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CAMPAIGN FOR CLEAN MILK

A SERIES OF ARTICLES THAT HAVE APPEARED IN THE "OBSERVER"

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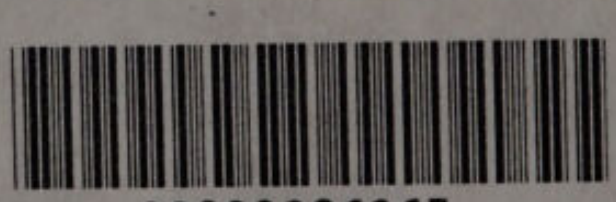

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NATIONAL CLEAN MILK
SOCIETY

CAMPAIGN FOR CLEAN MILK

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A SERIES OF ARTICLES THAT HAVE APPEARED IN THE "OBSERVER"

PUBLISHED BY
THE SAINT CATHERINE PRESS
STAMFORD STREET, S.E
FOR
THE NATIONAL CLEAN MILK SOCIETY
(Incorporated)

[1916]

THE NATIONAL CLEAN MILK SOCIETY

(INCORPORATED)

2 SOHO SQUARE, LONDON, W

OBJECTS

To raise the hygienic standard of milk and milk products ana to educate the Public as to the importance of a clean and wholesome milk supply

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PREFACE

THE chapters in this book appeared as separate articles in the *Observer* between October 17th, 1915, and January 16th, 1916, and are reprinted through the courtesy of the Editor.

They were written and published with the hope that they might be the means of stimulating interest in a subject which is of prime importance to the welfare of our Country. The condition of our milk supply is bad, and it cannot be much improved until the public clearly understands the relative value of clean and dirty milk, and, consequently, not only demands a clean, wholesome supply, but is willing to pay a higher price for it than for a dirty product.

The National Clean Milk Society [Incor.] has been formed with the objects of raising the hygienic standard of milk and milk products, and of educating the Public as to the importance of a clean and wholesome supply. More can be done by organised than by individual effort, and therefore it is hoped that those who are dissatisfied with the present condition of our milk supply will aid this national work by becoming members of the Society.

A NATIONAL NECESSITY

SOME astonishing facts are now the subject of special consideration concerning the mortality amongst young children :

> The number of deaths amongst children under one year of age in this country is more than double that of the men of our Army who were killed at the Front during the first year of the war.
>
> Amongst the infants who are artificially fed the mortality is approximately ten times as great as that amongst those who are fed from the breast.
>
> Apart from the deaths there is an enormous number of children whose health is undermined at the start and who become drags on the nation throughout their lives.

It is held to be no exaggeration to say that if the mothers of these children could be taught to rear them properly and to give them the requisite care and attention, and if the nation at the same time could ensure a supply of clean, wholesome milk, at least one half of the deaths could be prevented and the health of the race greatly improved.

Milk, which should be the only food of infants, is a governing factor in the situation. Let us see what a pure supply has already done. In New York City, where it is graded according to its hygienic quality and where the poor can get milk of a better quality than the richer classes can buy in England, the number of deaths of children under one year of age was reduced approximately 4,500 per annum as soon as the New York Milk Committee was formed and its activity had resulted in the poor throughout that city being able to obtain clean milk and educational help.

In London one sees, not only in East End slums, but in West End squares, milk exposed, as the milkmen go their

rounds, to the dust and dirt of the streets. Much of it may have already been exposed to other impurities on the farms from which it comes and during transit from those farms. There is no encouragement in this country, as there is in America, for the farmer or the dairyman to produce a better article. As there is no grading the price is always the same, and for any expense to which he may be put in improving the supply he is personally out of pocket. Milk, whether it is good, bad or indifferent, is always fourpence or, as the case may be, fourpence halfpenny a quart. In America, where its hygienic value is more carefully studied, the better qualities fetch a higher price, and it is in the interest there of the farmer and the dairyman, as well as his moral and legal duty, to produce an article that is above suspicion.

One result of the demand for milk of the higher grades is that the educational force that is created spreads at once to all producers, so that the quality of the lowest grade is directly improved.

So many impurities are allowed to get into our milk from the time it leaves the cow in the country till it reaches the consumer in the town, that if it were transparent, like water or beer, probably few would ever drink it. Being an opaque fluid the dust and dirt and other impurities that it contains pass unnoticed. For men and women who take a little with their coffee and tea there is probably, in a general way, not very much harm in drinking such milk, though few would knowingly drink milk contaminated by dirt or manure, but for delicate little children, whose sole diet it is, there is the gravest danger. Impure milk may carry off as many lives as the deadly weapons of war.

Now, if by making great efforts to ensure pure supplies and by selling milk in grades and making it absolutely illegal for any to be sold for ordinary consumption that is below a definite standard New York can reduce her death-rate

amongst children, we in this country can surely take similar measures with beneficial results. The Government, it is true, intends to do something to bring about reform, but it has by no means done enough. Our Government does not move except in response to public demand; therefore public opinion must be aroused as to the necessity of a clean, wholesome supply.

We are glad, therefore, to welcome the advent of the National Clean Milk Society, which has been formed for the purpose of raising the hygienic standard of milk and milk products and of educating the public as to the importance of a clean and wholesome milk supply.

One of the first definite steps that the society has taken in its campaign for clean milk for the nation has been to arrange, through the generosity of a friend, to open a clean milk department in connection with a London Infants' Welfare Centre. Not only will the mothers be able to get clean, wholesome milk from this department, but statistics will be kept of the progress of the children and comparisons made with those who are fed from ordinary supplies.

CONTAMINATED SUPPLIES

IT has been truly said that milk is the only material in the whole range of animal matter that is designed and prepared by Nature expressly as food. Nature has provided that the young shall receive it from the healthy mother in a sterile condition. When, therefore, Nature is thwarted and the milk of the cow is substituted for that of the child's mother, it behoves us to take every care to guard it against contamination.

And yet it is a literal fact that the average sample of milk sold in the West End and the East End of London contains about the same number of bacteria to the cubic centimetre as the sewage as it is received at the City of Birmingham Corporation sewage farm.

Sewage usually contains about 5,000,000 bacteria per cubic centimetre, whilst samples of milk recently purchased in the West End contained as many as 28,000,000, the dirtiest sample found on the same day in Bethnal Green containing 3,200,000 per cubic centimetre.

In all the large cities in the United States clean milk can be obtained—containing less than 10,000 bacteria per cubic centimetre. In England milk of this quality is practically unobtainable, in spite of the assurances of dairymen that their product is "pure."

In the city of Richmond, Virginia, to take an actual example, approximately 40 per cent. of the entire supply during 1912 and 1913 contained less than 10,000, and 76 per cent. contained less than 50,000 bacteria per cubic centimetre. The result of our dirty supply is death and disease that could be prevented.

The nation must be aroused to the necessity of improving our milk. This can only be done by teaching the consumer, the producer, the distributor, the medical practitioner and the sanitary authority the importance of a

more hygienic supply and the means of creating the necessary improvement.

Were milk not opaque the problem would be comparatively easy, but as contamination is not necessarily discernible to the consumer's eye, it is difficult. Sediment at the bottom of the glass advertises the presence of dirt and manure, but the careful dairyman, by straining or centrifuging, usually disposes of such tell-tale evidence, although by such means only a small part of the deleterious matter is actually removed.

Dr. Kerr, of the United States Public Health Service, when a delegate of the Federal Government to the great Conference on Infant Mortality, held two years ago in London, said :

> " I classify supervision of milk supplied in the United States in point of time as representing three epochs—namely, from 1855 to 1880, during which time the object was essentially the prevention of fraud ; from 1880 to 1890, when attention was devoted primarily to dangerous milk ; from 1890 to 1913, during which time the object has been mainly the production of safer milk."

To which epoch do we in England belong ? Clearly to the first ; but let us hope we are now at the end of that period.

Ten years ago a well-known London physician wrote to an American correspondent :

> " The care of milk ? There is no care of milk ; it just takes care of itself from the time it leaves the manure-begrimed hands of the milker, on its way to the railway station, by the train, dragged through the Metropolitan streets to the milk depots, then in the milk carts to the large private house and the smaller milkshops, and finally to the consumer, who fetches it in person and who has as much knowledge of how to

keep the filthy stuff as she has of taming a lion. The sanitary authorities do all they can to prevent adulteration, and for that they possess full powers, but they have no power to compel clean collection and clean transit."

What applied ten years ago applies just as fittingly to-day.

Contaminated milk may be a means of spreading tuberculosis, diphtheria, scarlet fever and other diseases, but the greatest evil caused by impure milk is the mortality and great damage to health amongst infants from diseases of the intestinal tract.

A well-known doctor emphasised this point when he remarked to a parent who attributed to Providence the death of her bottle-fed baby from diarrhœa: "Madam, God did not kill your baby—it was dirty milk."

BOVINE TUBERCULOSIS IN MAN

A VALUABLE pamphlet on bovine tuberculosis in man, written by Dr. Stenhouse Williams and Dr. Harries, was first published in 1913 by the *Reading University College Review*. As much new work has since been carried out on the subject with which it deals, a revised issue has recently appeared. The following information is taken from this publication:

In 1901 Koch, at the International Congress on Tuberculosis, startled the scientific world by asserting that man is practically never infected by bovine tuberculosis. Subsequent research has shown that this statement was erroneous.

