

"THE MILK SUPPLY AND ITS RELATION TO HEALTH."

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Milk is a universal food and a perfect one. On it alone man could support life for an indefinite period—provided the supply was pure. As a food it has several things in its favor, namely, that it contains the four classes of nutrients, protein, fats, carbohydrates and mineral matter in about the proper proportion; it is cheap and it is easily digested. It is not therefore to be wondered at that it has been used from earliest times by all peoples.

As it comes from the cow it contains in the neighborhood of 87 per cent water, the remainder or milk solids $3\frac{1}{2}$ to $4\frac{1}{2}$ butter fat, a small amount of mineral matter and several nitrogenous substances chief of which is casein.

It is sometimes asked why milk should receive so much more attention from hygienists than other food. As a matter of fact the whole subject of food is receiving much more attention than formerly, but milk takes precedence over all others, owing to the peculiar conditions surrounding its production which may easily lead to infection, and to the fact that it is taken into the system uncooked.

As the world grows older each succeeding generation finds itself with new problems to solve. The pure milk problem at least in certain of its phases is distinctly modern. Preceding generations for the most part have found it an exceedingly easy matter to have fuller knowledge of the sources of their milk supply. In former times if a man did not himself keep a cow he bought milk from his neighbor and naturally knew the exact conditions of affairs at the barn. For the majority of us this state of affairs has passed, never to return, and we find ourselves at the mercy of some milk dealer miles away from us, the condition of whose dairy we know nothing about and to visit which would cost us from half a day to a day of valuable time. We are thus to a great extent dependent upon our local or state authorities to insure us a clean milk supply. The consumer, until lately satisfied if his milk showed a fair proportion of cream, has in some cases awakened to the fact that the opacity of milk covers many sins and that it is time for him to investigate the subject a little more closely.

Unfortunately, milk is just as perfect a food for bacteria as for man. Bacteriologists have taken advantage of this fact and use milk very commonly as a medium for growing their cultures.

As soon as the milk is in the pail these minute organisms, present to some extent even when the greatest care is taken, begin their work, thrive and multiply—incidentally changing the milk chemically by the products of their growth. As the organisms act on the milk it is safe to say that in the majority of instances the nutritious value of milk is lessened.

There may be, and usually is, a large number of different species of bacteria ordinarily present in the milk, but for the purposes of this paper we may divide them into two classes, the lactic acid or souring bacteria and the putrefactive organisms. The former are harmless, in fact, may even be considered as beneficial—the latter are distinctly harmful. Strange is it that we will cast aside meat that has the slightest taint and drink with satisfaction milk in an advanced state of putrefaction.

Suppose we imagine ourselves for the moment on a

milk farm. The farmer arrives from the fields after a day spent in plowing, seeding or what not. Perhaps he washes his hands—perhaps he doesn't. If the milking takes place after supper we will admit that his hands are probably washed. If it is winter he may spend a little time cleaning up the manure that has accumulated; if warm weather we will assume that the cows are fresh from pasture. Hay is thrown down for the cattle so as to keep them quiet during the milking process, incidentally also filling the air with dust. If the farmer is an extremely untidy man his animals may have—and this is no exaggeration—six months' accumulation of dung and dirt matted to the hair and udder, particles of which are flecked off and drop into the pail during the process of milking.

The farmer seats himself on the milking stool, but finds his hands hard and calloused from the work of the day. What more natural than that he should soften them with a little milk. If he is a little particular he may then wipe his hands on a dirty pair of overalls, otherwise he doesn't, but proceeds with the milking. The old-fashioned milk pail has flaring sides and no cover, making it easy to milk into and easier still to collect any dirt and dust coming that way; also easy for the cow if she gets restless to plant a hind foot squarely into the center of the pail. It may be good for the foot, but it is bad for the milk; however, it's dollars and cents to the milkman, and the milk is not always thrown away. The milk from the several cows is taken to the milk room—often called that by courtesy only—and there either mixed, strained and put into large cans if it has far to go, or bottled for nearby delivery.

In former times cans were returned from the city unwashed. After hours in a summer's sun, often covered with flies, one can imagine that a thorough cleansing was not always possible even with the best of intentions. Milk cans have in times past served as containers of molasses, vinegar or even kerosene, but recent laws have put a stop to this and require that the contractor shall return the farmer's can to him clean and sterilized.

