Some Problems of Sanitation

By P. S. Campbell

SANITATION involves the adoption of those measures which tend to preserve the health of the community. While the term is probably synonymous with hygiene, it has come to be regarded as limited to the provisions of health in connection with the home. Briefly, it refers to the cleanliness of the environment.

Within its scope municipal sanitation embraces water supplies and their purification; protection of bathing places; sewerage and sewage disposal, garbage collection and disposal; milk production and processing; hygiene of the school, home and public places; heating, lighting and ventilation; abatement of nuisances; fly and insect control; street cleaning; housing, disinfection and to a certain extent town planning.

This article will, however, be restricted to those forms of sanitation which are of basic importance to all municipalities, viz., water supplies, sewage disposal and milk production and processing.

The main purpose of modern sanitary science is to erect barriers along the streams of infection in order to cut off foci of infection and prevent them reaching susceptible individuals. At one end of the line we have actual or potential sources of infection, at the other end susceptible human beings. Sanitation comes along and places barriers between the two. For the maintenance of proper health standards, not only in cities, but in rural areas as well, very special attention must be given the questions of safe water supplies, adequate sewage disposal and sufficient milk protection.

Obviously it is easier to dispose of sewage, to provide potable water and to furnish safe milk in cities or towns than in rural districts. In cities or towns one better organized central authority can institute the necessary measures and pay for them out of the treasury. In rural regions where people are so far apart, common systems are less practical. Here each home owner is called upon to provide his own well or spring, refuse disposal and milk supply, and the provision of these necessities depends largely upon individual knowledge, vision and ability to pay.

Water

The Public Health Act of Nova Scotia stipulates that "Every local board shall require each owner to provide an abundant supply of wholesome drinking water for the occupants of all houses, either on the premises of each householder or tenant, by a public water supply or otherwise, and the local board may order the owner of any property to provide a well, suitably situated, where feasible and necessary." This is a reasonable provision since water is a necessity. Without it not only animal but vegetable life would cease. It is significant that the earliest settlements of all countries were in the neighborhood of water. Villages, towns and cities sprang up on the shores of lakes, on the banks of rivers and near springs. In modern times our engineering skill has enabled us to either obtain this product from deep artesian wells or to convey it from great distances by means of suitable conduits. The natural sources of water are rain and snow which are disposed of as follows: a certain portion is evaporated, another portion flows into lakes, rivers and the sea and a third portion percolates into the soil.

Our objective should be to encourage a liberal use of good water and at the same time to discourage its waste. The quantity of water required per person per day has been estimated from ten gallons up. It is true that in some places the con-

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sumption may be as low as one gallon, but this amount is hardly sufficient to meet the requirements of health and cleanliness. In some cities the quantity consumed goes up to one or even two hundred gallons per capita. Much water may be wasted from defective house plumbing, leaky mains and from unmetered systems.

Water supplies either from wells or municipal systems should be protected from surface and sub soil wash, otherwise pathogenic organisms may enter them and be responsible for outbreaks of communicable diseases. In 1885 an epidemic of water borne Typhoid Fever occurred in Plymouth, Pennsylvania; then a town of eight thousand people. Over one thousand cases were recorded with about one hundred fourteen deaths. A cholera outbreak in Hamburg, Germany, in 1892 was responsible for over seventeen thousand cases and approximately eight thousand deaths. In this connection there was a striking demonstration of the value of mechanical protection. Altona which obtained its water from the same river, had previously provided a slow sand filtration plant and escaped the epidemic. Many other water borne epidemics have been recorded through the years. One of the greatest sanitary accomplishments in North America since the beginning of the Twentieth Century has been the control of Typhoid Fever. While a number of factors have entered into this conquest, one of the most important has been the introduction of purification facilities to Municipal water supplies.

The simplest source of water supply is the well which is nothing more or less than a hole dug into the earth, to a sufficient depth to reach the water table and provided with some device for bringing the water to the surface. In locating a well, due consideration must be given to surface configuration, character of the soil and the proximity of probable sources of pollution. Most pollution and contamination enter wells from surface wash.

