



Fabian Tract No. 122.

MUNICIPAL MILK  
AND  
PUBLIC HEALTH.

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Milk supply - United Kingdom.



## Municipal Milk and Public Health.

THE attention of students of social science, as well as that of public health workers generally, is daily being more and more directed to the food supply of the people. The great epidemics of the nineteenth century resulted in such legislation as the Public Health Acts, which aimed at the external control of the environment of the population of the urban and rural sanitary authorities. But experience shewed that mere external interference was insufficient, and hence a movement became general towards investing the *ownership* as well as the control of the water supplies of the country in the hands of the community. The result shewed that although carelessness was not entirely got rid of, yet the condition of the publicly owned supplies was far safer and better than those left to private commercial management. It was proved that in the case of such a prime necessity as water—one so liable to pollution—the aim of profit-making must be superseded by the consideration of the public health, even though this might involve financial loss. No one will now deny the beneficial results of this change, and few will be found who oppose, in principle, the municipal ownership of water supply. This change has consisted in the replacement of an unlimited number of privately owned wells, from which bad water was sold at a high price, by a popularly owned central supply systematically distributed at about cost price to rich and poor alike. This change of industrial method, combined with public knowledge, has been the main cause of a reduction in the death-rate\* of about 3 per 1,000 per annum in the space of about twenty years. The annual rate of mortality from enteric fever—the chief of water-borne diseases—sank in the same time from 390 per 1,000 to 100.

With these facts in view, sociologists are beginning to ask themselves the question whether there is not the same need for public ownership and control of the milk supply. At the present time this indispensable commodity is being drawn from a thousand indiscriminate sources, whose main characteristic is the general dirtiness and stupidity of their methods of production; and whose distribution is through agencies, most of which are marked by their liability to contaminate the article they handle. It is no exaggeration to say that the great bulk of milk producers, distributors, and retailers know nothing of the nature and properties of the material they deal in, while such an elementary knowledge is essential for the public safety. County councils are doing something to teach dairying, but so long as it is as profitable to sell dirty milk as clean, or preservative butter as fresh, these efforts will produce but scanty fruit.

\* See Sixty-Sixth Annual Report, Registrar-General for England and Wales, 1905.



Public attention has recently been drawn to the existence of widespread physical deficiency among the children attending the public elementary schools of the country, and although the Inter-Departmental Committee on Physical Deterioration reported that there was no evidence to prove the existence of actual degeneracy, both that body and the Scotch Commission on Physical Training draw attention to the infantile mortality which is now actually higher than in the decennium 1841-50, as well as to the manifest weakness and liability to disease of a considerable proportion of the children at or below school age. Both agree that for children, at all events for young children, the most important factor in development is their food, and that, in this particular, everything seems against the children of the poor in increasing degree towards the earlier periods of life.

In times when breast feeding is on the decline\*, milk is becoming the staple food of an increasing number of the population. Throughout the earlier years of life it forms the most important element of diet, and hence the absence of milk from the diet of the poor involves almost certain underfeeding, or even starvation, for a proportion of their children. In order to build up the physique of the masses of the people, some method must be devised of procuring for them a clean, wholesome, and cheap supply of milk, and the question to be answered is: Can complete public control do this, or can it be better done in some other way? Let us, however, see what are the present methods of production and distribution.

#### Present Methods.

It may be confidently said that nowhere, except on the very small number of model farms, is anything like a really scientific method of milk-production known. But the most noticeable thing is not the absence of science, but of common cleanliness. Indeed, many dairy farmers believe that dirt is a good thing, that heated and ill-ventilated cowsheds are good for the cows, and that manure gives body and flavor to the milk. For instance, Dr. Leslie Mackenzie, speaking for Scotland, says: "To watch the milking of cows is to watch a process of unscientific inoculation of a pure, or almost pure, medium with unknown quantities of unspecified germs. Everywhere throughout the whole process of milking the perishable and highly nutrient liquid receives its repeated sowings of germinal and non-germinal dirt . . . and this in good dairies. What must it be when the cows are never groomed, and the udders are never washed, where the byres are never even approximately cleaned, where ventilators are never opened, where the pigs are a few feet away, where cobwebs are ancient and heavy, where hands are only by accident washed, where heads are only occasionally cleaned, where spittings are not infrequent, where the milker may be a chance comer from some filthy place, where, in a word, the various dirt of the civilized human are at every hand reinforced by the inevitable dirt of the domesticated cow."†

\* Infantile Mortality and Infant Milk Depots. G. F. M'Cleary; 1904. Chapter I.

† "The Hygiene of Milk," *Edinburgh Medical Journal*; 1898.