It is perfectly true that I have painted the blackest side of the picture, but if you think I have overstated the conditions surrounding the production of milk in some of the barns in this or any other locality, investigate for yourselves. All farmers are not filthy and some barns are to be found than which nothing better could be asked. But the average farmer is not in the angel class and is going to keep his dairy in no better condition than his customers or the board of health demand.

Enough has been said to give you an idea of how milk may be well seeded with bacteria. Gross particles of dung and dirt can be filtered out, but the soluble portions and the bacteria in large part remain. For the sake of argument let us suppose for the moment that all the bacteria in the milk may be harmless to the stomach and intestines of a healthy adult. But suppose a case of scarlet fever, diphtheria or typhoid fever develops on the farm and you will see what a vast potentiality for trouble lies in milk. Also aside from milk as an indirect carrier of infection we may find it carried direct as in the case of a cow suffering from tuberculosis of the udder.

But even without the organisms of acute infectious disease, dirty milk may cause intense intestinal troubles. Particularly is this true of infants whose bodies are not yet old enough to successfully carry on

the fight against these infinitesimal organisms. Imagine the infant taken from the mother's breast, the milk from which is practically sterile, and placed on milk containing millions of putrefactive organisms. Is it any wonder that under such conditions cholera infantum is common and many babies lose their lives? These statements are not fancies, but facts. In Rochester, N. Y., in the eight years prior to the establishment of pure milk stations from which during July and August mothers could obtain pure milk for their children, the number of deaths among children under five years was 1,744. The number during the eight years after the stations went into operation was 864, or less than half. During this time the population increased 30,000.

In Cambridge during the past two years stations have been open during the summer for the sale of milk properly modified, and of known purity, which is sold to mothers practically at cost. This work was undertaken by a committee from the local medical society aided by an organization of nurses, and much good has been done. A local milk contractor has done considerable along this line.

If the public at large realized what any physician will tell you is true that a very large proportion of our infantile death rate is due to impure milk, then would the demand for pure milk be such as to drive out of the business those who will not or cannot produce milk under sanitary conditions. Much attention has been called recently to race suicide. Would it not be somewhat more to the point to make an effort to save those children already here? Boston's Floating Hospital is but another proof of what pure milk and pure air can do.

Aside from the enormous importance of dirty milk as a large factor in the infantile death rate what does impure milk mean to the adult? The adult stomach and intestines, when in perfect health can take care of vast numbers of bacteria, the gastric juices probably playing a large part in rendering them inactive. The weak or tired system feels the effect, however, and in the case of infected milk is the first to succumb. The organisms of diphtheria, typhoid and dysentery are carried by milk and undoubtedly multiply vigorously therein. The infective agent of scarlet fever also, we have good reason to believe is disseminated by milk. It often needs but one case of an infectious disease on the farm to cause an explosive epidemic in the city. Clean methods greatly lessen this risk.

Aside from the question of infection it is to say the least not a pleasant thing to think that we are taking into our systems quantities of cow manure or pus which, by a little care, could be kept out of the milk.

In a city of 600,000 the daily milk supply will be in the region of 370,000 quarts. If we estimate but one gram, or in round numbers 1.30 of an ounce of dung to every quart of milk we have the very interesting result that that city is consuming in her milk in one day 811 pounds a day or 148 tons of dung in a year. This ought to have some value as fertilizer, and we would rather have the farmer have the advantage of it.

What are the essentials of a clean milk supply?

1st. On the part of the farmer, clean healthy cattle, clean utensils, clean hands, clean barns, and if possible, a clean coat while milking.

If a cow has lain in filth and her flank and udder is caked with dung, it is an impossibility to milk without flecking off some of the dung and loose hairs into

the milk and thus at the very beginning lay a foundation for a heavy bacterial content. The clean dairyman keeps his cows well groomed and before milking wipes off flanks and udder with a clean damp cloth. Experiments have shown that this one point makes a tremendous difference in the bacterial content of the milk.

