normal nutrition and growth.

**Milk is Rich in Calcium and Phosphorus.** So far as most necessary minerals are concerned, an average varied diet will supply adequate amounts. There are some of them, however, such as calcium, copper, and iodine which are not so common, and special care needs to be taken to provide them.
Milk and cheese are richer in calcium than any other foods, and calcium is one of the most necessary of all minerals. As it is contained in milk and cheese, calcium seems to be very efficiently used and readily available to the body. If for no other reason than its calcium supply, milk would be a most necessary food for children and adults. You will see the importance of calcium and phosphorus when you realize that they supply the materials for strong bones and sound teeth, and in addition contribute to the proper functioning of other parts of the body as well.

It has been recommended that the average adult should eat foods each day which will supply 0.68 grams of calcium and 1.32 grams of phosphorus.

According to feeding experiments, the calcium need of children is greater than that of adults. When the intake of calcium is below the minimum requirement, growth is usually retarded. It has been found that optimal storage of calcium occurs when a quart of milk is included in the daily diet.

In America, the dietary is considered more apt to be deficient in calcium than in any other one element; in most cases in this country the intake of calcium depends chiefly upon the extent to which milk and its products enter into the dietary. By far the most practical means of insuring an abundance of calcium in the dietary is to use milk freely as a food. Milk ranks many times richer in calcium than any of the meats, and will give also a liberal amount of phosphorus.

### Ash Constituents of Whole Milk in Per Cent

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### VITAMINS

Vitamins today are no longer the elusive "somethings" of 25 years ago. Chemists have been steadily
working on foodstuffs, and the latest literature reveals the importance of each of the several vitamins to our well-being. If any one of the vitamins is withdrawn from the diet, illness or derangement of bodily functions follows. For many years after vitamins had been discovered, no one saw them and it has only been within the last few years that scientists have isolated them. Now they know that vitamins are actually chemical compounds, and that their function in our bodies is chemical.

Despite all that has been learned about vitamins, however, the minimum requirements of each have not yet been defined. Some people may be eating diets which do not furnish the optimal quantities for best nutrition.

Because vitamins are so difficult to isolate and measure, their presence is usually determined by feeding experiments. Each vitamin appears to have its own particular functions, and every year new discoveries and new definitions of those functions are being made.

Milk is an unusual food in that it contains some of all the vitamins, but it is richest in Vitamins A and G. It is also a good source of Vitamin B.

Vitamin A, which is found so abundantly in milk, is an aid in maintaining the resistance of the body to infection in general. If it is withdrawn from an animal’s diet, the animal ceases to grow, and infections of the mucous membranes of eyes, ears, and other parts of the body develop more easily.

Vitamin G, the other vitamin found so plentifully in milk, is also essential to good nutrition. In other words, without this vitamin, you might eat plenty of other nutrients which your body needs, but still not be well nourished.

Vitamin B, for which milk is a good source, is also important to good nutrition.

SANITARY PRODUCTION AND MARKETING
Sanitary Measures in Milk Production. There are now strict rules and regulations for handling milk
from the cow to the consumer in nearly every state. The importance of healthy tuberculin-tested cows and periodic examination as to the health of men handling milk is now realized, as well as the importance of cleanliness and sterilization of all equipment used in connection with the production and bottling of milk.

Sanitary Measures in the Home. Sanitary measures in handling milk are equally important in the home. The housewife should see that the milk is immediately put in a refrigerator, or the coolest place possible, until consumed. If milk is kept above 40-50° F., the bacteria naturally in it will multiply very rapidly, and moreover if milk is left in the sun, the butterfat in the milk quickly becomes rancid, causing an "oxidized" taste in the milk.

Milk and cream should be covered tightly to prevent absorption of surrounding odors.

As soon as the bottle is empty, it should be washed thoroughly before returning to the milkman.

"Milk is an excellent medium for many dangerous bacteria as well as an excellent food for man. Disease germs may enter the milk directly from an ailing cow,
Milk should be introduced by insects, or be transferred to the milk by the fingers or mouth-spray of persons having to do with the collection or transportation of milk.

"Once in the milk, some of the disease germs may multiply enormously. Extensive epidemics of typhoid, scarlatina, diphtheria, septic sore throat, and other diseases are sometimes caused by contamination of milk supplies. Numerous cases of tuberculosis and undulant fever have been caused by raw milk.

"Since disease germs are readily destroyed by well established methods of pasteurization, all milk for direct human consumption or for use in ice cream, cheese or other milk products should be pasteurized according to officially approved methods. After pasteurization the milk should be so stored and protected that it will not be contaminated. Liquid pasteurized milk should be retailed in sealed bottles.

"The pasteurization of milk is a public health measure. The public should demand pasteurized milk for drinking and the use of pasteurized milk in milk products.

