

DOMINION OF CANADA—DEPARTMENT OF AGRICULTURE

WHY PASTEURIZE MILK

DAIRY AND COLD STORAGE BRANCH



Published by authority of the Hon. JAMES G. GARDINER, Minister of Agriculture,
Ottawa, Canada

630.4
C212
P 580
c. 1
1937

WHY PASTEURIZE MILK

About the year 1867, Pasteur completed experiments which proved that bacteria could be destroyed by heat. But it was not until some years later that this scientific principle was applied to the control of diseases which are sometimes spread by milk. The process of heating milk to prevent danger from this source is exceedingly simple and is called, in honour of the great French scientist, pasteurization.

Perhaps this name, being long and unfamiliar, has helped to create the impression that the process is complicated and intricate. As practised in modern milk plants, it is decidedly the reverse; the method is simply the heating of the milk to a temperature of 145° F. and holding at this degree of heat for 30 minutes, then cooling as quickly as possible to below 50° F.

Since pasteurization was first advocated for market milk, there has been great improvement in the equipment used for pasteurization and considerable headway has been made in the recognition of this process as a health safeguard. Modern, well-controlled pasteurization is a great sanitary advance. This is proved by the fact that its adoption in various cities of many countries has been the means of saving many lives, preventing disease and the mental suffering associated with physical disability.

In early times, the question of milk supply was a simple one. People lived under different conditions; there was no crowding together in cities and it was easy to obtain this food from nearby sources. But the problem of milk supply is made more complicated by increased population, especially where a large proportion of the people congregate—as in cities. To insure an adequate and safe supply, large cities have a more difficult task than towns and villages and even there, the problem is not so simple as on the farm.

The average citizen, enjoying his meals at home, knows little of and seldom gives any thought to, the tremendous organization necessary to provide him with his food. The handling of the milk supply for a large city is one of the romances of modern business; it requires a thorough and efficient organization to produce, transport, bottle and deliver in good condition and with unflinching regularity, thousands of quarts of this perishable food each day. Dairymen, in doing so, perform a public service.

It is generally conceded that milk and milk products are the most important factors in the food supply of the family. The dairy provides food best suited for growth and the maintenance of health. Because of the constituents of milk, it is a definite contribution to child health, supplying protein of pronounced nutritive efficiency to build strong muscles and promote growth; lime and phosphorous necessary for a strong framework and for satisfactory teeth; fat in one of its most easily digested forms; milk sugar of special physiological value; all known vitamins which have been described as the "spark which ignites the fuel mixture." These necessary components of the diet are supplied, by the dairy industry, in many forms of which liquid milk is the most abundant. Therefore, it must be a substantial part of a health program to encourage an increased use of these foods, to arouse public interest in the necessity for careful control and to stimulate a sense of responsibility on the part of the public as to the quality of milk demanded and the care given it in the home.

It is here that the great importance of pasteurization is manifest because it safeguards a food which has such an immense bearing on health. Few measures of public health have had a harder battle to overcome public indif-

ference; few have won the confidence of the medical profession, the nutrition specialist, and sanitarian to the same extent as has pasteurization. As an instance of faith in this practice, the following resolution passed by the Canadian Council of Child Welfare may be quoted:

"Whereas it has been established that pasteurization of milk reduces the diarrhoeal diseases of infants, is most effective in controlling epidemics of typhoid fever, scarlet fever, septic sore throat and other like communicable diseases of human origin, is an effective guard against the dissemination of bovine tuberculosis and is, in addition, the simplest, cheapest, least objectionable and most trustworthy method of rendering milk safe that is known at present, therefore be it resolved that the executive of the Canadian Council of Child Welfare strongly endorses all efforts of health or welfare organizations directed towards the pasteurization of the community milk supply."

It is significant, too, that the National Dairy Council, an organization made up of representatives from all branches of the trade, have also passed a resolution urging that all milk for sale in cities and towns be pasteurized.

Reference has been made to the simplicity of pasteurization. Reference should also be made to certain points which demonstrate the advisability—or rather the necessity—of the practice for a city milk supply. Just think for a moment of the number of farms from which milk comes for a city with a population of about 250,000. With an average of twelve to fourteen cows in a herd, it would require 850 herds to supply milk to a city of this size. Taking the average Canadian family as two adults and three children, we may assume that 4,250 people have something to do on the farm with this milk supply. Education is necessary to insure cleanliness and proper handling of milk at its source but when we consider the number of farms from which milk is shipped to the city, we realize that we cannot hope by inspection alone to cope with the problem of safe milk. To do so would require an inspector on every farm—impossible, of course. This shows the weakness of the suggestion sometimes brought forward that inspection is the solution of the question.