In a series of articles, entitled "The Milk Supply of Large Towns," the *British Medical Journal* drew attention, in March, 1903, to the defective conditions of milk production which are so prevalent. The Commissioner, reporting on a farm outside a large town, says: "The operation of milking was in full swing, three dirty-looking boys being hidden away behind their respective cows. . . . The clothes which the boys wore were equally dirty, and the stalls, which they were supposed to have been cleaning out while I was waiting, were several inches deep in manure and foul-smelling straw. . . . The hind-quarters of the cows were coated with filth. . . . I was horrified to see the filthy state of the milk as it flowed out of the pail. It was discolored with grit, hair, and manure. 'Look at that,' I said, pointing to a specially large bit of manure. I regretted my zeal, for Tom dipped his whole hand into the pail, and, as he brought it out, said, 'Oh that aint nothing; it's only off the cow.'" That this condition is a very prevalent one is shewn by reports of medical officers of health from widely separated parts of the country.\* In Staffordshire, for instance: "The ventilation of the [cow] sheds was, in most cases, not attended to in the slightest degree. In some it was necessary to open the doors for a few minutes before going in on account of the oppressive smell and moisture-laden air; in some there was no means of ventilation. . . . In few was there any attempt at keeping the floors or walls clean, and, in some cases, they were filthy. The hind-quarters of the cows were in a similar condition." In a county report, Dr. Reid summarizes the condition of Staffordshire dairy farms as follows:—"I may mention generally that I very rarely come across a dairy farm which is satisfactory as regards the cowsheds; *most are ill-lit, over crowded, badly ventilated, and badly drained.*" "With a few exceptions," says Dr. Newman, "the farms in Leicestershire sending milk to Finsbury appear to be neither regulated nor registered." Similarly unsatisfactory reports come from all over the country.

From a recent report of the Local Government Board (England)† it will be seen how little control is exercised over the farms in Ireland. The dirty and insanitary condition of many of the Dublin cowsheds is specially mentioned, and the general condition of the provincial dairy farms seems also very unsatisfactory.

These are but specimens, and give only a feeble idea of the extent and nature of the unwholesomeness of sources of the food of the invalid and infant.

### Some Results.

All observers are agreed that the conditions described above form the rule, and that a cleanly managed dairy farm—clean even in the everyday meaning of the word—is the exception. There are two ways of measuring the results on the health of the community. First, by means of the recorded epidemics which have been traced to milk; and next, by the Registrar-General's Mortality Returns.

\* Report on the Milk Supply of Finsbury. Dr. Newman; 1903.

† Parliamentary Paper (Cd—833). Appendix IV.



It must be borne in mind that the study of milk as a vehicle of disease is a comparatively recent one, and that it is, in regard to many diseases, such as diphtheria, only in its infancy ; thus it will be seen that recorded epidemics probably represent only a small part of the disease due in reality to milk infection. There is little doubt but that large numbers of isolated attacks of illness are due to this cause, although no one has a suspicion as to their origin.

In 1900 the Local Government Board for Ireland issued a report on the spread of typhoid fever, which alleged that "there had been repeated and detailed observations of the spread of enteric through creamery skimmed milk." In Glasgow in 1880 there was an epidemic of typhoid which caused 508 cases and 69 deaths ; altogether no less than 200 of these epidemics were traceable to contaminated milk supplies. About 18 epidemics of diphtheria have been traced to milk-borne infection, one of the worst was in St. John's Wood in 1878 when 262 persons were attacked, and 38 died.

About 73 epidemics of milk-borne scarlet fever have been traced to carelessness or ignorance among milk producers. In most cases these were due to infection among the employees which had been kept secret, and, in some instances, it is more than probable that the cows themselves were the source of the disease.

There is little doubt but that a proportion of the tuberculous disease, which is such a scourge of modern communities, is due to the drinking of milk from tuberculous cows, or infected with dust containing the bacilli. This is especially the case with regard to the young, who not only, as a rule, drink milk more freely, but are also more susceptible than are adults.

One of the most fatal diseases from the child's standpoint is that of *diarrhœa*. In 1901, 30,121 deaths\* were recorded as due to this cause alone. In London in 1902, 2,504 deaths were due to this malady. In Brighton in 1901-2 out of 226 deaths from diarrhœa, 191 were directly traceable to the unwholesome milk supply, and there is every reason to believe that this proportion holds good for the country generally. That this disease is prevalent in hot weather, that it occurs most frequently where food is liable to contamination, that it is much less common among children who are breast-fed, and that its incidence is most heavily felt by those who live exclusively on cow's milk—all point to the fact that the milk supply is the main cause of this waste of human life.