Practically all surface waters are polluted whereas ground waters are usually free. It has been said that running streams purify themselves in seven miles. This is a dangerous generalization. Some streams may, and many may not. Whether they do or not depends upon several conditions which time does not permit our discussing today. All municipal water supplies from surface sources should be purified and the principle methods of bringing about this purification are storage, filtration and chemical treatment. All municipal officials are advised to do everything within their power to provide chlorine treatment to central supplies. The cost involved is small compared with the protection thus afforded.

Sewage Disposal

The diseases which arise due to improper excreta disposal are Typhoid Fever, Cholera, Dysentery and others due to various intestinal organisms. While the improper disposal of sewage always creates a nuisance, a portion only of it contains germs capable of producing diseases. In order however, to render safe this portion, all of it must be taken care of as carefully as if all contained the dangerous organisms. In towns where municipal sewage and water carriage systems are found there will be little trouble. In rural districts certain difficulties present themselves, but even here at little expense it is comparatively easy to have sanitary conveniences. Any proper system should prevent contamination of wells or other sources of drinking water, scattering of excreta on the ground and access of flies and domestic animals.

It is too much to expect all people to give necessary attention to apparatus or systems that require regular care and the application of knowledge. On this account it is necessary to so design all installations that the follow up care will be negligible and the maintenance cost small.

The Health Act says "Every house shall be furnished with a suitable drain for carrying off waste water, also with a suitable water closet or privy and vault attached thereto, and the owner of any such dwelling house who neglects to provide the same shall be liable to a penalty not exceeding twenty dollars."

Milk

Milk is, without doubt, the most important single article of food, containing as it does most of the essentials of a balanced diet. It is always the chief and in some instances the only diet of infants and small children, consequently it must be an important one. Milk contains the three basic elements of diet. Viz., protein, fat and carbohydrates in apparently proper proportions. The quality and quantity of its proteins are satisfactory, as a consequence it is a splendid muscle builder and the fat and carbohydrate present furnish the energy necessary to the developing child. It contains Calcium Salts which are required to produce strong teeth and bones. In addition, milk carries a liberal supply of Vitamins, which we believe are required in a properly balanced diet. Vitamins are complex substances, and their exact composition is not known. They are found in certain natural foods and appear to be necessary to nutrition and growth. Their absence produce certain diseases of the deficiency type. Six or seven of these obscure compounds have been recognized. It is customary to designate these by letters, A, B, C, D, etc.

Students engaged in a study of food values, in many places, have come to the conclusion that no other food approaches milk in nourishment and cheapness. The statement that milk is the most valuable and cheapest food, can be better understood by comparing it with other foods. It has been calculated that one quart of milk is equal in nutritive value to one pound of steak, or eleven eggs or three and one-half pounds of fish or two and one-half pounds of chicken. Knowing the market prices of these foods we can readily see the preferred place milk occupies in economy. When we add to the price of the other foods mentioned, the cost of cooking and serving them, the cheapness of milk as a food is more apparent. It is therefore evident that where economy must be practised in the home, the quantity of other foods might well be reduced and the milk increased.

Dishonest dealers have been known to add foreign compounds to milk in order to make it more saleable. It has been thickened by the addition of chalk or lime. Alkalies have been used to improve its taste. Certain dyes have been employed to give it a richer appearance or to cover up cream extraction or watering. Preservatives in the form of boracic acid, formalin, salicylic acid, have, from time to time, been used.

Milk usually contains some bacteria which may or may not be harmful. Generally speaking it is the type of bacteria that determines the danger and not necessarily the number. Certain germs, harmful or otherwise, may work their way up the milk ducts, hence the reason for the first milk having more bacteria than the last. Other germs are contributed by objects which the milk comes in contact with, such as the hands of the milker, particles dropping from the cow, dusty air and the milk pail. In order then to produce a low count milk, the cow should be clean, the milkers hands clean and the milk pail clean and having a small top opening.

