LESSON VI.

Although milk is seven-eighths water, it is one of our most important foods. No other food has as great a variety of the materials which the body needs. It is indispensable for little children and of great value to everyone.

The tissue-building protein found in milk is in an especially valuable form.

In the fat of milk are found little-known but very important substances without which the body can not grow or recover from injury as it should. The only other foods which compare with milk as a source of these substances are the green leaf vegetables, such as spinach, chard, or lettuce.

Milk contains more of lime (calcium) than any other common food. Without it, the diet is almost sure to be lacking in this important building material.

Unless great pains are taken to keep milk clean, it is likely to carry bacteria which cause it to spoil. If infected with disease germs it may spread diseases such as typhoid fever, diphtheria, and scarlet fever.

Keeping milk cool prevents the bacteria from increasing. This is necessary not only to help make the milk safe, but to keep it from souring.

Butter is chiefly the fat of the milk, with some water and a little of the curd and salts.

Cheese is a valuable tissue-building and fuel food, which should be classed with such foods as meat or eggs, rather than as a pleasant accessory to the diet.

Skim milk contains most of the protein and lime of the whole milk and is far too valuable to waste, though it should not take the place of whole milk for little children.

For many good reasons such as higher costs of feed and labor, the price of milk has been rising lately, but even now its increase is relatively less than many other foods. It is an economical food when we consider all the materials it provides for the body. It is much safer to lessen expenditure for meat than for milk, especially for children.
MILK AND ITS PRODUCTS.

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Few if any foods surpass milk in value as a component of the ordinary diet. No other food has so great a variety of the nutrients which the body needs to build its tissues and keep it in good working order; and some of these nutrients are of an especially desirable quality. For little children milk is indeed indispensable.

Milk is about seven-eighths water, yet there is no greater mistake than to think of it as a beverage rather than a food. The other eighth, made up of solids that are dissolved or suspended in the water, is so valuable that milk is rightly classed with bread and meat as one of the mainstays of our diet.

The most abundant of the solids in milk is called milk sugar. This is much less sweet in taste than some sugars, such as cane sugar, maple sugar, and honey, and is thought by many to be somewhat more easily utilized in the body than the familiar table sugar. When milk sours part of this sugar is changed into lactic acid.

Next to the sugar the most abundant constituent in milk is the fat, present in tiny globules that tend to rise to the top as the milk stands and the cream forms. Usually milk contains about 3½ or 4 per cent of fat, and 5 per cent of sugar.

Like other sugars and fats, these constituents of milk provide energy for the body, much as gasoline provides motive power for an engine. By energy we mean power to work, and heat.

Third in abundance are the proteins, that, like the sugar and fat, can furnish energy, but which have special importance in building and renewing the tissues of the body. One of these, called casein, is familiar in the form of the milk curd that separates from the whey when the milk sours; another is present in the whey. Among the different kinds of protein found in human food none is more valuable than that in milk, though many other foods (especially lean meat, fish, eggs, dried peas, and beans) contain protein in greater amount. The proteins form a little less than 3½ per cent of milk. Three, four, five is a good way to remember the proportion of the chief nutrients of milk—three parts of protein, four of fat, five of sugar.

The so-called mineral matters or salts are also important solid ingredients. Milk contains a little less than 1 per cent of these mineral matters, some of which play an important part in building the body and keeping it in good condition. The salts of lime or calcium are the most abundant and important, and there is no other common food from which lime salts can so readily be obtained.
Aside from the milk sugar, fat, protein, and mineral salts, there are in milk minute, and as yet unmeasured, amounts of certain newly discovered substances whose apparent importance for the welfare of the body has only recently become known. These have been called by various names, such as vitamines, accessory substances, growth determinants, food hormones or regulators of nutrition. By whatever name we call them, the important thing to remember is that without them the child seemingly can not grow normally and the adult can not keep in good health. This is indicated by experiments in physiological laboratories where young rats have been given diets which contain everything else that the animals are known to need, and yet they do not grow until some of these are added to their food. Physicians know that practically the same thing holds in the case of many sickly children. It is not known how much of these newly discovered substances is needed to keep us in health; but for the present the only safe course is to make sure that they are generously provided, and this can be done better by the use of milk than in any other way, since probably no one common food provides them as abundantly.

All these materials that milk supplies for building and renewing the body, for regulating its processes, and for furnishing energy, are in forms that can be readily digested and used. Moreover, clean, fresh milk can safely be used in its original state by most persons—often a great advantage in a busy household.

Milk used alone is by no means an ideal food for either the older child or the healthy adult, because, containing 87 per cent of water as it does, it is too dilute. In order to get the energy needed for his day's work a man using his muscles as much as a carpenter, for example, would need to drink about five quarts of milk, or 20 ordinary glassfuls, and a woman who did the cooking and ordinary housework for her family would need at least four quarts, or 16 glassfuls—decidedly more than most of us would care to use. If the man did heavier work, such as coal, heaving, and the woman scrubbed floors or did heavy washing every day, each would need at least a pint more or perhaps a quart.