Much of the disease just referred to was conveyed by the milk, through dirty water either used to dilute the milk, or to clean the vessels in which it was conveyed. Some was traceable to dust or dirt getting into the supply on its way to the consumer ; some again to diseased people coming in contact with it. But, in addition, there is the question of diseased cows to be considered. If we take the proportion of tuberculous cows discovered in Manchester as the general average for the whole country, we shall find that about 10,800 out of 2,000,000 milch cows are affected in the udders with

\* Registrar-General's Annual Report.

this dangerous disease. But experience has shewn that country cows are, owing to less stringent inspection, more diseased than those kept in towns, and if we add to this the fact that there are several other diseases in the cow which, though apparently slighter, can yet cause severe illness in the human being, we shall realise that the proportion of diseased milk-sources is much higher than this.\* Under present conditions it is to the interest of farmers to hide the fact of disease among the cows, and hence the financial interest of one class is directly opposed to the health interest of another, and in this case, at least, the money wins. Any solution of the milk problem must aim at harmonizing the interest of producer and consumer, so that the occurrence of disease in an animal shall not be financially disastrous to the one or physically injurious to the other.

### The Use of Preservatives.

The distance which modern town life has necessarily placed between the source of the milk supply and the consumer has not only tended to remove control from the producer, but has necessitated a growing delay between the milking and the final delivery of the milk. With the present dirty methods of production it can easily be understood that the milk, butter, and cream are peculiarly liable to decompose, especially in hot weather. Hence it has become an almost universal custom for dairymen to mix varying quantities of chemical preservatives in their milk, cream, and butter, in order that they may keep well. With a public unable to detect the taste of the added chemicals, with a complete ignorance as to the physiological action on the part of the purveyor, and with such excellent results for the trade, it can easily be understood why this custom has grown so rapidly. A Departmental Committee† in 1901 shewed that 18·2 per cent. of the milk samples examined for them, 77·9 per cent. of the cream samples, and 57·1 per cent. of the butter samples, had been doctored with such substances as boric acid, formalin, salicylic acid, or benzoic acid. In butter the common proportion is about 1 lb. of chemicals to 100 lbs. of butter; but the proportion is generally left to the "inspiring moment's care." This custom at Southampton, if we are to believe the borough analyst, is more ingenious with regard to the milk; here 1 lb. of preservative is added to a gallon of water, and 1 pint of this mixture is added to every 8 gallons of milk, so that with every tumbler of milk you take 6 grains of some sort of chemical. "Both boric acid," he says, "and formalin preparation are being increasingly used."

But Southampton is not alone in this matter. The analyst of the Dairy Trade Protection Society asserts that there is an enormous amount of preservatives used in the milk trade of London—"far more than anyone has any conception of." Most preservative goes on in summer, and especially on Sundays—a day that is hallowed in many ways by the dairy trade.

\* Swithinbank and Newman: Bacteriology of Milk.

† Departmental Committee on Food Preservatives and Coloring Matter: Report.



The use of these preservatives is a necessary corollary of the dirty methods of production, and, while their action on healthy adults is at present unknown, it seems certain that for infants, young children, and invalids, the results are pernicious. The use of chemicals, again, while failing to arrest the growth of dangerous organisms, will hide the fact that the article is stale, and will thus encourage its consumption, even when unfit for food. In the words of the report of the Preservatives Committee: "There is further objection to the use of preservatives in the milk traffic, that they may be relied upon to protect those engaged therein against the immediate results of scrupulous cleanliness. Under the influence of these preservatives, milk may be exposed, without injury, to conditions which otherwise would render it unsaleable. It may remain sweet to taste and smell, and yet have incorporated disease germs of various kinds."

"It has been put before us that it is not possible to supply large towns, especially London, with new milk without the aid of preservatives, but we have abundant evidence to prove *that this is no more than a matter of organization and system*. No doubt the prohibition of preservatives in milk offered for sale would tend to the disadvantage of small retailers, who have no cold storage, *but this is not a consideration which should stand in the way of a much needed reform.*"

Denmark has prohibited the use of all preservatives, even in the butter destined for exportation, and has had to introduce greater cleanliness of production to compensate. At one time, France also had a prohibition law, but this was relaxed with regard to export at the urgent request of the British butter trade.

