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PROCEEDINGS

Conference on Milk Problems

Under the Auspices of

NEW YORK MILK COMMITTEE

at

NEW YORK CITY

December 2nd and 3rd, 1910

PRICE, ONE DOLLAR

PROCEEDINGS

CONFERENCE ON MILK PROBLEMS

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AGRICULTURE

UNDER THE AUSPICES OF THE

NEW YORK MILK COMMITTEE

December 2nd and 3rd, 1910.

AT

ASSEMBLY HALL
United Charities Building
105 East 22nd St., New York

ARTICLE II. OBJECT: The object of this organization shall be
(a) the improvement of the milk supply of New York City.
(b) the education of the public to a proper use of milk for
infant feeding and for other purposes.

—*Constitution of the New York Milk Committee.*

STEPHEN G. WILLIAMS, Chairman.

MARSHALL L. WARRIN, Treasurer.

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CONTENTS

	PAGE
PROGRAM	5
FIRST SESSION	9
SECOND SESSION	45
THIRD SESSION	95
FOURTH SESSION	155

PROGRAM

FIRST SESSION.—Friday Afternoon, December 2nd, 2 O'clock.

MILK ECONOMICS.

Stephen Francisco, Ex-President of the National Association
Certified Milk Producers, Presiding.

INTRODUCTION OF HON. JOHN PURROY MITCHEL.

Mr. Stephen G. Williams, Chairman N. Y. Milk Committee.

ADDRESS OF WELCOME.

Hon. John Purroy Mitchel, President of the Board of
Aldermen, New York City.

ADDRESS OF CHAIRMAN—THE FUTURE OF THE MILK SUPPLY FROM
THE PRODUCERS' STANDPOINT.

Stephen Francisco, Ex-President of the National Association
of Certified Milk Producers.

THE TRANSPORTATION AND CARE OF MILK BY RAILROAD COMPANIES.

G. E. Zippel, Gen. Agent, Milk Department, Delaware,
Lackawanna and Western Railroad.

SOME ESSENTIALS FOR THE SOLUTION OF THE CITY MILK PROBLEM
NOT SUFFICIENTLY CONSIDERED.

Julius Moldenhawer, Assistant New York State Agricultural
Department.

DISCUSSION.

F. H. Stadtmueller, Health Officer, Elmwood, Conn.
Veranus A. Moore, Professor of Pathology, Bacteriology and
Meat Inspection, Cornell University.

RESOLUTIONS.

Ira S. Wile, M. D.

SECOND SESSION.—Friday Evening, December 2nd, 8:15 O'clock.

THE PUBLIC MILK SUPPLIES AND THE PUBLIC HEALTH.

Prof. William T. Sedgwick, of the Massachusetts Institute of
Technology, Presiding.

INTRODUCTION OF CHAIRMAN.

Mr. Stephen G. Williams, Chairman New York Milk Committee.

ADDRESS OF CHAIRMAN—THE MILK PROBLEM IN AMERICA TO-DAY.

Prof. William T. Sedgwick, Boston, Mass.

THE RELATION OF THE PURITY OF MILK PRODUCTS TO THE PUBLIC HEALTH.

Dr. W. A. Evans, Commissioner of Health, Chicago, Ill.

THE BEARING OF COMMUNICABLE DISEASES ON THE CONTROL OF PUBLIC MILK SUPPLIES.

Dr. J. W. Kerr, Assistant Surgeon-General, U. S. Public Health and Marine-Hospital Service.

BACTERIAL CONTAMINATION OF MILK AS A CAUSE OF DISEASE.

Dr. William H. Park, Director of the Research Laboratory of the New York Health Department.

THE REAL NEED FOR PASTEURIZATION.

Dr. E. C. Schroeder, Superintendent of the Experiment Station, of the Bureau of Animal Industry, U. S. Department of Agriculture.

MILK SUPPLIES OF VILLAGES.

Dr. J. W. LeSeur, Health Officer, Batavia, N. Y.

DISCUSSION.

RESOLUTIONS.

Ira S. Wile, M. D.

THIRD SESSION.—Saturday Afternoon, December 3rd, 2 O'clock.

MILK STANDARDS.

Dr. Ernst J. Lederle, Commissioner of Health, New York City, Presiding.

ADDRESS OF CHAIRMAN—THE PRESENT METHOD OF SANITARY CONTROL OF NEW YORK CITY'S MILK SUPPLY WITH SUGGESTED PLAN FOR IMPROVEMENTS.

Dr. Ernst J. Lederle, New York City.

USEFULNESS AND LIMITATIONS OF MILK STANDARDS.

Dr. L. L. VanSlyke, Chemist, State Experiment Station, Geneva, N. Y.

THE SANITARY SIDE OF THE MILK QUESTION.

Dr. John Amyot, Health Officer, Toronto, Canada.

THE UTILITY OF LABORATORY MILK STANDARDS.

Dr. John F. Anderson, Director, Hygienic Laboratory, Public Health and Marine Hospital Service, Washington, D. C.

THE MILK SUPPLY OF CONNECTICUT.

Mr. H. O. Averill, Commissioner of Domestic Animals, State of Connecticut.

STANDARDS OF MILK UTENSILS.

Lyman Root, Ex-Health Officer, Stamford, Conn.

DISCUSSION.

RESOLUTIONS.

Ira S. Wile, M. D.

FOURTH SESSION.—Saturday Evening, December 3rd, 8:15 O'clock.

MILK COMMISSIONS.

Dr. Henry L. Coit, President of the American Association of Medical Milk Commissions, Presiding.

ADDRESS OF CHAIRMAN.

Dr. Henry L. Coit, Newark, N. J.

MILK STANDARDS AND HOW TO ENFORCE THEM.

George M. Whitaker, Chief, Market Milk Section, Dairy Division, Bureau of Animal Industry, U. S. Department of Agriculture.

STATE REGULATION OF MILK PRICES.

J. B. Coleman, Deputy Attorney General, New York State.

THE PRESENT SYSTEM OF MILK CONTROL.

Dr. Charles E. North, Chairman, Committee on Sanitation, Bacteriology and Public Health of the New York Milk Committee.

THE NECESSITY OF A CONFERENCE FOR THE IMPROVEMENT OF THE NATIONAL MILK SUPPLY.

Dr. G. Lloyd Magruder, Washington, D. C.

DISCUSSION.

Hon. W. F. Nickle, Member of the Legislative Assembly, Ontario, Canada.

Dr. Wm. H. Park, Director Research Laboratory, N. Y. Health Department.

RESOLUTIONS.

IRA S. WILE, M. D.

PROGRAM

THE NEW YORK MILK COMMITTEE:

STEPHEN G. WILLIAMS, Chairman.

MARSHALL L. WARRIN, Treasurer.

WILBUR C. PHILLIPS, Secretary.

CONFERENCE COMMITTEE:

Dr. IRA S. WILE, Chairman.

Dr. CHARLES E. NORTH.

Dr. HENRY C. SHERMAN.

FIRST SESSION

Friday Afternoon, December 2, two o'clock.

MR. STEPHEN FRANCIS, Presiding.

SUBJECT, MILK ECONOMICS.

The conference was called to order by Mr. Wilbur C. Phillips, Secretary, New York Milk Committee.

Mr. Phillips said:

This meeting has been called by the New York Milk Committee for the purpose of discussing some of the problems concerning the milk supply. One of the purposes of the Milk Committee in calling this conference was to afford an opportunity for the voicing of public opinion on milk matters. This will be done in the form of resolutions, which will be introduced by Dr. Wile, the Chairman of the Program Committee, at the end of each session. Persons who desire to introduce resolutions can introduce those resolutions through Dr. Wile, by presenting them to him in written form before the end of the conference,

In the absence of the Chairman of the Milk Committee, who is unavoidably detained, I take pleasure in introducing the Hon. John Purroy Mitchel, President of the Board of Aldermen of New York City.

MR. MITCHELL spoke as follows:

ADDRESS OF WELCOME

LADIES AND GENTLEMEN: It is my agreeable duty to welcome you here on behalf of the City of New York. You are met here to consider one of the most important problems that confronts this community, and all the metropolitan communities of this country. Tersely put, I think it can be said to be this: How can we so protect the milk supply as to make intestinal diseases of infants fed with cows' milk, as rare as smallpox? That, really is your problem.

This whole question is past the point when the necessity for milk protection is open to discussion. We know that of sixteen thousand infants under the age of one year who die annually in this city, approximately four thousand deaths are

due to bad milk or improper feeding. The question which we face in this city is not, should we save them; but how shall we save them?

Unfortunately, at the present time, this whole subject is fraught with more uncertainties than certainties, and is fuller of questions than it is of answers. The City Government of New York, on which, of course, must rest the responsibility for the solution of this problem within the confines of this community, has reason to hope—and I think I might even say has a right to look to you—to clear up some of these uncertainties and to furnish answers to some of these questions.

This question of milk supply and the protection of it, when presented to the Board of Estimate and Apportionment, comes primarily as a demand for money—for tax payers' money. That demand is usually in the form of an entering wedge—a trifle for experiment,—but in whatever form that problem is presented, or whatever the demand is, it always involves a principle that, sooner or later, will compel the appropriation of money sufficient to treat, adequately and properly, all of the milk consumed. Now, the Board of Estimate is anxious to proceed, but it needs light. It seems to me that we do not need more experiments. What we need is a clear statement of the facts already gathered in this matter, and a comprehensive program. Now, will you ladies and gentlemen give us this?

I wish to outline a few questions which I believe should be answered, and for which I am convinced the Board of Estimate and Apportionment must get answers, before they can proceed to deal intelligently with this important question. Now, these questions which I submit for the consideration of this conference are as follows:

Can efficient management secure safely clean milk within the economic reach of all citizens?

Can the milk supply be more adequately protected by State inspection and supervision or by City inspection and supervision?

What injury, if any, results from Pasteurized milk?

Is Pasteurization necessary for milk now graded as certified?

Is Pasteurization on a large scale successful anywhere at the present time?

Will Pasteurization make unnecessary the inspection of milk shops, depots or country dairies and creameries?

Can proper control over commercial Pasteurization be secured by City inspection, or should the City provide Pasteurization plants?

If all milk were properly bottled at dairies and properly iced at farms, in transit and at stores, would Pasteurization still be necessary?

Are conditions of marketing such that, without raising the price of milk in stores, the sale of loose milk can be prohibited and the bottling of all milk compelled?

Would Pasteurization appreciably raise the price of milk?

If the medical profession agrees that skimmed milk is nourishing and may be sold without detriment, if properly labelled, should the law prohibiting its sale be repealed?

Would this repeal reduce the cost of clean milk?

Has the cost of a comprehensive clean milk program for New York City been worked out, providing for—

(1) The protection of all milk necessary for infant feeding, and—

(2) The protection of all milk used for all purposes?

Will the new City milk stations increase the efficiency of the present infant nursing service, and will they make possible reduction in the number of visits of nurses to mothers?

Have the courts anywhere upheld restrictive or prohibitive legislation on the sale of impure milk by enforcing adequate penalties for violations? What is the record?

If economies in the distribution of milk are possible, and will lower the price of milk to the consumer, what steps can be taken to bring such economies about?

Is it desirable and feasible to provide some form of maternity insurance, enabling women who are engaged in industrial employment to refrain from such work for sufficient time prior to and after childbirth?

Ladies and gentlemen, we shall await with the keenest interest the answers given by your conference to these questions.

In behalf of the City of New York, I wish to thank you for holding your conference here. As you know, we are beset by the exponents of various plans for furnishing clean and safe milk. We want to do the right thing for New York's chil-

dren, but we do not want to divert money to useless or dangerous experiments. We hope you will give us a working program, which will answer and settle some of these simple questions for all time.

In conclusion, may I express the conviction that the most important factor, after all, in saving babies, is not the cow or the dairy or the nurse or the inspector, or yet the Board of Estimate, but it is the mother. We have appropriated this year some \$40,000 for the purpose of giving to mothers the best that science is able to give them in this matter. We have appropriated that \$40,000 for a summer's test, in reaching mothers, from milk stations as a center. But in reaching mothers, let me point out that it is most important that they be enabled to absorb the information which we endeavor to extend to them. Naturally, when they learn unconsciously, they learn best. It is therefore most important that the truth be given to everybody through the medium of the press, in the numberless ways in which the newspapers and the magazines may spread the truth. I trust that you will consider here and suggest a program for using the New York press for the purpose of telling mothers, particularly throughout the summertime, how hot waves can be met without losing babies by the hundreds.

If, in addition to the other contributions to the general subject at this conference, you will suggest to the Department of Health how it can successfully enlist their co-operation in this matter, you will render a service to the City, the value of which will be measured by numbers of useful lives saved to the citizenship of New York.

MR. PHILLIPS: Mr. Stephen Francisco, ex-President of the National Association of Certified Milk Producers, who was to act as Chairman of this meeting, has been detained at Montclair. In his absence, I will introduce Mr. G. E. Zippel, General Agent of the Milk Department of the Delaware, Lackawanna & Western Railroad, who will speak on "The Transportation and Care of Milk by Railroad Companies." I take pleasure in introducing Mr. Zippel.

MR. ZIPPELL spoke as follows:

THE TRANSPORTATION AND CARE OF MILK BY
RAILROAD COMPANIES

MR. CHAIRMAN, AND LADIES AND GENTLEMEN: In response to your invitation to discuss the question of the care and handling of milk, from a transportation standpoint, I will tell of the conditions prevailing on the Lackawanna Railroad, with which I am personally familiar, having been in charge of its Milk Department for several years. I will begin by a description of the cars used by that Company.

The standard milk car of the Lackawanna Railroad is 42 ft. over the end sills with steel underframe and is equipped with standard passenger trucks, high speed air brakes, and is, in fact, from the floor down, the same in every particular as a first-class passenger coach. These cars have a capacity of 300 40-qt. cans or 550 12-qt. boxes of bottled milk. They are provided with end and side doors, beveled and cushioned with canvas, opening in to facilitate handling at the various platforms and are equipped with a large ice bunker in each corner, which are filled by removing the hatches (the inside one being also beveled and cushioned with canvas), and dropping the ice through the roof. This is done at the various icing stations provided for that purpose.

Realizing the importance of proper refrigeration during the time milk is on the road, a series of experiments has been made to secure the best possible results, the object being to have sufficient ventilation for the proper and uniform melting of the ice in the bunkers, which are cleaned before loading to prevent an accumulation of hay or sawdust and to insure the free circulation of air, resulting in regular and uniform refrigeration.

