risk is considerably lessened when such milk is mixed, as it generally is, with that of healthy cows before it is sold. We believe that this danger has been greatly overestimated in the public mind and that it can best be met by systematic inspection and condemnation of cows revealing tuberculosis on physical examination.

To secure a good milk supply it is of the first importance to educate the farmers regarding the measures which alone make this result possible, and afterwards to see that the rules relating thereto are carried out. Since for the most part the contaminating agents which render milk dangerous are introduced at the farms, the production of good milk demands that the farmers be educated to as to secure this result, and also that proper surveillance be exercised.

To have efficient inspection of the milk business of New York City at least 100 inspectors for the country districts from which the supply is drawn, in addition to the fifteen now available, should be employed.

The work of the corps of inspectors should be two-fold: first, to point out to the producers of milk the conditions under which safe milk can be furnished; and, second, to determine that these conditions are secured before the milk is permitted to be sold in this city. These inspectors should possess such kind of education and experience as will qualify them to work intelligently. They should be familiar with farming by experience, and in their selection, preference should be given to men educated at good agricultural schools. They should be honest and possessed of good judgment and discretion. A certain proportion of them should be veterinarians, and a certain proportion physicians, so that both the diseases of the cattle and those of persons concerned in the production of milk can be promptly and effectively recognized and isolated.

Various recommendations are made as to labeling of bottles and cans with the name of the farm or creamery from which the milk was shipped, and concerning the control of the sale of milk at retail stores.

The report also states:

Notwithstanding, after all safeguards that may be imposed by education or otherwise, there will be cases in which unsafe milk will be produced or offered for sale, and all such milk must be judged on its merits. The commission, therefore, recommends that the Board of Health should, according to circumstances, require efficient sterilization or pasteurization of all milk which it finds unsafe for consumption as raw milk, on account of a suspicion of the presence of tuberculosis or other disease in the cows or insanitary conditions at the dairy, or a persistent high bacterial content. But in every instance milk so heated should be rapidly cooled to at least 40 F., and be put, after sterilization or pasteurization, into sterilized containers under aseptic precautions.

BOSTON'S CAMPAIGN FOR CLEAN MILK.*

JAMES O. JORDAN, PH.D.

BOSTON.

After a persistent and successful contest against adulterated skimmed and preserved milk, covering a period of over twenty years, the city of Boston, in 1904, through its Board of Health, laid the foundation for further improvement by inaugurating a campaign having for its ultimate aim the application of cleanly conditions and refrigeration of its milk supply. An account of this movement, as well as that of its influence on the inception of new methods governing the production and traffic in milk, is the province of this paper.

The initiatory step was the adoption of a standard limiting the number of bacteria in milk to 500,000 per cubic centimeter, and prohibiting the sale of milk hav-

ing a temperature higher than 50 F. Other regulations looking to a betterment of the milk supply were adopted at the same time, and these, together with such changes as seemed advisable from observation and progress, are now in operation.

A summary of a portion of the other regulations follows: Milk is required to be the product of healthy animals and to be strained and cooled in clean rooms separate from those in which animals are kept. All utensils used in its production and sale are to be properly washed and sterilized. Prompt notification of the occurrence of contagious diseases in those engaged in the sale or distribution of milk or in their immediate associates must be made to the board. Milk on sale in shops is not allowed to remain uncovered outside the cooler, box or refrigerator in which it is kept and sold, and the use of separate and properly drained ice chests or coolers for milk is recommended and encouraged; and the sale of milk in a room used wholly or in part for domestic purposes is prohibited.

The adoption of a bacteriologic standard by the Boston Board of Health has been decried and the subject of scoffing, but the example of that city has since been followed by other municipalities, until now nearly twenty cities are conducting bacteriologic investigations of milk supplies. This outcome is fortunate, for from multiplication of work of this character great progress may be expected.

The examination of samples procured from the cars on arrival showed that 87.6 of samples taken in 1905 conformed to the regulations of the Board of Health, while in 1906 89.98 per cent. of samples reached this standard. These results appear in Table 1.

TABLE 1.—BACTERIOLOGIC EXAMINATION OF MILK SAMPLES FROM CONTRACTORS. TAKEN FROM THE CARS ON ARRIVAL.