The up-to-date milk plant has facilities for testing the milk as it is received from the farm. Bacterial counts are taken, the sediment test is made, and farmers are promptly notified if the milk is below the standard. No one realizes the importance of satisfactory conditions for producing milk more than the distributor who, by his inspection and checking and by his activities in educating the farmer and stimulating in him a sense of responsibility, has done more than anyone else to improve conditions on the farm. This vigilance is an essential to his business and this fact answers one objection which has been voiced against pasteurization—that it tends to bring about a relaxation of effort to secure clean milk. That is not so and the fact may be emphasized that no one is more aggressive than the milk dealer in educational activities along this line among the producers of milk.

Pasteurization will not make dirty milk clean; it does make milk safe. Toronto was the first city in Canada to adopt pasteurization of all milk sold. The records in that city show a steady decrease in epidemics due to diseases which can be carried by milk as do the records of other cities in which pasteurization has been enforced. No epidemic has yet been traced to properly pasteurized milk. The Medical Officer of Health should be supported in any plans for the inspection of city milk plants, to check the accuracy of the recording thermometers, to see that the equipment is adequate to handle the volume of milk and that it is in good condition. He cannot, however, be expected to perform his duty without sufficient funds and sufficient staff.

Since pasteurization has been in general practice in Toronto, by-laws have been passed in other cities—each one a milestone of progress. But we are still short of the ideal, which is universal pasteurization of all market milk. There are still a few objectors—conscientious and otherwise—who make state-

ments designed to hinder. "Do not tamper with nature" is one of them. And sometimes it convinces the unthinking. It must be remembered, however, that though cow's milk is a natural food, people do not get milk directly from the cow, as does the calf, for which it is the natural and perfect food. If they did, and the cow were healthy, there would be no possibility of contamination of the milk. But they don't. Moreover, it might be noted that milk is the only animal food used in the raw state. Like all other animal foods, it is highly perishable and like all other animal foods, its food value is not destroyed by heat.

Another objection sometimes advanced is that pasteurization destroys the ability of milk to sour. Pasteurization does delay the souring process by a few hours but it does not destroy all the lactic acid bacteria and pasteurized milk will sour normally.

Monopoly by the big dealers and higher prices is feared by some. This is a weak argument for it is feasible for a number of small dealers to co-operate and equip a pasteurization plant where the milk can be so treated and made safe. Such a plant is in operation in Saint John, N.B., where many small dealers have milk pasteurized and bottled for them by one of the distributing plants. It does cost in the neighbourhood of half a cent a quart to pasteurize milk but a better article should command a slightly higher price. Municipalities can, to a large extent, govern milk prices and there is not much danger of exorbitant charges resulting from the adoption of pasteurization.

Some say it changes the taste but that is mostly imaginary. The same objection is often made to certified milk. The taste of pasteurized milk is wholesome and palatable.

It is thought by many that pasteurization lessens the nutritive value but that opinion is not borne out by scientific findings. The food value of milk is not destroyed by heating to the temperature required for efficient pasteurization nor does pasteurization make milk more difficult to digest. In fact, the tendency of heat to make the curd smaller is perhaps a digestive aid. One effect of pasteurization has been given great prominence. It is true that the one vitamine—Vitamine C—may be impaired by pasteurization. The fat soluble vitamins are not affected and even though this water soluble one is impaired—possibly destroyed—it is not a serious loss as the ordinary Canadian diet at every season of the year includes some fruit and vegetables which are an important source of the vitamine. The destruction of the vitamine C would affect babies fed wholly on pasteurized milk but that deficiency is very easily corrected by the addition to the child's diet of a small quantity of orange juice, or tomato juice, or the juice of turnips. As a precautionary measure, many physicians advise the addition of one of those to the diet of even the nursing child.

Then, it has been questioned, though not very generally, whether the butterfat content of pasteurized milk is as high as it is in raw milk. Perhaps this doubt arose from the fact that in the early days of pasteurization a temperature higher than 145° F. was used. This higher temperature caused a less perfect separation of the fat and the cream line was not so deep as there was a larger proportion of the fat distributed throughout the remaining part of the milk. This gave the impression that the milk was not so rich. The temperature in general use nowadays, however, does not prevent the rising of the fat globules. But, nevertheless, the depth of the cream line is not a reliable guide to the richness of the milk.