In order to secure this ventilation, the specifications of our milk cars provide for an opening between the end facia and end plate through which the air enters and passes along the entire length of the car through openings in the built up carlines and out at the other end. This also draws air up through vents on the inside and through two small openings at each end of the car near the bottom, which are covered with malleable iron gratings and screened. The air passes through the sides of the cars between the sub-posts and lining by means of openings cut in the sub-posts and then passes up and into the roof

through openings at the top. A damper is placed in the last carline opening at each end, controlled and operated by a rod from the inside of the car.

Having briefly described the system of ventilation, the refrigeration is secured by constructing the car with an outside sheathing of yellow poplar $\frac{3}{4}$ " thick, an air space of $2\frac{1}{2}$ " separated from a second air space of $1\frac{1}{2}$ " by a sub-lining of white pine covered with Hydrex felt and sheathed on the inside with white pine. This form of construction has given us the best results and, if milk is properly cooled at the point of shipment, insures its arrival at destination at a temperature satisfactory to the consignees and the New York City Board of Health.

Some years ago, one of the milk carrying lines, when building its equipment, made some interesting experiments, for the purpose of ascertaining if the color of the car made any difference in the temperature, the standard color being olive. One car was painted all white, including the roof, one with a white body and olive roof, and one olive with a white roof. It was found, however, that the color had no appreciable effect on the temperature of the car.

Realizing that nearly all the milk used in Greater New York is brought here by railroad service, most of it from a distance of from 200 to 400 miles, resulting in its being on the road eight to fifteen hours, the various companies serving the city are fully alive to the exacting conditions of this traffic and have endeavored, and we hope successfully, to measure up to its requirements.

The question of what is the best method of refrigerating milk in transit is an open one. Some roads accomplish this by placing ice directly on the cans and others, by using it in bunkers. In the opinion of the writer, if the icing stations are situated where required, and the milk cars properly constructed and provided with bunkers of sufficient capacity, no better method has so far been devised. I may say in addition to the ice in the bunkers, it has been the practice of the Lackawanna to permit its shippers to put ice on the cans when they desired to do so. Our experience, however, is that this is done for the purpose of getting ice to New York rather than to cool the milk en route.

The foregoing description of our standard milk cars show that they are in the same class with the passenger equipment, are run on passenger trains, and, when handled as solid milk trains, are run on passenger time. These trains are in charge of a milk messenger, or train agent, whose duties are similar to those of an express messenger and the service is of the same high character as that rendered by the express companies, except that, on arrival at the terminals, the milk is called for by the consignees, instead of being delivered by the Company.

In making up the milk trains, wherever carload shipments are made, a car is supplied, which is cleaned, loaded, and iced by the consignor, the rate on such shipments being twelve and a half per cent. less than that charged on L. C. L. shipments. The balance of the cars are distributed at convenient points along the line, the creameries at which they are left cleaning them and loading their output, to which other consignments are added until the car is filled, two or three stations usually being sufficient. It is then locked and comes through to its destination where the milk is unloaded, the cars cleaned, and the empty cans and boxes loaded for return to the various shipping stations.

This handling is all done at night, the Lackawanna trains arriving at 9:33, 10:27, and 10:32, and leaving Hoboken on the return trip at 3:30, 3:40, and 3:50 the next morning. There is a large and efficient force at the terminal, consisting of cashiers, foremen, and milk handlers, to properly take care of the business in the short time at our disposal.

I may say, in closing, that the Lackawanna owns no creameries and is entirely dependent on its superior methods, reliable train service, and splendid terminal facilities to hold and increase its milk traffic.

This, Gentlemen, is a brief outline of the method of handling milk by the railroads serving New York. The traffic has grown from a very small beginning, consisting of a few cans shipped in baggage cars from nearby points, to its present proportions of solid trains of refrigerator cars from a distance of over 400 miles. While much has been accomplished, we hope to be able to still further improve the service and, to that end, welcome suggestions and intelligent criticism.

MR. PHILLIPS: What Mr. Zippel has told us, I am sure, is of

interest to every one here. We have heard altogether too little of this question of the transportation of milk, and his remarks have given all of us information on this point which we have lacked before.

We have on the program Mr. Julius Moldenhawer, who is Assistant in the New York State Agricultural Department. Mr. Moldenhawer comes from the land of Norway and Sweden, where the milk supply is perhaps on a higher plane than in any other country in the world. He has practically given his entire life to a study of the milk situation, and he is thoroughly competent to discuss "Some Essentials for the Solution of the City Milk Problem Not Sufficiently Considered." I take great pleasure in introducing Mr. Moldenhawer.

Mr. Moldenhawer, in responding, said: "I want to make one little correction. I come from Denmark and not from Sweden. It is all right, though; we are Scandinavians, all of us."

MR. MOLDENHAWER spoke as follows:

SOME ESSENTIALS FOR THE SOLUTION OF THE CITY MILK PROBLEM NOT SUFFICIENTLY CONSIDERED

The efforts of all forces interested in the problem of milk supply of cities are combined towards the one main object: "Enough milk of good quality for all," and much has been accomplished; still there is enormous work to be done which never can be done until all the people interested will try to work together instead of each one only looking after his own interest. *Genuine coöperation is necessary.*

Fundamentally only two parties are to be considered: Producers and Consumers—transportation companies and dealers are only links, though at present necessary. While all are consumers, still the producers are of first importance as we all depend on the farmers to supply our food.

The consumer complains that milk costs too much, the farmer complains that it does not pay him to produce good, pure milk at the price he receives. And while producers and consumers agree that the middleman (the milk dealers) make too great profit, still the main remedy for the whole trouble lies in the *reduction in the cost of production*. This can only be brought about by various means of educating the farmer, as already is being done in many ways by the Department of

Agriculture, thereby gradually enabling him to produce two bushels of feed instead of one and two gallons of milk at the present cost of one. This must and will be done as certainly as farmers in Denmark and other lands have through necessity learned to do so, and are profitably importing feed from America for their cows and pigs. The principal means by which the Danish farmers have succeeded is *coöperation*, which has been adopted in every line connected with farming, such as cowtest associations, breeding associations, creameries, slaughter-houses, machine shops, egg exports, etc., all on a strictly coöperative basis. Our farmers must learn to do likewise, and only as the farmer becomes more progressive and successful will the city people obtain better food, and especially better milk at a fair price. We are constantly told that American farmers will never coöperate—why? Is this not greatly caused by our exaggerated emphasis on independence? Everyone for himself, etc.—extreme competition along every line of the dairy industry is its greatest enemy; coöperation will prove its only salvation.

LINKS BETWEEN PRODUCER AND CONSUMER.

We all like to put the blame on others. The farmer criticizes the railroads for poor transportation, high rates, etc.—not without cause. The milk companies are blamed for making too large profits and handling the milk carelessly, in which there also often is much truth. At the same time the farmer overlooks his own shortcomings, and too many agricultural papers pour oil on the fire instead of, like such papers as *Hoards Dairyman* and a few others, fearlessly telling the farmers their shortcomings and advising them how to remedy them. All are blaming the so-called “milk trusts” for every kind of trouble, while after all the consumer receives a better and safer product to-day from a number of large companies, than when the milk was handled by thousands of small dealers. *A properly controlled consolidation of the city milk supply is of equal benefit to producers and consumers.* Whether it is accomplished through consolidation or coöperation of many milk companies, or through municipal ownership must depend on local conditions. A consolidated city milk supply operated by a farmers’ coöperative society will hardly succeed. Let the

farmers only learn to coöperate in the country and they will not need to run any city business.

ONE MEANS OF REDUCING COST OF PRODUCTION.

We have spoken of the education of the farmer, especially how to produce at less cost, but there is one problem much talked about, which affects the farmer more than any other industry: the securing of *reliable farm labor*. The exodus in years past of the young men from the farms in the East to the new West and to the cities has deprived the land of the first essential for profitable cultivation: the necessary, efficient farm help. Many old farmers thus find themselves compelled to sell their farms greatly below their value, and here is the greatest chance awaiting thousands of young, intelligent farmers who have not been able to secure their own homes in the West where farmlands have risen to excessive prices. The Agricultural Department of the State of New York has, during the last few months, received thousands of letters from farmers in the West; and the speaker has alone received over three hundred (300) such letters, from Germans, Danes, Swedes, Norwegians and Finlanders, asking prices for farms in New York State. Nearly all these people have large families and have made some money which will suffice to buy farms for themselves as well as their boys. Here is the soundest of all methods of solving the farm labor problem, one of the first essentials to produce more food at less cost, and especially more and better milk. Germans and Scandinavians are especially desirable as most of them are experienced stock-breeders and dairymen, which we need most of all. We hope, before long, to have several small colonies of these people established in various sections of the State and not only will they themselves be able to *make dairying pay* and supply good milk at lower cost, but their example will necessarily have a good effect and cause others to do likewise.

THE CONSUMER INFLUENCED BY THE CITY PAPERS.

The consumers would be more reasonable if not constantly stirred up by exaggerated and misleading views expressed by many city dailies. Strange that people dare use milk at all, hearing about all the horrors lurking in milk. As a fact we

have much better milk to-day than ever before, and are better off by buying our milk from a few responsible milk companies than from thousands of peddlers as in years gone by. The consumer can help much by appreciating the good work of several dealers and by not blaming all milk troubles on the farmer and dealer, but learn to care better for the milk after he receives it. Coöperation must be the slogan all along the line.

MR. PHILLIPS: Students of the milk problem have expressed concern from time to time that what is said about the character of the milk, its bacteriological content, its qualities, and its possibilities of carrying infection, may discourage the use of milk, without which most important food, our children will grow up under-nourished and physically unfit to compete with other children and to develop into strong and healthy citizens. The New York Milk Committee issued recently a leaflet on the care of milk in the home, and in this leaflet, this significant statement is found: "Milk borne diseases are far less common than the underfeeding which results from the use of too little milk." We all realize that the excessive infant mortality in this City is largely occasioned by the fact that mothers are unable, on account of poverty, to purchase a milk which is safe for their babies. We also realize that there is a very close relationship between retardation in the public schools and under-nourishment. The New York School Lunch Committee has said that children who are unsuccessful in school, in the majority of cases, are underfed, and that once you give these children sufficient nourishment, so that they can compete, physically and intellectually, with their schoolmates, their lives become successes instead of failures, they succeed in their school life, and they are started out on the pathway to strong and efficient citizenship. And the reason that so many of our school children are under-nourished is that their parents are too poor to afford a milk which is essential to the lives and to the health of these children.

Now, if we recognize that our infants are our future citizens, and that the strength of the State depends upon the number of its citizens, then it becomes the duty of the State to see that the milk upon which the lives of our infants depend, is placed within reach of the pocket-books of the poor. And if we realize that once these children are saved to the State, the strength of the nation depends upon their future physical and intellectual strength, then it becomes the duty of the State to see that proper food is placed within

the reach of these children, in order that they may grow up to be strong and useful citizens. Therefore, the question of the price of milk is a question that vitally concerns the State.

We have with us to-day a pioneer in the milk business, a colossal figure among those who have worked out solutions of the question of successful milk production. Mr. Stephen Francisco, ex-President of the National Certified Milk Dealers' Association, is President of a milk company which the New York Milk Committee organized one year ago, for the purpose of ascertaining whether a milk which satisfied the standards for purity that are demanded by the sanitarians of the country, can be produced and sold in New York City at prices which the majority of poor people can pay. Mr. Francisco, as President of this philanthropic and educational milk company, the first of its kind to be established, as well as President of the Fairfield Dairy, one of the most successful dairies supplying certified milk, is very well qualified to speak on the subject of "Milk Economics."

Mr. Francisco is the Chairman of this meeting, and I take pleasure in introducing the Chairman at this late moment.

MR. FRANCISCO spoke as follows:

THE FUTURE OF THE MILK SUPPLY FROM THE PRODUCERS' STANDPOINT

The subject that I chose when they asked me to say something to you about milk production, was one that was very near to my heart. Making clean milk, I think, is one of the greatest opportunities any man ever had; it goes so far and has so much value. "The Future of the Milk Supply from the Producers' Standpoint" is the title to which I have attached a few thoughts, or just "avenues." You can investigate them and look into them and find where they lead.

As long as the consumer insists upon getting something cheap, he will be likely to get something inferior, if not worthless, or even injurious. As long as the dealer takes the profit, the consumer as well as the producer is the loser, especially the consumer. As long as the producer depreciates his responsibility, the loss is all around.

On the producer, then, hangs the thread of the story—The future of the milk supply of the city. Realizing the importance of the producers' part, our interest grows in the problems that confront him.

PRODUCERS PROBLEMS:

It has been no secret that the struggle of the past has been to extract a living from the production of milk, a necessity. The problem of the future has the added burden of making that production safe and valuable with immediate promise of returns.

This problem has been met by various methods, foremost among which has been that of raising the requirements for clean milk.

A physician in 1892 suggested requirements for the production and care of milk till it reached the consumer. These requirements formulated in a contract with a producer, have been adopted by over 60 Medical Milk Commissions for the production for Certified Milk in this country and abroad. The reasonableness of this contract led an assistant of Major Alford, the Chief of the Dairy Division, at Washington to exclaim: "This makes it possible to secure a better milk supply." The producers have come to value the advice of the physicians and look to them for suggestions in working out the problem of clean milk. But when the physicians and Boards of Health undertook to carry out these high ideals there was often times only disappointment for the producer; for the public discounted the value of carefulness in the production, with corresponding increased cost of the product; and the problem remained the same.

Then the method of education was tried and the producer eagerly responded. Farmers sent their boys to agricultural schools while agricultural papers increased in circulation. The farmer is being educated, but the public remains ignorantly unreasonable.

Another method is being tried out, that of co-operation, will it succeed?

The New York Milk Committee seems to be an example of this idea. Composed of physicians, dietitians, consumers, dealers and producers, it has the chance to investigate and counsel with sympathetic understanding because of mutual interest. Their purpose is one, their only glory or profit is—

a—To better the milk supply so that a clean milk (less expensive than Certified) can be had for the masses at a reasonable cost.

b—To help educate the public to desire for their little ones such a supply and to be willing to pay the extra charge necessary to the production of the same, and

c—To convince the *dealer* that it costs no more to sell a clean milk than a milk unfit for food.

THERE MUST BE CO-OPERATION.—

The producer and the dealer must be like two brothers. The producer let us liken to an older brother, because he needs more experience and responsibility in caring for the herd and meeting the many requirements necessary to secure a clean and safe product. The younger brother takes charge of and disposes of this product at the city end, a fair return from the sale of it is expected by the older brother.

The older brother, faithful to the cause of the production of clean milk sometimes complains that the younger brother takes more than his share of the results sending back just what is left after expenses and profits have been retained, giving little thought that there might not be enough to pay the cost of careful production.