"There is no cogent evidence that pasteurized milk is significantly inferior nutritionally to raw milk."*

Pasteurized and raw milk have practically the same food value. About 60% of market milk is now pasteurized.

The most commonly used process of pasteurization is heating milk to 143° F. and holding it there for a period of 30 minutes. It is then sealed in bottles which have been carefully washed and sterilized. The milk is refrigerated until distributed.

**Chemical and Bacteriological Tests.** Government regulations provide tests which determine the purity and safety of the milk supply. These tests are used in the laboratories of all up-to-date milk distributors.

The Babcock Test is a rapid and accurate method of determining the amount of butterfat in milk and cream. The fat is separated by the addition of sulphuric

* From decision of the Committee on Foods of the American Medical Association.
acid, centrifuging, and measuring the fat column in the neck of a glass test bottle.

The Sediment Test is a single screen test for determining the amount of sediment (or dirt) which has gotten into milk. The sediment may or may not be harmful but it is an indication of careless handling.

The Acidity Test determines the amount of lactic acid in the milk. It guards the sweetness. High acidity, but not sufficient to alter the taste, indicates that the milk has not been properly cooled and will soon sour.

The number of bacteria per cubic centimeter of milk is determined by propagating colonies found to grow from individual bacteria in agar jelly contained in flat glass, so-called Petri dishes.

Marketing of Milk. Milk is usually delivered to milk stations and sent to the city bottling plant in iced cars, unless the bottling has been done at country stations.

The efficient scales, pasteurizers, bottle washing machines, bottling machines, and conveying systems in a modern milk plant leave little to be desired in economy, speed, and sanitation.
LOW COST OF MILK

Because of the generous supply of food energy in milk, complete protein, calcium, phosphorus, and Vitamins A and G, milk furnishes maximum nutrition for minimum expenditure. The price of milk varies in different localities but even those who pay the highest prices actually buy more food value for the money than for any other food. It supplies maximum nutrition for a minimum expenditure. Many authorities advise that as much should be spent for milk and for milk products as for meat, poultry and fish, and at least as much for fruits and vegetables as for meat, poultry and fish.

It is a common fallacy to believe that milk is too high in cost, whereas the actual fact is that milk would be a most inexpensive food, as compared to other foods, if the price were doubled.

On the basis of fuel value alone (taking no account of its other values) a quart of milk at 15c would be equal to:

- 9 eggs .......................... at 31c
- ¾ lb. steak  ..................... at 27c
- 4/5 lb. chicken ................. at 24c
- 6½ oranges ..................... at 26c
- 3 lbs. string beans .......... at 25c

FALLACIES REGARDING MILK

In a recent digest of the National Dairy Council three dietetic fallacies regarding milk were discussed in detail ending with the following summary:

"That milk may be drunk naturally, and not sipped slowly, to create good conditions for digestion;

"That it is preferable to use milk and acid fruits together rather than to avoid the combination;

"That milk, when used properly with foods furnishing adequate roughage, is not constipating."
MILK FOODS AND DAIRY PRODUCTS

The Two Greatest Friends of Mankind—
The Cow and Her Infant Calf

As we have seen, it is the cow which supplies milk — man's greatest foodstuff. But it is the infant calf which supplies the milk digestant, the rennet enzyme, which enables the calf to digest cow's milk as easily as a baby digests mother's milk.

RENNET-CUSTARD DESSERTS

A century or more ago the rennet used for making milk into rennet-custards was homemade and of variable and uncertain quality. A young chemist, Christian Hansen of Copenhagen, was the first to produce rennet of standard and uniform strength and purity. This led him to found the organization known as "THE 'JUNKET' FOLKS," at Little Falls, N. Y., which scientifically produces this enzyme used in "JUNKET'S" Rennet Preparations.

Today, anyone may buy "JUNKET'S" Rennet Preparations anywhere in the United States and know that he is getting a pure, safe, clean product of uniform coagulating power.

The "Curds and Whey" of olden times bore little resemblance to the dainty SIX FLAVOR rennet-custard desserts that have now been made possible for the American people by the development of "JUNKET" Rennet Dessert Powder.

By adding "JUNKET'S" Rennet Preparations to lukewarm milk, the milk is quickly transformed into delicious rennet-custard desserts — dainty, tempting, and so easily digested that they are one of the first foods for babies, invalids, and the convalescent. Yet,
so wholesome, nourishing and good to eat are rennet-custards that they are a favorite dessert for growing children and adults.

When this rennet enzyme in "JUNKET" Rennet Dessert Powder is added to lukewarm milk, the result is like magic. Ordinary, plain white milk is changed into a pretty, colorful, sweet, delicious dessert. It is no longer a liquid — within 10 minutes the milk sets into custard-like form. Actually, the first step in digestion of the milk has been performed. Just put rennet-custard in the refrigerator for half an hour or so until it is thoroughly chilled, and you have a dessert which most people think as good as ice cream.