Year.	Under 500,000 Bacteria per c.c. Per cent.	Above 500,000 Bacteria per c.c. Per cent.	Under 50,000 Bacteria per c.c. Per cent.	Under 100,000 Bacteria per c.c. Per cent.
1905	87.60	12.40	59.80	74.90
1906	89.98	10.02	62.33	72.67

In connection with the examination of milk from contracting firms, the results obtained from the supplies of the different concerns are of value.

Figure 1 presents graphically the comparative bacteriologic standing of the firms for 1905 and 1906, and in addition shows the percentage of infected milk (to which subject reference will be made later) for the same years. With one exception (contractor B), each supply denotes an increased percentage during 1906 over 1905 of samples complying with the bacteriologic standard, and at the same time a marked diminution in the quality of infected specimens.

Bostonians are in a sense slaves to custom in the matter of delivery of milk. They expect their milk to be left at their doors in time for breakfast surmounted with a layer of cream, and in order to satisfy this demand the milk delivered in the morning is that of the bottling of the day before. Thus the milk is a day older than when it reached the city; and even when it is kept under conditions unfavorable to bacterial growth, the latter continue to develop—the extent, of course, depending on the surrounding conditions. It is of interest to trace this milk bacteriologically as it is being delivered from wagons, or is offered for sale from shops. These results appear in Table 2.

These results, by comparison with those obtained by the examination of samples from the cars, show the

* Read in the Section on Hygiene and Sanitary Science of the American Medical Association, at the Fifty-eighth Annual Session, held at Atlantic City, June, 1907.

detrimental influence of age and handling—changing from one vessel to another—on milk. But pronounced as is this development of bacteria in the wagon samples, there is no such wealth of bacterial content as exists in the shop milk which is older than that obtained from teams. The shop milk is subjected to further handling and mixing while on sale, to contamination from dust, and from non-sterile containers in the shops, as well as from drippings from pitchers or other vessels brought to the stores by customers.

TABLE 2.—BACTERIOLOGIC EXAMINATION OF MILK SAMPLES FROM WAGONS.

Year.	Under 500,000 Bacteria per c.c. Per cent.	Above 500,000 Bacteria per c.c. Per cent.	Under 50,000 Bacteria per c.c. Per cent.
1905.....	54.40	45.60	18.00
1906.....	52.21	47.99	16.75

Of these store supplies, containing over 500,000 bacteria to the cubic centimeter in 1906, 84.29 per cent. contained over 1,000,000 bacteria to the cubic centimeter, which affords ample proof of the poor quality of milk from this source.

TABLE 3.—BACTERIOLOGIC EXAMINATION OF MILK SAMPLES FROM STORES.

Year.	Under 500,000 Bacteria per c.c. Per cent.	Above 500,000 Bacteria per c.c. Per cent.	Under 50,000 Bacteria per c.c. Per cent.
1905.....	28.50	71.50	4.90
1906.....	18.99	81.01	3.14

Too much can not be said against the use of shop milk as a food for infants. It is a dangerous expedient to resort to milk of this type as sustenance for the young, and while the danger is great at all times, it is especially pronounced during the warm months of the year. Convenient as shop milk may be as a source of supply to purchasers, the employment of such milk as a food for infants is both wrong and inexcusable. Often the action

Fig. 1.—Record of Individual Contractors' Samples, 1905 and 1906.

of this milk with infants is not that of milk, but of a poison, and its use should be universally disapproved. The stamp of condemnation can not be too quickly placed on the employment of shop milk for this special purpose.

Despite the fact that the number of shops engaged in the sale of milk is constantly increasing, unless a change is made which results in improving the quality of milk

sold, it is believed the time is not far distant when there will be a significant lessening of the number of these dealers. The eradication of shops where only a few quarts are sold daily is a certainty, for they are a menace to the community. By temperament many of the owners and employes of these small stores are unfitted for the proper conduct of the milk business, even where the surroundings and equipment are adequate.

Fig. 2.—Record of Individual Contractors' Samples, 1905 and 1906.

In time the right to deal in milk may be considered as much of a privilege as that for the sale of spirituous liquors. On the ground of public utility there is ample justification for stringent regulation of the traffic, and a reduction in the number—if not the classes—of middlemen, can not fail to result advantageously. One experiment in the sale of shop milk is already being made in Boston, namely, that of the sale of bottled milk just as bottled and received from the milkman. If, as it is planned, this milk is sold to consumers in unopened bottles, the opportunities for impairment are decreased, and for this reason the test is beneficial and worthy of encouragement.