It is desirable that in the production and sale of milk, the producer should be an equal partner in results if he must share the responsibilities to the consumer. And further, he must do all that is necessary to insure a safe and clean milk. Let the brothers divide the amount that the milk brings on the platform in the country, at the R. R. station, working together to give a clean milk to the consumers and demanding *just* returns for the same.

A *New work of the Committee* is being tried in this method of co-operation. The New York Milk Committee lent its influence to the formation of the New York Dairy Demonstration Co. whose purpose it is to put the findings of the Committee on a working basis—to assume the oversight of all sanitary methods and carry out as far as possible all useful suggestions made for the production of a clean milk.

The subscribers of this company are milk dealers, producers, and philanthropists. With \$25,000, a part of which has been spent for a creamery, finished and equipped with modern machinery by the aid of the sanitary expert of the Committee, assisted by the Chairman of the Milk Committee

(a producer of Certified Milk) and a member of the Milk Dealers Committee with large experience in the sale of milk; both of whom are on the Executive Committee of the Board of Directors, the company has begun its work. The manager is Mr. H. B. Winters who can be addressed at 30 Church St. Terminal Building, New York City, or Homer, N. Y.,

SOME OF THE REQUIREMENTS NOW IN OPERATION.

In testing the cattle by the State Board of Agriculture the surroundings and care of the cattle must be conducted as they direct, all reacting animals being removed.

Further, all utensils that are used in the gathering, handling, and carrying of the milk at the creamery, must be left at the creamery to be washed and sterilized.

The farmers have been wondering what further requirements, besides testing their cows and milking in certified pails, would be required of them by our Sanitary Expert.

One farmer who has 53 head offered his herd and farm and allowed the Demonstration Co. to test and score. The President of the company with its Sanitary expert and manager, attended the investigation. The accuracy of the tuberculin test was proved in every instance. The examination of the organs showed the presence of tuberculosis, although the general appearance gave nothing to indicate its presence. The farmer was game, said he felt repaid and was ready to go on, for he had a tuberculin tested herd. Other farmers followed his example and are anxiously waiting to have their farms scored and cattle tested, ready to meet the requirements of the New York Dairy Demonstration Co. for the advance of one cent per quart which adds about 25 per cent to their income over the old way, besides the satisfaction of owning and operating a farm that is practical and up-to-date.

Let us repeat:

Milk from tuberculin tested cows is taken in covered pails and cans which are washed and sterilized at the creamery in the country.

If any other milk is received it is also milked into covered pails and under the same sanitary control, but is immediately scientifically pasteurized, in a holding tank pasteurizer, and labeled pasteurized, at the creamery in the country.

Therefore, with a building equipped with the best modern machinery, located where the farmers are intelligent and where 1200 cans of milk is produced within a radius of six miles, there is an opportunity to select from the Dairymen those who are willing to co-operate in the production of clean milk.

This has been done at Homer, where the farmers after three months' operation of the New York Dairy Demonstration Co., are anxiously waiting to accept the advantage of the extra price given for such high ideals. I believe it can be duplicated all over, where milk is produced.

Will this co-operation plan succeed? That is one of the questions of the future. From the producer's point of view it is promising; for he is at last considered, his work paid for, and clean milk assured.

THE CHAIRMAN (Mr. Francisco): Now, we have had some very valuable papers here this afternoon, and I think the greatest value of any paper is in its discussion, and especially in asking the authors of the papers any questions that may come into your minds, so that you can understand just what they mean.

Now, Mr. F. H. Stadtmueller, Health Officer of Elmwood, Conn., will lead in this discussion. All of the speakers will please come to the platform and give us their names. We will appreciate this. Is Mr. Stadtmueller present?

MR. STADTMUELLER spoke as follows:

Mr. Chairman and Ladies and Gentlemen: The problem in which we are all interested, the production and distribution of milk, is a matter of very much importance, as anybody at all conversant with modern conditions can see. As to the best methods of obtaining the ends in view, there is a great diversity of opinion.

We have heard one speaker this afternoon say something about the matter of competition. Now, that very competition, which is the life of trade, although somewhat questioned by the modern institutions and methods of the trusts, and becoming somewhat obsolete, nevertheless accounts for a great deal of the life that is in our milk. Competition, in the business, accounts for a great deal of the bacterial activity or the actual life in milk, a statement that cannot be controverted.

The matter of organization has been touched upon, a matter that is gaining tremendous force throughout the civilized world, and it is amazing, in many respects, that the agricultural interests of the country do not take advantage of the abundant illustrations

that we have on all sides, and organize. A great deal can be accomplished through organization.

I was very much pleased by the paper presented by Mr. Zippel, in which he so clearly indicated the methods adopted by the railroads for the proper transportation of milk. I think that any transportation company or public service corporation that will provide equipment of the kind described, whereby, if it receives the milk at the proper temperature (namely, that of about 45 degrees) it can guarantee to keep it there to the point of delivery, is deserving of great credit. That is a remarkable achievement, and one of extraordinary benefit to a community like New York.

Whatever phase one takes of this discussion, the most important thing that crops out—at least to me—is and always has been the lack of attention to basic principles—those large questions and problems of life beyond the control of the individual, which, after all, are the cause of the conditions confronting us to-day. With your permission, I will ask your attention to the unfolding of some of those problems.

In approaching the whole problem, for instance, we never stop and ask ourselves, why does a farmer ever make milk? If you will begin with that as your basis, and follow it to its logical conclusion, to the time of the delivery of your milk at the city and at your house, at your table, I think you will be rather astonished at the number of forces that are contributing factors to that movement, and to see how helpless the efforts of any one individual are toward the correction of abuses.

The factors contributory to milk economics are legion. Moreover, these factors vary both in kind, intensity and importance according to the locality involved, *i. e.*, the problems of New York city are obviously different from those of remote rural communities, although there is a certain interdependence between the two.

The most important factor is that the price of milk is largely determined by the price of butter. Some exception may be taken to the foregoing statement on the ground that in this respect cheese occupies a similar position. This basic principle of milk economics, though well understood is, nevertheless, so frequently ignored that it will be well to devote a few moments to a brief detailed recapitulation thereof.

This important position of butter originates from three conditions. A practice common to all farms of this and adjacent states, with relatively few exceptions, is the keeping of one or more cows. Even where but one cow is kept an abundance of milk, in excess of the family needs, usually exists for an indefinite period of each lacteal period. Consequently, at such times, to avoid waste, the

common practice was, and with minor exceptions continues to be the case, to convert the perishable surplus into butter or cheese or both. Such procedure not only avoids waste, but increases the marketing facilities of the product, as butter and cheese, being in a much more concentrated and less perishable form than milk, can be shipped greater distances before the freight becomes prohibitive. This principle of conservation naturally receives added force with the increase in the stand of cows maintained.

The second (important) reason why butter determines the price of milk embraces the one just enumerated with the added opportunity butter offers for the marketing of numerous farm products for more money than could otherwise be obtained therefor. Thus in addition to the grazing land of pastures, bearing in mind that pastures usually comprise such areas of farms as are not readily adapted to tillage purposes, there is much waste material such as fine or clover hay, not suited for horse feeding and, consequently, limited to farm use, cullings from root crops, vegetables, etc. Furthermore, granting the crops just mentioned might be sold, yet they admittedly are of low value and are either exceedingly bulky or heavy, either of which characteristics limits their transportation. Through their conversion to butter they become exceedingly condensed into a greatly enhanced valuable product, capable of infinitely greater transportation and resultant limitless market.

The third condition abounds in the great opportunities for conservation of soil fertility provided through butter production. Thus when crops are sold directly from farms, much of the major portion of plant food required for their growth is removed from the farm. Where milk is sold and proper treatment is accorded the manure, about 20 % is removed, while when butter is made and sold from the farm but about 1 % is removed.

The price function exerted by butter upon milk is what has assured the supply of milk to all large centers of population in suitable abundance and at fairly uniform cost. Moreover, up to about 1895, when the proper relation of micro-organic activity and raw milk effecting public health first began to be clearly demonstrated, said supplies were, with minor exceptions, based largely upon adulteration of one kind or another, fairly adequate for the needs of even rapid growing communities.

Community growth, however, has much to do with existing conditions. As cities grow the needs thereof increase both in quantity and diversity. This affords increased options for the sale of energy applied to farms in direct ratio of distance of farms from cities plus the size of the latter. Whereas a farmer originally was, in a

large measure, for reasons previously stated, compelled to make butter, he becomes tempted to sell milk when the growth of a city has created a demand for milk sufficient to pay a premium to meet the loss of fertility imposed by the sale of milk instead of butter. This stage soon gives way to the period when it becomes more inviting to raise vegetables, fruit, etc., or even sell the fodder, hay, etc., as such instead of converting them into milk. The final development of this evolutionary process is attained whenever the market prices of farm products other than milk provides a premium sufficient to offset the increased loss in fertility of the soil brought about by the growth and sale of such products.

The hay crop affords a concrete illustration of the foregoing. The current market price of hay is \$22.00 per ton. A ton of hay carries about \$6.50 of fertility, consequently a dairyman within close distance of a city should obtain about \$17.00 per ton for hay fed to produce milk. To meet this requirement would raise the current price of milk about 25 %. It may be and frequently is argued that farmers should seek to overcome the economic situation just detailed by growth of cheaper crops than hay. While such action is undertaken, to a certain extent, it is nevertheless transitory and not enduring inasmuch as the controlling factor is that of maximum revenue for energy expended. That is, under such circumstances, farmers are concerned, not so much with lessening the cost of milk production through the use of cheaper food products, as they are in the increase in the price of milk adequate to meet the term offered by the less and infinitely simpler hazardous task of growing and selling hay or whatever other crop it may be. Rather than meet the required premium, milk contractors extend the zone of milk supply and draw on localities where butter still determines the price of milk. On the other hand, the farmer owing to habit and the difficulty of changing money invested in his existing dairy equipment, is loath to abandon his work. Unable to obtain a price for his milk commensurate with the market price of hay, he naturally seeks to produce the former at a lower price which he can do by producing milk of lower food value. This is accomplished through the use of large milk producing types of cattle, principally represented by the Holland breeds. Generally speaking and broadly stated it is well known that the food constituents of milk decrease with the increase of yield of milk. Much of the favor accorded Holstein cows rests upon the foregoing facts; they are economical producers of milk when measured by the standard of quantity only. Their ability as economic producers measured by food value of milk has not yet been demonstrated.

Another collateral procedure is to round off corners in labor required in caring for the animals, the effect of which, while reducing the cost, imperils the sanitary quality of the output.

This concrete illustration of the price of hay is capable of duplication in one way or another by numerous other crops, and applicable to zones of various dimensions. However, whenever dairying exists under the operation of such influences and all other things are equal, it defines the places where the poorest milk is produced. This accounts for the well known and seemingly anomalous condition that the milk handled by contractors produced relatively near to place of disposal is frequently inferior to that obtained at more remote points.

Moreover, other deterrent factors attend the growth of communities which affect the actions of farmers in close proximity to such places. Land values appreciate rapidly resulting in higher assessments and taxes.

For instance, take the land in the immediate vicinity of New York City. Carry yourselves back before New York State attained its present proportions. There was a time somewhere or other when the land was only worth \$15 to \$20 an acre, and when milk was sold from there and consumed here in New York; but with the great growth of New York City, and with the "unearned increment" that flows out to the country, these lands are worth even, in some instances, \$400 an acre. Now, a farm of from twenty to thirty acres at \$400 an acre, represents an infinitely greater investment than a farm 100, 200, or even 300 miles from New York, on a basis of \$25 per acre. Land situated close to a great city increases greatly in value as the city grows, and the owner of the land is confronted with the problem of earning a fair income on his investment. That fact becomes an added cost to milk production. In that way, the difference in land values alone, varying from those of a farm worth \$200 an acre and those of a farm worth \$25 an acre, other things being equal, will add almost a cent to the actual cost of the production of the milk itself. If you do not believe that, you can make the computation yourself. It is a very simple problem in mathematics.

The labor, although more readily obtained, is of inferior quality and more expensive than that at more remote points. Social rivalry is more intense, demanding a more expensive scale of living. All of which sooner or later change farm practices even where individuals at first ignore or oppose the forces enumerated. Consequently, milk zones have been constantly extended. The total effect of the forces just reviewed may be graphically considered by the fact that were it not for these conditions all the milk required

by New York could be readily produced within a radius of 60 to 70 miles without serious disturbance to any existing industry, as against the existing radius exceeding 300 miles.

In other words, there is enough land here within sixty or seventy miles of New York City to supply all the milk that New York needs, and at a vast saving in freight, if it was properly cultivated and tilled. Why isn't it? It is because of these forces that I have just referred to—not all of them, but a part of them.

I live within five miles of the city of Hartford, a city with practically 100,000 population. There are good roads right into the city. It is five miles to the center; not to the outskirts. Within three years, more than a hundred cows have gone out of business, as you start and drive from my house to that wonderful market of Hartford—going right toward it. The buildings are there, the land is there, the equipment is there; everything except the cows. The sun shines there just as it used to. The rain falls and moistens the land, and the grass grows as luxuriantly as ever. But still, as Hartford grows and the demand for milk grows, just because of these conditions that I have mentioned, those owners have been forced out of the milk business because they did not get enough for their milk. And that is the effect these conditions are having right around me and around every other large community.

The labor problem, on dairy farms in particular, is exceedingly unsatisfactory. Explanations of this are too emphatic in ascribing the causes thereof to the gregarious instinct of man, which is urged with greatest frequency as the most prominent cause. The principal difficulty rests upon the fact that farm labor, when compared with the units of energy and skill required with that in most all other industries is the lowest paid class of labor. Any doubt regarding this statement may be removed by consulting the eighteenth report of the U. S. Commissions of Labor published in 1903. The disparity then existing has become intensified since then. The significance of the great changes wrought in the disposition of labor during the past forty years is overlooked. By the intense application of the law of division of labor which has in its application made such rapid progress during the period just mentioned, the demand for skilled labor has largely disappeared. In former times a man followed his work—the position is now reversed, and the work is brought to the man.

You find a good illustration of this in the trade of a locksmith, or even of a watchmaker. And you haven't got to look very far until you find any number of such trades that have become obsolete because of the operation of this law of labor, whereby the work is divided or sub-divided. A man is placed at a machine to make only

one part of the whole; another man is placed at another machine to make another part; and then all of these parts are brought together from these different departments to the assembling room, where girls or boys simply take one part out of each little tray and put them together, and lo and behold! there is the lock or the watch. Under those conditions, no skill is required except the genius that is required to invent the machinery and build the machinery; but after the machinery is once built, the manufacture of the lock or the watch requires no skill any more at all. Consequently, those trades have become obsolete.