#### Adulteration.

While the use of chemical preservatives and coloring matter in dairy produce is essentially a form of adulteration, a few persons may yet be found to defend the custom; but these are practices which no one will defend, practices which exist to a great extent—even an increasing extent—among the sellers of dairy produce. We have just seen how the consequences which should normally result from the dirty methods of production, and which themselves represent a great financial saving on the proper cost of production, are hidden by the use of chemicals. We have now to consider a less legitimate, although equally harmful custom. It may be pleaded that the use of preservatives is the result of ignorance, but such an excuse can hardly be put forward to defend adulteration. From earliest times milk has, by its very nature, lent itself to the dishonesty of the dealer. In the old days, chalk and calves' brains were said to have been added to replace quality; water was added to increase the bulk. But the use of the former ingredients have long since been given up, and the main forms which adulteration takes, are:—

The addition of small quantities of water.

The addition of separated to "whole" milk.

The abstraction of cream.

The addition of diluted condensed milk.



The business of adulteration is a highly skilled one, and has increased in cleverness to meet the demands of a growing number of public analysts. Formerly the making of a profit and the keeping up of a business connection were the two ends to be kept in view; now detection by experts has to be avoided as well. As a guide to analysts the Board of Agriculture has fixed the standard of 3 per cent. by weight of butter-fat, below which it is illegal to sell milk as "whole." This is to ensure that the customer shall have milk of a reasonably good quality, and which has not been grossly tampered with. This standard is arrived at by experts in dairy work, and on the basis of a very large number of analyses. That the standard is a low one is shewn by the chemist to the Aylesbury Dairy Company who, after analyzing 100,000 samples, found the average of fat was 4 per cent. by weight. The amount of fat in good milk generally amounts to about 3·5 per cent. to 4 per cent. in winter, and often to as much as 5 per cent. in summer. The recommendation of the Departmental Committee to raise the standard to 3·25 per cent. is not, therefore, an extravagant one. The great drawback of indirect interference in the matter of an arbitrary standard is shewn by the fact that many members of the trade consider it legitimate to make a profit out of any fat which happens to exceed the standard amount. Hence a custom has grown up called "toning down the milk," which consists in the addition of skimmed milk to such an extent as just to reduce the percentage of fat to the legal minimum. By the addition of separated milk (*i.e.*, milk free from fat) the adulteration is rendered less easily detectable as the proportion of "solids not fat" is left normal, and only the proportion of fat reduced. In this way it is much easier to plead that the milk had only been standing, and that the cream had been taken away from the top layers by earlier customers.

In 1902\*, 11·6 per cent. of the samples taken in England and Wales were reported against, and this was the highest rate recorded for ten years. The percentage of adulterations discovered in London was 15·6 per cent. In six metropolitan boroughs the percentage of adulteration to samples taken was no less than 20; and in the Borough of Finsbury the average percentage taken over a period of ten years was 25, or a quarter of the whole. It is always possible to raise these percentages by the appointment of a fresh and specially skilled inspector. For instance, in Islington, of 385 samples taken by the ordinary inspector, 23 or 6 per cent. were adulterated; while out of 547 taken by a special officer, 111 or 20·3 per cent. were condemned. The multiplication of hands through which the milk passes greatly adds to the rate of adulteration. The profits of adulteration, even when balanced against the fines of the police courts, must be very great; in 1902 the Local Government Board reported that, on the return made to them, the people of London were paying an annual sum of £30,000 for water which had been fraudulently added to their milk. If we take this basis for the United Kingdom,

\* Annual Report Local Government Board, 1902.

the nation is paying about £240,000 annually to the adulterators for the water they add;\* to this must be added the annual cost of the medical officers, sanitary inspectors, police courts, lawyers, etc., etc., after deducting the fines and costs recovered. It has been estimated that, at the lowest, the people of England and Wales are paying about £25,000 per annum under these heads also. It would be thought that private enterprise had done enough when it had caused the great amount of illness which dirty and slipshod methods can account for, without defrauding those who already suffer so much.

It must not be thought, moreover, that the monetary loss represents the total social cost of adulteration. To adults it may do, but it is far otherwise with regard to the infant population. For them directions are issued by means of which cows' milk is diluted and prepared so as to somewhat resemble human milk. These proportions are based upon the use of good whole milk, and when the dealers have already tampered with the milk, the mother or nurse is misled, and the modified milk sinks below the proper standard of nourishment. In this way those children who are unfortunate enough to be hand-fed may be slowly starved. There is no doubt that the high infantile mortality, attributable to dirty milk, is increased by the supply of diluted and preservatized milk.