The continuous decrease in the percentage of samples for the two years which complied with the bacteriologic standard of 500,000 bacteria to the cubic centimeter, from the time of receipt of the milk by the contractors and its subsequent delivery from wagons or sale from stores, is illustrated by Figure 2.

This affords conclusive proof of the influence of repeated handling and age on this product, as well as the urgency for increased care by dealers and rapid and direct delivery to consumers, even though such change

may eliminate the shopkeeper as a factor in the sale of milk. Partially from prevailing custom—and for this both dealers and consumers are blamable—much of Boston's milk supply is allowed to become stale and acquire bacterial affluence between the time of its arrival in the city and receipt by householders. The remedy for this impairment rests largely with consumers, on whom responsibility for the present condition of the milk situation largely devolves.

For practical and commercial purposes, the Boston Board of Health prohibits the sale of milk having a temperature above 50 F., but a lower temperature is more advantageous. A liberal interpretation of a temperature standard as applied to this fluid means cold milk and the colder the better.

Naturally, the most work in maintaining a cold milk standard is done during periods of high temperature. At such times many temperature tests are made. These include taking the temperature of the milk as it arrives from the country, also as it is being delivered from wagons or sold from shops. Throughout the year the temperature of all samples for bacteriologic examination is taken. Where high temperatures are found warning notices are sent the offenders. Whenever the notices relate to milk found at the cars on arrival from the country, the warning cards are sent to the contractors, and by the latter remailed to the producers in the country. If the warm milk is found on a wagon or in a store, the notice is sent to the owner. In most instances this method brings good results, but in exceptional cases more stringent measures are required to attain the desired end. This means prosecution in court, and fines of from \$5 to \$25 have been imposed in these actions. As ice costs less than the payment of fines, the imposition of a penalty results in bringing about the condition wanted, namely, that of keeping the milk cold.

A feature not to be overlooked in connection with the temperature problem is that of the influence of summer heat on milk after delivery by the milkman. In summer, milk is usually left on the door steps of houses and there allowed to remain until breakfast time, and occasionally, if the location is right, the milk bottle becomes a target for the sun's rays. During the interval from leaving the milk until the serving of breakfast, many hours may have elapsed, and in warm weather—even if the milk was cold when delivered—the conditions are favorable to a marked increase in temperature, consequently it is important that milk should be iced as soon after delivery as possible. Similar conditions govern the delivery of milk at shops, and the same precautions against exposure to high temperatures should prevail. The constant maintenance of a low temperature at every stage of handling is essential for the checking of bacterial development in milk.

Another advantage accruing from bacteriologic control of milk is that it affords an opportunity for the detection and exclusion of specimens which are the product of diseased animals. In connection with this subject, Harrington¹ asserts that "there is still another group of bacteria commonly present of vastly more importance than the peptonizing species, namely, the pyogenic species, which are associated with the most common of all bovine diseases, garget or mammitis." Milk from these diseased animals is characterized as infected and is distinguished by the presence of streptococci, or by streptococci and an excess of pus, or by excess of pus alone.

Evidence is not lacking that these noxious products when present in milk used as a food, may produce disturbances in the human economy; but regardless of this danger, esthetic considerations alone are sufficient to render this type of milk repugnant.

Although attention is being gradually directed to milk of this character, the subject demands the fullest consideration from those responsible for the quality of public milk supplies. Not enough attention is given to the condition of the animals used in milk production, and there is abundant evidence that reliance solely on the integrity of dairymen to withhold the milk of unhealthy animals from the supply sent to the market, results frequently in insufficient protection to the public. To the majority of dairymen, the cow is a milk machine, valued solely for quantity of product, and whether that product be normal milk, or milk plus streptococci or other objectionable contaminations, if it has the appearance of milk the public gets it in instances all too frequent. Even where the circumstances are such that the abnormal conditions in animals are apparent from obvious external indications, the evidence is not utilized for the public good excepting in rare instances, because it would entail the loss of a few quarts of milk.