Koch based his statement upon the fact that he had been unable to produce tuberculosis in young cattle by human tuberculous material, although he realised that to show that cattle or pigs were not susceptible to human tuberculosis was no proof that the reverse may not occur. As no direct experiments could be carried out, he discussed indirect evidence. He argued that:

> The milk and butter consumed in great cities very often contain large quantities of the bacilli of bovine tuberculosis and unintentionally carry out the experiment which we are not at liberty to make.

He then asserted:

> That a case of tuberculosis has been caused by alimenta (foods) can be assumed with certainty only when the intestine suffers first—that is, when a so-called primary tuberculosis of the intestine is found. But such cases are extremely rare.

Koch's position was that cattle could not be infected by tubercle bacilli of human origin, and that since primary tuberculosis of the intestine in man was extremely rare, it was very improbable that man, considering his many opportunities of infection, was liable to bovine tuberculosis.

The statistics quoted by Koch concerning the frequency of primary tuberculosis in children do not correspond with those obtained in this country. Woodhead, Shennan, Guthrie, Still, Ashby, and Carr have found 286 cases (20·3 per cent.) of primary intestinal tuberculosis in 1,161 post-mortem examinations of tuberculous children. Those who listened to Koch realised the gravity of his statements. Professor Nocard pointed out that M. Chauveau had infected cattle with tuberculosis from human sources. Professor Bang did not agree with Koch's opinions, and stated, what has since unfortunately been proved to be true, that Koch's opinion would be rather detrimental to the work going on in many countries in order to procure wholesome milk for the public.

In the last fourteen years a large body of evidence has been accumulated which seems to prove that a certain proportion of tuberculosis in man is due to the bovine type of bacillus. The evidence may be divided into two main groups: (*a*) experimental, (*b*) statistical. The experimental evidence must clearly be of two sorts: first, the proof or disproof that tuberculous material from human beings can infect cattle; and, second, that man can be infected with tubercle bacilli of the bovine type.

The Royal Commission in their report of 1907 describe results from which one must inevitably conclude that both man and cattle may be infected by the same organism. If this conclusion be true it is necessary to consider the route by which the bovine type of bacillus penetrates man and the material in which it comes. The opportunities for the transmission to the body by the respiratory passages of the air-borne bacilli coming from the lungs of a tuberculous cow are insignificant compared with the abundant opportunities for the transmission to man of tubercle bacilli present in cow's milk.

It is now known that infection of other parts of the body may readily occur through the intestinal tract, and later research has shown that rather than consider the intestinal tract only we must consider the whole alimentary tract, including teeth and tonsils. Stiles has stated that

> the human bacillus is inspired : the bovine is ingested. Both have access to the tonsils. In swallowing tuberculous milk the bacilli are squeezed into the little pockets of the tonsils, where they multiply, and then pass to the upper glands of the neck.

Mitchell, as the result of the examination of the tonsils from seventy-two such cervical glandular cases, has shown that if the tubercle bacillus be brought in contact with the alimentary tract it can penetrate the human system and produce disease.

There is only one material that passes from the cow to man in such a form and in sufficient quantity to be able to produce an appreciable amount of chronic disease. That material is raw milk. Between 9 per cent. and 10 per cent. of the mixed milks sold in our large cities is tuberculous. To what extent does infection take place ?

Park, Krumwiede, and Fraser, working with material from 1,101 cases of tuberculosis, found that amongst 686 aged sixteen years and upwards nine were of the bovine type. On the other hand, amongst 155 cases of children between five and sixteen years there were forty-two, and amongst 260 children under five years old eighty-seven that showed the bovine type.

These and other investigations clearly show that a very definite proportion of tuberculous disease, at any rate in children, is due to bovine infection, and that the persons most liable to this infection are those who drink most milk.

We find from data published by Sir George Newman, in his report for 1914, evidence to show that the diminution

of the death-rate at all ages from those forms of tuberculous disease chiefly produced by milk has not been quite so great throughout England and Wales within the last seven years as the diminution in the death-rate at all ages from tuberculous disease of the lungs. In Manchester the proportion of tuberculous milk has fallen from 17·2 per cent. in 1897–8 to 5·14 per cent. in 1909 as a result of more careful control; and Professor Delépine, who is responsible for the work, has published figures to show that the death-rate from tuberculous diseases other than pulmonary tuberculosis has diminished in Manchester at a greater rate than that for all other causes and for pulmonary tuberculosis, and he ascribes this result to the improvement in the milk.

Dr. Stenhouse Williams and Dr. Harries conclude that on the evidence at present available one-quarter to one-third of the deaths from non-pulmonary tuberculosis at ages 0–16 is due to the bovine type of bacillus—that is to say, about 3,000 deaths each year—and that inasmuch as it is usually supposed that for every death there are at least ten people suffering from the disease, bovine tuberculosis is responsible for 30,000 cases of illness at any one time.

THE ERADICATION OF TUBERCULOSIS

CONSIDERABLE attention has been called in recent years to the necessity of preventing children from contracting tuberculosis from cows' milk. About ten per cent. of the milk offered for sale in this country is tuberculous.

Dr. A. Philip Mitchell published in the *British Medical Journal*, on January 17th, 1914, the results of an investigation into the infection of children by the bovine tubercle bacillus. He examined the diseased cervical glands of seventy-two children under twelve years of age. Thirty-eight of these children lived in Edinburgh, and six came from districts within a radius of twenty miles. Eighty-four per cent. of those of two years of age and under were fed on unsterilised cows' milk.

Amongst the children under five he found that 8 per cent. suffered from the human and 92 per cent. from the bovine type of tuberculosis. From five to twelve years of age 10 per cent. suffered from human and 90 per cent. from the bovine type.

No one can dispute the necessity of eliminating tuberculosis amongst cattle. The question is how it can be done. The Government has provided, through the Board of Agriculture, that cows suffering from tuberculosis of the udder, or from emaciation due to tuberculosis, shall be slaughtered, the owner bearing the smaller part of the cost of compensation to himself for the cow's "value" and the ratepayer and tax-payer the larger part.

We shall never eradicate tuberculosis by this means. Cows so suffering are, of course, great sources of danger. But their elimination touches only the fringe of the problem, as it is estimated that less than 2 per cent. of the

entire number of cows in the country come under this category, whilst probably 30 per cent. suffer from the disease in one form or another, many of which are capable of spreading it to other cattle. Moreover, milk from non-tubercular cows frequently becomes contaminated if, as almost always happens, it is left standing in the cow barn in uncovered pails whilst other cows are milked.

The National Clean Milk Society believes that the problem can only be solved by the Government, acting through the authorities responsible under the Milk and Dairies Act. These authorities should aid those farmers who wish to maintain a tubercle-free herd to determine, by use of tuberculin, which cows are in any way affected by the disease, and such cows should be withdrawn from the herd and slaughtered, or, at any rate, dealt with in some manner that is satisfactory from the point of view of public health and of economy. The herds should remain under the supervision of the proper authority, the owner holding some sort of renewable certificate so long as they contain no animal reacting to the tuberculin test.

A farmer owning such a herd would be encouraged, because the milk dealer would be enabled to pay him a higher price for his product owing to the fact that it would command a higher price from the public. It is essential that farmers should receive a higher price for milk from tubercle-free herds because the maintenance of such herds necessitates the owner rearing his own young stock, which consumes a large part of the pasture that otherwise would be utilised for the cows actually producing milk, and it is on this latter class of animal that the dairy farmer depends for his profit.

Many milk dealers offer milk from "tuberculin tested cows," but such descriptions are usually valueless. There is no means of knowing at what period of their careers cows so described have satisfactorily passed the test,

whether they have since contracted the disease, whether their milk has been contaminated by tubercle from other cows whilst in the cow barn, or whether it has been mixed with milk containing tubercle bacilli. An entire herd free from tuberculosis is the only safe source of milk, and in this country such herds are almost non-existent, because no inducement has been offered to farmers to provide them.

The *National Clean Milk Society* will urge upon the Government this plan of helping the farmer to maintain a tubercle-free herd as one step towards the improvement of the general milk supply.

VISIT TO A MODERN FARM

THE contamination of milk occurs in four places :—

1. On the farms where it is produced.
2. In transit from these farms to the towns.
3. In the dairies of the towns to which it is transported and during distribution.
4. In the houses of the consumers.