We should not on this account go without milk, but everyone, except little children, should endeavor to use milk in combination with more concentrated foods that yield a greater amount of energy, rather than by itself. It should be remembered, too, that milk takes the place of meat, fish, eggs, and other foods rich in tissue-building protein, and that when we use milk we need less of these. As a source of protein 1 glass of milk (one-half pint) might take the place of 1 large egg or 1 small serving of meat or fish (1½ to 2 ounces) or one-third cup of baked beans.

It is unfortunate that a food as valuable as milk is one of our most perishable foods, and one which needs the most careful handling to keep it safe for use. We avoid dirty milk when we can see the dirt, but the existence of invisible dirt is sometimes forgotten. From the air, from contaminated water, from ill-care-for utensils, from unclean hands the organisms called bacteria may find their way into the milk. Some of them are useful; without certain kinds, butter and cheese would not have their distinctive flavors. Some kinds cause milk to turn sour, though it still remains wholesome; others may form from it unwholesome, even poisonous products; still others may be disease germs that make milk a carrier of such maladies as infectious sore throat, diphtheria, typhoid fever, and tuberculosis. The only way to prevent danger is to see that everything connected with milk is kept as clean as possible and that neither the milk nor anything connected with it is handled by anyone who has come in contact with these diseases.
Milk should be chilled immediately and kept cool from the time it is drawn until it is used, since the bacteria that get into it multiply very rapidly in warm milk. These precautions are so necessary that nearly everywhere there are laws to enforce them.

Even with the greatest care it is almost impossible to have all the milk delivered in a great city in a sweet and wholesome condition; hence, to lessen the danger from spoiled or contaminated milk many municipalities require that all milk (except that from "certified" dairies) be pasteurized. To pasteurize milk it is heated to 145° F., kept at that temperature for 30 minutes, and then cooled rapidly. This treatment destroys any disease germs that may have been present and checks the growth of most of the other bacteria, so that the pasteurized milk keeps sweet longer than raw milk.

The price of milk has been increasing lately for various reasons, until in some places it sells for twice as much as it did ten years ago. Many families of limited income feel that it is now too expensive for them to afford, even for their children. A study made in New York City upon 2,200 families, all with children under 6 years old, showed that when milk went up to 14 cents a quart more than half of the families had substituted tea and coffee for milk and 120 families had stopped taking milk altogether, though in 25 of these there were babies under 1 year old. This situation is most unfortunate, for if milk is cut out of the diet the children may fail to get as much of the lime and the growth determinants as they need; and if these are lacking children can not develop into strong and healthy men and women.

In deciding whether any food is high or low in price, we must ask not merely how much we must pay for a pound or a quart, but how great is the return in actual food value. The following table may help to show how much protein and energy one can buy for 25 cents when food is at the prices given:

| Protein and energy purchasable for 25 cents from foods at certain assumed prices per pound. |
|-----------------|-----------------|-----------------|-----------------|-----------------|
|-------------------------------|-------|------|-------------------------------|-------|------|
| **Milk, at—** | | | **Cod, fresh, at—** | | |
| 10 cents a quart | 2½ | 1,575 | 15 cents a pound | 3 | 350 |
| 12 cents a quart | 1½ | 1,215 | 20 cents a pound | 2 | 205 |
| 18 cents a quart | 1½ | 875 | **Cod, salt, at—** | | |
| **Skim milk, at 5 cents a quart.** | | | 3½ | 1,650 | 10 cents a pound | 7½ | 900 |
| **Full-cREAM cheese, at—** | | | 3½ | 1,245 | 15 cents a pound | 5 | 600 |
| 25 cents a pound | | | **White bread, at—** | | |
| 35 cents a pound | 3½ | 1,965 | 5 cents a pound | 6½ | 5,925 |
| **Cottage cheese, at 15 cents a pound.** | | | **5 cents for 12-ounce loaf** | | |
| 5½ | 835 | (about 7 cents a pound). | 4½ | 4,446 |
| **Eggs, at—** | | | **Rolled oats, at—** | | |
| 25 cents a dozen | 2½ | 805 | 6 cents a pound | 11 | 7,510 |
| 35 cents a dozen | 2 | 720 | 10 cents a pound | 6½ | 4,507 |
| 60 cents a dozen | 1½ | 640 | **Corn meal, at—** | | |
| **Beef (sides, medium fat), at—** | | | 6 cents a pound | 6 | 6,721 |
| 25 cents a pound | 2½ | 1,065 | 10 cents a pound | 3½ | 4,032 |
| 30 cents a pound | 2 | 840 | | | |
| 35 cents a pound | 1½ | 720 | | | |