Beginning in January, 1905, and since that date, the Bureau of Milk Inspection has insisted on the exclusion of these infected specimens, and a persistent search has been made for their presence. The majority of this work has been done on milk obtained at the cars just as it arrives from the country, and so a large proportion of these samples denoting infection are from this source. Where contaminated milks are found, contractors are immediately notified to stop bringing the milk from the dairies at fault into the city until the source of the trouble is located and eliminated. Where infected milk was found in the possession of a dealer other than a contractor, warning notice was sent the offender, and when possible the milk was traced to its source and the supply stopped. There has been an encouraging diminution in the number of these samples, as will be observed from the following data:

In 1905, of the 5,559 samples from all sources examined bacteriologically, 583, or 10.48 per cent., showed the presence of streptococci, pus, or pus and streptococci. Of the 5,007 specimens examined in 1906, only 246, or 4.9 per cent., indicated a streptococci, pus, or pus and streptococci content. These results are summarized in Table 4.

TABLE 4.—INFECTED MILK SAMPLES.

Year.	Number of Samples Examined.	Per cent. of Infected Samples.
1905.....	5,559	10.48
1906.....	5,007	4.93

This improvement is gratifying and no doubt attributable to the persistent exclusion of milk of this character from that permitted to enter the city. It has been brought about only by continuous and untiring effort, and not without grumbling and protest, but as none of the objectors have been willing to admit that they would knowingly consume milk thus infected, but little value could be attached to the protestations.

How the producer is to know that milk is contaminated is a query often propounded. He can at least be more observant of the health of his cows and not sell milk from animals whose condition is questionable; he should also exclude from the public supply the milk from cows just prior to and after the calving period. The

1. Bulletin State Board of Health of Massachusetts, December, 1906.

regulation of the Boston Board of Health on this subject is specific. It provides that "no milk shall be sold, offered for sale, or distributed in the city of Boston which was drawn from cows within fifteen days before, or five days after parturition." Before and after the calving period milk is subject to pus contamination, and many of the specimens so polluted, it was later ascertained, were obtained from cows approaching or following parturition. Greater care should be exercised by producers with milk of this character.

An attempt has been made to procure information concerning each case of infection, as to the actual condition of the animals at the faulty dairies. To a certain extent the bureau has been handicapped in these investigations for the reason that contracting firms have to be depended on as channels for information. In many instances a praiseworthy effort was made to ascertain and supply the facts. This knowledge, where obtainable, not only demonstrated the value of and necessity for this work, but disclosed conditions which, although of scientific interest, did not accelerate desire for this kind of food. It also demonstrates, in instances much too frequent, the utter lack of care in keeping the milk of animals of apparent abnormal condition from the market supply. More attention to quality and less to quantity is a desirable determination for milk producers.

Prior to the adoption of these regulations by the Board of Health, very little had been attempted or accomplished by the contracting or wholesale milk firms in improving the condition of the dairies or the methods under which milk was produced. So long as the product arrived in the city not faulty from the standpoint of taste or odor and was sweet enough when delivered to satisfy customers, or, in other words, was a salable commodity, it was acceptable to contractors. But these regulations brought a radical change for the reason that under the former prevailing methods, which were too often shiftless and faulty to a degree, milk was being produced impregnated with cow dung, hair and other filth, and overloaded with bacteria, both from this cause and from insufficient cooling. This milk in many instances largely exceeded from the bacteriologic standpoint the requirement of the board.

To improve the product was the end in view, and while this desire may have been at first largely founded on necessity, it has developed an earnest effort on the part of some of the contracting firms not only to comply with the requirements of the board, but to have the product of as good quality as care, observation and experience can make it.

The methods pursued by the individual firms for improving the milk supply, while varying in details, all tended toward the same objective point. Printed matter was used to a large extent in this campaign for clean and cold milk. In this manner valuable information was given the producer as to the best method of stabling cattle, the proper lighting and ventilating of stables, the necessity of having the cows clean and kept in a part of the stable from which other animals are excluded, the undesirability of having a person of untidy habits about a dairy, the proneness of milk to absorb odors from surrounding objects, and the best manner of protecting it from such contaminations; directions for the proper cleansing of all utensils used in the handling of milk, necessity and methods for its rapid cooling and being maintained at a low temperature, urging generous supplies of ice with plans for its storage, also reasons for providing a separate room for handling milk.