Clean utensils are an absolute necessity to clean milk. Everything coming in contact with the milk should be thoroughly washed immediately after use, otherwise it is not always possible to clean it completely. It used to be the practice for the contractor to forward cans from the producer directly let us say to some corner store from which they were returned first to the contractor and later to the producer in an unspeakable condition, perhaps having been used as containers of molasses, vinegar or even kerosene in the interim. This has in the last year or two been changed, the law requiring the contractor to have but one set of cans which are sterilized by steam before being sent back to the farmer—a second set of cans going back and forth between the contractor and the store. Responsibility is thus placed, and a law forbidding the use of milk cans for other purposes than milk has practically put an end to one source of trouble.

The use of a milk pail having but a small opening in the top. The instant removal of milk after milking to a milkroom, used for the purpose and that only—where the milk can be filtered, bottled or canned and set without delay in the cooler, a plentiful supply of hot water for washing purposes—are all factors having a strong effect on the result. A milk inspector in one of our cities in a neighboring state tells me that having compelled the dairymen to put in running hot water in their milk rooms, most of the men are wondering how they ever got along without it.

The second essential of a clean milk supply is the rapid transportation of the milk from the producer to the consumer without unnecessary delay, the milk being kept cold in the interim. It is a common practice to hold night milk over until morning, and send the night and morning milk together to the station, where it may remain for some hours in the sun, waiting for the train. Efficient icing on the train can hardly overcome the harm done.

The third essential of a pure supply is in rapid and cleanly handling at the milk receiving depots.

All the contractor's milk coming in during the afternoon is bottled, set in the cooler and held for delivery the following morning, because the average householder wants to be sure of receiving nice fresh morning's milk and thus demands that his milk be left in the early morning and also demands that his milk should show a well-marked cream line. To answer these demands the contractor is obliged to give his customer milk anywhere from 24 to 60 hours old.

The fourth point in securing clean milk is proper handling from the time the milk leaves the contractor or pedlar until it reaches the consumer. Pouring from can to can or from can to bottle is a practice to be discouraged. The average small corner grocery is in the majority of instances unfitted to sell milk, and in the opinion of the speaker the number of these places which are allowed to sell milk ought to be decreased. As a rule the poorest grade of milk finds its way to these places.

What can be accomplished in the way of securing a better milk supply:

Thirty odd years ago there was absolutely no inspection of milk whatsoever in Boston. Milk was watered, adulterated and preserved to such an extent that honest men were driven out of the business. Conditions became such that finally milk inspectors were appointed, analyses were made and men put into court for selling milk below the standard. To-day, although it is a physical impossibility to cover more than a small portion of the sources of supply, adulterated, watered or preserved milk is the exception.

Four years ago in Boston we started on the bacterial examination of milk. We found milk was handled in an uncleanly manner. A regulation was drawn up limiting the number of bacteria in milk to 500,000 per cubic centimeter—which in round numbers means around 100,000,000 to the tumbler full—a fairly liberal allowance you will admit. Examinations were begun for the number of bacteria present, for pus and pus producing organism. What has been the result? To-day 90 per cent of the milk as it comes into Boston is below 500,000 bacteria per cubic centimeter and 83 per cent is below 100,000. Dirty dairies are warned and if the warning does no good the milk is refused admittance to the Boston market. Pus, when found in milk, is, if possible, traced back to the herd and often to the cow in the herd. It has become nothing unusual for the milk inspector to find that the milk containing the pus was taken from a cow with a deceased or ulcerated udder, or from a cow either just before or just after the calving period. Dirty milk refused entrance into Boston has been sent to other cities and these cities in turn have begun bacterial milk examinations to protect themselves.

It takes in the neighborhood of 8,000 dairies to supply Boston. About 80 per cent of the milk comes into the city through the large contracting houses. The other 20 per cent is brought in in wagons from surrounding towns. It is, of course, impossible for us to examine samples from all of these dairies even once a year, but some samples are taken every day and the moral effect is excellent. No one dairy is sure but that its supply may be the very next one to be tested—consequently is obliged to keep its supply good at all times in order not to fall under the ban. The effect of the work on the milk contractor has also shown itself. In the majority of cases these men have shown a willingness and a desire to live up to the regulations and have done their part in conducting their end of the work in a sanitary manner. Some of these men have put inspectors of their own in the field to see that farms supplying them are kept in a cleanly manner. When a warning from the bureau of milk inspection is received stating that the milk from such and such a dairy shows a high bacterial content or that the milk contains pus or pus producing organisms, the notice is forwarded to the producer and a watch is kept on that particular dairy. The attitude of the contractors has in the main been one of co-operation. Many of them as a direct result of the work of the board of health laboratory have opened laboratories of their own and are thus in a position to know themselves as much about their milk from a bacteriological standpoint as they know about the chemical. The contractors have seen the advertising value of their farm inspection and laboratory examination and are taking advantage of it in street car, press and pamphlet. One firm has made their laboratory and bottling room a show room for strangers.