These figures mean that in buying milk at 12 cents a quart one gets protein as cheaply as in meat at 25 cents a pound, or eggs at 35 cents a dozen, or fresh cod at 20 cents a pound; and one gets energy more cheaply than from any of these other materials. Even at 18 cents a quart milk would be almost as cheap a source of protein, and a cheaper source of energy, than meat at 35 cents a pound; it would be a cheaper source of both protein and energy than eggs at 60 cents a dozen. Because of these facts dietitians advise families who must make every penny count to buy less meat rather than less milk.
When milk is compared with cereal foods the story is a different one. Wheat, corn, oats, rice, and other cereals are by far the cheapest sources of energy, but they are lacking in lime and in other nutrients which are contained in milk. Milk and cereals together make a remarkable combination; “bread and milk” is justified not only by experience but by theory.

Milk products should be thought of as including not only cream, butter, cheese, skim milk, buttermilk, and whey, but also milk in the condensed, evaporated, and powdered forms.

Cream is prized highly for its “rich” flavor and the pleasant consistency it gives to other foods. Its chief nutrient is fat, and the amount of this may vary from 18 to 20 per cent in ordinary “single” cream to 40 per cent in very thick “double” cream. About 5 quarts of milk are required to make 1 quart of single cream, and 10 quarts for 1 of double cream. The widespread use of cream is comparatively recent. If an actual shortage develops those who are accustomed to using it freely ought to forego this dietary habit, because the milk from which it is obtained is needed for use as such. For most families it is much better economy, both of money and of milk, to use “top milk” instead of cream on cereals, in coffee, and on puddings. If the milk is reasonably rich to begin with, what is left after the top has been poured off is suitable for cooking or drinking.

Butter is made up mainly of the fats of milk, with a little protein and some salt. These fats, amounting to nearly seven-eighths of the whole, yield energy rather than building material to the body. In other words, butter is a good fuel food. There is at present no reason for believing that it is more readily digestible than any other clean, carefully prepared edible fats. However, it contains more of the growth determinants than such vegetable fats as olive oil, cottonseed oil, corn oil, or peanut oil, and on this account can not be replaced by them readily.

Most of the protein, milk sugar, and the greater part of the lime of the milk are found in skim milk or in buttermilk, left from butter making. Hence these have food value not ordinarily recognized, and they should never be wasted.

One of the most valuable milk products is cheese, with its many varieties. Cottage cheese made from skim milk is a wholesome substitute for meat. One might pay 15 cents a pound for it and buy protein three times as cheaply as from beef at 25 cents a pound, thereby also obtaining the lime which is so hard to provide without milk or milk products. Ordinary American “full cream” cheese is made of whole milk, and contains nearly all of the solid ingredients of the milk except the small amounts that are drained off from the curd in the whey. It is a concentrated food that even at present prices is an economical source of protein.

If the water is removed from milk it can not easily spoil, for bacteria need moisture for their growth. Condensed, evaporated, and powdered milks are in the main simply skim milk or milk of low fat content from which more or less of the water has been driven off in one way or another. In some brands, especially the less thoroughly evaporated ones, sugar is added. Where good fresh milk can be obtained it is to be preferred to any of the dried kinds, but where it is scarce or inferior the dried milks are often very useful. These forms of milk can easily be transported and are less liable to spoilage. The low content of milk fat in most of these products must not be overlooked.

Unfortunately, with the difficulty in getting labor, the cost of supplies and many other causes, the milk production of the United States is not increasing as fast as the population. Not only should production be increased but there
should be the fullest use of all dairy products and by-products for human food.

Recalling that a quart of milk a day is recommended for every child from the time it is weaned until it is 3 years old, or even 6 years old, and that the Allies are now depending on us for part of their dairy products, we must realize how important it is for us to conserve and wisely distribute our milk supply and to conserve it by using every particle of it. Every effort must be made to stimulate greater production and a wiser use of milk.

**WHAT WE CAN DO TO HELP THE MILK SUPPLY.**

We can use all milk and milk products carefully.

We can insist on buying clean, pure milk, and keep it in a clean, cool place, and in well-scalded dishes to prevent its spoiling.

We can use other fats, especially meat trimmings and "drippings" or vegetable fats, in the place of butter in cooking, when butter is scarce.

We can use "top milk" in the place of cream on cereals and desserts.

We can use skim milk, buttermilk, and whey in cooking.

We can use more cottage cheese made from skim milk.

We can make sure that children and sick persons have all the milk they need, even if some of the rest of us have less than usual.

We can encourage our farmers to increase the production of milk.

We can be willing to pay the price necessary to cover the cost of production and a reasonable profit.
RECIPIES, WITH SUGGESTIONS FOR DEMONSTRATION.