But it should not be imagined that all the blame rests with the producer or middleman; owing to the present slipshod methods of distribution the employees on the rounds are doing their part in the general swindle. They, on their own account, dilute, give short measure, and tamper with the milk which, totally unguarded, is left in their hands. And in these circumstances the middleman is powerless, for if he prosecutes a dishonest employee he only condemns his own business, and publishes the condemnation.† Finally, there is no doubt at all as to the existence of a system of blackmail among the inspectors themselves. A recent writer† describes the process. "I do not think that anything is to be gained by beating about the bush in this matter, and so let me briefly state that the inspector's fee is one guinea, as a rule paid in cash, but occasionally in kind. Now there are two ways in which this transaction may be viewed. You may picture the wicked trader bribing the innocent inspector to overlook his crimes, or you may imagine the inspector threatening the dairyman with—'Your money or your reputation.' It is not very difficult to see on which side the blame lies. It is a negative advantage only which the dairyman's money gains for him. The inspector does not say, 'Give me my guinea, and I guarantee that you will *not* get into trouble,' but 'Refuse me my guinea, and I guarantee that you will get into trouble.'" This is another explanation why the full burden of adulteration never sees the light of day.

#### Social Reaction.

It is impossible to do more than outline, in the limits of a Fabian Tract, the present chaotic and disastrous conditions which private

\* The Problem of the Milk Supply. F. Lawson Dodd.

† Vide *Economic Review*, January, 1905. Article on Milk Trade from Within.



enterprise in the supply of a commodity which is essentially suitable for collective ownership, has brought into existence. The methods of distribution are as bad as those of production; the railway companies have no financial or other interest in the delivery of clean milk, and therefore very seldom provide proper vans for its conveyance. Fish, paint, petroleum, or any other unsuitable goods are packed along with the milk. The churns from the farms are allowed to stand for hours on platforms of rural stations to be dealt with as ordinary goods, or to await the slow milk train. While thus waiting, the milk is often exposed to the hot rays of the sun and the dust of passing traffic, which both make for increased bacterial contamination. It is improperly covered in badly shaped receptacles, which are scarcely ever locked, and from which the contents are often pilfered or polluted. Neither farmer, middleman, nor railway company cares what happens to the delicate foodstuff which they are handling, and so long as the farmer gets his price, the company its rate, and the middleman his fat profit, considerations of cleanliness and public health are little cared about. "If the Almighty had intended that there should be no manure in the milk, he would have placed the udder at the other end of the cow" represents the rural mind. "Doctors' fads" suffices for the rest. Hence, after passing on its slow and often interrupted journey, it finally reaches the poorest customer who buys it from a small shop where pickles, soap, vinegar, and paraffin are its close companions, and where, remaining uncovered, in a doubtfully clean basin, it forms the last resting place of flies, and a receptacle for the dust and dirt of the shop and the street. When it reaches the jugs of the poor in pennyworths and ha'porths, it is often as much as three days old, and is loaded with bacilli, but alas! unprotected by the souring which would have occurred had it not been for the doses of chemicals which it has received in its strange career. Good milk may contain 50,000 to 500,000 micro-organisms to the cubic centimetre: it will now be understood why Dr. Newman records the numbers in milk sold in the City of London and Holborn as 4,800,000 at a good class shop, and as 3,200,000 in a poor class shop in Finsbury. "In 1899, 50 samples of milk were examined in St. Pancras: 16 (or 32 per cent.) were normal healthy milks; and 34 (or 68 per cent.) were unhealthy milks. Of the latter, 12 samples contained pus [matter from abscesses] in smaller or greater amount, and 5 (or 10 per cent.) contained the tubercule bacilli."<sup>\*</sup>

In the face of such facts, which could be multiplied many times over, the urgency of the matter of milk supply is beginning to dawn on the minds of the people. But something has already been done which may be summarized here.

The Dairies, Cowsheds, and Milkshops Orders, 1885-1899, are issued now on the authority of the Local Government Board, under powers granted under the Contagious Diseases Animals Act, 1878. These orders throw upon every urban and rural sanitary authority the duty of regulating and supervizing the milk trade, and of carrying

\* Report on the Milk Supply of Finsbury. Dr. Newman.

out certain general regulations prescribed by the orders. They further have the power of making and enforcing bye-laws under section 13. A register of all cowkeepers and dairymen is to be kept and revised from time to time. Before any fresh dairy or cowshed is occupied the authority must be first satisfied as to its sanitary condition; and it is made unlawful to occupy any such place if it is likely to be injurious to the cattle, or to the milk, or may afford opportunities for infection or contamination.

It is further made illegal for any infected person to take part in the supply of milk; and no dairy may directly communicate with a water-closet, or be used as a sleeping apartment, or a piggery; lastly, no milk from a cow suffering from certain specified diseases (now including tuberculosis) may be sold for human food, or for food of animals unless first boiled.