The fact is that when you eat a rennet-custard dessert, the rennetized milk begins to digest almost at once and much more quickly than ordinary milk does. It is one of the most nourishing and easily digestible foods you can eat. Scientists at a great university recently made many studies of the digestion of plain milk as compared to rennet-custard desserts, and found that rennet-custard desserts digest much more rapidly. Look at this picture of the small curds which the rennet causes the milk to form, and you'll see one of the reasons why.

Making rennet-custard desserts with the six flavors of "JUNKET" Rennet Powder is called the 6-flavor way to make milk delicious, and it's certainly true. For you can have a different flavor, a different color every day.
Action of the Rennet Enzyme. As soon as the rennet enzyme comes in contact with milk or cream, action begins. It transforms the casein of the milk into paracasein which in turn is coagulated into custard-like form in the presence of the soluble calcium salts natural to milk.

One of the secrets of making a good rennet-custard dessert is to warm the milk only slightly — until just LUKEWARM.

Evaporated or condensed milk, or milk that has been scalded or boiled, will not set with rennet, because the high temperatures used in preparing these milks precipitate some of the calcium salts in the milk and makes them inactive because insoluble.

RENNET-CUSTARDS IN INFANTS' DIET
It should be a mother's inviolable rule to keep her baby under the constant supervision of her doctor. So delicately adjusted is a baby's digestive system that utmost care must be used to give it only foods which will be easily digested.

Because rennet-custards are among the most easily digested of all foods, doctors often recommend them as one of the first foods for babies to supplement the bottle and fruit juices. It has been the practice at first to make these rennet-custards with "JUNKET" Rennet Tablets, because they are unsweetened and unflavored. Babies should not have foods too sweet or too strongly flavored: just enough sugar and flavor should be added to make the rennet-custard appetizing. As the baby grows older, the mother may begin to use "JUNKET" Rennet Powder — which is made in six flavors. This famous 6-flavor way of making milk into delicious rennet-custard desserts is easy, and provides a larger, more tempting variety.

Babies and children love rennet-custards made with "JUNKET" Rennet Tablets. For older children, they should be chilled until ice cold before serving. For babies, it is wise to serve them lukewarm — the temperature of a baby's bottle.

A baby's first experience in learning to eat semi-solid food is most interesting and instructive. We all
Baby’s first solid food

think of the process of chewing and swallowing as instinctive, but it is not. It is one of the first lessons a baby must learn. Eating with a spoon requires a new, and to him entirely different tongue formation. The consistency of rennet-custards is so “slippery” that often when first fed to a baby, he expels the food instead of swallowing it. This may be overcome by mixing a few graham cracker crumbs with the rennet-custard dessert so that he will be able to get a “grip” on it.

“JUNKET’S” RENNET PREPARATIONS FOR MAKING RENNET-CUSTARD DESSERTS

“JUNKET” Rennet Tablets, not sweetened or flavored, for making rennet-custards, milk foods, and smoother ice cream with less cream in hand freezers.

There is practically no fuel value in the tablets themselves, and they are therefore recommended by doctors for making milk foods for bland diets, low calorie diets, and infants' formulas. Protein or albumin milk, whey, and cottage cheese are other foods easily made with “JUNKET” Rennet Tablets.

An appetizing rennet-custard dessert
“JUNKET” Rennet Tablets contain pure table salt, a small amount of starch and calcium salt, and the concentrated rennet enzyme.

“JUNKET” Rennet Dessert Powder, for making rennet-custard desserts, served plain or with attractive toppings which add to their appearance and nutrient.

Six natural tempting flavors, with their true colors (in the orange, lemon and raspberry flavors, U. S. Certified Colors are added):

- Vanilla
- Chocolate
- Lemon
- Orange
- Raspberry
- Caramel

“JUNKET” Rennet Powder contains sugar, pure flavor, calcium salt, small amount vegetable gum, and the rennet enzyme.

“JUNKET” Mix for Ice Cream in automatic refrigerators or hand freezers.

No warming. No stirring while freezing. Just mix with milk and cream, and freeze.

Three delicious flavors:

- Vanilla
- Chocolate
- Maple

Because of the rennet enzyme in “JUNKET” Mix, the ice cream made with it is smoother, and is very easily digested.

Contains sugar, skim milk powder, small amount vegetable gum, pure flavor, and the rennet enzyme.

**FOOD VALUE OF RENNET-CUSTARDS**

Rennet-custards, being uncooked, contain all the vitamins, calcium and phosphorus salts, and other nutritive values of fresh pasteurized milk.