Inspections of dairies are also made, either by paid agents or by members of the different firms; one concern employs an inspector who devotes his whole time to this work; another has a veterinarian who gives one-half day of each week to visiting the farms supplying his firm with milk, and others have men in their employ who are required to give a portion of their time to the inspection of dairies. In this manner faulty methods are brought to the dairyman's notice, and suggestions for improvement made. In addition, these inspection trips serve a good purpose, as they stimulate the farmer to constantly maintain better methods, as he is unaware when the next inspection trip will be made. Four firms resort to the method of personal inspection and find the results satisfactory. Some of the contractors take the temperature of the milk as it is delivered at the receiving stations and issue warnings to those producers who send milk insufficiently cooled. Several of these firms have inserted in their contract with the farmer a clause requiring the milk to conform to the Board of Health standard, and to be cooled to a temperature of 50 F., or lower, within an hour of milking. During 1906, three of the contracting firms notified their producers that in future no milk would be received from farms not supplied with ice. Many meetings were arranged throughout the country at which the subject of a better milk supply was discussed with the farmers. An effort has been made by all of these concerns to lessen the dirt content, and one of the firms makes frequent tests of the milk as received in the city to ascertain whether or not the quantity of dirt is excessive. The test is a rough one, but it has the advantage of ready application and serves as an object lesson, filthy but effective. A filter of absorbent cotton is utilized. This is held in position by a wire support at the bottom of a funnel of special construction, and through this the milk from the suspected can is passed, the dirt collecting on the cotton. The filter and dirt are then dried, and if the filth is in large quantity, the filter and dirt are mailed to the farmer to emphasize the necessity for greater cleanliness. It is true that a test of this description is not, strictly speaking, scientific, but results are the true indications of value, and that this method is a success has been demonstrated conclusively to this firm's belief by bacteriologic investigation. From the fertilizer standpoint, if from no other, the farmer has an opportunity to see that he is wasting valuable material.

In addition to the course of action of these firms previously outlined, the establishment of laboratories, solely for the bacteriologic examination of milk, by six of the contracting firms, must not be overlooked. It is an indication that this work is considered of value from a purely commercial basis; the fitting up of these laboratories was voluntary in every instance, and the cost of equipment, together with the salaries of the bacteriologists employed, add a considerable amount to the expense account of each concern. The work of these private laboratories has been of much assistance in improving the quality of Boston's supply, for in the two years of their operation between 40,000 and 50,000 examinations of milk have been made, and in instances in which large numbers of bacteria were found producers were notified of the quality of their supply and cautioned to use more care. These notifications were followed by repeated examinations of the product of the dairy at fault, until the quality showed improvement.

The consensus of opinion with contractors is that the bacteriologic examination of milk has already proved

beneficial. One firm states that this is evidenced by the fact that 75 per cent. of the samples received contain less than 50,000 bacteria to the cubic centimeter, and over 40 per cent. contain not more than 10,000 bacteria to the cubic centimeter. The same firm is convinced that under bacteriologic supervision the number of samples containing less than 50,000 bacteria to the cubic centimeter has greatly increased. Other concerns state that the dairies investigated on a bacteriologic basis have shown improvement. These opinions are practical endorsements of this method of oversight of milk supplies. Not all of the firms have pursued the methods outlined, but they have all done something in the way of improvement. Thus it is seen that those engaged in the milk business may be important factors in bettering conditions surrounding the milk supply. The cooperation of dealers is an adjunct not to be despised; on the contrary, their support is to be enlisted and encouraged. Without their aid adequate protection to the consumer is made more difficult.

That the wholesale firms in Boston have rendered valuable aid is beyond dispute, and in so far as they have assisted the movement their efforts should be given the fullest recognition. Their example is worthy of emulation by large concerns in other cities.

While bacteriology is an important factor in the control of milk supplies, namely, in ferreting out dirty dairies, in locating insanitary conditions like that of the use of unclean vessels or lax methods of handling while the milk is on its journey from the producer to the customer, as well as ascertaining its condition as to fitness for use as food by the young, sole reliance on this method of control would be a mistake. It must go hand in hand with what may be designated as field work, which as milk is now produced is necessary to efficient progress. Bacteriologic results may be utilized as a guide to the efficacy of this field inspection, the index of success or failure, the silent detective for bringing imperfections to light.

Field work involves supervision of the production of milk, and from the dairy watchfulness over the product until it reaches the consumer. Vital as is this work at every stage of the journey from producer to user, the point of greatest vantage for the attack on the common enemy, dirt, is at the place of production—the fountain head; faults here are lasting, the errors of commission and omission being eradicable.