The justification of all effort and of all additional cost involved in pasteurization lies in the fact that it destroys the germs of all diseases which can be carried by milk—typhoid, diphtheria, septic sore throat and common cold. We should remember, however, the possibility of recontamination if the milk is not properly taken care of and we must emphasize the responsibility of the housekeeper in this regard. Careless handling in the home is one of the weakest

links in the chain of effort to insure a safe milk supply. Every housekeeper has a right to demand good milk and it is her duty to do so. She has also a responsibility equal to that of the farmer and the distributor in taking care of it. Her share begins when it is delivered to her doorstep and the three words—"Clean, Cold, Covered"—which are the key words in the dairy industry, are of importance to her as well as to the producer and the distributor. If she does not provide some sort of covered receptacle to protect milk from the sun and from prowling animals until it is taken into the home, she is neglecting the first step in properly caring for milk. If she lets it remain in unsuitable temperatures, she is not being fair to those who have provided her with good milk and not being fair to her family for whom only the best milk is good enough.

It is clear, then, that inspection and controlled pasteurization is the only solution of a safe milk supply. The American Public Health Association, after years of detailed and exhaustive observation and study, have put themselves on record as of that conviction, as have also many authorities in Canada and United States and other countries. Certified milk cannot solve the question. It is too expensive. After more than seventeen years in Toronto, only one-half of one per cent is certified, most of that going to the Sick Children's Hospital where it is pasteurized before being used. Milk from non-reacting tuberculin tested herds cannot wholly meet the situation. However important the tuberculin test may be, and its importance is undoubted, it is not an absolute assurance of safety. Tests for reactors are made at stated periods; between the dates, cows may develop the disease and the milk from these cows may be used for some time before the fact is known. Then, too, protection from other diseases such as typhoid, sore throat, etc., is not effected; nor is the possibility of contamination in transportation lessened.

The reader's attention is directed to the contribution to public health which every housekeeper has in her power to make by an active interest in improvement of the milk supply. Such a contribution is not made by a negative or an apathetic acquiescence but by a positive stand in favour of a by-law calling for pasteurization of all milk. Such a step places you definitely on the side of those health leaders whose object is the safeguarding of the public. The results of such a step would be written in the glowing health of the children and in the sturdy physique of the future men and women of this glorious country.



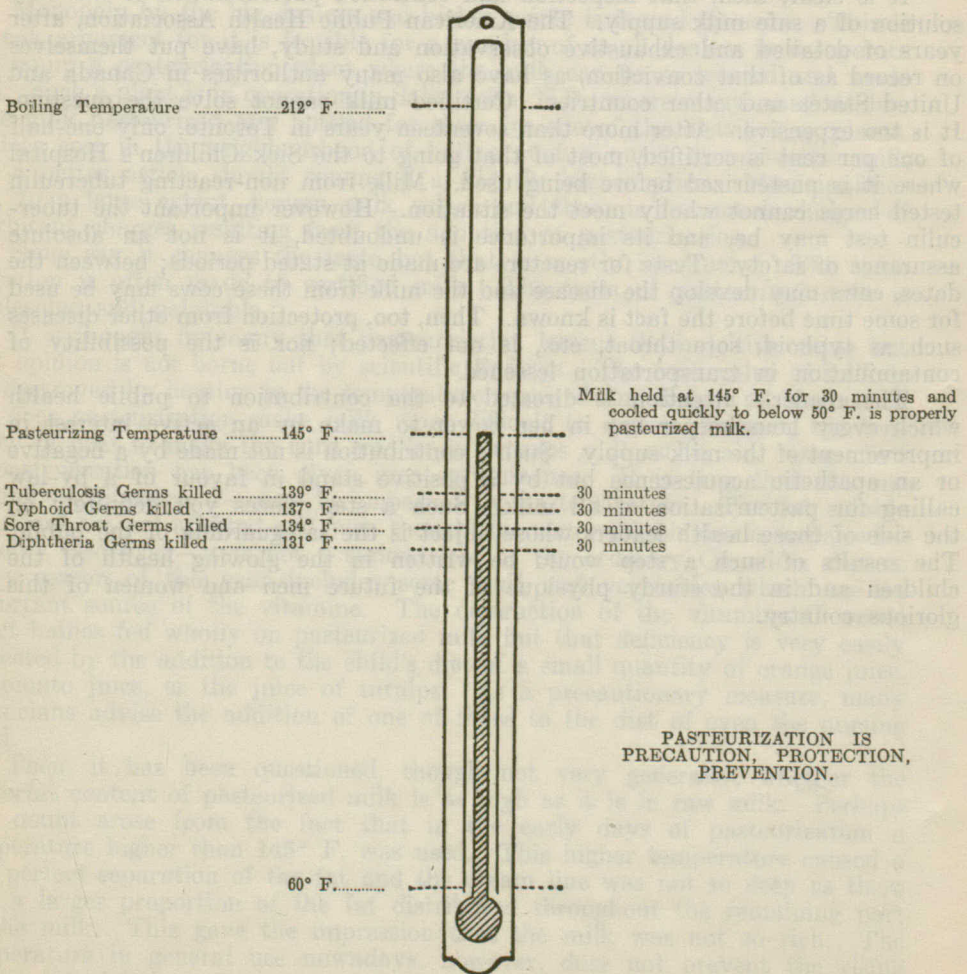
The method as outlined employs the same temperatures and time as used in pasteurizing milk and when carefully followed will give highest bacteriophage activity.