It has been the same way with the machinist. The all around machinist has disappeared. He is either a good lathe hand, a good press hand, or a good planer hand; but the all around machinist has disappeared.

Farmers cannot avail themselves of the principles upon which this change has been built. They cannot have men do nothing but milking, plowing, sowing or reaping. The work is constantly changing. The men have to follow the work as of old. This requires plasticity, and adaptiveness to frequent changes. While it is true that this situation has been ameliorated in one direction through the introduction of improved farm machinery whereby the total number of units of labor required has been reduced, it has, however, been augmented by the very remedy enumerated through the increased demand of skilled labor to operate the machinery used. In brief, the farms now require a much larger percentage of skilled labor, but are prohibited from employment thereof because of the limitation of wage imposed by the price obtained for produce sold. Particularly is this true upon dairy farms.

Moreover, all labor employed in most all other industries is placed or handled in compact groups or places, capable of comprehensive, close and, when necessary, of exacting surveillance, conditions rarely possible on dairy farms. Consequently, laborers who chafe or resent factory conditions naturally drift to farms where the environment is less irksome. This points clearly to low efficiency and reflects actual conditions. For our labor is largely of the foregoing type or recruited from foreigners whose efficiency, no matter how ambitious the effort to do may be, is governed by knowledge of our language which, in the majority of cases, is admittedly nil.

Just stop a moment and think of the dairy farms. We have practically none but foreigners in the section in which I am. I do not question their willingness or their desire to work, or their ambition; I will concede that they are just as good and better than I. But what is their effect upon the milk supply that we are discuss-

ing? Can you tell a farmer or make him understand how to tell a foreigner who does not himself understand a word of English and who has not been blessed with a very good schooling in the old country, how to keep a cow clean and get clean milk? I would like to see you do it. I would like to have you try it just once. That is a constant condition confronting the dairyman. Such a foreigner will remain with him for a week, or a month or so at best, and as soon as he can speak a word or two of English, he is turned into the factories or the shops in the cities. The dairyman simply keeps breaking them in. That is one of the conditions that he has to confront. It is an economic situation, gentlemen, and it is a part of the problem. You cannot dodge it.

This stringency of the labor question compels such severe physical application on the part of the farmer as to discourage the mental application needed to change from dairy practices of the past to modern sanitary conditions, and finds expression in the apathy, antipathy and distrust manifested by the majority of dairymen towards even any suggestion of improved methods.

Another matter worthy of consideration is the demand of regularity of the milk supply. This involves the co-ordination of two unknown quantities, viz., the breeding or freshening of cows and crop production. Cows breed with much uncertainty and irregularity. Neither can the yield of any crop be determined ere completion of harvest, when it frequently is too late to wholly avert the effect of any serious shortage. Shortage due to either of these factors can only be met by increased expense.

The price of beef now exerts considerable influence upon the price of milk. While this was a negligible quantity ten or more years ago, it has, during the past three years, assumed considerable importance. This rests upon the increase in value of milch cows and the agitation for the elimination of bovine tuberculosis in dairy herds. Up to a few years ago the carcass salvage amounted from fifty to sixty-five per cent. of the original cost of cows. At present, under normal conditions, it amounts to but thirty to thirty-five per cent., and in such dairies as pay heed to the eradication of bovine tuberculosis by rejection of animals responding to tuberculin tests, the average period of usefulness of cows is materially diminished and causes greater expense through increased replacement of animals and greater frequency of repetition of loss involved by carcass salvage.

The effect of advance in prices of concentrated food stuffs, labor and cows are so well understood as to require no detailed discussion.

The foregoing remarks have touched the more important phases

affecting the productive sides of the milk supply. Other problems are projected by the collection and distribution of milk.

Obviously there may be and are great differences in milk, *i. e.*, milk varies in richness or food constituents contained therein. The range in this respect may be fully forty per cent. It also differs in cleanliness. The range in this respect cannot be well expressed numerically, but is exceedingly great. The custom of milk contractors and operators has been, in the past at least, to ignore any possible differences, paying a uniform price, no matter what the quality was so long as it would pass inspection. The long continued action of this policy could have and has had but one result, *viz.*, the practically uniform adoption of the lowest conceivable standard of quality consistent with such hasty and imperfect inspection as is provided by statute. Moreover, to safeguard the prices of milk, contractors must necessarily seek to have at least a semblance of, if not an actual surplus of milk on hand or in sight most of the time. This has compelled the constant extension of the milk zone in advance of the actual needs of the demand. Such action of itself, might be justifiable, but when measured by the penalty it imposes upon the quality of milk offered through the maintenance of intense keen competitive conditions, such action becomes seriously questionable. The detention of milk at various points to make up carload lots and thus secure lower freight rates does not afford sufficient saving, even if such saving accrues to consumers, to offset the deterioration milk thus held undergoes.

The distribution of milk is governed too much by convenience of consumers instead of conditions such an exceedingly perishable product as milk requires to ensure its maximum usefulness. The distribution of milk, particularly loose milk, should be limited to such as can show proper knowledge regarding the care and handling milk requires.

I do not know that you ever stopped to think what inconsistent mortals we are. For instance, take the matter of automobiles. Now, a mortal of ordinary intelligence can learn to guide an automobile within two or three weeks. I do not mean to say that he can master the intricacies of the mechanism, and so forth, but he can learn to steer it on the highways. If a man wants to drive an automobile, he has to go up to the Secretary of State's office in our state—I do not know just what the procedure is in New York State—and he has to present reasonable assurances to the Secretary of State that he possesses the required skill and knowledge, or that which is deemed to be sufficient to run an automobile, and he has to take out a license and pay a pretty good sum for it. Now, why? Simply because you and I and somebody else have seen an auto-

mobile throw a man from a bicycle and kill him or injure him. That is a thing we could see.

But here, as we know perfectly well, is milk, which is the most perishable of foods. It would take a very intelligent man to learn all the requirements and the limitations surrounding its production in a safe way. It would take a very intelligent man to familiarize himself with all those details inside of six months or a year, at the most. Nevertheless, any Tom, Dick or Harry, whenever the mood seizes him can go to work and manufacture milk—make milk—or can buy a horse and cart and peddle it and handle it, and, in doing so, run the chance of killing thousands of people by peddling poison up and down the streets, *carte blanc*, and we fold our hands and say, "Amen; it is all right."

In this necessarily hasty and brief discussion only the salient features of milk economics have been touched. From what has been said the following deductions may be made:

1. The existing standard of market milk is the culmination of forces and practices of long duration and where the principle of price has dominated to the exclusion of practically all other considerations excepting that of adulteration.

2. Such procedure has resulted in a very low standard, but has, nevertheless met the approval of the mass of consumers and producers alike.

3. Owing to our knowledge of the possible and probable bacterial action in milk produced under these conditions, the assurance thus established through years of experience has been superseded by grave apprehension.

4. The much needed improvement of the milk standard can only be accomplished through redirection and readjustment of the forces and practices reviewed. This can not be accomplished without material increase in price of milk.

5. Increase of price in itself will not materially improve the situation.

6. Efficient supervision, inspection and police control thus become imperative.

7. Although the whole question of milk improvement must fail if it is not an economic measure, nevertheless, inasmuch as any improvement in milk is more real than apparent, the degree of success attained will be in close relation to the attitude of public opinion to the principal at issue. This calls for an energetic campaign of education. The producer must be taught to overcome practices founded on years of application and adopt new methods. This emphasizes the duties devolving upon inspectors. They should not only be able to categorically score stables, dairies, etc.,

but should be thoroughly informed regarding all dairy principles, and practices, in order to inspire the confidence essential to the execution of such recommendations they have to make.

Consumers must also be taught the greater economy a pure milk supply vouchsafes. This is really the most difficult phase of the whole problem. With many people, an advance in price of milk commensurate to meet the end desired, will be seriously opposed and can only be brought about by complete readjustment of domestic expenditures.

8. Much confusion will attend all efforts for improvement because one of the basic principles upon which the present price of milk is established has practically reached its limitations, viz., the policy of zone extension for new sources of supply cannot be indefinitely extended. The price function exerted by butter on the price of milk will cease. As soon as this shall have occurred, an inevitable increase in price of milk will follow, regardless of quality.

I submit that for your consideration. The convenience of the consumer is consulted altogether too much in the matter of milk distribution.

THE CHAIRMAN: Is Prof. Veranus A. Moore in the audience? We would like to have him step forward and take part in this discussion. Prof. Moore, Professor of Pathology, Bacteriology, and Meat Inspection, Cornell University.

PROF. MOORE spoke as follows:

Some weeks ago I was asked to prepare a paper for this occasion on the subject of Bovine Tuberculosis. I felt that it was absolutely impossible for me to do that, on account of other duties. Then I was requested to discuss that paper, or such a paper. I find, however, that there is not a paper on that subject. Consequently, I see comparatively little for me to discuss. Had it not been for the Chairman so kindly alluding to this subject, there would have come directly before this meeting nothing on which I was to speak.

I feel, however, that this is a very vital question—the production of pure milk, and no one who has a family, no one who is interested in the welfare of our citizenship and the development of the nation and the health of the children, which is the basis of it all, and who understands or knows something about the conditions in this country, can get away from the grave difficulties that confront us in the production and distribution of a wholesome safe milk. I do not feel that one should neglect his duty if, in any way, he

can point out any single item or element that would tend to increase the efficiency and wholesomeness of this universal food product, especially for children.

I feel, too, that the consumers of milk and the producers of milk are to be congratulated upon the progress that has been made. I feel that we are too apt to deplore the weaknesses that we see, and not give encouragement and appreciative expression to the good that has been done. I do not believe that more progress has been made in the production and distribution of any food product in the last ten years than has been made in connection with milk, when you take into account the great difficulties of educating the producers to produce clean milk, and of educating the transportation companies in means of transporting it, and of educating the consumers in means and methods of caring for it after they receive it. When you take this thing into consideration, the magnitude of the undertaking becomes enormous.

But tremendous progress has been made, and I feel that we should be congratulated rather than that a pessimistic attitude on this question should be taken, because there is a momentum for good in the work that is being done throughout the length and breadth of this country.

But to come to the subject, it would seem that if care is taken in the production and in the handling and in the transportation and in the care of milk, the other and most vital question to be considered is the health of the cow which produces it. The inspections have extended, in various ways, and by various means. The purposes of inspection have been variously interpreted. But we who are watching the situation as to the health of the animals are somewhat depressed to read, as we are obliged to and have done within the last few months, or, at least, in recent times, that the results of investigations have shown that a considerable percentage of tuberculosis of children is derived from the bovine type of bacilli, and that the examinations of the milk in our large cities (there are reports of such examinations and investigations in nearly every city), show that tubercle bacilli are quite commonly found in market milk. We have, to be sure, the certified milks and the guaranteed milks, with which all the precautions are taken that can be taken, even including very delicate and sensitive scientific tests, but for the great mass of the milk, these things are not done. In the State of New York, I doubt if more than two per cent. of the herds have been tested, and are under careful supervision, so far as the tuberculin test is concerned. Now, that being the case, and on account of the almost insurmountable difficulties of bringing about a uniform and universal tuberculin test and the exclusion of

reacting animals, it seems to me that we will have to meet the situation as best we can.

A year ago I had the privilege and the pleasure of spending some time in Denmark and in Germany, in studying the methods which they had put into practice, in order to safeguard the consumers of milk from tubercle bacilli coming from those herds which have not yet been under the tuberculin test. I found that their method was to make frequent and rigid physical examinations. We find, for example, in Copenhagen, the statement that they have the lowest mortality in children, and the Copenhagen Milk Supply Company has a force of skilled veterinarians who are inspecting the herds from which they receive their milk, at very frequent intervals.

While it is recognized by Prof. Bang and Dr. Osterbach and Dr. Bulls and others who have learned in this line that the physical examination will detect a very small percentage of the animals that are infected with tuberculosis, yet it is possible, by that means of detecting it and by acting upon this detection to eliminate the very great majority of those cows that are eliminating tubercle bacilli in their milk or with their feces.

Consequently, it does seem to me that, in view of the fact, that children are contracting tuberculosis of the bovine type, and that tubercle bacilli are present in considerable numbers in market milk, our inspection, however good it may have been as to the cleanliness of the stable, circulation, light and so on, has been somewhat derelict in the elimination of the spreaders of tubercle bacilli.

Prof. Bang said to me last summer, "You people in America never will succeed because you want too much at once. You want too radical measures; you are not willing to give a physical examination and eliminate the spreaders, and gradually work back with the tuberculin until you eliminate the disease itself, thereby procuring constantly increasing safety to the community and constantly increasing benefit to the owners of the farms, that they may have sound herds."

Now, it does seem to me that the one thing that is lacking in the milk production of this country is the physical examination in our dairy districts, for the purpose of excluding from the milk supply those animals that are obviously spreading the tubercle bacilli. Now, a good many careful investigations have been made in this line. We have, at our institution, undertaken some investigations that are most interesting in this respect. Similar ones have been and are being carried out in Germany and elsewhere. These are for the purpose of finding, as nearly as we can, to what extent tubercle bacilli are being eliminated by animals that are infected,

as determined by the tuberculin test, but which appear to be sound and free from disease.

Now, it has been our experience, in the examination of a large number of animals—single examinations—and in the repeated examinations of the milk and feces and sputum of a few animals, that the number of animals that are eliminating tubercle bacilli in their milk, and are yet free from evidence or symptoms of the disease is very small indeed.

Now, while I do not believe that the physical examinations will eliminate all of this danger, I do feel that we have sufficient grounds to warrant the statement that if we could have frequent and repeated thorough physical examinations by skilled veterinarians, of the cows producing the milk for our cities, and specious animals were eliminated until the diagnosis was positively made, we would minimize the amount of bovine tuberculosis that exists and it is this one point that I wish to bring to your consideration.

As to the question of other diseases of cattle, the germs of which are transmitted in the milk, they are practically negligible. Anthrax is perhaps the only one that we have seriously to consider, and that exists in such a small number of places and to such a very slight extent that it need not be considered. So I think, Mr. Chairman, that if we can take into account the serious proposition of providing some way by which the dairy herds can be carefully and frequently examined, and animals in which evidence of disease can be detected in the udders, in the lungs and in the intestines and the uterus, by the best methods that we have at the present time, and those animals eliminated, we will minimize the danger, and, by the continuation of this method, we will continue to have constantly better milk.

THE CHAIRMAN: I wish we had time to have another hour of that. That was along lines that we need to know about.