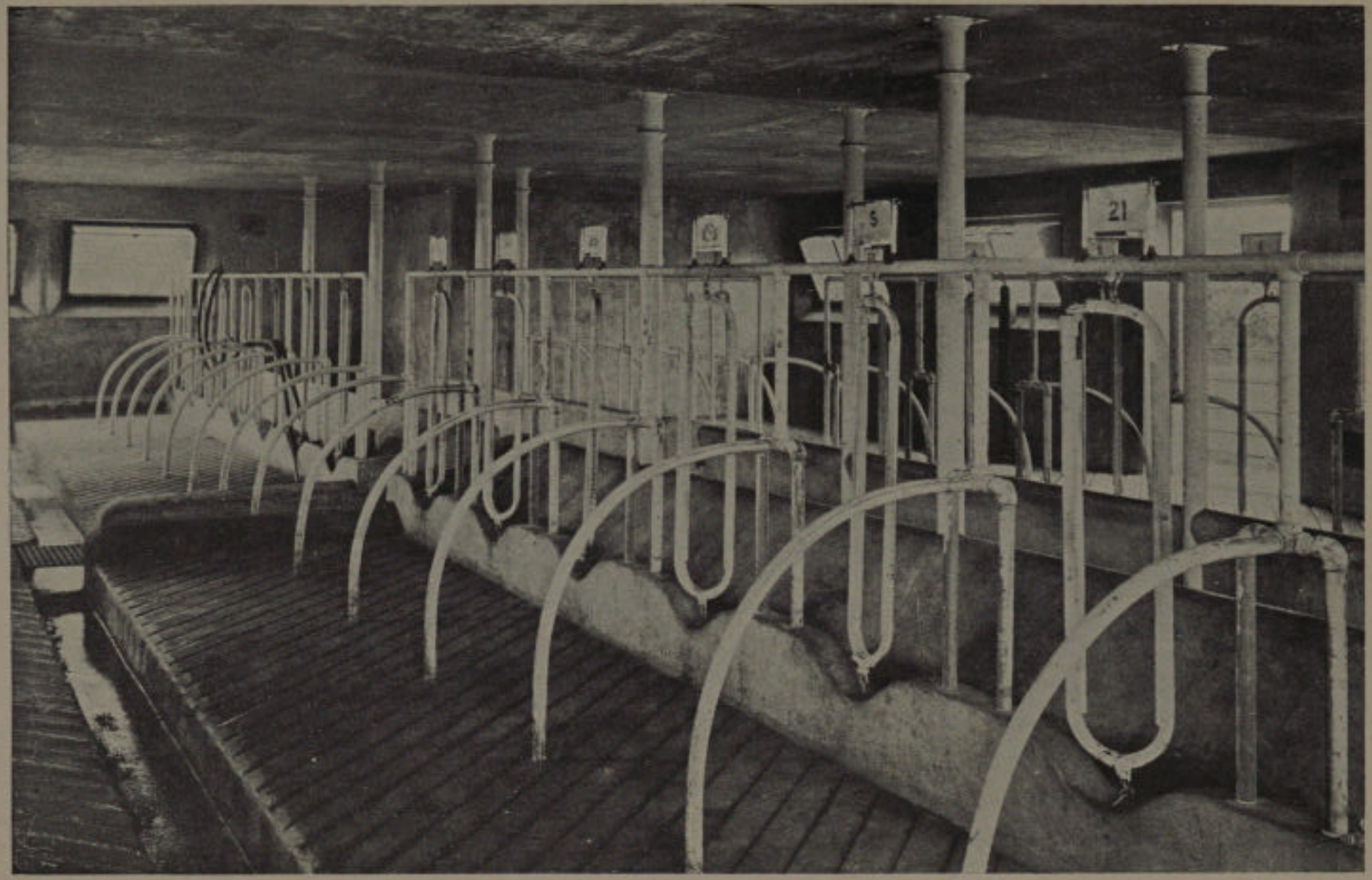
In order to show how contamination may be prevented at the farm, let us take as an example the farm that is to supply the Infants' Welfare Centre in London in connection with which the National Clean Milk Society is opening a clean milk department.

This farm is not "a rich man's hobby." It is typical of scores of dairies in the United States where high-grade milk is produced. It has a herd of a hundred cows. The owner breeds his own heifers. When, originally, cows were bought they were placed on arrival in an isolation hospital and tuberculin tested. If they passed that test they went into the herd and were retested at the end of three months and after that annually. If they failed to pass the test they were disposed of as tubercular.

Light and air, which Nature has provided free, are the essential features of the farm. Half of the entire roof area of the sleeping barn is glass, letting in sun all the year round. In the walls are large hopper windows, which are always open at the top, have wings at the side to prevent draughts, and, being without hinges, can be removed altogether at any time.

The "standings" in this barn are 5 feet, with a 2-foot manure trough immediately behind. On most farms in this country standings, if they exist at all, are usually too long, with the inevitable result that the cow lies with her udder and hindquarters in her own manure.

Clean milk could be produced, if proper precautions



24A. Interior of a modern cow-shed constructed entirely of concrete and metal.

24B.

Interior of a modern cow shed constructed entirely of concrete and metal.

were taken, were the usual practice to be followed of milking the cows in the same barn in which they sleep. There is, however, on this farm a special milking barn, in which a squad of twenty-five cows can be milked at a time. In the case of milking in barns where the cows sleep it is essential that the manure should be removed before milking —a duty which is rarely, if ever, performed in this country. And the manure heap ought never to be within thirty yards of the barn. Here it is seventy or eighty yards distant.

The milking barn is scrupulously clean. The walls, the floor, the ceiling and the mangers are of concrete. The stalls are of metal piping. Everything can be, and is, washed down immediately after milking. The milking stools are thoroughly cleaned with hot water and sterilised once a week.

When the cows come into the barn they are groomed. Care is taken to keep the hair on the udder closely clipped, and the udder and teats are washed, and wiped with a damp cloth immediately before milking.

The milkers, men and women—for there are four young women working on this farm for patriotic reasons in order to free men for the front and do their utmost to help to produce the food of the nation—wear clean overalls and caps. Their hands and nails are clean, and they milk with a dry hand.

Contrast this with the method of the wet hand, which is almost invariably practised. The one is clean, the other is dirty and disgusting. Only the other day a medical officer of health, in a report, referred to the " practice " of spitting on the hand before milking.

Another necessary precaution that is taken by the milkers is to put the head as little as possible against the side of the cow. When the head is pressed, as it often is, against the animal, dust from the hair inevitably falls into the milk. Fastened to the dress of the milkers is a small piece

of towelling, on which, if necessary, the hands may be wiped.

The milk is milked into a hooded bucket through a $4\frac{1}{2}$-inch hole, and the moment that each cow is milked the bucket is removed from the barn to the milk room, twenty yards away. For greater cleanliness and convenience the milkers do not enter this room at all. They pour the milk into a receiver placed against the outside wall which communicates, by means of a removable pipe, with the strainer inside the room through which the milk passes into a receptacle from which it flows over the cooler. The entire apparatus is sterilised and put in place immediately before the morning and the afternoon milking.

The milk is cooled to as near the temperature of 33° F. as possible, and from the cooler it falls into bottles or churns, as the case may be, in which it is transported.

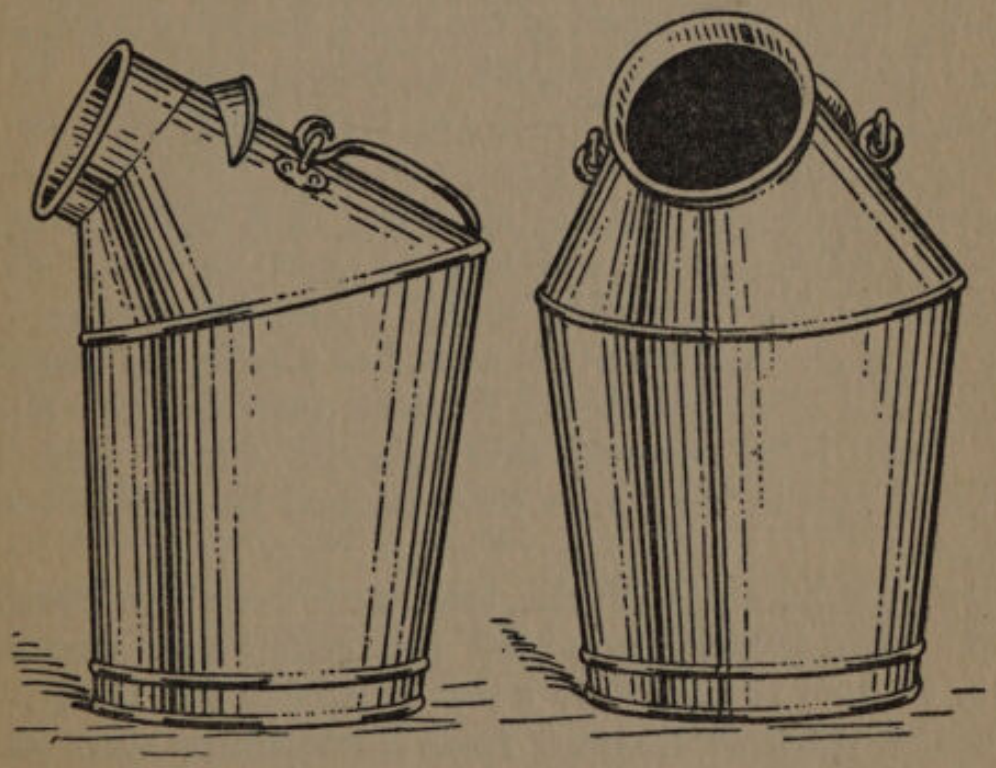
All the bottles are soaked, cleaned and sterilised in a special machine, and are filled without being touched by the hands.