A NOTE ON THE HOME PASTEURIZATION OF MILK

BY

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Commercially pasteurized milk is not always readily obtainable at all places where properly pasteurized milk is desired. This is particularly true in small centres, in the country and at summer cottages. Where the householder is unable to secure pasteurized milk, the following directions will be found useful in carrying out home pasteurization of the daily milk supply.



The method as outlined employs the same temperatures and time as used in large commercial dairies, and where carefully followed will give efficient pasteurization.

Equipment—

- (1) Aluminum double boiler with cover.
- (2) Floating Dairy Thermometer. These thermometers are of glass construction and may be purchased from leading dairy supply houses and many hardware stores.
- (3) Stove or heater.

The Process of Pasteurization—

1. About half fill the lower portion of the double boiler with water.
2. Add the milk to be pasteurized to the upper half of the boiler. A boiler of $2\frac{1}{2}$ quarts capacity will be required to pasteurize 2 quarts of milk. Where larger quantities of milk are to be pasteurized larger boilers must be used.
3. Place the thermometer in the milk.
4. Place the double boiler with its contents on the stove or heater and examine the thermometer from time to time until a temperature of 140° F. is reached. At this stage it is well to reduce the heat as the water will be hot enough to bring the temperature of the milk up to 145 to 150 degrees. When this temperature is reached the heat should be regulated to maintain it for 30 minutes. It is well to give the milk a vigorous stir each time the thermometer is examined.
5. After heating for the required length of time the milk should be immediately covered and cooled to 50° F. or below. In cold weather this may be accomplished by setting the vessel containing the milk in cold water but in the summer months a mixture of ice and water will be found necessary to properly cool the milk.
6. Place the boiler containing the cold milk in a refrigerator or a cool cellar and keep there until used. The milk should be used within 24 hours for infant feeding and within 48 hours for adults.
7. All milk should be fresh at the time of pasteurization and all containers and equipment coming in contact with the milk should be kept scrupulously clean. This may be accomplished by first washing in cold water, then with hot water, and finally scalding. All vessels should be thoroughly dried over the stove and never by means of a cloth.

(1) Aluminum double boiler with cover.

(2) Floating Dairy Thermometer. These thermometers are of glass construction and may be purchased from leading dairy supply houses and many hardware stores.

(3) Stove or heater. A stove or heater is required to heat the water in the double boiler. It should be of the type which will heat a large volume of water.

1. About half fill the lower portion of the double boiler with water. 2. Add the milk to be pasteurized to the upper half of the boiler. A boiler of 2 1/2 quarts capacity will be required to pasteurize 3 quarts of milk. Where larger quantities of milk are to be pasteurized larger boilers must be used.

3. Place the thermometer in the milk.

4. Place the double boiler with its contents on the stove or heater and examine the thermometer from time to time until a temperature of 180° F. is reached. At this stage it is well to reduce the heat so the water will be hot enough to bring the temperature of the milk up to 145 to 150 degrees. When this temperature is reached the heat should be regulated to maintain it for 30 minutes. It is well to give the milk a vigorous stir each time the thermometer is examined.

5. After heating for the required length of time the milk should be immediately covered and cooled to 50° F. or below. In cold weather this may be accomplished by setting the vessel containing the milk in cold water but in the summer months a mixture of ice and water will be found necessary to properly cool the milk.

6. Place the boiler containing the cold milk in a refrigerator or a cool cellar and keep there until used. The milk should be used within 24 hours for infant feeding and within 48 hours for adults.

7. All milk should be fresh at the time of pasteurization and all pasteurizing and equipment should be cleaned with the milk should be kept scrupulously clean. This may be accomplished by first washing in cold water then with hot water and finally scalding. All vessels should be thoroughly dried over the stove and never by means of a cloth.



Diagram of a double boiler with a thermometer inserted into the inner pot.

It is well to note that the thermometer used in this process should be of the floating type and should be of the type which will heat a large volume of water.