We have in the room (although, being old, I can't locate him) the Commissioner of Agriculture of New York State. If more farmers and dairymen had a chance to vote for him, they would make him Commissioner of Agriculture for the next twelve years. We want him to come forward and tell us something about milk in New York State. He needs no introduction; nobody need even mention his name. Mr. Pearson, of Albany.

MR. PEARSON spoke as follows:

Mr. Chairman and Ladies and Gentlemen: The subject that we are considering is one of tremendous importance. I have given a large part of my life to the study of it, and to-day I am endeavor-

oring, as best I can, to enforce State laws which relate to this subject. But I feel that I know very little about it. You have heard some splendid papers upon the science of civic milk supply, and the philosophy of it and the economy of it, and I think I may say the religion of it; and still much more might be said.

Our city milk supply is improving. It is better to-day than it has ever been before, and there are a number of forces which are bringing about these improvements. They are not working as fast as we might wish, but they are working in the right direction.

First, there are 196,000 farmers in New York State who are producing milk, and a large proportion of them are producing it intelligently. We have in this State four institutions that are maintained by the State, that are giving instruction to large classes of young men to-day on this very subject of clean milk production, and Dr. Moore, who has just talked to you, is one of the noted teachers of those young men. At this very minute there are, in the four institutions that I refer to, about 1500 young men studying agriculture, and a large number of them are studying clean milk production. Fifteen years ago there were less than one hundred studying those subjects. That speaks well for the advance we are making. Give these increased numbers of young men a little time to get themselves established, and we shall see great results.

We have to-day more discriminating dealers in the purchase of milk than we have ever had before. I think it is safe to say that seventy-five per cent of the milk that comes into New York City is purchased by dealers who have reasonably good standards concerning the quality of milk.

We have far greater intelligence to-day on the part of the milk consumer than we have ever had before.

Then, the City is conducting a milk inspection, at a large cost, and I must say that they are doing a great deal of good to New York. I can't see that they are doing good to the other cities and villages of the State, because I often receive letters from health officers in the smaller cities who say that "dairyman so-and-so has had his milk shut out of the New York market because it does not come up to the standard of that city, and since he has lost that outlet, he has begun disposing of it in our city or town, where we do not have these prohibitory regulations, and we wish you to do what you can to help us." But this milk inspection is a great thing for New York City.

Then, we have a State law relating to milk. It is a part of the agricultural law, and it makes it the duty of the Department of Agriculture to look to its enforcement. Just a few words on that

law. Three days ago, in the Supreme Court here in New York City, a milk dealer was fined because he had sent some dirty cans back to the producer in the country. A few years ago, the matter of washing cans and bottles which were to go back into the country cities and towns, was unthought of. I myself have done some work in those country institutions, and I know that I am not exaggerating when I say that in many instances, the condition of the cans going back to these institutions a few years ago, was simply indescribable. Not alone rotten milk, but every rotten thing you could possibly think of (cries of "Amen!" "That is right!" etc.) found its way into those cans. The Legislature passed a law requiring cans and bottles to be cleaned, and we are doing the best we can to enforce that law.

About a month ago, I had two of our detective agents who are not known to any one in New York, slip in here and quietly go the rounds, and inside of four or five days they had made thirty cases—which, of course, is a very small number when you consider the large number of dealers working here. Three days ago the first one was tried in the Supreme Court in this City, as I said, and the defendant was fined, and how much do you think he was fined? There were three dirty cans, and that gentleman walked up and paid to the State \$50 a can. He paid \$150. As soon as that verdict was announced, the others couldn't come too fast to the representative of the Attorney General and ask on what basis they could settle. One of those gentlemen to-day is worrying under the possibility of having to pay a fine exceeding \$25,000.

Now, until a short time ago our efforts concerning the milk itself were confined to the detection of adulterations, skimming and watering, and we are doing that work yet—a great deal of it. There is a heavy penalty. There is never a time when we have not a number of cases pending here in New York City—cases of the adulteration of milk.

Besides what we are doing of course, the City Health Department is doing a large amount of the same kind of work.

Last winter, on the recommendation of Gov. Hughes, the Legislature enacted an amendment to the Agricultural Law, which provided that the Department of Agriculture should look to the sanitary conditions under which milk was produced and handled. That had not been a distinctive part of our law previously. Since last winter, we have done as much along these lines as our funds would permit. We have not been able to increase our force, but our present agents have been instructed to give attention to the sanitary conditions of dairies, wherever they can do so. To-day, we have pending, not only in this city but in the different parts of the

State, a considerable number of cases against dairymen themselves, and against dealers whose premises are kept in such a manner as to endanger the healthfulness of the product that passes through them.

There are some things which we should constantly bear in mind in connection with this problem of better city milk supply. One is that the inspection will always be necessary. What we need is intelligent, healthful, sympathetic inspection. We need inspectors who are willing to co-operate with the dairymen, and not the one who goes in, so to speak, with a policeman's club and demands that this, that or the other be done, and at once. We need more inspection during the morning hours and the evening hours, when the cows are in the stable, and less inspection during the noon hour when there is nothing there to see. And I am well satisfied that such a system of inspection could very easily be devised in this State.

We need to appreciate that the price of milk is none too high. The law of supply and demand will govern our milk supply, above all other laws. When conditions are revealed, such as Mr. Stadtmueller speaks of in the vicinity of Hartford, where, within five miles of the city where only a few years ago, farm after farm had many cows upon it, the cows are gone to-day and those same people are doing other kinds of work, it means just as much to you and me as though we walked down Broadway and saw nine-tenths of our shoe stores closed up. There is no money in it, and the people are going into something else. That should be the best proof that any reasonable person could want that the prices received by the farmers have not gone beyond the proper point. We in the city need to co-operate more with the dairymen and the dealers, to the end that we may get better milk; and some excellent ways of co-operation have been mentioned here this afternoon.

There is just one way I have thought of, which was not mentioned, I think, and I will refer to it. Milk should not be delivered at the time of the day or night that is most inconvenient to every person that has anything to do with it. Why is it that the people in New York City, who are so vitally interested in the question of getting pure milk, demand a service which brings it to their doors at two or three or four o'clock in the morning, where it is left to stand in the alleyway, and where the tops of the bottles are licked by the cats and the what else we know not, and where the dishonest scamp can come along and take off the top of that milk if he wishes to—or, perhaps, the dishonest milkman—and substitute something else? Why is it that they require that milk to be delivered at such a time, when they could get the same bottle of

milk—not a different bottle, but the same bottle of milk—twelve or sixteen or twenty hours earlier, in daylight. Why is it? It is because these miserable little series of connected closets that they call apartments are not big enough to hold a quart of milk longer than is absolutely necessary. Now, that would pay the people well. They would get more out of it than it costs them if they would provide refrigerators, and provide two cents more worth of ice, if necessary, and facilities to hold that milk over night, or, at least arrange to receive it when it is fresh.

Now, we have heard a most excellent series of statements from various speakers, and I was especially interested in those which were numbered and given by Mr. Stadtmueller. Just think of a man like that being the health officer of a small town! I wonder how it happened. If Mr. Stadtmueller ever gets tired of living in Connecticut, I hope he will migrate to New York.

I was delighted with these common sense papers. What Mr. Stadtmueller gave us was almost the ideal, and that is what we should always keep in mind and always strive for. We will never accomplish much unless we have an ideal, and that is what he gave to us. But I want to say that I can give you an additional point which possibly may appeal to you as being of a little more immediate practicability, although I would not discount one fraction of one per cent the good things that Mr. Stadtmueller has said. Now, here is a question. We are here to consider how we can get purer milk for this City. Yonder in New York are thousands of dairies producing milk, and there is an enormous stream of milk flowing down into this city every day. Up at its thousands of sources, much of the milk comes out pure, high grade, clean and desirable, and some of it comes out impure from its very source, low grade and undesirable. Those streams of milk come down to the city, and the nearer they get to this city, the more they intermingle. When they get down here, so far as the consumer is concerned, they are pretty much all alike. Now, you live in New York City, and you want clean milk and you do, and you do, and you do and I assume that you are willing to pay a fair price for it, though I don't believe you want to pay any more than you have to. We will say that Mr. Francisco lives in the country and that he is one of those who is producing pure milk. Now, what is the use of talking so much? You want pure milk, and you want it, and you (indicating Mr. Francisco) have got it. Why don't you fix it so that you can get his milk, or that you can get pure milk? Now, that is not theorizing a bit. We ought to have it provided that any person who wishes to sell milk, and who describes that milk to his consumers as being pure—the product of tuberculin tested cows, cooled to

forty-five degrees, in the market within thirty hours after it is milked, and clean and sanitary all the way along down—we ought to have it provided so that the man who produces that kind of milk and the man who sells that kind of milk will be protected against the scamp who produces and handles those fewer number of streams of dirty milk, and brings it down here and sells it to you with just exactly the same claims for cleanliness, wholesomeness and purity that the other man is justly making. Now, I do not make myself clear, because, if I did, you would be enthusiastic about it.

One of the main principles underlying the Pure Food laws of to-day is that a food containing a certain percentage of preservatives shall not be excluded from the market. The principle is not that a food of a third or fourth or fifth grade shall be excluded from the market. Those are not the advanced principles of pure food legislation. The advance principles to-day are these: That foods shall be true to their representation; they shall be true to label; they shall be true to the claims that are made concerning their purity. Then it is for the person who buys to decide for himself whether he wants Prussic acid in his tomato ketchup. If he wants it, he can have it. If he does not want it, he will not be deceived into buying it. All the food inspectors do is to come along and get samples of the foods and ascertain whether they are true to label or not.

Now, if that is true as to impurities in tomato ketchup and olive oil and coffee and spices and what not, why, it is ten times as important that such a principle should be carried out in the milk business. I believe in selling milk for what it is, and in letting the dealer and the buyer both know what it is, and in letting the public protect itself just as it does now with all other foods. I cannot for the life of me see why milk should be treated differently than every other kind of food.

To make this suggestion a little more concrete, I would suggest, for your consideration, that legal provision should be made, wherever you see fit, so as to enable those persons who are selling high grade milk and so advertising it, to be protected against those persons who are selling low grade milk and claiming for it the highest honors.

In a city not far from us, some time ago, a little investigation was made and inspectors went out to visit the premises of those dairymen who had signs on their wagons, and on their letter heads, and elsewhere, to the effect that they were selling inspected or veterinary inspected milk—milk from healthy herds, and so on,—and it was found that a large percentage of them had no inspection, and their herds were no more healthy than the herds of any other

persons. Now, a condition of that kind leads simply to confusion, and that is the condition of the City milk business to-day. It is in a condition of confusion.

I believe, ladies and gentlemen, that that is one of the most important means of solving this very confused question: Simply to require those persons who are engaged in the business to do so intelligently and honestly. I thank you for your attention.

THE CHAIRMAN: I do not think you would like to go home without hearing just one of our elder brothers who is in the milk business. Oh, Mr. Campbell, won't you come forward and tell us something about the handling of milk? (Mr. Campbell did not come forward.)

This has been a delightful afternoon, almost as inspiring as as it was during last January, when I had the opportunity, in three different states, to look into the faces of boys who were preparing for home work. Hardly any of them wanted positions. I told them there was pretty good money for good boys, but nearly every one of them told me that he was going home. Oh, what a good sign that is! There is no place to-day like the farm, where brains can be used with the same amount of energy as they are using them, and compelling you to use them, if you are in the city; and no greater results are had from the use of brains anywhere than on the farm. Those results will come to us through the milk, and the conditions that will make our farms look as if we were proud of them.

Now, the time has been passing pretty rapidly, and we have some great things for this evening. If any results from this afternoon session have been found, we should be glad to have them find their way into resolutions, and see what we can do with them. Dr. Wile.

DR. IRA S. WILE: Mr. Chairman and Ladies and Gentlemen: As Chairman of the Committee on Resolutions, I wish to say that there are two resolutions to be presented at this meeting. The first resolution is as follows:

WHEREAS, There is a high mortality during infancy, owing to impure milk supplies, and

WHEREAS, Large numbers of children are physically and mentally handicapped and unfitted for future citizenship, through mal-nutrition, in large part due to lack of milk in the dietary, owing to the cost of milk to the families of the poor, be it

“Resolved, That this Conference advise a general investi-

gation of the economics of milk production, milk transportation and milk distribution, with a view to determining the best method of producing a sanitary milk supply, within the means of the general public."

THE CHAIRMAN: You have heard this resolution. I know you like it. What is your pleasure?

(The adoption of the resolution was duly moved and seconded.)

THE CHAIRMAN: Now, we cannot give you much time, but we would be delighted to have a few speak to it for just a minute. We will give you that opportunity now. If not, are you ready for the question?

(The motion was carried and the resolution adopted.)

DR. WILE: Mr. Chairman, the second resolution, and the last resolution, that has been presented to the Committee, reads as follows:

"Resolved, That this Conference advises the promulgation of laws to insure the proper labeling of milk packages."

(On motion, duly seconded, the resolution was adopted.)

DR. WILE: Those are all the resolutions, Mr. Chairman.

THE CHAIRMAN: We want to thank you for so many coming here this afternoon and listening to these stories. They are good for you, and we hope to see you all again this evening.

Thereupon an adjournment was taken until 8:15 o'clock P. M.

SECOND SESSION

Friday evening, December 2, 8:15 o'clock.

Prof. WM. T. SEDGWICK presiding.

SUBJECT.—THE PUBLIC MILK SUPPLIES AND THE PUBLIC HEALTH

DR. IRA S. WILE, Chairman Conference Committee, spoke as follows:

Ladies and Gentlemen, in opening the second session of this Conference, held under the auspices of the New York Milk Committee, it would be a pure waste of valuable time for me to spend a moment in introducing the presiding officer, who is probably far better known here, in questions that pertain both to sanity and to sanitation, than any one else who may be in the room. I take pleasure in introducing the presiding officer of the meeting, Prof. William T. Sedgwick, of the Massachusetts Institute of Technology.

PROF. SEDGWICK spoke as follows:

THE MILK PROBLEM IN AMERICA TO-DAY

LADIES AND GENTLEMEN: It is a great privilege to be able to attend this Conference, and especially to be able to take an active part in it.

The whole problem of milk supply to-day, and of milk supplies and public health, is so important and so extensive, covering every inch of the country, as it does, that this Committee, it seems to me, has done well to come together and deal with it.

Now, it is not my intention to make any lengthy address, nor is it my desire to do so. The principal speakers of the evening will follow me. As I am expected to say something, and in order that I may save time—yours and mine—I have committed to writing what I should, in many ways, have preferred to give you without so formal a statement.