The supervision of the dairies supplying Boston with milk is at present in charge of the Massachusetts State Board of Health and under the immediate direction of its secretary, Dr. Charles Harrington. This work includes not only the inspection of dairies located in the state but those in adjoining states as well, and, although in its infancy, has already been productive of much good. The inspection involves in brief consideration of the health of the stock, the condition of the cows and their surroundings as to cleanliness, the adequacy of the supplies of light and air, and methods of handling the milk. The board reinforces its actual field work by the publication in its monthly bulletins of a white list, which includes the names of the farms where the conditions are satisfactory. This salutary proceeding is an effective spur to those whose names are omitted from the list.

In connection with this inspection in dairies the proposition has been advanced that local boards of health could not control milk produced outside their jurisdictions. This idea is erroneous; local boards of health

possess the right to exclude all milk not produced under proper conditions, and an efficient manner of exercising control is by a proper application of its authority over its licensees, those who hold permits to sell milk from wagons within the city limits. In Massachusetts it is illegal to sell milk without these licenses, and the regulations of the Boston Board of Health provide for a revocation of these permits for non-compliance with the provisions of the regulations. Recent cases serve to illustrate the value of this method of control. Inspection of dairies by the Massachusetts State Board of Health in towns in the immediate vicinity of Boston brought to light several swill farms where an immediate change of conditions was imperative. The milk from these farms was sold to milkmen who were licensed to do business in Boston. These facts were reported by the State Board of Health to the Boston Board of Health and the details of adjustment were by the latter board entrusted to the Bureau of Milk Inspection. The milkmen using this milk were promptly notified of the conditions and warned that unless the necessary changes were immediately made at the farms new sources of supply would have to be procured by each milkman or recommendations for revocation of licenses would be made to the Boston Board of Health. In other words, the sources of supply in question were unsatisfactory and the burden of adjustment was properly placed, namely, on the purchasers and distributors of the milk. The results were highly satisfactory, all of the farmers but one either complying with the requirements of the State Board of Health or disposing of their stock. The farmer in question showed no inclination to make the desired changes and, as his product was to be excluded from Boston, began selling his milk to a milkman in a town adjoining Boston. This state of affairs was communicated to the State Board of Health, which board promptly notified the milk inspector of the town in question concerning the details. This latter official warned the milkman that a continuance of the use of the product of this farm would cause the withholding of his license for the ensuing year, which resulted in the producer being again without an outlet for his supply. To the producer it means loss of market unless he makes the suggested sanitary changes. By such methods the local authorities, working in conjunction with state boards of health, can control sources of milk supply beyond their own borders and insist on and maintain the desired conditions.

In Boston, within a year and a half, there has been a marked change in the method of handling milk cans sent into the country for milk by the contractors. Formerly no attempt was made to clean these cans, and they were returned to the farmer often putrid from decomposition of milk drainings, or after having been employed as containers for swill, broken eggs, coffee or kerosene oil in shops or restaurants from which they were collected. Not all of the cans were of this latter type, but the cans in the best condition contained milk drainings of different degrees of sourness. The unfairness and hardship to the farmer of cleaning such cans is apparent, and after such an object lesson it is not so much a source of wonder that some producers are skeptical over the demand for cleanliness in connection with this milk question.

As an outcome of agitation over this subject the matter of can washing in Boston has been revolutionized, and at present fully 87.5 per cent. of the cans are being washed by the contractors before they are returned to

the producer. Four of the contracting firms wash all of the cans returned to the country; one firm washes one-half of its cans; another all but 200 cans, and one firm washes cans for only those producers who desire cans cleaned. This washing, however, does not relieve the producer of responsibility as to the condition of the cans. Before filling each can should be examined and if found to need further cleansing this should be done before the can is employed for milk.

To further aid the movement for clean milk vessels an effort has been made to prevent the use of cans and jars, which had become much too common, as containers for other substances. Allusion has previously been made to their employment for swill and other objectionable products. Fortunately, general utilization for such purposes has lessened to a noticeable extent, but the impression is not fully eradicated that milk cans are public property and available for use for any desired purpose. To eliminate this idea copies of the state law and of the regulations of the Boston Board of Health relating to the misuse of cans have been extensively circulated, and this step has been reinforced by an office exhibit of misused cans as an object lesson. A lessening of the evil followed, but the subject is one demanding constant attention. Within a few months milk cans were found in different sections of Boston in use as containers of broken eggs, coffee, olive oil, chocolate, blood, molasses, kerosene oil, and for heating water in lunch carts and bake shops. One specimen taken from a bake shop, and at the time of discovery used for the latter purpose, had on the outside an accumulation of baked and carbonized dough of unsightly appearance. Milk cans are more frequently employed as holders for kerosene oil than for any other substances. Such use, however, can only be considered objectionable because of the difficulty of removing the odor of this fluid. Warning notices to offenders and prosecution have also been employed in this campaign for clean milk cans, and in time it is hoped that the impression will prevail that milk cans are to be used for milk and milk alone.