By means of an automatic machine, which does away with the possibility of contamination from the fingers, a sterilised disc is fitted to the mouth of the bottle. The top of the bottle is then covered by means of another machine with a paper cap, which is automatically fastened with wire, thus protecting from dust and dirt the lip of the bottle over which the milk must ultimately be poured.

Proper sleeping and living quarters, including a bathroom, are provided for the employees, for, apart from other considerations, it is realised that to get good results one must have good workers, and good workers deserve good housing.

The effect of all this extreme care is immediately demonstrated in the bacterial count of the milk. The average London milk supply has been found on numerous occasions to contain approximately four million bacteria

to the cubic centimetre, or teaspoonful. On the occasion of the *Observer* representative's visit to this farm there was an official letter posted in the dairy stating that a sample of the milk taken in London without the knowledge of anyone on the farm contained less than one thousand bacteria per cubic centimetre. Great as is the value of the quality of the milk produced, of still greater value is the educational influence that is exerted by a modern dairy of this character.



An excellent form of modern milking bucket, so shaped that every part of the inside can be seen.

WHAT CAN BE DONE BY THE SMALL FARMER

A DESCRIPTION was given in last Sunday's *Observer* of a visit to a modern farm with a hundred cows on which really clean milk is produced. It is obvious that for such a farm a considerable investment of money is necessary. Many of the farmers could not undertake the responsibility even if they wished to do so. The question, therefore, arises whether and, if so, how such farmers can produce similar results if they have not the means at hand for sterilising buckets and churns and adopting all those sanitary measures that were there described.

A most interesting and reassuring answer to this question is to be found in a report of the State Board of Agriculture issued by the Commonwealth of Massachusetts. In this report Dr. Charles E. North, of New York, tells us that during an experience of five years as a "certified milk" producer he found, to his surprise, that milk containing numbers of bacteria, which were just as small as the numbers in his "certified milk," could be produced not only in old cow stables of his own, but also in the insanitary cow stables of neighbouring farmers, provided the milking was done into covered milking-pails which had been sterilised and by men who were trained to milk in a clean manner.

The surroundings of the cow, and even the condition of the cow herself, provided the udder was reasonably clean, seemed to play only a minor part in the result.

In the town of Homer, New York, there were at the date of the report twenty-nine dairy farmers, producing 6,000 quarts of milk daily by a system which was organised by the New York Milk Committee to demonstrate that the rank and file of dairy farmers are perfectly capable at small expense of producing clean and satisfactory milk.

In this case an old shipping station was purchased in Homer and completely equipped with washing, sterilising, cooling and bottling apparatus. Each morning the farmers who patronise the station exchange their utensils of the previous day for a complete outfit of milk-cans which have been washed and sterilised and of covered milking pails which have a removable cap over the opening, in sufficient number to provide for both their night's and morning's milking.

At milking time they milk into these covered milking pails, and when each pail is filled the milk is poured into the 40-quart cans, which are standing in watertight cooling troughs, with which the farmers are also provided.

There is at the central station a laboratory, where all the milk is tested for butter fat and examined for its bacterial content every day. That the system has been entirely successful is illustrated by the official table, which shows that the numbers of bacteria in the milk were in only one case as high as 21,000 per c.c.; that usually they were between 1,000 and 2,000, and that occasionally they were as low as 700 or 800.

So valuable, indeed, have been the results achieved that a number of co-operative societies and other large milk dealers in the United States have been working during the past two or three years upon the same system. The inducements that are offered to dairy farmers for the adoption of these sanitary measures consist in the payment of premiums over and above the market price of milk.

In the case of Homer, for example, one premium is paid for milk from herds that are entirely free from tuberculosis, and a second—and most important—for all milk containing less than 10,000 bacteria per cubic centimetre. There is also a premium for butter fat. Finally, there are three prizes, first, second, and third, for the men who produce

the milk containing the smallest numbers of bacteria during the month.

If it is admitted, Dr. North says, that the most powerful factor in bringing about the adoption of sanitary measures is the economic factor, then the solution of the milk problem lies primarily with the milk consumer. When the milk consumers in our large cities are sufficiently aroused to be willing to pay the small increase in retail price which is the cost of cleanliness, clean and safe milk will be quickly obtained.

As to the amount of this increase, the New York Milk Committee have shown that clean milk can be produced at no more than three-quarters of a cent (three-eighths of a penny) per quart above the regular market price of milk, including the extra cost entailed by the extra work at the central station previously described. If in addition to other sanitary precautions the cows are tuberculin tested, another half a cent (one farthing) per quart has to be added. Consequently, for about three farthings per quart above the regular market price of milk a milk is obtained in America which is essentially clean, which contains small numbers of bacteria, and which comes from tuberculin-tested cows. And what has been done in America could undoubtedly be done just as successfully in this country. If three farthings were to be paid to the farmer and another farthing to the retailer, consumers would be able to buy for an extra penny per quart milk of a quality that is at present practically unobtainable in this country.

The milk produced at Homer is now purchased by the city authorities of New York and sold to the poor through the Infants' Welfare Stations. Consequently the New York poor can get what even the rich in London cannot obtain. If this statement be doubted, let anyone wishing to verify it take steps to have the milk that he receives bacteriologically examined.

HOW TO IMPROVE DAIRY FARM CONDITIONS

ONE of the first practical steps taken by the National Clean Milk Society in their endeavour to raise the hygienic standard of milk in this country and to improve the methods of dairy farming was to adopt the score-card * system for the inspection of the farms. It is a system of giving credit for good conditions in equipment and methods and taking off points where they are unsatisfactory.

The system owes its origin to Dr. William C. Woodward, Health Officer of the District of Columbia, U.S.A. So rapidly has it grown in favour in America that it is now in use in most of its leading cities. In this country Birmingham, Bradford, the Agricultural Organisation Society, and the Reading University College have adopted the National Society's card, and other towns and agricultural associations are considering its value at the present time.

The essence of the system is the assigning of a number of points to as many conditions as possible, and the rating of each condition according to its deserts, on the basis that the total number of points represents perfection.

For example, in equipment six points would represent perfection if the cows are tuberculin tested and thoroughly healthy. Other points are given for the construction, ventilation and provision for light in the cowshed. The construction and condition of the utensils and the location and construction of the milk room offer further opportunities for scoring.

In methods points are given for the cleanliness of the cows, cowsheds, and milk room, for the care and cleanliness of milking, for the cleanliness of the attendants, the conditions of cooling, and so on.

* Copies of score cards or of the score-card pamphlet can be obtained from the Hon. Secretary of the National Clean Milk Society.

The aggregate number of points is a hundred. It is highly probable, Mr. J. Mackintosh, Lecturer on Dairy Farming at Reading University College, considers, that the number gained by the average English farm would be round about fifty. But attention to details, requiring but little extra time, would soon, he thinks, raise the score to sixty or seventy, and the increase would represent a most marked improvement in the cleanliness of the milk produced.

The average score of the farms supplying six American cities rose, indeed, nearly ten points in a single year, and at the same time the bacterial content of the milk produced on those farms appreciably diminished.

For simplifying the work of dairy inspection the score card, wherever it is used, has been found invaluable. It is of very great importance as a means of educating the farmer, for the inspector should invariably furnish him with a copy of the rating of the farm and he can thus see immediately the places where he is deficient in his equipment or in his methods.

It is equally important as a means of giving very necessary information to the inspector himself, for too little attention has been given in this country to the education of sanitary inspectors in regard to clean milk production. The majority of them, and for that matter of the authorities on whose behalf they act, pay some attention to such a question as the whitewashing of walls, but very little to the cleanliness of the cows' udders, the milkers' hands, or the utensils in use, which is of far greater importance.

Based upon common sense, the advantages of the score card in accuracy and fairness commend it to all who take the trouble to give it careful consideration. The United States Department of Agriculture, reporting on the system, says :

All the essential facts of importance regarding equip-

SANITARY INSPECTION OF DAIRY FARMS.

SCORE CARD

Recommended by the Certified Milk Producers' Association and the National Clean Milk Society.

Occupier of Farm .....

Owner of Farm.....

P. O. address.....

.....

Total number of cows.....Number in milk .....

Imperial gallons of milk produced daily.....

Product is sold to.....

.....

.....

Date of inspection ..... 191.....

REMARKS :.....

.....

.....

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(Signed).....