The practice of the corner grocery is often that of

keeping milk for hours on the counter after serving a customer before putting it back in the cooler. If this practice is carried out to-day the storekeeper sooner or later finds himself under the necessity of explaining why the temperature of his milk is above the legal limit.

What Boston has done Haverhill can do. Your problem is a simpler one than ours. I am informed that the milk supply of Haverhill comes from comparatively short distances, while ours comes from Maine, New Hampshire, Vermont, Connecticut, Massachusetts and even eastern New York. Your dairies are within easy inspecting distances, ours sometimes beyond reach except indirectly.

True it is that an inspector has no legal right to enter a dairy outside his own city. But the refusal of permission to enter a dairy bears on the face of it evidence that something is wrong, and a careful bacterial examination of milk from such a dairy will oftentimes bear out the suspicion. Efficient inspection will do much, but this should be backed by regulations establishing a legal limit on the bacterial content of milk and on the temperature. In a city the size of Haverhill, having its supply for the most part from not very distant places, a regulation of as low as 100,000 bacteria per cubic centimeter would not be a hardship. The temperature limit should be set at 50 degrees F. The three factors stated are all important and each has a direct bearing on the result.

A word should now be said on the farmers' side of the question. For uncleanness there is no excuse, and the dirty producer must either clean up or get out of the business. He has no right to imperil other people's lives. But, on the other hand, we cannot expect the farmer to build a milk room separate from his stalls—put in running hot water and make some other necessary changes in his methods and expect him to do all this for nothing. The farmer is not a philanthropist and you can't expect him to be one. He is not going to increase his investment in the way stated, pay more for hay and grain, work 14 hours a day and then get at best a new dollar for an old one. It costs money to handle milk in the way it should be handled, and the public should be willing to pay a cent, or even two cents, more a quart if they can be assured of getting a better article for their money. How many but would gladly pay more for milk if they became convinced that by doing so they would have to call in the doctor less often. Two quarts of milk at 16 cents have the same nutritive value as a pound of sirloin at 30 cents.

Clean, pure milk is not chimerical. The chemical changes in milk are very largely produced by bacteria and bacteria only. If milk could be produced absolutely free from all bacteria it would keep indefinitely. The speaker has kept a sterilized sample of milk for months, the milk remaining sweet and good. This is, of course, exceptional and impracticable, but milk can and has been produced under such conditions that without pasteurization, sterilization or other treatment it has been shipped across the ocean and back again before turning sour, the reason for this being an attempt to provide a supply of pure milk for infants on the ocean liners.

The watering of milk does no one harm—if the water be pure—except in the region of the pocket-book. The bacterial invasion of milk by means of dirty cows, dirty men, dirty barns and dirty utensils affects the health. The number of bacteria in milk is a cri-

terion of the way in which the milk has been handled—any improper handling at any step in its progress from producer to consumer showing in the bacterial content. Sooner or later the public will wake up to the fact that in this, as in other matters, health is our greatest asset.

DAIRY AND FOOD COMMISSIONER FOR THE STATE OF VIRGINIA.