Their full food value cannot be measured in calories alone, because of the importance of calcium and phosphorus, and Vitamins A and G in which milk is so rich. These important food values are not calculated in a computation of calories, and this should be borne in mind whenever rennet-custards are compared with any other food.
MILK DRINKS

Rennetized Milk made with "JUNKET" Rennet Tablets or Powder. The action of the rennet enzyme in making milk more digestible is not dependent upon thickening before consumption. Thus a "JUNKET" Rennet Tablet simply dissolved in milk makes it digest much more quickly and easily than ordinary milk.

"JUNKET'S" EASILY DIGESTIBLE HOT CUP

often taken before retiring because the warmth of the milk in the stomach induces relaxation which encourages sleep.

Warm 1 cup milk just hot enough to drink (about 140° F.). When the milk begins to steam, remove from stove. Then add two heaping teaspoons of "JUNKET" Rennet Dessert Powder, or according to taste. Stir thoroughly with a spoon until dissolved — not more than a minute. Do not use an egg beater or milk shaker.

Pour into glass at once.

DRINK IMMEDIATELY . . . because the milk may begin to thicken within a few minutes, indicating that the natural and valuable coagulating action of the rennet enzyme is already taking place. If this should happen, do not stir, but put in the refrigerator to cool. It will turn into a rennet-custard and can then be eaten with a spoon after cooling.

COLD RENNETIZED MILK DRINKS

The six flavors of "JUNKET" Rennet Powder make it easy to stir up a tempting variety of delicious, digestible cold milk shakes. It takes only a minute to dissolve one or two heaping teaspoons of "JUNKET" Rennet Powder of the desired flavor in a glass of milk. (The Chocolate flavor should be beaten with an egg beater.)

This 6-flavor way of giving milk a variety of flavors and colors appeals to children, and from a digestive standpoint, rennetized milk digests just as easily and quickly as rennet-custards.
OTHER MILK DRINKS

Chocolate and cocoa are always popular as milk drinks, hot or cold. Other milk beverages are: Common milk, rich milk, lemon whey, plain whey, and egg milk shakes.

Cultured buttermilk, buttermilk from the churn, Bulgarian milk, Acidophilus milk, and Kumiss are beneficial, refreshing types of soured milk.

Cultured Buttermilk is made by souring milk, previously pasteurized, with a culture of Lactic Acid Bacteria such as found in “Hansen’s” Lactic Ferment Culture and repopulating a number of times using a small portion of the preceding propagation each time for inoculating the next culture.

The so-called “mother starter” is used for inoculating larger batches of pasteurized milk for commercial quantities of cultured buttermilk.

Buttermilk from the Churn. In making butter from ripened cream, the cream is soured with a Lactic Culture such as “Hansen’s” Lactic Ferment Culture. The buttermilk from the churn from ripened cream is very popular, and especially digestible. Buttermilk from a churning of sweet cream is ripened with a lactic culture as in cultured buttermilk.

MILK COOKERY

Milk should be used a great deal more in our menus.

Authorities on diet say that no family of five should spend money for meat until three quarts of milk have been purchased and this should be done even though the price of milk should go to twenty cents a quart. Absolutely nothing in the food line will keep children so well nourished as their daily supply of milk.

In looking over recipes in your cookbook, choose often, those requiring the use of milk. Cream soups, with or without the addition of meat stock, cereal soups made with rice, sago, oatmeal or “Cream of Wheat” or “Farina,” corn soups or milk chowders
Most foods give a pleasing variety of ways to include milk in the diet. Most cereals are better cooked in milk than in water. Eggs and potatoes and other vegetables may be creamed with a thick white sauce made from milk, flour and butter, seasoned with salt and pepper, or sometimes with celery salt or onions. Eggs poached in milk are more palatable and nutritious than when poached in water. Milk toast is another much used method of including milk and sometimes butter in the diet. Most cookbooks provide a large variety of milk breads, waffles, biscuits, and griddle cakes, made with sweet or sour milk. Boiled or baked custards made with milk and eggs, and cornstarch puddings are good ways to use milk, but rennet-custard desserts made with “JUNKET” Rennet Powder or Tablets give the housewife the easiest and most delightful means of giving each member of the family his daily quota of milk in a delicious form without eggs or cooking.

ICE CREAM

Historical. It was in the Alpine peaks that snow was first combined with fruit juices to make a frozen fruit beverage. Marco Polo is said to have brought recipes for making milk and cream ices from the Orient back to Italy and after his return they became very popular foods. In France and England royalty introduced frozen desserts. The first advertisement for ice cream appeared in the New York Gazette, but it is to Dolly Madison, wife of the fourth president, to whom we owe the acceptance of “America’s favorite food,” when she served ice cream at the second inaugural ball.

Today ice cream is an everyday food — enjoyed by everybody regardless of season. Everybody likes ice cream. In the peak year, 1929, records show that over 254,618,000 gallons of commercial ice cream were made. In most modern ice cream plants, continuous brine or direct expansion freezers are used, the ice cream
mix being fed into the machine at one end and the frozen ice cream discharged at the other end. Extremely fast freezing has recently been developed, resulting in minute ice crystals, giving a much smoother texture.