Under the provisions of the Infectious Diseases Prevention Act, 1890; and for London, under the Public Health (London) Act, 1891, sanitary authorities are given the appearance of powers for dealing with milk-borne epidemics. When such an epidemic appears the Medical Officer of Health may, after obtaining an order from a magistrate of the locality where the dairy is situated, proceed to inspect such dairy, and, if accompanied by a veterinary surgeon, the cows also. If satisfied that this is the offending dairy, he must report to his council, and they may order the dairyman to appear before them within 24 hours, and shew cause why an order should not be made forbidding him to sell his milk in the district of the authority concerned until their order is withdrawn. If the offender refuse to obey, then proceedings may be taken in his own district, and he may be fined £5 and 40 shillings for each day of default.

This measure has been found quite worthless in practice, as it takes three or four days at least to get in motion, and then further delay may be achieved by the dairyman, who would thus get time to dispose of a diseased cow. While this delay takes place the people are all the time consuming the diseased milk. In fact, promptness is the main factor in dealing with milk epidemics, and under this Act it is the very thing that is impossible. Then, too, when all is done, you have only locked the stable door after the escape of the horse, you have not *got such control as will prevent the occurrence of disease.*

#### Prevention of Fraud.

We have now seen what society has done to protect itself against the filthy conditions which are so prevalent in the places where milk is produced. The machinery has been at work since 1885, and very little has been done at the sources, at least, for the administration of the law is in the hands mainly of the very persons whose interest lies in its neglect—viz., the farmers. Then, too, the somewhat later attempt made to control milk-borne disease is admittedly a failure.\* We will consider lastly the measure against fraud in the form of adulteration which has been in operation since 1875, and

\* See Dr. Newman's Report on the Milk Supply of Finsbury, 1903.



which was strengthened in 1899, and under which adulteration seems, till quite recently, to have been on the increase.

The Sale of Food and Drugs Acts, 1875-1899, are aimed at the prevention of (a) the mixing of injurious ingredients with any article of solid or liquid food or drug, (b) the selling of any such article of inferior quality, and (c) the abstraction of anything from such article which might injuriously affect its quality. In one class of cases it must be proved that the added substance is injurious, and, in the other class, it is only necessary to prove that the article is not of the nature, substance, or quality demanded. It is under these Acts that sanitary inspectors take samples. It will be seen from what has already been said of adulteration that it is still profitable, and that this law although preventive in its action in some cases, does not seem to touch the bulk of the evil. It may be mentioned that inspectors may not take samples outside their own areas; and that the use of coloring matter and preservatives does not constitute an offence.

These attempts to control from the outside by legislative methods a trade so thoroughly disorganized, ignorant, dirtily managed, and permeated with dishonesty, have naturally failed to produce any real and lasting result, and it is certain that such measures, while acting as palliatives, will never prevent the evil or wholly remove it.

The law then is hopelessly inadequate, even if carried out to the letter. Under the Dairies' Orders satisfactory regulations have been adopted in only a few districts, and in others they are not nearly stringent enough. Those in force in London were drawn up by the old Metropolitan Board of Works at a time when the relation of milk to disease was little understood. "In the eyes of the law milk may contain large quantities of preservatives, such as boric or salicylic acids; it may shew a deposit of stable manure; it may be colored with annatto or turmeric; it may contain pus or innumerable micro-organisms, either harmless or pathogenic; it may be coated with dust from the street, or contain dead flies in suspension; it may contain saltpetre to hide the flavor of some unsuitable food given to the cow; it may be the product of a cow fed on such fermented food as brewer's grains, which renders it unfit for infants' food—it may contain all these impurities, and yet be legally 'pure milk!'"\*

#### Certified Milk.

The Borough of Sunderland, amongst others, has started a movement for the improvement of the milk supply by means of certificates granted to those producers who fulfil certain definite conditions. These certificates, renewable from year to year, give a guarantee of quality on behalf of those who fulfil their conditions, and may be used as an advertisement. The system has not found much favor, and the ignorance of the public is at present so great that, while caring little for the conditions of milk production, they certainly do object to the added cost that is entailed by any extra precautions under the present system.

\* "The Problem of the Milk Supply." 1904.