The General Assembly of this State at the sitting recently held, enacted a law, under which the Governor is required to appoint a Dairy and Food Commissioner for the State, whose office shall be a part of the Department of Agriculture of the State and who jointly with the Commissioner of Agriculture and with the approval of the State Board of Agriculture shall appoint a Deputy Dairy and Food Commissioner and other necessary assistants. The commissioner shall hold his office for four years and subsequent appointments shall be made by the Governor and the General Assembly. The Commissioner is given full authority to inspect and have analyzed all dairy and food products for man or beast offered for sale in the State and power to seize and condemn same if not up to standard of purity and quality. In addition to these duties he is specifically required "to foster and encourage the dairy industry of the State and for that purpose to investigate the general conditions of the creameries, cheese factories, condensed milk factories, skimming stations, milk stations and farm dairies in the State with full power to enter upon any premises for such investigation with the object in view of improving the quality and creating and maintaining uniformity of the dairy products of the State." He has authority given to warn and notify any person selling unclean or unwholesome milk or other dairy products, not to sell same after such unclean or unwholesome condition has been determined by the Commissioner and any person failing to obey such notice and warning and continuing to sell shall be guilty of a misdemeanor and upon conviction shall be punished by a fine not less than \$10 nor more than \$50 or imprisonment in the county jail, not to exceed 90 days. He may require persons to make the necessary alterations in premises to correct unsanitary conditions and failure to obey such requirement subjects the owner of the premises to a fine or imprisonment. All manufacturers or sellers of concentrated commercial feeding stuffs, for feeding live stock, are required to affix to every package a plainly printed statement certifying the weight of the package, with the name or trade mark, the name of the manufacturer or shipper, and a guarantee stating the minimum percentage it contains of crude protein and fat and the maximum percentage of crude fibre. There are other stringent provisions affecting the sale of these concentrated feeding stuffs, such as requiring each package to be tagged with the Commissioner's tag, etc., and forbidding the sale of same without Commissioner's license. The act is now in force and the Governor has appointed W. D. Saunders, the Professor of Dairying, at the Agricultural College, Blacksburg, the commissioner to execute the law. This appointment is a most excellent one and we expect to see great progress made in dairying in this State under his direction. Every dairyman and stock-keeper should have a copy of the act.—*Southern Planter*.

Massachusetts has a new standard for milk under consideration.

WHISKY AND THE PURE FOOD LAW.

Why People Prefer the "Blend"—A Sane View of Prohibition.

One of the most interesting incidents in connection with the administration of the pure food law is the attempt of certain whisky interests to secure an interpretation of that law restricting the name "whisky" to their unrefined product, while denying it to the pure and more refined whisky.

This whisky interest has been aided in its efforts by Dr. Harvey W. Wiley, the government's chief chemist of undoubted ability, but is unfortunately the type of man who decides without investigation, and once his mind is made up he cannot see the slightest merit in any side of a controversy which does not agree with his own preconceived ideas.

These tendencies of Dr. Wiley have become so well known that the President has recently appointed a commission of five leading chemists, headed by President Remsen, of Johns Hopkins University, to examine and revise some of the opinions issued by Dr. Wiley, and to report as to the correctness of the analyses upon which they were based, and it is unfortunate for the whisky consuming public that this commission was not appointed before the President and others adopted Dr. Wiley's views on the whisky question.

Those who predict that the appointment of this commission is the beginning of the end of Dr. Wiley's official career point to the fact that for the past six months there have been no official utterances from the doctor.

Dr. Wiley is not the only man, however, in the government's service who has erred on this question. Attorney-General Bonaparte's various opinions on that portion of the pure food law dealing with the whisky question clearly disclose the fact that he has little knowledge of the subject. His perplexity is easily seen by the fact that his last formal opinion is almost a flat contradiction of the views expressed in his earlier one. His difficulties are increased by the fact that the Internal Revenue Department has for forty years been branding as whisky that product which the attorney-general now contends is not whisky. More than this, it is admitted that this same product was known as whisky long before the unrectified or so-called straight whisky was ever entitled to bear that name.

Although the specific point at issue between the blenders and the straight whisky men is rather technical, there are, nevertheless, a few points about it which are of undoubted interest to people who now and then indulge in an "eye opener," a highball or a nightcap.

The straight whisky interests claim that the only product entitled to be called whisky is the unrectified, unrefined product which goes from the receiving cistern directly into the charred oak barrels.

The blenders, on the other hand, maintain that a distilled spirit from grain, which has been purified and refined so as to remove almost all of the fusel oil, is more entitled to be called "whisky" than the unrefined product, and that the mixture of the two different kinds is justly entitled to be called "a blend."

Furthermore, the blenders maintain that their product was originally known, and has always been known, as whisky, and that the so-called charred barrel process came into use only fifty years ago. They