The milk problem in America to-day is perhaps the toughest of all our pure food and public health problems. Water supply problems, ice supplies, oyster supplies, and the purity and salubrity of ordinary foods such as meats, fish, flour, pre-

serves, and the like, compared with milk supply, are easy to deal with.

Doubtless to the public at large this seems surprising, for like the cup of cold water which is a symbol of disinterested charity, the glass of milk has long been regarded as the wholesomest of foods and the most serviceable of drinks. How then does it happen that this once simplest and most trusted of all the foods of man constitutes so difficult a problem in modern life? The answer is threefold:—first, because of the growth of cities; second, because of the rise of Bacteriology; and third, because of the testimony of epidemics.

The growth of cities has separated cows,—the producers, from mankind,—the consumers, and the rise of Sanitary Science has disclosed unsuspected dirt and dangers in milk, hitherto veiled and hidden by its whiteness. Think for a moment of the ever widening distance, as cities grow, between the cow and the consumer; a fact bringing in its train a long chain of undesirable consequences, such as these:—lack of acquaintance and therefore of sympathetic interest between original producers and ultimate consumers; transportation problems of increasing magnitude, cost and complexity; the lapse of time, giving opportunities for milk to grow old and stale and finally to spoil; manifold handling by various middlemen, giving opportunity for sophistication and adulteration;—any or all of which may be sufficient to bring about extensive deterioration in the quality and increase in cost.

In the second place, while human experience and Chemistry long since proved milk one of the most decomposable of foods, the newer Science of Bacteriology has revealed the presence, previously unsuspected even in comparatively clean sweet milk, of vast hordes and various kinds of micro-organisms; and the microscope has confirmed the frequent testimony of the eye and the nose to the presence in market milk of visible or invisible amounts of cow dung and other forms of dirt.

In the third place, the testimony of epidemiology is that hundreds of disastrous epidemics of infectious diseases, especially of typhoid fever and scarlet fever, have proceeded directly from the drinking of a supposedly fresh and pure milk.

I need not elaborate or dwell upon these now wellknown

facts. Let me rather pass on to a protest against the common comparison of milk supplies with water supplies, with its misleading corollaries, and a plea for the far more reasonable use of those closer analogies which exist between milk supply and the supply of some other foods,—especially oysters.

Public water supplies are almost invariably derived from one or a few large gathering grounds which are comparatively easy of inspection and eventually from huge reservoirs, the protection of the purity of which is comparatively easy. From these reservoirs one or a few great aqueducts, the safeguarding of which is easy enough, convey water to our cities, which are so served by branching and connecting pipes, all leading to one source, that the public shares in common a really common supply.

But with milk supplies this is never so. The gathering grounds may be a thousand farms upon a thousand hills, and, while from the earth water may flow from a thousand springs fed from the skies, farm lands flowing with milk and honey are unknown even in history, except among the hills of Palestine. In the next place, there is nowhere any one great reservoir of milk or any cluster of a few great reservoirs. There is no great artery or any small number of great arteries bearing milk from such reservoirs to our cities, and finally there is no single common and branching stream carrying through pipes of various size milk, as such pipes carry water to the ultimate consumers. On the contrary, from a thousand or ten thousand remote and distant farms a few gallons, more or less, of milk are first drawn from the teats of a domesticated wild animal, often by hands far from clean and under sanitary conditions leaving almost everything to be desired. These relatively small quantities of milk are then for the most part separately transported from the farm to the railway, and by the railway to the city. Here sometimes united but more often kept apart, after various treatments at the hands of middlemen, they are eventually distributed to the doorsteps of houses, institutions, stores, and other establishments in which further time elapses, giving opportunities for further changes to take place, until at last the milk, or much of it, is swallowed raw, and more or less stale and decomposed, if not dirty or diseased, by the ultimate consumer, perhaps a helpless infant.

Here is no useful analogy with a water supply, but if we need any helpful analogy, we can find it in our system of public oyster supply. Oysters are produced upon hundreds if not thousands of areas which are practically submarine farms: from these gathering grounds they are taken by oystermen unfamiliar with the first principles of cleanliness; by them or others like them they are perhaps opened and thrown together into small receptacles. They are not united into one great reservoir but transported separately, very much as milk is transported, upon railways and steamboats. Various middlemen have access to them during transportation and in the city they are finally distributed to houses, institutions, markets and similar places where, once more subjected to delay and handling, they finally pass on to the ultimate consumer, who oftentimes devours them raw. Precisely as milk upon the farms is often exposed to gross pollution, so also oysters drawn from farms beneath the sea may become contaminated by sewage.

I honestly believe that the use of the analogy of oyster supply rather than water supply will tend materially to sounder instruction of the people in the difficulties and dangers connected with the milk problem in America to-day. The present is no time for haste or for impatience. The farmer who is producing milk is, as a rule, engaged in what is still a primitive if not an uncivilized industry; he is confronted by increasing costs of labor, of fodder, of family life and of taxation, and as if these were not enough, he is informed that milk which he always supposed to be the safest as well as the simplest and best of foods, is, unless he is extremely careful, liable to endanger the public health. The railroads and other common carriers of milk must have their proper rewards for its careful transportation. Often the milk must be refrigerated and finally the costs of distribution must be superadded to those which have already accumulated.

Meantime the milk is in danger of becoming sour or stale and the ultimate consumer naturally enough complains both of cost and quality. Boards of Health and physicians enter their objections and their pleas for improvement, and the public resists any considerable rise of prices. So that with all these and many other conflicting elements at work the milk

problem in America to-day is one of the most tangled and one of the toughest and one of the most difficult to solve of any which confronts the public.

But while we wait more or less patiently for the solution which we believe must eventually come, there is one and only one complete safeguard against any infections which may hide themselves behind the veil of whiteness, and hence of innocence, worn by milk. That remedy is extremely simple, being the same which we apply to suspected water or oysters or meats, namely, ordinary cooking. Cooked milk may not always be palatable or in all cases digestible but it is always safe so far as infectious disease is concerned; while raw milk may be most unsafe. Whether cooking shall take the form of brief scalding or more prolonged boiling or that par-boiling, which we have come to know as pasteurizing, makes, so far as safety goes, but little difference. We must of course have inspection, all we can get of it, beginning with the examination of the cow and extending into the consumer's kitchen and refrigerator; but we must not delude ourselves by the belief that any system of inspection, however intelligent or complete, can ever give us perfect protection against disease conveyed by milk, or can ever equal, as a sanitary safeguard, simple cooking.

The milk situation in America at present is more acute than ever before and is everywhere hedged about by difficulties which cannot be removed either to-day or to-morrow. But they can be diagnosed and studied in conferences like this and by and by they may be overcome.

THE CHAIRMAN: Now, Ladies and Gentlemen, if there is any one man in the United States who has been more active than any other as a public health official, in stirring up the community in which he lives and in standing for good work along health lines, that man is Dr. Evans, Commissioner of Health of the City of Chicago, who needs no introduction to this or any other audience in America.

DR. EVANS spoke as follows:

THE RELATION OF THE PURITY OF MILK PRODUCTS TO THE PUBLIC HEALTH

MR. CHAIRMAN, AND LADIES AND GENTLEMEN: As I look over this program, and also as I look out over this audience,

I find it difficult to decide just what phase of the subject that has been assigned to me, I shall occupy your time with. The subject that has been assigned to me is "The Relation of the Purity of Milk Products to the Public Health," and that, of course, comprehends the situation in its entirety. I could not very well speak to that subject without, in some measure, covering the subject that appears next on the program, namely "The Bearing of Communicable Diseases on the Control of Public Milk Supplies," or the next, "Bacterial Contamination of Milk as a Cause of Disease," or going into the program of the morrow, "The Sanitary Side of the Milk Question," or "The Present System of Milk Control," and certainly not without, in part, at any rate, touching upon the side that is to be covered by Dr. Magruder, namely, "The Necessity of a Congress for the Improvement of the National Milk Supply."

It is rather peculiar to my mind that that great man, that great, forceful personality, Theodore Roosevelt, should have become interested, and so deeply interested, in a good meat supply, in view of the fact that meat is of relatively so small importance as compared with the question of a good milk supply.

As I look over this audience, as I have just said, I am confronted with a further perplexity. I am not quite convinced as to what particular phase of the subject I should touch upon or what particular line I should occupy your time with. It occurs to me that I might, for a while, dwell upon the things that are responsible for the harm that is done by milk when it is bad, and then, having briefly spoken upon that phase of the subject, I might offer you my opinion as to what is the solution of the milk problem in cities in this country.

In my judgment, milk is the second of the most important causes of death. It ranks second to air as a great causer of disease and of death amongst our people. There are other agencies that are of consequence and that are worthy of consideration, but they are not of greater importance than is bad milk in the production of disease.

The harm, arising from bad milk, is done in several ways. In my judgment, much the most important part of the agencies that are responsible for the harm that comes from milk are those agencies that are to be found in milk by reason of

its spoiling. It is dirty milk, which is old and which has been kept warm, and which, by reason of these experiences, is harmful, that constitutes the most important grouping of the harmful effects of milk. We hear much of the harm that is done by tuberculosis in cows, and much of the harm that is done by milk as a conveyor of typhoid and other diseases that are contagious, but, in my judgment, bad milk is, far and away, more important, from the standpoint of the harm that it does, through being dirty or through having been unduly warmed, or being unduly old, and having, by reason of these experiences, spoiled. This is the great, important, and overshadowing way in which milk is harmful to humankind.

Next in importance, in my judgment, comes the spreading of typhoid fever through milk. When a community has reached a typhoid rate of about twelve, as my community has now, and has maintained, for several years past, it is probable, in my judgment, that the major part of that typhoid fever is being spread through milk.

Tuberculosis, in this category of diseases that are caused by harmful milk, comes third.

Fourth would come scarlet fever. The epidemics of scarlet fever that are milk-borne are striking in their characteristics, but they are comparatively infrequent as compared with the manifestations or the spreading of typhoid fever through milk.

Diphtheria is of less consequence than typhoid fever, and there are other things caused by milk that are of less consequence still.

Those of us who are engaged in the control of the milk supplies of large cities often grow impatient at the point of view and the decisions of those who are arriving at decisions as the result of experiences that are comparatively limited, and as the result of experiences which have not qualified them for judicial determination as to questions that we are settling.

Communities, from the standpoint of milk control, fall into three groups. First is the group in which is found cities where the milk in the main is produced and consumed on the same premises. The methods of controlling the milk supply there, inasmuch as they exist where that milk is consumed, without transportation, without the intervention of other

agencies of time or place or circumstance, do not illumine, in great measure, as to the necessities that exist in cities where there is a railroad haul.

The second group of cities is that group in which there is a wagon haul, the group of cities in which the milk is produced so close to the city that, when comparatively fresh, it can be loaded into wagons and can be, within an hour or two, at the home of the consumer. There, too, there has intervened so little of time and so little of foreign circumstance or incident, that there is not the necessity for the same provisions of control, for the same points of view, for the same masterly activity, that is necessary where there exists a railroad haul.

There is a legend in law that time is the essence of the contract, and while this is true of certain legal transactions, there is no legal transaction of which it is anywhere near so true as it is of milk. In the milk question, time is the essence of the contract, and for every moment of time that has interposed between the milking of the cow and the consumption of the milk by the consumer, and for every interposition in the handling, the carrying, the warmth and every other detail that influences that milk, there is brought into play the necessity for additional precautions for control. I am sure that those who make up so large a part of this audience, namely, the administrators, have been constantly brought face to face with the point of view of the farmer who says, "This milk has been consumed by my children, and they have grown up well and strong, and I argue from that that it cannot be harmful for the children of the city." That farmer forgets that the milk, as he consumes it, or as it is consumed by his child, was but two or three or, at most, six or eight hours old; that the foreign bodies that were there and the bacteria that were there, did not have much of opportunity for the development of their baneful influences; but that that is not the condition of affairs that prevails when that milk has been hauled several miles in a wagon, has been delivered to a railroad platform, has been loaded up on trains, and hauled a few hundred miles into the city, where, again, it has been loaded upon a wagon and hauled a few miles to a depot, and then again upon a wagon and hauled a few miles through the city streets and delivered at a doorstep, where it has remained exposed to the

weather for an hour or more and has then been taken into the inside of the home and has stood there for several hours that intervened between that time and the time of its consumption. That milk is not milk four hours old; that milk is from seventy-two to ninety-six hours old. But that is not the sole expression of the differences between those two milks. Many things do happen and will happen in milk during those intervening hours.

Then, there is the additional thing that the farmer loses sight of, that his child that drinks, with impunity, the milk that is not clean, that is not as clean as it should be, is in some measure harmed thereby, but that harm is compensated for by the opportunities that his child has to play in the open air, by the sunlight that is there, and by the grass and the flowers that are there. There must be a different standard of milk for the child that does not have sunlight and air and grass and flowers and opportunities—a standard different from the standard that there must be for the child who plays in the sunshine and the air and amongst the flowers and the grass.

In view of the fact that this milk is older and that it has had many experiences that have come into its life, if we might so term it, that do not and have not come into the life of milk in these other communities, there are necessities for standards and there are necessities for observances that the farmer cannot well understand, and that the health officer of a small town, even, cannot fully comprehend. There are three groups of precautions that are necessary for the protection of the milk for the people of a large city. The first of these is that the milk should be clean, that it should be fresh and that it should be cold. The second is that it should be free from contagion, and the third is that it should not be a conveyor of tuberculosis from the cow or from the milker or other attendant, to the people in the city.

There is one of these methods or efforts at control that evokes great opposition, and that is the effort to control tuberculosis. A considerable part of those who are engaged in the management of milk supplies are of the opinion that it is the most difficult part of the milk problem to control. In my judgment, it is not. In my judgment, it is to be no more dif-

difficult to eradicate tuberculosis from the herds than it is to prevent the spread of contagion by milk, or to get clean, fresh and cold milk for the children in our cities. There is as much opposition on the part of the farmer, however much may be said to the contrary, to an inspection and a correction of those difficulties that lie along the lines of the preservation of the milk from contamination with stable manure or other forms of dirt, as there is in other lines.

I remember well going to a milk farm once where they had spent several thousand dollars in building barns that conformed to sanitary requirements. There were floors that were impervious; there were walls that were whitewashed; the yard was clean and the cows were clean, and there was a good milk house. But the elemental and fundamental things had not been attended to, for those milkers were milking with hands that were dirty. At least, the backs of their hands were dirty. The palms of their hands were beautifully clean, because the dirt, in the main, had gone into the milk. Then, as they moved from cow to cow and lifted up their three-legged milk stools, they grabbed them by the legs, where there was dry manure and milk. I scraped off four ounces of dirt from those legs. Now, there was a man who had been persuaded to spend several thousand dollars for a good and sanitary barn, but who told me that in his eighteen years' experience as a milker, he had never washed his hands preliminary to milking.