EQUIPMENT.	SCORE. Perfect	Allowed	METHODS.	SCORE. Perfect	Allowed
COWS.			**COWS.**		
Health	6		Cleanliness of cows	8	
Apparently in good health 1			(Free from obvious dirt, 6.)		
If tested with tuberculm within a year and no tuberculosis is found, or if tested within six months and all reacting animals removed 5			**COWSHEDS.**		
(If tested within a year and reacting animals are found and removed, 3.)			Cleanliness of cowsheds	7	
Food (clean and wholesome)	1		Floor 2		
Water (clean and fresh)	1		Walls 1		
COWSHED			Roofs, rafters and ledges 1		
Location of cowshed	2		Mangers and partitions 1		
Well drained 1			Windows and artificial lights 2		
Free from contaminating surroundings 1			Stable air at milking time	4	
Construction of cowshed	4		Freedom from dust 2		
Impervious floor 1			Freedom from odours 2		
Raised standing space and efficient gutters 1			Cleanliness of bedding	1	
Impervious walls and easily cleaned ceiling or roof 1			Yards around cowshed	2	
Proper stall and manger 1			Clean 1		
Provision for light	5		Well drained 1		
Daylight, 3 sq. ft. per cow 3			Removal of manure daily to 50 feet from cowshed	2	
(2 sq. ft. per cow, 2; 1 sq. ft. per cow, 1. Deduct for uneven distribution.)			**MILK ROOM OR MILK HOUSE.**		
Artificial light 2			Cleanliness of milk room	3	
Ventilation	6		**UTENSILS.**		
Air space per cow, 600 cub. feet 3			Care and cleanliness of utensils	10	
(Less than 600 cub. ft., 2; less than 500 cub. ft., 1; less than 400 cub. ft., 0)			Thoroughly washed 3		
Provision for fresh air 3			Sterilized in live steam for 15 minutes 3		
Air inlets and outlets through walls, 1; and roof, 1; windows to open widely, 1.			(Placed over steam jet, or scalded with boiling water, 2)		
Bedding	1		Protected from contamination 3		
Facilities for cleansing	1		Cleanliness of milking stools 1		
(Water supply for washing stalls, gutters and gangways, and for hands of milkers.)			**MILKING.**		
UTENSILS.			Care and cleanliness of milking	12	
Construction and condition of utensils	1		Clean, dry hands 4		
Water for cleaning	1		Udders clipped 3		
(Clean, convenient and abundant)			Udders and flanks washed and wiped 4		
Small-top milking pail	4		(Udders cleaned with moist cloth, 3; cleaned with dry cloth or brush at least 15 minutes before milking, 1)		
Steam	1		Fore milk discarded 1		
Milk cooler	1		**HANDLING THE MILK.**		
Clean milking suits	1		Cleanliness of attendants in milk room	1	
MILK ROOM OR MILK HOUSE.			Milk removed immediately from cowshed without pouring from pail	2	
Location: free from contaminating surroundings	1		Cooled immediately after milking each cow	1	
Construction of milk room	2		Cooled below 50° F.	5	
Separate rooms for washing utensils and handling milk	1		(Cooled below 54° F. 3)		
			(Cooled below 58° F. 2)		
			Transportation below 50° F	1	
			Transportation in proper vessels	1	
Total	40		Total	60	

Equipment ..... + Methods ..... = ... **Final Score.**

NOTE 1.—If any exceptionally filthy condition is found, particularly dirty utensils, the total score may be further limited.

NOTE 2.—If the water is exposed to dangerous contamination, or there is evidence of the presence of a dangerous disease in animals or attendants, the score shall be 0

ment and methods are tabulated in an orderly manner, and numerical weight is assigned to each point in proportion to its importance.

The inspector takes up each point in detail and enters on the score card a number expressing his opinion of the relation that the condition in question bears to the standard of perfection. The total score represents his very carefully analysed opinion of the condition of the dairy as compared with the standard of perfection followed.

Whilst local authorities in this country are considering the question of its adoption, public and private consumers of large supplies of milk, such as schools, colleges, and hospitals, would find the card of immediate use in enabling them to have at one and the same time a definite statement of the conditions under which their milk is produced and suggestions for improvement.

Farmers and others interested in producing a high-grade article would also find the use of the card by and for themselves highly instructive, while students of dairying should find it very useful for developing accuracy of observation and power of judgment.

Since this article was written a letter has been received from Mr. Ernest Kelly, in charge of the Market Milk Investigations, United States Department of Agriculture, Washington, D.C., in the course of which he states: "I have been much interested in reading the pamphlet to see that the score-card system of dairy inspection is being adapted to use in England. The score card has been a very potent factor in dairy improvement in this country, and has probably done more than any other single thing in improving the sanitary conditions of the milk supply."

CONTAMINATION IN TRANSIT

ONE great obstacle at the present time to a clean and wholesome milk supply is to be found in the methods of transportation. With two or three exceptions the railway companies charge as much for carrying milk in quart bottles fifty miles as it costs the farmer to produce it.

The general freight rate for carrying milk in bottles packed in special cases is six times as much as that for taking the same quantity in churns, although the actual weight conveyed by rail is no more than double. The natural result is that no attempt is made to carry it in this way, although it is by far the best.

Meat is carried in refrigerated vans, but milk, which is far more perishable, is not. If milk is kept warm it quickly deteriorates, and often it becomes sour before it reaches the dealer to whom it is consigned, the annual loss to the farmer in consequence being considerable. When it does not become actually sour a good deal of it reaches its destination in such a poor condition that many dealers, unknown to their customers, sterilise it in the hope of making it keep until it is out of their hands. If refrigerated cars were provided and used only for carrying milk these evils would be remedied.

The type of churn which is almost invariably in use is apparently designed solely with a view to the ease with which it can be handled, and with no consideration whatever for the care of the milk that it contains. It is so deep that it is exceedingly difficult, if not impossible, without special cleaning machines—which few, if any, farmers possess—to scrub it thoroughly.

Its lid is usually fitted inside the neck in order that the milk that wells up over it whilst it is being handled shall not be lost, but shall run back again. It does run back again, and the dirt and dust that have fallen on the churn

are washed back with it. Nor are instances rare of such objects as crates of live fowls being placed on top of the churns in the railway vans—a true but unpleasant fact.

The porter or anyone handling the churn usually spins it along with one unwashed hand on the unprotected rim, thus ensuring one more source of contamination. A common practice, moreover, that can be seen daily at almost any large station is for milk to be dipped or poured from one churn to another in the midst of the dust and dirt of the traffic.

How can milk as it reaches the consumer be fit to drink under such circumstances as these? Ask yourself the question whether you would permit drinking water to be handled in such a way. The difficulty is that milk is opaque and the dirt that it contains cannot be seen. As drawn from a healthy cow it has no bacteria, but as it reaches the consumer in our large towns, whether he is rich or poor, it usually contains as many bacteria as are to be found in sewage.

It is one of the objects of the National Clean Milk Society to induce railway companies to provide refrigerated cars to be used solely for the transportation of milk and to offer reasonable rates for its carriage in bottles.

THE LAST STAGES OF CONTAMINATION

THE last stage in the career of milk between the cow and the consumer is more nearly under the public eye than those that have been described previously. Yet it is one of the most damaging to its hygienic value. It has passed through the vicissitudes of the farm and the railway. Our last article described the treatment that it receives before it reaches the dealers. Now let us see what happens to it afterwards.

A certain proportion is at once carted to the premises of the large dealers. The few who have the very best equipment proceed at once to "clean" the milk. The most thorough method of "cleaning" is by the use of a "clarifier," which, by the aid of centrifugal force, leaves as a deposit on the inside of the machine an unappetising mass known as "slime." This "slime," most of which is present through the carelessness of the farmer, consists, amongst other things, of udder waste, blood, pus, manure, dust and bacteria from udder inflammations—the latter being a frequent cause of septic sore throats.

At the most carefully conducted dairy the milk is then bottled and sealed. One difficulty that such dairy owners have to contend against is that householders do not take the care they should to ensure the return of the empty bottles. A request for their return is too often answered by a change on the part of the purchaser to another dairyman, who is willing to bear such loss with less complaint in order to hold his trade. This is one way in which the careless buyer discourages the conscientious dealer.

The vast majority of dealers simply strain the milk, thus only removing the matter that is apparent to the eye. Many of them do not clean the churns properly, but content themselves with wiping them with a rag and then

rinsing them by pouring water from one churn into the next.

Except in the comparatively rare case of the dealer who bottles the milk on his own premises, this most easily damaged food is poured into churns—always clean on the outside if not on the inside—and these churns are taken to the consumer's door, where, amidst the dirt and dust of the open street, it is poured into the small measure and taken into the home. Sometimes it spends hours on the doorstep before being taken into the house.

The small dealers, or many of those supplying hospitals, institutions or milk shops, pour or dip the milk from one churn to another in the cart that conveys it from the railway station. Where the delivery is being made directly from the cart to householders who might notice the obvious dirt the precaution of straining is usually taken.

How few people take care to guard the milk from contamination when they have received it. It should always be kept carefully covered and as cool as possible ; yet, more often, it is left exposed to the air, and to that dangerous enemy of the human race, the fly.

Coercion will never provide a clean milk supply. It is only by education that such a result can be brought about—education of the producer, the distributor, and the consumer. The solution of the difficulty lies in the hands of the public. They must realise that until they demand clean milk they will not get it and they must be willing to bear their share of the financial burden.

Really clean milk costs more to produce than dirty milk—and it is worth far more. However, the general standard of our supply can be raised immensely by the force of education alone, for whilst such necessities as tubercle-free herds, or the process of bottling on the farm or at the dairy, costs money, for which the consumer must pay, yet the simple decencies that are now usually omitted can be supplied at no cost whatever.

LICENSING MILK DEALERS

THE Medical Officer of Health of one of the London boroughs has had analyses made of one hundred samples of milk purchased in his district. Ninety-nine were found to contain manure ; it is uncertain whether the hundredth contained manure or not.