The Food Administration's early injunction "Save milk" has been sometimes misunderstood. The rest of the direction was not always read—"do not waste a drop of it?" Milk is to be used. Children are to have an abundant supply. It is to be used freely by invalids and the sick, and all adults are to have some, varying with the supply. But every part of the milk must be used. It is a simple matter to use the cream and butter, but the skim milk is sometimes wasted or not used for human food. In this lesson especial emphasis should be laid on its value. A few recipes are given for its use. Many others will suggest themselves.

**Duchess Soup.**

1/2 onion.
2 tablespoons fat.
1 tablespoon rice flour or 2 tablespoons sago or minute tapioca.
1 quart milk.
1 teaspoon salt.
Paprika.
1 egg or 2 egg yolks.
3/4 cup grated cheese.

*Directions.*—Cook the onion in the fat until tender but not brown. Remove the onion, add the flour, then the milk gradually, saving out 1/4 cup. Cook until smooth and add seasoning. If sago or tapioca is used in place of flour, add it to the milk and cook 15 minutes. Pour the soup over the egg beaten with 1/4 cup of cold milk. Add the grated cheese and serve immediately.

**Cottage Cheese.**

Use freshly soured clabbered milk, or clabbered buttermilk. Pour the milk slowly into a bag and allow it to drip, or heat over hot water until lukewarm (about 100° F.). Let stand a half hour, pour into a strainer lined with cheesecloth. Gather up the cheesecloth around the curd to form a bag, and let hang until the curd is free from whey. Moisten with a little butter, oleomargarine, or top milk. Salt to taste.

**Peanut Cheese Balls.**

Mix equal parts of peanut butter and fresh cream cheese, or homemade cottage cheese. Add a few grains of salt, and moisten with a little sweet cream if necessary. Shape into small balls. Serve with salad.

**Cottage Cheese and Celery Balls.**

Mix equal parts of cottage cheese and finely chopped celery, form into balls, and serve on lettuce as a salad. Nuts may be used instead of the celery or with it, and the balls may be rolled in nuts.
WHEY SALAD DRESSING.

Mix in the top of a double boiler 1 teaspoon each salt, sugar, and mustard, a few grains cayenne, and 1 1/2 tablespoons rice flour; add 1 egg and mix again. Add 1 1/2 tablespoons clarified chicken fat, 1/4 cup whey, and add 1/4 cup vinegar. Cook over boiling water until mixture thickens, stirring constantly. Strain and cool.

IVORY JELLY.

1 1/2 tablespoons granulated gelatin. | 1/4 cup sugar.
1/2 cup cold skimmed milk. | 1/4 teaspoonful salt.
2 1/2 cups scalded skimmed milk. | 1/4 teaspoonful cinnamon.

Directions.—Soak the gelatin in cold skimmed milk and dissolve in the scalded milk. Add sugar, salt, and cinnamon. Strain into mold and chill.

MAPLE JUNKET.

1 quart skimmed milk. | 3/4 cup cold water.
3/4 cup maple sirup. | 1 teaspoonful vanilla or spice.
2 junket tablets.

Directions.—Heat the milk until lukewarm (not more), add sirup and the tablets dissolved in the cold water. Pour mixture immediately into sherbet cups. Stand in warm room undisturbed until firm like jelly. Cool and serve.

LEMON MILK SHERBET.

1 quart skimmed milk. | 1 cup sirup.
3/4 cup lemon juice.

Combine lemon juice and sirup, and gradually add the milk. If added too rapidly, or without constant stirring, the mixture will have a curdled appearance. Freeze. Grated pineapple may be added, lessening the lemon juice and sirup. Other sweetened fruit juices may be substituted for the lemon juice and sirup. The taste is a sufficient guide for quantity.

INDIAN PUDDING.

5 cups scalded skimmed milk. | 1 teaspoonful ginger.
3/4 cup Indian meal. | 1/2 cup molasses.
1 teaspoonful salt.

Pour skimmed milk slowly on meal, cook in double boiler 20 minutes, add molasses, salt, and ginger; pour into greased pudding dish and bake 2 hours in slow oven. Ginger may be omitted. Any ground cereal may replace the corn meal to vary the flavor.
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No. 487, Cheese and Its Economical Uses in the Diet.
No. 712, School Lunches.
No. 717, Food for Young Children.
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Farmers' Bulletin No. 413 is a practical discussion of the use of milk in the home. Farmers' Bulletin No. 824 discusses simply but accurately the food value of milk and cheese as sources of protein. Farmers' Bulletins 487, 712, and 717, and Food Leaflet, No. 7, include simple statements and recipes. Department of Agriculture Bulletin No. 469 gives practical directions for using other fats as substitutes for butter.

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LANTERN SLIDES.

Relative Amount of Milk Used for Various Purposes in the United States.
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An Attractive and Inexpensive Milk House.
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