While milk is the one almost perfect food, nevertheless contaminated milk has been responsible for more sickness than perhaps all other foods combined. For the reason that bacteria grows so well in milk, it is the most difficult food to produce, transport, process and deliver in good state. The pathogenic bacteria discovered in milk usually get into it from human sources. Two exceptions of course are the organisms of bovine tuberculosis and malta fever.

Diseases Spread Through Infected Milk

Of the diseases that may be spread through milk Typhoid Fever, Septic sore throat, Tuberculosis, Scarlet Fever, Diphtheria and Malta Fever are important. Then there may be certain so called Summer diarrhoea's and gastro intestinal disturbances and, of academic interest only, milk sickness. Many will remember the milk borne outbreak of Typhoid Fever of terrifying magnitude which occurred in Montreal a few years ago. Fifty-one hundred persons were stricken and over five hundred died. Fortunately

most epidemics from infected milk have not been as serious as this one was; yet every year a goodly number is reported. In the United States of America upwards of thirty to forty a year occur. Coming nearer home in 1923 there was a sharp outbreak of Typhoid in a town in Nova Scotia in which there were sixty-seven cases and nine deaths. The infection was traced to a carrier who operated a dairy farm.

Pasteurization

Since milk is such an important food and, at the same time, such a dangerous one, if not properly handled; it is not surprising that much attention has been directed by Health Departments towards ensuring a clean safe supply. To this end special regulations are made and systems of inspection are in vogue. Much attention is placed upon the necessity of producing milk under the strictest cleanliness, to the health of cows and milk handlers and to the cooling of milk in storage. In order to prevent the transmission of diseases through milk, and in addition to the precautions mentioned, pasteurization of the product is recommended.

What is pasteurization? Simply this—Heating it to a temperature of 144 to 148 degrees F., holding it there for twenty-five to thirty minutes and then rapidly cooling it. Immediately after cooling, it should be placed in sterile bottles and kept stored at a temperature of 50 degrees F., or preferably lower until delivered to the consumer.

We need not worry about the effect of heating milk to the pasteurization temperature, upon its food value. There is no significant effect, especially when it is realized that all children should receive orange or tomato juice or other source of vitamin C., whether the milk they drink is raw or pasteurized. Therefore since we can easily give the child all the vitamin C. it needs why take chances on disease by feeding it raw milk. It is correct to state that scientific pasteurization does not change the appearance, taste or digestibility of milk and it is the cheapest, and most trustworthy method of rendering it safe.

It must be remembered that pasteurizing apparatus requires the intelligent care of competent persons. It is not advocated that pasteurization replaces sanitation, but it is safe to assert that pasteurization plus inspection gives us a clean safe milk.

Objections to pasteurization have been advanced from time to time but none of these rest on a solid base. It has been said that the process destroys souring which is natures danger signal. This is not so.—Properly pasteurized milk sours just as raw milk does, but more slowly. Others have said that children thrive better on raw milk. There is no available evidence to prove this, in fact the reverse would appear to be the case. Some years ago the United States Public Health Service conducted a special study on over three thousand children to determine whether or not those who used heated milk throve as well as those who used raw milk. The result showed the average weight of those receiving raw milk was 33.2 pounds and the average weight of those receiving heated milk was 33.6 pounds. The average height of those drinking raw milk was 37.4 inches, whereas the average height of those receiving heated was 37.5 inches. It was also found that those who drank raw milk suffered more from communicable diseases than the others. Other experiments have also given the same results.

Another objection offered is that pasteurization adds to the consumers cost and therefore is a hardship on the poor man. Even if it did add to the cost, the objection would not be a valid one. But does it add to the cost? There is evidence extant to show it does not. Some of those engaged in selling pasteurized milk have told me they would not, even on a cost basis, return to handling raw milk for the reason that the maintenance charges on their plants is at least made up for, or perhaps more than made up for, on the saving in spoiling and souring and besides they have the satisfaction of knowing they are distributing a safer product. The same saving is passed on to the consumer. It is a significant fact that in a number of places raw and pasteurized milk are selling at the same price.