All kinds of foreign substances exist in these samples—sand, ashes and even an earwig. The responsible authorities must be aroused to the necessity of enforcing more thoroughly the powers they now have to guard the milk supply. Fuller powers, moreover, must be given them, so that dealers and producers cannot, either through ignorance or indifference, contaminate the food on which the lives of so many of our children depend.

Dairy farmers, wholesale dealers and retailers, should be licensed, and their license should be renewable annually, and should be cancelled if the conditions and methods employed are found by properly trained dairy inspectors to be below a certain standard. When milk is sold in grades based on its cleanliness, determined by analyses of its bacteriological contents, all dealers should state, when making application for their license, what grade or grades of milk they intend to handle, and they should only be permitted to sell the grades designated.

At the present time any casual observer, either at the farm or in the streets of any of our cities, can see things that should make anyone interested in infant welfare or in common decency revolt against the conditions under which milk is sold and produced.

A few weeks ago the Director of Education of one of our counties had occasion to visit a farm, where he noticed half a dozen pails standing in a cow barn filled with what appeared to be brown wash. It occurred to him that

the farmer was about to colour his cow barn walls brown, and on asking what was in the pails the reply was—Milk !

The writer of this article visited at milking time a farm that supplies one of the most expensive schools in England. The head milker was milking with a wet hand into an open bucket. He was asked if he would allow his hand to be scraped. This was done with the blade of a knife, and a mass of milk-saturated manure, big enough to cover a sixpence, was removed from the man's hand.

The writer then spoke of the benefits of the modern covered bucket as a means of preventing dirt falling into the milk ; and, pointing to what appeared to be a large bluebottle floating on the surface of the milk in the bucket into which the man was then milking, said that a covered bucket would have prevented that fly from drowning.

The milker dipped his hand into the bucket, allowed the milk to run between his fingers, and, looking at what he had caught, remarked with evident approval, " That isn't a fly—it's muck ! " and shook it back again into the milk.

Not far from the office of the National Clean Milk Society a dealer, before beginning to distribute his milk, every day " washes " his churns by rinsing water from one into the other whilst they stand in the gutter of the street in front of his shop. He mixes the milk with a metal stirring appliance which he stands on the dirty pavement when he needs to put it down between operations.

One day last week he was pouring milk from other churns into the " clean " ones, when it happened that in the middle of the street, exactly opposite his churns, the corporation refuse cart pulled up. One man busied himself in emptying the garbage cans, whilst another swept up shovelfuls of mess within five yards of the churns and threw it into the cart.

Such episodes as these are in no way unusual, and demonstrate the abysmal ignorance in which so many who

handle milk are steeped and the absolute need of education and of improvement in the supervision of the entire industry. Licensing would put a powerful instrument into the hands of the authorities.

Photograph of a culture on an agar plate (reduced) containing 1 *ten-thousandth* of a cubic centimetre of milk purchased in London, produced and distributed under ordinaryconditions. This sample contained 21 million bacteria per c.c.

Photograph of a culture on an agar plate (reduced) containing 1 *thousandth* of a cubic centimetre of milk purchased in London, produced *and bottled* at a clean Farm. This sample contained no bacteria.

CERTIFIED MILK

THE previous articles in these columns on the campaign for clean milk have been written with the hope that they may bring home to the nation, and particularly to mothers, the absolute necessity of improving the quality of our milk supply. The exact quantity of the cream in milk is of comparatively little interest. It is the cleanliness of the supply that matters.

Dirty milk not only kills thousands of young children, but it so undermines the health of an enormous number in their early years that they never become the strong men and women they would if they received a proper start in life.

The problem is to bring about the necessary improvement. The public must be taught that milk is not simply a food to be sold at a fixed price. Like all other commodities, its price should be regulated by its value, and as its chief value depends almost entirely upon its cleanliness it must be sold in grades based upon cleanliness, always provided, of course, that it has not been adulterated and that the fat has not been abstracted.

There is an important clause in the Milk and Dairies Act which gives the Local Government Board power to prohibit the use of the term "certified milk" except for that produced and distributed under conditions which they will define.

At present many dealers offer at an enhanced price "nursery" or "invalids'" milk, which is almost always identical in quality with the ordinary milk sold by the same firms, and for which the producer is paid the same price by the dealer. As a matter of fact, it usually only becomes "nursery milk" when it is offered for sale.

Those responsible for the insertion of this clause in the Act intend that "certified milk" shall be the highest

grade that can be produced. The public will not have to depend upon the assertions of dealers or producers that it is above suspicion, but will be assured by an unquestionable authority in whom they can place entire confidence that it is what it purports to be.

"Certified milk" must be produced on farms where the general conditions and the health of the employees and of the cows are under constant supervision; and, moreover, it must be bottled on the farm in order to prevent subsequent contamination, and the date of its production must be marked on each bottle.

At the place of delivery—not of production—a sample must be taken at least once a week, and an examination must be made to ascertain its bacterial content, for inasmuch as milk from a healthy cow is usually entirely free from bacteria when drawn, the quantity that is found when it is examined is the only sure way of determining the care or the lack of care with which it has been handled. Certified milk must not contain more than 10,000 bacteria per cubic centimetre. Contrast this with the average London supply at the present time, which contains about 4,000,000.

The clause as accepted by the Government during the Committee stage of the Bill enabled the Local Government Board to provide for another grade of milk which would have been inferior to certified milk, but vastly above the quality of our general supply. Unfortunately these proposals were opposed by a small number of Members of Parliament, some of whom keep cows and others represent districts containing a large number of small dealers who feared that their trade would be damaged if high-grade milk were to be offered for sale.

They used two arguments. One was that they wished the Bill to provide that all the milk in England should be clean and pure—a pious wish with which everyone will

agree. The second was that if some milk were known to be better than other milk the sale of the lower quality might be damaged—an opinion with which no one will quarrel. Mr. Herbert Samuel withdrew the request for power to provide a second grade, and the provision for certified milk was then accepted, but again resisted, though in vain, when the Bill came before Parliament in its final form.

" Certified milk " will be expensive, but will be of inestimable value. Whilst those who can afford to buy it will be benefited, its chief value will be educational, for it will be the means of teaching the public the difference between wholesome and dirty milk. At the same time it will teach the producer and distributor how to produce and handle milk so that it shall remain clean. The inevitable result will be an improvement of the general supply, because the gross contamination that now exists can be removed without expense, but education is needed to point the way.

The National Clean Milk Society has undertaken to do its utmost to advocate the authorisation by Act of Parliament of a second grade of milk, inferior to " certified milk," but far superior to the ordinary supply.

PASTEURISATION

IT cannot be too much emphasised that infants should be breast-fed whenever possible; no other milk will adequately take the place of that supplied by nature. Many babies, as well as older children, for one reason or another, have, however, to be fed on cow's milk, and therefore the problem arises in what form shall that milk be given. Shall it be in the raw state, or shall it have been treated either by boiling or by pasteurisation ?

We believe that few will dispute that raw milk cannot be improved upon, provided that it reaches the consumer in the state in which it should leave a healthy cow, if that be possible. Such milk can only exist in cases where it has come from most carefully conducted farms and has been handled at each successive stage by carefully supervised and instructed people.

" Certified milk " as produced in America (for which grade of milk special provision is made in the Milk and Dairies Act, 1915) is the only milk that conforms with such a standard. The differences between really clean and ordinary milk are that the latter contains a large number of bacteria, and also that those bacteria have by their action caused chemical changes to occur in the fluid itself.

If the bacteria in dirty milk be killed by any process the milk has already undergone a chemical change, and for this reason no system of freeing milk from bacteria can possibly convert dirty milk into good milk—it can only render it less dangerous.

Pasteurisation and boiling are means of killing bacteria. Boiling necessitates raising the temperature to 212 deg. Fahr., whilst pasteurisation takes place at various temperatures dependent upon the length of time at which such temperature is maintained.

One of the objections frequently raised against pasteurised milk is that the process of heating produces changes in the chemical composition which make it unsuitable for infant nourishment. On the contrary, Dr. Lane Claypon holds that—

> when an animal is fed upon the milk of another species, the milk from which has been found to be suitable for this purpose, such small differences as have been found in the nutritive values of raw and boiled milk have been found in favour of boiled milk.

A series of experiments undertaken by Dr. Ruff on behalf of the United States Board of Agriculture shows that milk pasteurised by the "holder" process at 145 deg. Fahr. for thirty minutes does not undergo any appreciable chemical change, but that certain chemical changes do take place if milk be heated to higher temperatures, but whether they render the milk of less nutritive value is not dealt with.

Professor Rosenau makes a very necessary comment on the object of pasteurisation when he says :

> Pasteurisation should only be used to destroy the harmful bacteria in milk and for no other purpose. It cannot atone for filth. It should never be used to bolster up bad milk. It should never be used as a preservative.