Intermittent or batch freezers are also used in various sizes for hand or power.

The expansion of good rich mixture, with sufficient stabilizer, will be 70% to 100% on freezing, which is called “overrun.”

**Food Value of Ice Cream.** In commercial ice cream, concentrated milk solids, in the form of condensed or dry milk are usually added to cream.

The quantity of butterfat in commercial ice cream is dependent upon the grade as well as upon federal and state food laws. Good ice cream usually contains over 12% of butterfat, but various brands vary from 8% to 16%.

To this concentrated milk and cream are added stabilizers (in form of gelatin or vegetable gums, for making a smoother product and preventing ice crystals), sugar, flavoring, with or without nuts or fruits, and coloring.

A typical basic formula for commercial ice cream might be as follows:

- Cream (containing 18% butterfat) ..........53.0 lbs.
- Evaporated Milk (containing 8% butterfat) .................29.1 lbs.
- Whole Milk (containing 3.5% butterfat) .. 3.4 lbs.
- Sugar ........................................14.0 lbs.
- Gelatin ....................................... 0.5 lbs.

100 pounds of the above ice cream mix would make approximately 20 gallons of finished ice cream.

In homemade ice cream, made in the hand freezer, when no stabilizer is used, it is necessary to use cream with a higher per cent of butterfat (usually coffee cream, containing 18-24% butterfat, is used with flavor and sugar).

In making ice cream in hand freezers with “JUN-KET” Rennet Tablets, however, creamier ice cream can be made with much less cream and without the use of gelatin — one part of cream to three parts of
milk being sufficient. Ice cream made with "JUNKET" Rennet Tablets is therefore not only smooth and delicious, but very economical.

Made in automatic refrigerator with "JUNKET" Mix

With the tremendous increase in the use of electric and other automatic refrigerators, housewives are now enjoying a large variety of ice creams made in their refrigerator trays. Until the development of "JUNKET" Mix for Ice Cream, it was very difficult to make a smooth, creamy ice cream in automatic refrigerators. Women found it necessary to use very rich cream only, and to add cornstarch or gelatin to avoid ice crystals, and this was both expensive and objectionable.

ICE CREAM MADE WITH "JUNKET'S" RENNET PREPARATIONS

For 50 years "JUNKET" Rennet Tablets have been used to make the smoothest, most delicious ice cream in hand freezers, with less cream. The action of the rennet enzyme on the milk and cream seems to give the finished ice cream an apparent richness and smooth texture not equaled in any other way.

More recently "JUNKET" Mix for Ice Cream has been developed. It has the advantage of making even finer, smoother ice cream in automatic refrigerators than is possible with "JUNKET" Rennet Tablets, and in addition makes delightful ice cream in hand freezers.
It is very easy and simple to use for it is already sweetened and flavored. Just mix "JUNKET" Mix with milk and cream, beat and freeze. No heating, for it contains no starch or gelatin. No stirring while freezing. And what delicious, digestible ice cream it makes!

"JUNKET" Mix for Ice Cream is available in three delicious flavors:

Vanilla Chocolate Maple

"The 'JUNKET' Folks" recipe book contains many attractive recipes for variations by adding fruits, nuts, peanut butter, etc., which intrigue the housewife, and delight the whole family.

For the most particular cooks, some whipping and freezing hints are given below.

**WHIPPING TIPS**

To be properly whipped, the liquid ingredients of the ice cream mixture and the utensils used must be COLD. In method calling for whipping cream, whip the heavy cream only stiff enough to hold its shape, BUT NO MORE. Too much whipping will beat out the air. In the method calling for half milk and heavy cream or light cream only, whip the mixture of milk and heavy cream, or light cream only, until thick and fluffy. It will not become stiff.

To prevent cream from spattering, slip a piece of waxed or wrapping paper over the egg beater below the wheel. Drop edges of paper down over edge of whipping bowl.

**FREEZING TIPS**

In Electric Refrigerator

1. Have all ingredients, utensils and freezing pan . . . ICE COLD.
2. A tablespoonful of water dashed into the freezing compartment before setting in freezing pan will form an ice layer below the pan and so aid freezing.
3. Do not try to make ice cubes at the same time you make ice cream.
4. A thin layer of ice cream tends to freeze too hard, become icy, and sometimes to separate. The most
delicious ice cream is obtained by freezing it in a deep layer about one inch thick or more with the temperature control set for fast freezing.

If you set cold control at coldest point when ice cream has frozen to desired consistency, set control back to its accustomed place. If ice cream is served when TOO HARD, it tends to be “icy” or “snowy.”

If ice cream is too hard near serving time, allow to soften in refrigerator just below freezing compartment.