A part of the blame for the misuse of milk cans rests on milkmen, for despite the fact that the cans represent much money to the dealer, the latter either from negligence or fear of displeasing customers does not collect the empty cans promptly and they remain around shops, restaurants and hotels, affording a temptation for use for other substances or becoming offensive in warm weather from putrefying milk drainings. All cans or jars used in the delivery of milk should be promptly collected by the dealer and cleaned for subsequent use.

A possible outcome of the agitation of this milk question may result in the production of milk on gigantic milk farms in localities not too remote from the population to be supplied, to be conducted and governed by modern methods and on as strict a commercial basis as that surrounding the present day successful business. While this suggestion may not form a part of the future solution of this problem, from a contemplative basis solely the idea has advantages.

The present day trend is toward the handling of milk in cities by large concerns, and it must be admitted that the equipment of these large firms in caring for and delivering milk is superior to that of the small dealer. This means the complete elimination of the latter class, excepting those who are engaged in the production of milk and who from advantage of location are enabled to supply consumers directly with fresh milk. These latter should be given the fullest encouragement.

With the present knowledge of this mooted subject, one immediate remedy is the utilization of the product of only clean dairies. Milk from filthy farms or from those not using ice should be under the ban of exclusion.

These are necessary but minor details beside the one of greatest importance, namely that of education of the public. No effort should be spared to arouse consumers to the danger from dirty milk. They must be made to realize the necessity for cleanliness, that the responsibility for a dirty and stale milk supply rests on them, and that they form the pivotal point for solving the problem. But the first essential is for the public to realize and be reconciled to the fact that cleanliness is next to their pocket-books, and that if they want clean milk they must pay for it, for milk plus dirt is more cheaply produced than milk minus that contamination. Consumers must pay for cleanliness. Cow dung as an addition to beefsteak would be abhorred, as a condiment in dressing a salad its use would not be countenanced, in beer or champagne it would be an efficient aid to temperance, yet its presence in milk is daily countenanced, provided the insoluble portion is removed by the dairyman or milkman by some straining device. But the straining does not remove the harmful portion, namely, that which has gone into solution and which once in the milk can never be taken out. It is not visible to the consumer, however, and so no complaint is made, provided the baby is not made sick or does not die as a result of using such milk for food. The absence of a deposit in milk does not signify cleanliness; it is simply a tribute to the straining device adopted for the removal of insoluble excrement. The best method of dealing with the milk and dirt problem is to keep them separate from the beginning; let the divorce proceedings between the two be final and complete, for the damage of union once made is beyond repair.

This then is the text for presentation to the public; they should be made to see that the same dirt to which objection would be made in other forms of food is doubly obnoxious as a milk contamination, because of the adaptability of milk for the propagation of bacteria. But dirty milk is not cheap; on the contrary, it is the most expensive milk which can be purchased, and the appalling infant mortality, with the attendant expense of sickness and death, which has followed its use is ample proof of this contention. The cleanest milk, even though its first cost is more than that of the dirty brand, is in the end the least expensive. Let the economies be with other necessities or with luxuries, but eradicate the false idea of economy by purchasing filthy milk. Cultivate abhorrence for the unclean article.

That the best is the cheapest should be firmly grafted into this milk situation, even if to bring conviction it is necessary to point to the attendant expense of sickness or death of the young. Constant repetition of the danger from unclean milk is at present necessary to arouse the public from inertia and fancied security. Public determination and sentiment are the all essentials to the rapid clearing up of this milk problem. Let the day of its coming be not long delayed!

Fatty Applications to Scalp.—Fatty applications, as a rule, are not well borne by the scalp or any hairy part of the body. When such a selection, however, has been made, the hair must be clipped short, or else, especially in girls, who absolutely refuse to cut the hair, we must have recourse to lotions, preferably aqueous or alcoholic, which invariably act more favorably than unctuous preparations.—N. E. Aronstam, in *Medical Fortnightly*.