Pasteurisation kills all but a small number of the bacteria usually found in market milk, and it fortunately kills all pathogenic germs. Improper pasteurisation is dangerous, for if the temperature be not sufficiently high or if the milk be held at the proper temperature for too short a time the bacteria increase in numbers, and it is for this reason that pasteurisation of commercial milk should always be controlled by proper authorities. Unfortunately, many people have the idea that when milk has once been pas-

teurised it is immune from contamination, whereas it needs to be kept fully as carefully as raw milk.

Whilst the hygienic value of our milk supply can be vastly improved if the proper steps be taken by our authorities, it is extremely doubtful if the bulk of the milk can be raised to the highest standard, and the decision will have to be made, as soon as the milk problem is properly tackled, whether it will be safer to have our milk pasteurised under proper control or to be sold raw.

In the United States far greater attention has been paid to the milk problem than has been done here. The U.S.A. Government, State and city authorities have led the milk industry in constantly seeking to improve the quality of the supply, and it is therefore of great interest and should be of great help to us to study their decisions. The first step that is being taken by their large cities is that all milk is graded based on its bacterial contents, as well as in some instances on the relative standing of the farm where it is produced, as shown by the score-card system of inspection. Then all but the highest grade is pasteurised, and in some cities, such as New York, even the highest grade must undergo this process. The United States Government has issued leaflets giving directions for the home pasteurisation of milk.

The question of pasteurisation needs to be very carefully considered in all its aspects.

VALUE AS A FOOD

THE value of milk as a food is not sufficiently appreciated in this country. At all times we make too little use of it, and now it is more than ever our duty to rely as fully as possible on home produce.

Milk is a particularly cheap food, one quart being about equal in food value to any one of the following:

$1\frac{5}{16}$ lb. of lean beef	$3\frac{3}{4}$ lb. fresh codfish
10 eggs	$2\frac{1}{2}$ lb. chicken
$2\frac{1}{2}$ lb. potatoes	5 lb. beets
$7\frac{1}{2}$ lb. spinach	$6\frac{1}{4}$ lb. turnips
$8\frac{3}{4}$ lb. lettuce	$\frac{5}{24}$ lb. butter
5 lb. cabbage	$1\frac{5}{2}$ lb. wheat flour
$2\frac{1}{2}$ lb. salt codfish	$1\frac{5}{2}$ lb. cheese

Contrast the cost of any of these with that of a quart of milk. Before the war a quart cost 4d. for the ordinary quality. When it is sold in grades based on its cleanliness and wholesomeness, as it must be, high-grade milk will probably be 5d. This is equal to $\frac{1}{2}$d. for an egg, or 2d. for a pound of chicken.

It has been argued that if the cost of milk is increased by raising the quality less will be consumed. Experience has shown that the reverse is the fact. In New York, where milk is sold in grades, and the quality that is usual in England is forbidden by law to be sold except for cooking, the consumption has risen in ten years 40 per cent. per head of the population.

Those who object to the extra cost of clean tubercle-free milk should concern themselves not with lowering the price that must be paid to the farmer, but with reducing the actual cost of distribution. If co-operation could be established amongst milk sellers one cart could distribute as much as it does at present in a fraction of the time that is now taken.

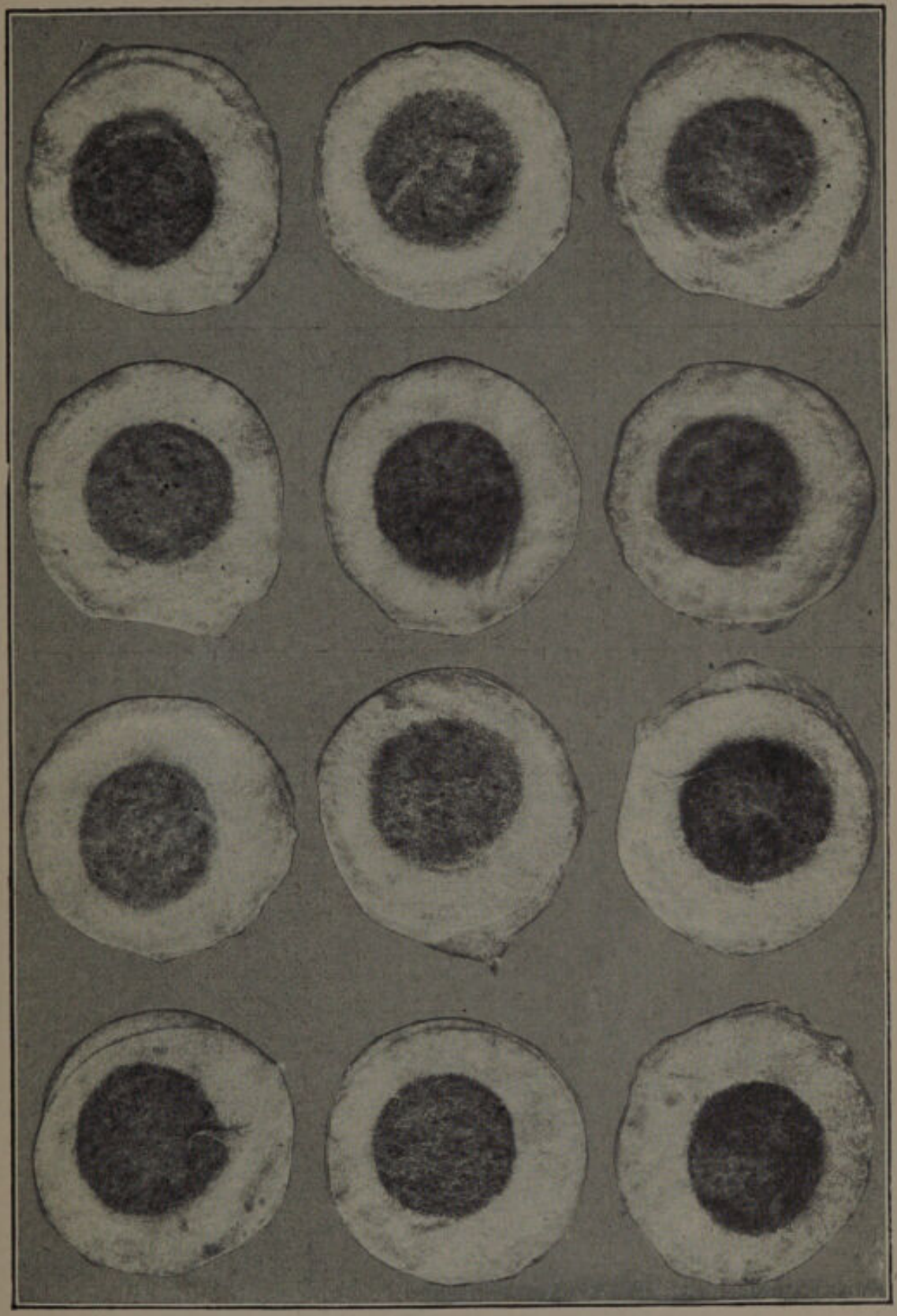
The unnecessary part of this expense is now borne partly by the dealer and in greater part by the consumer. The dealer cannot afford to pay proper wages to his delivery men, and the result is that many of the latter rob the consumer by delivering short measure and selling what is left. This practice is known to exist throughout the trade, and these "perquisites" are called "sparrows." This is one reason why both dealers and men are opposed to the plan of bottling milk at the farm or the town dairy, for if the milk were bottled the "sparrows" would automatically disappear.

If the public will only realise the necessity for a large consumption of clean and wholesome milk the entire nation will be benefited. There will be fewer deaths and less disease amongst young children. Consumers and producers alike will be benefited, and we shall be producing more food at home and buying less from abroad. At present few people except children drink milk. Like all other commodities it needs advertising, and the first step necessary is to make it better worth advertising.

Everyone concerned with the industry is perfectly well aware that our usual methods of production and distribution will not bear the light of day. At present spade work is being done by those officers of health and sanitary inspectors who have the courage to perform their duty by calling public attention to the bad conditions prevailing. For instance, the Medical Officer of Health for Hampshire in his annual report, just published, writes:

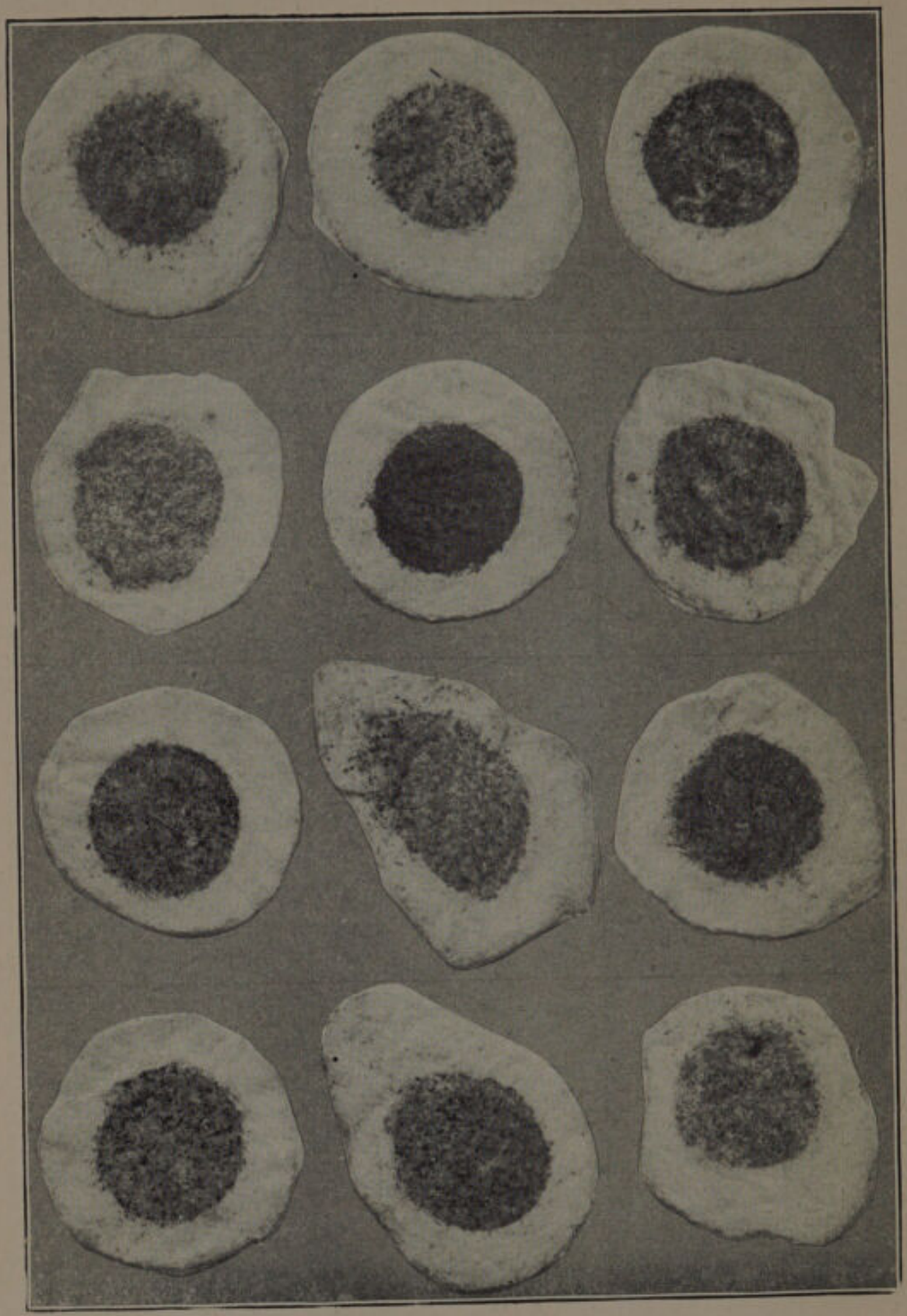
> The conditions under which milk is produced in this county, as in the whole country, continue to be, as a general rule, unsatisfactory. This is due partly to the unsatisfactory legal position and partly to the indifference and apathy of the public, who continue to take their milk supply "on trust."

The Medical Officer of Health for the Rural District



48A.

Photograph (full size) of 12 cotton wool discs, through each of which one pint of milk purchased from a large London wholesale milk dealer who supplies hospitals, has been strained.



48B.

Photograph (full size) of 12 cotton wool discs, through each of which one pint of milk purchased from West End of London milk shops has been strained.

of Whitchurch instances a case where, under the eyes of the medical officer of health and the sanitary inspector, a milker with extremely dirty hands dipped his right hand in the pail of milk before commencing to milk another cow, and, on interrogation, admitted that such was his invariable practice. Undoubtedly the present system of supervision is a failure, and milk in an incredibly foul and polluted condition is being sold generally.

It will be interesting to see whether the Hampshire County Council will take any steps to remedy the evils to which their Medical Officer of Health calls attention. It is in their power to see that their inspectors are trained to really know their work, and that they shall invariably use the score-card system of inspection.

NATIONAL SOCIETY'S PROPOSALS

THOSE who have read the series of articles in the *Observer* on the campaign for clean milk will be interested in the immediate plans of the National Clean Milk Society which have now been agreed upon by the Council. In order to promote the objects of the society, which are to raise the hygienic standard of milk and milk products, and to teach the public the importance of a clean and wholesome milk supply, steps are to be taken :

1. To advocate the use of the score-card system of dairy-farm inspection by local authorities and other bodies having power of inspection.

2. To advocate assistance being given by the Board of Agriculture and other authorities to farmers and dairy owners who wish to free their herds from tuberculosis, and to urge that such authorities should grant renewable certificates to the owners of herds which have been found by the tuberculin or other tests to be free from the disease, so long as such herds remain under the supervision of such authorities.

3. To induce railway companies to provide refrigerated cars to be used solely for the transportation of milk and milk products.

4. To induce railway companies to offer reasonable rates for the carriage of milk in bottles or other special vessels.

5. To promote and assist in promoting legislation making it illegal for any person to open churns or other vessels containing milk or milk products whilst in transit between the farm and the place to which it is consigned.

6. To introduce a score-card system of inspection of milk shops and other places where milk and milk products are sold either wholesale or retail.

7. To advocate and to promote the compulsory annual licensing of all dairy farms, milk shops and places where milk or milk products are sold either wholesale or retail.

8. To promote improvements in the methods of distribution to consumers of milk and milk products.

9. To call the attention of consumers to the necessity and means of guarding milk and milk products from contamination in the home.

10. To promote clean milk exhibitions in London and elsewhere.

11. To promote clean milk competitions.

12. To advocate the authorisation by Act of Parliament of a term or designation defining a grade of milk inferior to "certified milk," but which shall be produced from herds free from tuberculosis and shall contain at the time of its delivery to the consumer not more than 60,000 bacteria per cubic centimetre.

13. To consider and define matters which it is advisable should be incorporated in the Milk and Dairies Orders to be issued by the Local Government Board under Section 2 of the Milk and Dairies Act, 1915, and to take any steps that may be deemed necessary to secure their incorporation.

At no time in our history has it been more important than it is to-day to rear strong and healthy children. The cow is the foster-mother of the nation. The hygienic quality of our milk supply is bad. Death and disease are the natural consequences.

LIST OF PUBLICATIONS recommended and offered for sale by THE NATIONAL CLEAN MILK SOCIETY (Incorp.) at Sixpence each, post free prepaid

A STUDY OF THE BACTERIA WHICH SURVIVE PASTEURIZATION, by S. Henry Ayers (Bacteriologist) and William T. Johnson, Jr. (Scientific Assistant, Dairy Division).
Published by U.S. Department of Agriculture, Washington, U.S.A., 1913.

THE BACTERIOLOGY OF COMMERCIALLY PASTEURIZED AND RAW MARKET MILK, by S. Henry Ayers (Bacteriologist, Dairy Division), and William T. Johnson, Jr. (Scientific Assistant, Dairy Division).
Published by U.S. Department of Agriculture, Washington, U.S.A., 1910.

SOME IMPORTANT FACTORS IN THE PRODUCTION OF SANITARY MILK, by Ed. H. Webster (Chief of the Dairy Division).
Published by U.S. Department of Agriculture, Washington, U.S.A., 1909.

THE MILK SUPPLY OF NEW YORK CITY AND ITS CONTROL BY THE DEPARTMENT OF HEALTH, by Ernst J. Lederle, Ph.D. (Commissioner of Health) and Russell Raynor (Chief of the Division of Food Inspection).
Published by Department of Health of the City of New York, 1912.

THE PRODUCTION OF SANITARY MILK BY OUR PRESENT MILK PRODUCERS, by Charles E. North, M.D.
Published by the Commonwealth of Massachusetts.

THE SANITARY CONTROL OF LOCAL MILK SUPPLIES THROUGH LOCAL OFFICIAL AGENCIES, by Ernst J. Lederle, Ph.D. (Commission of Health)
Published by Department of Health of the City of New York, 1912.

BACTERIA IN MILK, by L. A. Rogers (Bacteriologist, Dairy Division, Bureau of Animal Industry).
Published by U.S. Department of Agriculture, 1912.

COMMISSION ON MILK STANDARDS. Second Report of the Commission on Milk Standards appointed by the New York Milk Committee.
Published by United States Public Health Service, 1913.

WHAT HAS BEEN DONE WITH THE TUBERCULIN TEST IN WISCONSIN, by E. J. Hastings.
Published by Agricultural Experiment Station of the University of Wisconsin.

CAMPAIGN FOR CLEAN MILK. A Series of Articles that have appeared in the "Observer." **Price 1/-**
Published by The Saint Catherine Press, Stamford Street, S.E

THE SCORE CARD SYSTEM OF DAIRY FARM INSPECTION, by Wilfred Buckley and James Mackintosh, N.D.A. (Hons.), N.D.D.
Published by the National Clean Milk Society (Incorporated).

ALSO THE FOLLOWING :—

THE MILK QUESTION, By M. J. ROSENAU (Professor of Preventative Medicine and Hygiene, Harvard Medical School, formerly Director of the Hygienic Laboratory, United States Public Health and Marine-Hospital Service, Washington D.C., U.S.A.)
Price 8/6

INFANT MORTALITY AND MILK STATIONS,
Special Report of the Committee for the Reduction of Infant Mortality of the New York Milk Committee, 1912.
Price 4/6

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