Ice cream which has been frozen too hard lacks flavor because “the flavor is frozen out.” Most people do not know this, but it is easily verified.

5. Fruits or preserves must be mashed thoroughly. Large pieces of fruit tend to sink to the bottom.

6. Fresh fruits and berry mixtures should stand in a sugar solution 2 or 3 hours — overnight is even better — and be thoroughly drained before adding to the ice cream mixture.

7. Canned fruits or berries need to be drained, if they have been canned in a sugar syrup. This prevents icy crystallization.

In Hand Freezer
1. You can make a most delicious ice cream with “JUNKET” Mix in a hand freezer with much less cream than is usually called for in most recipes.
2. Beat mixture until smooth.
3. Pour into freezer can and freeze in ice and salt mixture (4 parts ice to 1 part ice cream salt).
4. Turn freezer about ten minutes.

In Molds or Ordinary Tin Cans
1. Fill mold or can with mixture, using recipe for automatic refrigerator, to within one inch of top.
2. Cover tightly . . sealing cover to can with strip of muslin cloth (not cheesecloth) which has been dipped in melted fat (butter or mild cooking oil). The fat will harden as it gets cold, preventing salt or water seeping into freezing mixture.
3. Bury in 4 parts ice and 1 part ice cream salt mixture — 3 to 4 hours.
4. Wooden box or pail acts as best insulator. If metal pail or pan is used, wrap it tightly in several thicknesses of newspaper.

**BUTTER**

The origin of butter is buried so deeply in the pages of antiquity that there is no true record of when it was first made. The ancient Hebrews, Arabs, and others used it as a cosmetic and as an ointment. It has been made in the four corners of the world, not only from cow’s milk, but from the milk of goats and buffaloes as well. For generations, butter was churned by hand at home on the farms. And popular was the home of the dairymaid who was noted for making the best butter.

In the early 1850’s, the first creamery was established in America. Large scale manufacturing and scientific methods quickly began to replace “The art of making butter.” Today, practically all butter sold commercially is made in modern, power driven churns from carefully graded cream. It requires the butterfat
from approximately twenty pounds of milk to make a pound of butter. Most milk is separated on dairy farms and only the cream, containing all the fat from milk, is shipped to the creameries. There are some “whole milk creameries,” however.

Almost without exception, the cream made into butter today, is first pasteurized to guarantee a pure, wholesome product. After the cream has been cooled down, the large, creamery power-driven churns are filled \( \frac{1}{3} \) to \( \frac{2}{3} \) full of cream, then revolved for about 45 minutes, when granules of butter begin to separate out, or “come.” The buttermilk is drained off and the butter salted. It is then worked to thoroughly distribute the salt and congeal the granules into one mass of butter.

There are several kinds of butter, and many grades, varying widely in both quality and price.

**Creamery Butter** is butter made in a dairy plant, receiving its cream or milk supply from more than one farm.

**Sweet Cream Butter** is made from cream which is of a mild flavor and sweet to the taste. Only the very best grade of cream, free from objectionable odors and flavors can be used in making a high grade sweet cream butter.

**Ripened Cream Butter** is made from cream which has been soured by use of a culture, and sometimes from cream which has been received at the creamery in a sour condition.

**Sweet Butter** is butter without any salt added. It is very light in color.

The United States Government, as well as many important butter producing states, have set up certain minimum requirements as to composition. They are, fat 80%, moisture not over 16%. The balance is usually made up of salt, 2-3%; and minerals and other milk solids, 1%.

The grading of butter is also under Government control. The most important single factor determining the grade of a butter is its flavor (45 points out of a possible 100). Butter scoring 93 points or better is known in the trade as “extras” and is of high quality.
Butter is a very rich source of food energy. It is also one of the best sources of Vitamin A. Butter is one of the most readily digestible fats. A pound of butter contains about 3300 calories. Butter should be included in the diet of every growing child and every normal adult.

Good butter has a firm, waxy (not crumbly) body, and while it may have a little moisture on the surface, it should not be “leaky” or have large water droplets on the surface. It should be uniform in color, not too highly salted and neatly and cleanly packed. A quick test of the flavor of any butter is to spread it on hot toast. The hot toast melts the butter and brings out its flavor.

The flavor should always be fine and clean, free from all objectionable weedy or other off odors and flavors. Whether it shall have a mild or a more pronounced flavor is not a matter of grade, but of personal preference. A brand of butter should be selected having the flavor which pleases the family making the purchase. In general, the trend in America today is toward a mild flavored Sweet Cream Butter, with a low salt content. All things being equal, the fresher butter is, the more delicate and desirable will be its flavor.

In most stores butter may be purchased in packaged form in pound “prints,” or in bulk. When purchased in prints, it is protected in tight waxed wrappers and cartons which help to prevent the absorption of foreign odors and flavors. These packages offer a ready means of protecting butter in the home. They also help to eliminate the possibility of errors in weight, which can so easily occur in purchasing bulk butter.