We are now conducting dirt tests on the milk supply of the City of Chicago, and it is rare that we do not find a demonstrable amount of dirt in a pint bottle of milk, and in my experience, it is going to be just as difficult to get a proper standard of cleanliness in milk—I mean, now, infant milk—as it is to get it free from tubercle bacilli.

When we come to the question of getting the milk fresh, there is an additional difficulty of great moment.

The next thing is the protection of the milk supply against milk-borne contagion. How is the milk to be protected against contagion which can be spread by milk? I know that in the State of Illinois—and I rather believe in the State of New York—the reporting of contagion and the supervision of contagion in the country places, and probably also in the

cities, is not such that the milk supply can be protected, and properly protected, against the typhoid fever and scarlet fever and diphtheria. I do not see that, even so far as developed cases of these diseases are concerned, a proper protection against them is within the immediate view of the future, and, of course, the possibility of protection against carrier cases is much more difficult and more nearly unattainable.

The problem of tuberculosis, I believe, we need not dwell upon at any considerable length, and yet we are disposed to lose sight of the fact that in this also there are two factors. In the first place, there is the tuberculous cow. In the second place, there is the method of ventilation of the barn, without proper attention to which we will not accomplish much by taking proper precautions against the tuberculous cow. So, you see, there are great difficulties in the way of a solution of the milk problem. In those cities where the milk producer and the milk consumer are so far removed, each from the other, that neither comes well under the view of the other, there are great difficulties.

As I sat here this afternoon and listened to the very illuminating addresses that were given, and as I listened particularly to the speech that was made by Mr. Stadtmueller, it seemed to me that one of the elemental difficulties lay in this: The farmer has a point of view to which he closely adheres; namely, that he is engaged in a business proposition, that he is producing milk, and that he has in mind the financial side of that proposition. On the other hand, there is the point of view of the consumer, who sees, who knows, and who is fully convinced that considerable harm is being done in the cities through milk that is improperly and imperfectly controlled. It is difficult for each of these groups of people to understand the point of view of the other group. Neither of them can thoroughly see just the way the proposition presents itself, however anxious they may be to see it. In my opinion, this is the thing for which we should work, in the ultimate. I believe that this thing of the production of milk should proceed along the lines of community development that are manifesting themselves in everything else, and that there must be greater specialization. I believe that we must have baby

milk as well as a general milk. So far as a general milk supply is concerned, it will not be difficult to throw around it such precautions as are necessary to insure a reasonable degree of safety for that. But in the production of baby milk, we must proceed along another line. The producer of baby milk must be a specialist. We cannot have a man who is making milk in order to use economically the hay that is made on his farm, or one who produces milk as a secondary proposition in the operations of his farm, engaged in the production of baby milk. That cannot be made secondary to the making of manure for the purpose of fertilizing that farm and to the economical consumption of oats, corn and hay that are made on that farm. That baby milk is of such importance that it must be made by people who are engaged in the making of milk as a primary proposition, and the consumption of hay or oats or corn, or the making of manure and other fertilizers, must, on those farms at least, become a secondary consideration.

Having established a grade of baby milk, it must be made legally obligatory that that milk, and that milk alone, shall be used in the feeding of children, where artificial feeding is necessary and where cow's milk is the method of feeding those babies. It must be made a violation of law to feed babies with other cow's milk than this quality or grade of milk that is known as "baby milk."

Now, how is that to be produced? In my judgment, the ultimate thing is that we shall bring the baby and the cow back together again. The ideal thing is to put the baby at the teat of the cow, and everything that you cause to intervene between that baby and that teat means dead babies, when you consider babies by the hundreds and the thousands. The best way and, in fact, the only feasible way that I see for getting milk that is fresh—getting milk that is less than twelve hours, or, better still, less than six hours old—is to bring the cow back into the town.

I do not mean that you shall judge the possibilities of this proposition by that which you remember as the hygienic conditions under which cows have been kept in the towns with which you have been acquainted. To illustrate this proposition to you: In the City of Chicago, there are 77,482 horses

that are used for commercial purposes. There are 4800 horses in the first ward of the City of Chicago alone. 8000 cows in the City of Chicago would furnish milk for every cow's milk drinking baby in that City, and if we will put up with the nuisance of 77,000 horses for the purposes of trade, why won't we put up with the nuisance of 8000 cows for the purpose of good baby milk? You may have an idea that a cow stable is more offensive than a horse stable, and it is, or rather, it can be somewhat more offensive than a horse stable. But did you ever go into Mr. Francisco's barn? If you ever did, I warrant you that you have never seen a horse barn in your life that was so inoffensive as Mr. Francisco's barn, or as any cow barn can be maintained. I therefore can see no reason why cows could not be kept in the City of New York or in the City of Chicago, producing good milk, fresh and clean, from tuberculin tested cows that are healthy, and that are milked by milkers that are so closely under observation that there is no possibility for the development of contagion among them, and, in that way, getting the milk from the cow to the baby, and consumed by the baby, when the milk is less than twelve hours old. I believe that thoroughly clean milk, less than twelve hours old would be, if kept properly cool, better than the best milk that has ever been produced by anybody after that milk gets to be three or four or five days old.

If there are considerations of land value to make it difficult to solve that problem in this way, then it may be possible, in an island such as this—a necessity that would not exist in the City of Chicago, where there is more unoccupied land—that you should establish milk producing stables at the periphery of your city, where land values are not so high, and then, if you will bring that milk, young, fresh, cold, into the city, not by your present system of railroad haul—for, in my judgment, the present system of railroad haul is not suited for city transportation—you will have milk that is fit for babies. The large freight unit that steam railroads now operate under is not fitted for the transportation of goods in the vicinity of cities, from one point within a city to another point within a city. The proposition is, that with an electric railway haul, you can load milk cars with your milk, immediately upon its production, and then use your street car lines to rapidly distribute it

to points of distribution situated particularly in those parts of the city where it is most needed. Is this not possible from the economic standpoint? Probably it would cost about three-quarters of a cent more to produce milk in the city than it would in the country; that is about the way it has figured out.

Did you know that a considerable part of the feed that you now give to your cows on your milk farms in the country is handled in the city and shipped from the cities out to the country again? It is a question as to how much of the feed could be produced and is produced on the farm, offset by the saving on that part of the cow feed that would come from consuming it in the city rather than shipping it out into the country districts. And as an offset to that three-quarters of a cent a quart, you have the cost of the transportation into the city. And I believe that the wise way to do it would be to so distribute these milk distributing stations throughout the city, that it would do away with a large part of the present wagon cost of milk transportation.

Ladies and gentlemen, this is the ultimate. What are we going to do in the meanwhile? In the meanwhile, I see but one thing to do, and that is to take the milk as we have it now, to see that the places in which it is produced are inspected to the best of our ability, to exercise our energies in every agency of control that we can demand, to see that contagion is not spread by that milk, and then, as Prof. Sedgwick has said, recognizing the deficiencies of every existing system, and recognizing the deficiencies of things as they are and as they are going to be for the next several years, to cook that milk at such a temperature as will kill the bacteria that are contained therein. This, in my judgment, is the only thing that is open to us for the present, and the only thing that will be open to us for several years. This other thing is a thing toward which we should be constantly working.

THE CHAIRMAN: In the old times, the wise men used to come out of the East, ladies and gentlemen, but now we get constructive suggestions from the other country.

Some people are not aware that we have in the United States a public health service, and those same people are so eager for another one that they seem unable to discover the excellent one

which we already possess. The South does not fail to see it. When yellow fever threatened our southern states in 1905, I think it was, they clubbed together and requested the United States Public Health and Marine Hospital Service to take charge of the fight against yellow fever. California does not think so, either. She called in this same service to fight the plague. In both instances splendid work was done. We have such a service in Washington, and the assistant chief of it is with us to-night and will speak to us next. Dr. Kerr.

DR. KERR spoke as follows:

THE BEARING OF COMMUNICABLE DISEASES ON THE CONTROL OF PUBLIC MILK SUPPLIES

The legal control of public milk supplies is a many-sided problem, and one not only affecting the individual, but the community and nation as a whole. For obvious reasons the need of an efficient method of control from the farm to the consumer has been most keenly felt in the larger municipalities, but, as is shown by an examination of their laws upon the subject, the States have also realized the necessity of some supervision over milk supplies. The Federal Government, from its standpoint, also recognizes both the economic and sanitary importance of milk, and has put forth well directed efforts to encourage the production of a more abundant and safe supply both in the interest of the producer and the consumer.

The laws relating to milk and milk products in the several States may be regarded as having three general objects; first, development of the dairy industry; second, prevention of fraud or adulteration; and third, protection of the public health.

On account of the food value of milk and because of its almost universal use, the development of the dairy industry is essential, and in devising an efficient method of control, this must be borne in mind; the dairyman being entitled to proper protection and reasonable profits. In the interest of the consumer on the other hand, it is necessary to guard against adulteration of milk, and to provide that its food value shall not be impaired.

Milk is a food, and many of the States have laws to prevent its adulteration and to require that it shall conform to certain standards. The national Pure Food and Drugs Act of June

30, 1906, is primarily of this character, and under its provisions some steps have been taken to prevent adulteration and misbranding. Under such laws it should be possible to maintain minimum standards with respect to the various constituents of milk, and to prevent the sale of milk containing diluents or preservatives. But important as it is to guarantee to the consumer the proper food value of milk, and its freedom from adulteration, these provisions must be regarded as being primarily in the interest of commerce and "the square deal."

If it were not for the public health questions involved, the milk problem would be capable of early and easy solution. But as it is, the absolute protection of public milk supplies from contamination by infectious organisms is a well nigh impossible task. The physician is frequently made aware of the dangers of milk that is filthy, and the sanitary officer is constantly having his attention called to the dangers of milk as an agent in the transmission of communicable diseases. In my opinion, this is the most serious indictment brought against milk, and one that must be met before it can be claimed that there has been devised an efficient method of control in the interest of the public health.

It is not the intention to minimize those efforts that are being made to secure *clean* milk. They should by all means be continued and extended, but in endeavoring to perfect them, we must not lose sight of the fact that *safe* milk is the real necessity. The present measures are inadequate to insure freedom from the infections of tuberculosis, typhoid fever, diphtheria and scarlet fever in market milk. Fifteen out of 223 samples of market milk (or 6.72%) in the city of Washington examined by Anderson contained tubercle bacilli virulent for guinea pigs. And Trask has tabulated examinations of 7097 samples of market milk of which 594 contained tubercle bacilli.

Of even greater importance is the contamination of milk by typhoid bacilli. These organisms have been actually isolated from market milk, and there have been no less than 320 typhoid epidemics reported as spread through this agency. With approximately 350,000 cases of typhoid fever occurring annually in the United States, and the disease being more prevalent in proportion to the population in country districts,

there must be frequent pollution of the rivers of milk as their minute tributaries radiating over hundreds of square miles are gathered together into vast streams that flow daily into the larger cities. It is a wonder there are not more reports of milk borne epidemics, and there would be, if epidemiological investigations were made of every outbreak, particularly among children.

What then is the present status of the milk problem from a sanitary point of view? An extremely small amount of *pure* milk for clinical purposes is being produced. A moderate amount of *clean* milk can be insured as a result of careful dairy inspection as maintained by some cities at the present time. Milk free from tubercle bacilli is possible, but it can only be had at the expense of much time and money, and it is safe to say that much of the market milk sold is not free from this infection.

An adequate supply of *safe* milk cannot be guaranteed with the *amount* and character of dairy inspection conducted at the present time.

The average number of dairies inspected per day by inspectors of the District of Columbia during the fiscal year ended June 30, 1909, was 2.7. At this rate, one inspector would visit approximately 840 dairy farms in a year. It is understood that the milk supply of New York City comes from over 30,000 farms. At the same rate, it would require at least thirty-five inspectors to make one visit annually to all of these farms. That much inspection undoubtedly accomplishes some good, but it is manifestly inadequate to insure a safe milk supply to New York City, and fails to afford like protection to other communities.

The fact that safe milk can be produced under prescribed methods is of great encouragement to sanitary authorities charged with the prevention of communicable diseases, and has resulted in the adoption of more or less adequate laws and ordinances to safeguard the production and handling of milk.

But any supervision short of the requirements formulated by medical milk commissions to prevent contamination by infectious diseases will not guarantee absolute safety from those diseases.

It is necessary, therefore, in devising an efficient method, to

come as near meeting those requirements as possible. Two methods are open; first, extension of dairy inspection as at present conducted, supplemented by pasteurization under official supervision; second, rigid medical and veterinary supervision over the production and handling of milk, and enforcement of the tuberculin test.

If the second method is to be relied upon, some system must be adopted whereby there will be reciprocity between the several States and communities within those States. In other words, the effort should be to secure uniformity of methods and standards in the production of milk, and coöperation of federal, State, and municipal authorities in their enforcement.

In sanitary matters the "every man for himself" policy has too long prevailed, and, while it has resulted in more or less effective protection of milk supplies of many of the cities of the country, sanitary administration in rural districts has suffered in consequence. An efficient sanitary service for the country as a whole can only be secured through coöperation of the federal, state and municipal authorities. If New York City in common with other communities were to adopt approved standards of milk production and transportation, and require certificates of inspection from the health authorities in those districts from which its supply comes, it would have a wonderful influence in the development of an efficient sanitary inspection service that would cover the country.

I believe this plan is practicable, although it would take time to inaugurate and perfect it. It would be a means also whereby federal and state authorities could discharge their duties in the interest of those communities that are not now able to maintain expensive inspection services.

The Surgeon-General of the Public Health and Marine Hospital Service has aided in every way possible the campaign for safe milk, and encouraged the compilation of data showing the extent and influence of the use of such milk among infants. But he realizes that more definite results could be attained by strengthening the hands of federal, State and municipal health authorities, and increasing their effective coöperation.

There appears to me to be a way by which this might be accomplished with the view of reducing the liability of the spread of contagious and infectious diseases. The Act of

February 15, 1893, provides for coöperation of the Public Health and Marine Hospital Service with State and municipal authorities to prevent the spread of such diseases from one state or territory to another, and authorizes the Secretary of the Treasury to issue such regulations as may be necessary to prevent such spread. When issued, these regulations may be enforced by the state authorities, but if they fail or refuse, the President may take such measures as may be necessary to enforce them. Certain of the states likewise have laws authorizing the promulgation of regulations for the protection of life and health within their borders and providing penalties for their violation. Under these laws and others that may by experience be shown to be necessary, and through the conferences of state health authorities with the Public Health and Marine Hospital Service, uniform and efficient measures should be decided upon for the prevention of the spread of contagious and infectious diseases through public milk supplies.