### Municipal Milk Depots.

It was in France, where an increasing infant mortality accompanying a falling birth rate led people seriously to consider the question of the food of the infant population, that the first Infants' Milk Depot was started by Dr. Dufour at Fécamp under private auspices. Many local authorities, on both sides of the channel, have now followed this example. Liverpool, St. Helen's, Bradford, Battersea, and many other places have inaugurated depots in this country. The general plan in all these is to provide, at a low price, sterilized humanized milk in sealed bottles with sufficient in each for one meal. The sterilization kills the germs, and the humanization adapts the milk to infants' digestive processes. These bottles of milk are sold at a central depot, and, in the case of Liverpool, at about 30 dairies as well. In this last named place 3,000 bottles per day have been sold. The cost to the parent for the food of one child is about 1s. 6d. to 1s. 9d. per week, and in Battersea about 400 children are being fed.\* By far the best municipal milk supply is that established in the City of Rochester, U.S.A., in 1897, and, as it shews the main lines on which all public supplies should be carried on, it will be useful to describe its method of working. "A central station at which the milk is prepared is organized each [summer] on a farm outside the city, where a trained nurse and assistants have full control of the cows, utensils, bottles, etc., and where all of the milk-work is carried on in a portable milk laboratory. Everything coming in contact with the milk is thoroughly sterilized in steam sterilizers. The milk itself is not subjected to any Pasteurizing or sterilizing process. Sterilizing and Pasteurizing are only an open invitation to the milkman to be careless in the production and handling of milk.

"At the milk station on the farm the milk is taken from clean, well-fed, tested cattle, into sterile cans which are carried to the farm in sterile cheese-cloth bags. Just before milking, the cows' udders are washed. A sterilized cheese-cloth fly cloth is placed over the cow, the first portion of the milk being rejected. So soon as the cans are filled they are immediately covered by a layer of cheese-cloth held in position by a rubber band. The cans of milk thus covered are immediately taken from the barn into the laboratory, about 200 yards away, where the milk is properly diluted, sweetened, and turned off into sterile nursery bottles of various sizes of the Siebert type. The bottles are corked with sterile rubber corks, placed in racks, covered with cracked ice, and immediately transferred to the city for use. Of the cleanliness of milk prepared in this way, forty-three daily samples were found to average not more than 14,000 bacteria† per cubic centimetre, while the city milk for the same period approximated 235,000 bacteria per cubic centimetre."‡

\* Annual Reports on the Health of Battersea. 1903 and 1904.

† *Cp.* number found in London milk noted above.

‡ "The Influence of Municipal Milk Supply on the Deaths of Young Children." Dr. Goler, Health Officer Rochester, N.Y., U.S.A., *New York State Journal of Medicine*, 1903.



Of most municipal milk depots it must be said that they are only attempts to solve a great problem, but, though small, they go in the right direction. Good has been done, but it is little, owing to the following reasons:—

1. The farms are not under the control of the depots, and hence sterilization is necessary, although in itself bad.

2. The sale of only one kind, viz., modified milk, reduces the usefulness, as those who wish to prepare their own infants' food get the unwholesome milk of the ordinary dairy.

3. There is no system of advising each mother, and supervizing the growth of the child as is the case in Paris.

4. They do not touch the really important point, which is the clean production and general organization of the milk supply of the poor.

5. No help is given to the deserving mother, suckling her own child, who therefore needs extra nourishment for herself, and often finds it impossible from lack of food to continue in this right course.

#### Private Experience.

Many attempts have been made by private enterprise with varying success, and recent revelations in connection with one of the best companies in London have shewn that they in no really efficient manner protect the public from danger.\* In York a pure milk supply has been carried out on commercial lines, under a skilled and intelligent dairy farmer, and so great has been the demand that prices have had to be raised above the ordinary market rate to choke off business. In Paris, Dr. H. Rothschild has organized a supply of pure sterilized milk which is sold in several depots in the poorer districts, the demand is very great, and continually increasing owing to the quality, cleanliness, and price of the milk sold; but although this milk is supplied at a much cheaper rate than at other dairies the profit made is considerable, and that the benefit has been great is evidenced by the vital statistics of the city. Another instance of a useful attempt to solve the problem by private effort is that afforded by the Copenhagen Milk Supply Company under the able direction of Mr. W. Busck. This company pays a limited dividend of 5 per cent., and the managing director expends much time, energy, skill, and experience without any remuneration. It has not only improved the quality and sources of the milk, but has successfully prevented the attempts of other companies to form a corner to raise prices. Another valuable work done to supply pure milk to the very poor is that of the Hon. Nathan Straus in New York. He has succeeded in giving good milk at reduced cost to the poor by means of careful organization of supply and distribution.† It is needless to enumerate more cases. Two main facts stand out prominently to the student. First, all attempts at improvement on

\* Vide case of Typhoid Fever caused, in the opinion of the jury, by the Milk from a farm on the books of the Aylesbury Dairy Company. *Frost v. Aylesbury Dairy Co.* Court of Appeal, Feb. 1905. *Times Law Reports*, p. 300.

† *Infant Mortality and Infants' Milk Depots*, p. 68.

present lines of distribution inevitably keep up and raise the market price of milk. The second point is that wherever improvement has taken place and the price has been kept down or lowered, the undertaking has not only been on a large and carefully organized scale, but there has always been an absence of the mere commercial element. Dr. Rothschild and Mr. Busck both bear testimony to this.