A quick, easy test to determine whether a product is true butter or a substitute, is to put a little on a spoon and heat over a gas flame. Butter melts without noise and produces a considerable amount of characteristic foam. Substitutes crack and snap without producing foam.

As most butter will deteriorate quite rapidly when warm and soft, it should always be kept in the coldest possible place in the home. It should always be kept in original packages if purchased in prints, or should
otherwise be covered. Butter standing uncovered in a kitchen where fish or onions are being cooked will very quickly absorb such penetrating objectionable odors. It should never be stored adjacent to vegetables and other foods with pronounced odors.

Butter should be served cold. If it is to stand a little time before being eaten, good hotels and restaurants will usually serve it packed with a little ice for protection. One pound will make about forty servings. If purchased in prints, the easiest and most common way of serving is to slice off little cubes. But in those homes where there is time for and a desire to practice the cherished art of serving, attractively made butter balls, curls, or molds have not gone out of style.

A few of the many varieties of cheese

CHEESE

The American people have never learned to appreciate the value and economy of cheese as a food. Some other countries consume five to six times as much cheese per person as we do, and we might well follow their example. For cheese is very rich in proteins, fats, and calcium, and is easily digested.
Cheese is almost as old as civilization. No one knows when cheese was first made, but throughout the centuries, in many countries of the world, cheese has been appreciated as an economical, staple article of the diet, as well as a delicacy.

Did you ever realize, as you heard someone ask your grocer for “A pound of snappy cheese,” that there are over 400 recognized varieties or kinds of cheese? There are two general types, SOFT CHEESE and FIRM OR HARD CHEESE. Some of the soft cheeses are Cream, Neufchatel, Cottage Cheese, and Camembert. The hard cheese, such as American, or Cheddar (as it is known in England), Swiss, Edam, Pineapple, and the like, are aged or “ripened” to bring out their full, delightful, individual flavors, and to make them mellow and “creamy.”

The real cheese connoisseurs may many times prefer natural cheese, cheese in its original form. But due to the great demand on the part of the public for food packaged in small units, there has been developed what is known as Processed or Pasteurized Blended Cheese. It is most frequently made from American Cheese, although Swiss, Brick and a few other varieties are also processed upon occasion. Briefly, it is made by melting different lots of natural cheese and mixing them together. This mixture is then poured out into tin-foil lined containers to harden. The most popular is perhaps an eight-ounce package. Processed Cheese usually has a soft texture, will slice easily, and has no rind. It will not dry out as quickly as natural cheese. But in the melting process, the especially piquant flavor of one select cheese may be lost in the whole mixture. Be it said in favor of Processed Cheese, however, that it is much more uniform because of skillful blending than is most natural cheese.

The manufacturing of cheese remains, with all of our scientific knowledge, an art — one of the highest arts in dairy manufacturing. Cheesemaking cannot be learned alone from a book. Perhaps, for this reason, more than any other, cheesemaking is still largely carried on in small factories which are in the hands of owner-managers, spotted amongst the fertile valleys.
The rennet enzyme plays its part

and rolling hills of our great dairy states, Wisconsin, New York, Oregon, and California. Nothing but the keen sense of smell and taste of the cheesemaker will pick out the particular flavors and aromas which "make" cheese. No apparatus can measure the correct "silkeness" of cheese curd, like the skilled hand of the "maker."

The basic way in which milk for cheese is curdled is by adding the rennet enzyme. The specific action of this enzyme is to thicken or curdle sweet milk. Milk for American or Cheddar Cheese is "set" or curdled with rennet, and the cheesemaker then cuts it into fine cubes or particles with specially designed curd knives. This allows the whey, a light amber liquid, to be expelled quickly. To this cut curd, heat and mechanical manipulation is applied, and it is then finally put in a hoop and pressed to expel the last of the liquid whey. In this solid curd is the butterfat, casein, Vitamin A, and much of the calcium and phosphorus. The American Cheese curd is then ripened on shelves several months before being ready to serve.

In all cheesemaking, either before the milk is curdled, or after the curd is formed, cultures of specific bacteria, molds, or other microorganisms, characteristic of that particular cheese, are used to inoculate the milk or the curd.

From this point on, cheesemaking is largely a matter of controlling the development and growth of selected strains of bacteria and molds which produce those delicate and delightful flavors, found only in cheese. Thus, from particular "eye-forming bacteria" come the characteristic holes in Swiss Cheese. From another bacterium in this same cheese, comes its sweet, nutty flavor. From a mold comes both the appearance and flavor of Roquefort. The control of the development or growth of these molds and bacteria is the work of the skilled maker.