### The Lines of True Reform.

Mention has already been made of the municipal milk depots established in many large centres of population. These have commenced the work of public supply; and the next move must be to enlarge their basis and increase their control over their sources of supply. Hence, each town should have a municipal milk depot for the sale of milk of all kinds—whole, separated, buttermilk, cream, and other dairy produce—connected with a farm under the same ownership and control. These depots should be situated in the poorer districts, and they should sell the articles at a cost covering production and distribution. To secure freedom from adulteration, all the employees should be well paid, and the milk should be distributed in sealed cans and bottles to the depots or the consumers. At first it might be made compulsory for the customers to fetch their own milk, and thus save the cost of delivery, as at Dr. Rothschild's depots in Paris. The municipal farm should also supply pure milk to all public institutions, whether officially or privately managed, such as fever hospitals, asylums, workhouses and schools. In connection with the elementary schools it would be advisable to follow the suggestion in the Report of the Scottish Physical Training Committee: "It would in many cases be an inestimable advantage could regular and sufficient meals—such as broth, porridge and milk, or bread and milk—be provided at a minimum cost"\*; or to obtain half a pint of milk for each child at least once a day. Such an arrangement would secure a saving on the cost of the milk purchased from the contractors, and would prevent such epidemics as have occurred even in the largest London hospitals. This is no new idea. The Corporation of Nottingham, for instance, supplies its asylum from its own herd of cows, and receives about £2,500 per annum for the sale of milk and butter. In 1903-4 the Birmingham Drainage Board took £1,894 for the sale of 61,404 gallons of milk produced on their sewage farm; and at Reading the same thing is done. It is imperative that all such institutions as have just been mentioned should have an unimpeachable milk supply; and the only way to ensure that is by giving them one under the direct control of the local sanitary authority. If the physique of the poorer classes is to be built up, it is essential that their food should be both good and cheap, and this applies especially to the milk supply. The milk produced on the municipal farm would be distributed to the local depots, and the extra cost of clean and healthy production would be saved from the profits of the middlemen and the loss entailed in bad organization.

\* *Vide* Report, p. 30.



These model farms should be run in connection with the technical schools, and the science and art of dairy-farming taught under the most favorable conditions. It is certain that no mere tariff interference can prevent the loss of an industry carried on in a way which not only displays technical ignorance, but also want of organization, combined with practices which are injurious to the public health.

The establishment of municipal milk depots supplied from municipal farms is the first step towards the social organization of the dairy industry; and this would inevitably lead towards a complete organization of the supply. Well-to-do people would soon purchase their milk from stores which they could rely upon, and each successive increase in demand would render the whole process more economical, and hence a lowering of price possible. The community would take over the whole of the supply, and production as well as distribution would be completely organized on one system. The milkman would be on the same footing as the postman, and his rounds would be as regular, although their frequency would be greatly reduced, owing to the better keeping quality of milk produced under clean conditions, and also to the fact that all milk would be bottled at the farms after being cooled, and thus protected from the sources of pollution which under present methods are so harmful. The number of carts and men and shops would thus be lessened, and the saving could be used to improve the article or lower the price. The number of hands through which the milk passes would also be reduced, and hence the possibility of infection or contamination made less. The sources of supply—the cows, farms, farm-hands, etc.—would be under control and supervision, and epidemics could be entirely avoided. Encouragement would be given for honesty on the part of the men in case of infectious disease existing in their homes or families; they would be paid the usual wages even when not at work if they gave the needed information, and punished if they failed to give it. The presence of disease amongst the animals would be known, and precautions would be taken to isolate the cow if curable or to destroy it if incurable or dangerously ill. Such a decision would be arrived at easily when there was no question of bringing serious financial loss to one man in the interests of the many; the community would lose the animal, but the community would gain the immunity; whereas, under present circumstances, if anything at all happens, it means that the gain of the one is made the loss of the other. The industry would for the first time be put into the hands of skilled persons, and controlled in the interest of the public health. What has happened to water will take place in regard to milk, with the same beneficent results.

The most important industries should be put under public control first. It was epidemics and not epigrams that caused the municipalization of the main sources of our water supply. If tramways or electricity are mismanaged, the public reap inconvenience in transit or lighting; but if the supply of milk is mismanaged—as has been shewn to be the case—the community reaps disease and physical degeneracy in its youngest members, as well as death and

misery resulting from the frequent epidemics amongst the adult population. It is only necessary to convince the public that it can no longer afford to drink dirty and expensive milk in order to support its adherence to a worn-out and obsolete economic theory.

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