There is a wide number of varieties of cheese, from the low cost Cottage Cheese and from the moderately priced and common American or Cheddar, to the ex-
pensive old English Stilton, aged in wine. Here is a food to grace every table, from the lowly huts of laborers to the stately mansions of millionaires. What a variety to answer that oft repeated question, "What shall I serve tonight?"

One pound of American Cheese will yield about 2,000 calories. It is a completely digestible food, with very little waste. It leaves very little residue, nearly all of it being assimilated by the body.

The ways in which cheese can be served and used are almost as innumerable as the varieties. Welcome in many homes, is the familiar cheese plate on Sunday night. And what is apple pie without a piece of rare old American Cheese? What possibilities cheese offers in salads. And who does not like, occasionally, for luncheons, a cheese fondu or other tasty cheese dish?

In many of our larger cities are food stores with a cheese counter in charge of real connoisseurs of cheese, men who can be of much help in making selections. One store in Chicago carries over 115 varieties. When selecting American Cheese, one might first look to its age. A fresh or "green" cheese will have a mild flavor and may tend to be more or less rubbery in texture. A cheese six months or more of age, will probably be broken down so that it has a more mellow, soft body. Real old cheese may even have somewhat of a buttery consistency. It is this soft, mellow body and accompanying sharp or snappy flavor that a real lover of rare old American Cheese will seek out. After all, however, the flavor preference of her family is what every woman must consider when she orders cheese. The preference of individuals in fact is perhaps more responsible than any other one thing for the 400 odd varieties of cheese in existence today.

All of the hard or firm types of cheese should be kept cool and dry. A cheese jar will help to keep them from drying out and becoming brittle on the ends where they are cut. The soft types of cheese should be kept in a refrigerator and if they come in jars or wrapped in tin-foil, they should be closed up as tightly as possible after the serving portions are cut.
REVIEW QUESTIONS

Milk
1. How long has milk as a food been known? (pages 3 and 4)
2. What is the chemical composition of milk? (page 5)
3. Why is milk Nature's most nearly perfect food? (page 5)
4. What is a calorie and how many calories are supplied in a quart of milk? (page 6)
5. Why is calcium necessary in the diet? Is milk an important source of calcium? (page 7)
6. What vitamins are contained in milk and what is the function of each of these vitamins? (page 8)
7. How should milk be cared for in the home? (page 9)

Rennet-Custards
8. What beneficial effect does rennet enzyme have on milk? (pages 13, 14 and 15)
9. Why must milk for making rennet-custards be only warmed until lukewarm? (pages 14 and 15)
10. Why cannot rennet-custards be made with condensed or evaporated milk? (page 15)
11. Why are rennet-custards recommended for infants? (page 15)
12. Name as many uses of milk as you can. (pages 19 and 20)
13. Name the different kinds of milk drinks. (pages 18 and 19)
14. Name the 3 "JUNKET'S" Rennet Preparations and what each is used for. (pages 16 and 17)
15. In what ways are "JUNKET'S" Rennet Preparations especially beneficial to milk? (pages 13 and 14)
16. What is the advantage of using "JUNKET" Rennet Tablets or "JUNKET" Rennet Dessert Powder for milk drinks? (page 18)
17. What proof have we that "JUNKET'S" Rennet Preparations aid in the digestion of milk? (page 14)
18. Why are "JUNKET" Rennet Tablets especially good for making rennet-custards for babies? (pages 15 and 16)
19. Is there any fuel value in "JUNKET" Rennet Tablets or in "JUNKET" Rennet Dessert Powder? (pages 16 and 17)
20. What are the ingredients in "JUNKET" Rennet Dessert Powder and in "JUNKET" Rennet Tablets? (page 17)

Ice Cream
21. Name 3 advantages of using "JUNKET" Mix for making ice cream. (page 17)
22. How long has ice cream been known? (page 20)
23. What are the advantages of using "JUNKET" Rennet Tablets for making ice cream in the hand freezer? (pages 21 and 22)
24. Why is "JUNKET" Mix for Ice Cream easy to use? (page 23)
25. How is ice cream made using "JUNKET" Mix? (page 23)
26. What factors should we remember when whipping cream? (page 23)
27. Name at least 7 points to observe when freezing ice cream. (pages 23 and 24)

Butter
28. Of what particular value is butter in the diet? (page 27)
29. Describe briefly the process of buttermaking. (page 26)
30. Mention the qualities of good butter and how you would detect butter from a butter substitute. (page 27)
31. How should butter be cared for in the home? (pages 27 and 28)

Cheese
32. Give briefly the process of making American Cheese. (page 30)
33. What are the two general types of cheese? Name examples of each. (page 29)
34. How many calories are there in a pound of cheese? Is cheese considered easy to digest? (page 31)
35. What part does the rennet enzyme have in cheesemaking? (page 30)
36. How does cheese get its flavor? (pages 30 and 31)
37. Name several uses of cheese. (page 31)
38. What is the best way to store cheese? (page 31)