Many of the state health authorities, on the other hand, are required to hold conferences with the municipal health authorities; and through this means, municipalities should be able to secure uniformity of methods, and state aid. Combined action on the part of the several agencies mentioned should bring about tuberculin testing of cattle, frequent and rigid medical inspections of dairy employees and those handling milk, and eventually a much more efficient sanitary service for the country at large. The inspections should be systematically made by local health officers, and their efficiency insured by the states. If a particular district failed or refused to conform to the regulations, it would appear to me to be practicable under federal law to prevent the shipment in inter-state traffic of suspected milk from those localities. Until some such provision is made, it will be impracticable to prevent the sale in one municipality of milk condemned by another municipality, at least in some form or other. In the meantime, no adequate protection can be had against such practice, and the dangers it involves, except through pasteurization under official supervision.

Finally, in suggesting reciprocity among the communities and states, as one means of securing an efficient sanitary inspection, I am not unmindful of the difficulties that will arise.

At the same time I would remind you that a similar method has developed our system of national maritime quarantine, so that such information relative to notifiable diseases as is available, is compiled through coöperation. This principle, when put into practice, will do much for the improvement of public health administration.

THE CHAIRMAN: Of course, the problem of milk supply and the public health is most acute in the biggest cities. We are all proud of the fact that the City of New York maintains a Research Department in connection with its health work, and those of us who know Dr. Park are proud of the fact that Dr. Park is the head of that laboratory. I have great pleasure in presenting him to you.

Dr. PARK spoke as follows:

BACTERIAL CONTAMINATION OF MILK AS A CAUSE OF DISEASE

MR. CHAIRMAN, AND LADIES AND GENTLEMEN: Recently I was at a meeting of a milk conference in New York, and after talking to the members upon the bacteria question, one of the dealers said, "I think there is altogether too much of 'bacteria' in this milk agitation." I confess that there has been an embarrassing amount of "bacteria" in the talks that we have been having this evening, and there were certain things that I was going to speak of that have been so well spoken of by Commissioner Evans and by Dr. Kerr, that I can simply say, to everything except, perhaps, the city cow, that I absolutely agree with them. And I think perhaps that I can do best by cutting out a good deal of the general talk that I was to give, and devoting my time to other things to which I have given special attention, or rather to which the colleagues of mine who are working in the laboratory, have given special attention. I think, therefore, I will confine myself principally to the infant milk.

As Commissioner Evans has said, all of those who are working on the milk problem, whether they be inspectors or physicians or laboratory men, are coming more and more to believe that we must have a certain quantity of infants' milk, and also milk which can be taken by those who wish to pay for clean drawn milk. Then, of course, you have the big supply, which must be handled differently.

I want to say something about some words which Commissioner Evans used, which, if any here believe that bacteria are spoken of too much, might lead them to think that he had given them grounds for faith. He spoke about the very great and harmful influence in milk, due to dirt, warmth, and staleness. Now, I believe that he would agree absolutely with me in saying that the dirt is harmful chiefly because the dirt carries bacteria; that the warmth is harmful chiefly because the warmth allows bacteria to multiply; and that the staleness is harmful because the staleness gives time for the bacteria that come in with the dirt and are growing with the warmth, to grow to the full amount; and that, although he used words other than "bacteria" the fact is that those three things are the things that allow the bacteria to enter the milk and to develop there.

As I was coming down on the subway, I was trying to make up my mind whether to give the first place to tuberculosis or to typhoid fever, and I decided, as I thought it over, that undoubtedly typhoid fever came first and tuberculosis came second. I was quite interested to see that the Commissioner, in looking over the ground in Chicago, had come to the same conclusion; namely, that typhoid comes first and tuberculosis second, both coming after the infant mortality due to the bacteria from dirt, warmth and staleness. After the unanimity with which the subject of bacteria in milk, so far as the infant is concerned, has been spoken of here, it seems almost unnecessary to dwell upon that, and yet very recently I was talking about infant mortality with one of the most intelligent workers in infant diseases, and that person said that she believed it was rather the warmth than the bacteria. And a great many children's physicians and others interested in the subject believe that, really, bacteria do not make much difference, but that it is the warmth. I was really staggered to find that apparently intelligent people should hold such an opinion. It seems to me as strange as the opinions of those who feel that vaccination is unnecessary and harmful. Now, believing that that which is true of intelligent physicians may also be true of those here, I want to speak about some experiences that I had several years ago. The Rockefeller Institute allowed the Health Department to spend quite a sum of money in this direction, and

we started out to make observations on a large number of healthy babies. Those babies were on different kinds of milk; on cheap milk, heated before they took it; on good bottled milk, heated or not heated before they took it; on a good milk, properly modified and pasteurized and given to the children in the bottles; on the certified milks; and on the milk from the mother's breast. Those babies were watched through two summers—different sets of them, and through two winters, and then we compared the results and with the aid of Dr. Holt, put them into concrete form. Now, the results there were so definite, and they agreed so well with all that is claimed by those who have really studied the matter in any way and have not simply left it to the observation of those who go about among sick babies, that I want to go over them a little in detail, although it may seem a little dry.

Now, in the first place, the babies on the store milk: There were altogether 79 of those in the summer, and the milk was cheap store milk which ran from 5,000,000 to 40,000,000 bacteria per cubic centimeter. It was heated, of course, before they took it. They could not keep it without heating it. Of that 79, 15 died and 20 did badly. "Doing badly" means that they had a large number of days of diarrhœa. Now, it is rather interesting to note that there were about an equal number on condensed milk, where the bacteria did not become a factor, and yet, of those on condensed milk, out of a total of 70, 14 died and 14 did badly—practically the same result that was obtained from the cheap store milk. I just speak of this because those of us who believe we know that these bacterial growths make milk unfit for the infant, do not deny for a moment that other things may make food unfit for the infant, and that other things cause infant mortality. We do not maintain, for a moment, that the children that died from bronchitis, and broncho-pneumonia, and meningitis, contracted it from the milk, and, of course, those on the breast milk who died from those causes, didn't die from the effects of cow's milk. We are not speaking now of the other kinds of baby food that may be filled with bacteria and the products of bacteria, which are so harmful. Now, it may be interesting, also, to bring out the point which Dr. Evans touched upon, that we cannot have filthy milk and pasteurize it, and give that milk to infants,

without having serious danger and death. This very milk that was so bad because of its dirt and warmth was heated before it was given to the infants, and yet they did so badly upon it. This shows that such milk could not be made as it should be simply by killing the bacteria.

Now, we had 98 babies on good bottled milk, and there we had nine deaths, against, as you see, 15 deaths out of 79 with the cheap bottled milk. That is a good deal better result as to the deaths, but 29 did badly.

Now, when it came to a good milk, modified and pasteurized and sent out in bottles, here we had an entirely different result. Of 145 babies, only 4 died, and only 24 did badly. You see, with the cheap store milk, out of 79 babies, 15 died, while, with good milk modified, pasteurized and put into the small bottles, of 145, only 4 died. You see, therefore, the absolute advantage on the side of good milk pasteurized and put into the bottles.

We had, naturally, on the good plain certified milk that was given raw, a very good result. We only had 12 infants, and they all did well, and naturally, none died.

Of the breast-fed, there were 31 and none died. These babies, of course, were all healthy in the beginning.

Now, we turn to winter—and that is the season when intelligent physicians say that bacteria cannot do any harm. And we have learned, from what the laboratories and the physicians working together have said, that infants in winter can drink bacteria in the milk and apparently derive no harm from it. Milk in winter is cold from the beginning to the end, and the milk changes are, therefore, of a very much less degree. Not to go into detail, in the winter the infants did nearly as well on the cheap store milk as on the good bottled milk and the certified milk. The deaths in winter came entirely from pneumonias and not from diarrheas. Of the 211 treated in winter, only 6 died altogether, while, as you see, in the summer-time of 421 there were 41 that died.

So the point is plain that the bacteria in the summer milk make that milk unfit for babies. Those babies, with the depression due to the heat, cannot stand the changes in the milk and the dangers of bacteria, as they can in the winter. In summer, the heat multiplies the bacteria which cause death

or diarrhea, while in winter, the bacteria can be taken with considerable impunity by infants, the same as by older children. But they cannot take them in the summer time.

Now, my experience, up to this time, brings out this point very clearly: That bacteria and their changes do produce diarrhea and death.

At one time, the 15th of June, 50 babies were getting a certain milk. It was all pasteurized and was fairly good milk. On the next day, one-half of them got this milk in bottles and the other half got raw milk, everything else being the same. Instead of being free from bacteria, there were from a million to two million per cubic centimeter in the raw milk. The mothers did not know the difference, but one-half of them got the milk raw. In ten days, the two sets of children were doing entirely different, and we had to put a number of the children who were on the raw milk, back on the pasteurized, because otherwise we would have been responsible for sickness and death. There was a change without anybody's knowing the difference. They were simply provided with the milk without its being pasteurized.

Another thing: Observation shows, of course, that children can have diarrhea without getting it from cow's milk. They have infant diarrhea in the country where they have a very pure milk right on the farm, and they have more diarrhea there, also, in July and August, and more deaths, than in the cool weather. So you see the effect of the heat, with the cow's milk, with no bacteria and you see that those infants that were on the mother's milk had almost no diarrhea. So I say, there is no question about it; a clean raw milk or a clean pasteurized milk will be much better for infants in summer than milk that has bacteria.

The other point I want to touch upon is typhoid fever. I simply wish to bring out the point that Dr. Evans just mentioned, that however much care we may take about the observation of developed cases of typhoid fever, we are practically at a loss to know how to handle the typhoid carrier. Now, actual observation has shown that there are practically as many typhoid carriers going about among us as there are typhoid fever cases in a year. So there are, here and there, cases that we know nothing about, that are affecting the milk.

It came to the notice of the Health Department a little more than a year ago that a large number of cases had come from one man, who had had typhoid fever forty-seven years ago. We found that he was still passing typhoid fever bacilli in great abundance. We have had other cases, and one of our men, Dr. Baldwin, who has been giving considerable attention to typhoid fever and watching and looking up the cases, says that milk produces more typhoid in New York than any other single thing. That agrees, you see, with Commissioner Evans' observations in Chicago.

Now, to take up the last point that I want to touch upon, that of tuberculosis. All of you who have been in touch with this work, know that from time to time there has been a great change in our feelings about tuberculosis. I remember that when I first took up, as part of my work, the direction of the very small laboratories then in the Department, we believed that the bacilli of cows were equally as infectious as those from men, and we started in to tuberculin-test all the cows in Greater New York,—beginning with Greater New York and expecting to pass out to the farms. We tested some 5000 cows in that year. Suddenly we got word that Prof. Koch had stated that tuberculosis, as transmitted from cows to man, was a negligible quantity. Although, of course, we had somewhat different views, that simply prevented us from going on. If the greatest authority stated that it was so, it was almost impossible for us to enforce the tuberculin test. Then, as you know, men all over the world, as well as Koch himself, restudied the question, and we had to go back to the careful observation, not of cases but of bacteria obtained from actual persons dying of tuberculosis. The fact was that human tuberculosis was to be found everywhere, and cow tuberculosis was to be found everywhere, and that in Washington, Chicago, New York and other places a considerable share of the milk was found to contain such bacilli, and it was impossible to prove any relation between those facts. Then it was found that the bacilli had different characteristics, and case after case was studied, to find out actually how many had tuberculosis from cows and how many from man. So, of course, it was undertaken to prove, if possible, whether some people or some children who got it, got it from cattle. That was proved by the New York

Commission and the German Commission and others. And here in New York, some three years ago, we started, in another way, to find how much tuberculosis was due to milk. We took every case that came to a number of hospitals, and for three years a group of workers at the laboratories have been studying them. In that way, following the best lines and bringing the results together with those of other workers, it is giving us a fair idea. So far as adults go, we have only found one in a number of hundreds, that derived tuberculosis from cattle, and that was an insignificant lesion that was found accidentally upon an operation. But with the children, as you know, the story is very different. I will read here first the total number of cases in children, and then give you two different institutions, to show how the accident of taking cow's milk or mother's milk will affect this percentage.

Altogether, we have, in children under five years of age, more than sixty cases. Of these, fifty-nine were under five years. Nine died from bovine tuberculosis, and fifty died from the human contagion—that is, the human type of bacillus. That is, fifteen per cent of all the deaths of little children (from tuberculosis) that we have come across, taking the cases as they came, without selection, have been due to the bovine infection. Now, these cases were largely from two institutions. The one which gave us the most of the cases was the Baby's Hospital, and the Baby's Hospital represents very fairly the average baby in New York. Some eighty per cent of those babies were breast-fed. Most of them were under a year old. Of those babies in the Baby's Hospital, we had, altogether, forty-three fatal cases. Of those forty-three fatal cases, four were due to milk that had the bovine infection, and thirty-nine to the human infection. That is, we had there about nine per cent due to the bovine infection, among average babies. But taking the other institution, with the cases that I spoke of, it brought it up to fifteen per cent.

The next institution was one in which the children were not breast-fed. They were sent out and cared for by women not their mothers, and they were all on cow's milk. Here, although we had very few cases, the condition was remarkable. There were nine fatal cases that we studied, and these babies were all on New York City cow's milk. Of these, five died

from milk infection and only four from the human infection. So that, while it is true, I think, that only about nine per cent of the New York babies that die from tuberculosis die from milk infection, where eighty per cent of them were breast-fed, yet, where they were all on cow's milk, over half of them who died of tuberculosis were found to have the bovine type.

I may say that, so far as the older children go, the percentage of tuberculosis to milk is higher, but here it is no longer fatal tuberculosis, but was recovered from in most cases.

We have been trying to find out what this means, and to interpret these figures. We find that a great deal of bronchitis and marasmus in infants is really tuberculosis. When we consider that far the greater number of cases in adult lives are due to human infection, we believe that only two or three per cent of all cases of tuberculosis are due to bovine infection, because so many more cases of tuberculosis occur from twenty years on until death. But you see, among children, the bovine infection is extremely marked, and you see again, that the dirt and the bacteria that we find in children's milk has a very decided effect on infant mortality, as is proved when its results are contrasted with those of a general milk and a children's milk free from tubercle bacilli. Likewise, we who are grown up may drink dirty and bacteria-laden milk almost with impunity, if we choose to do so.

I think it is most interesting to note that those who are working in different cities in different ways agree so nearly on some of these things, although, as Dr. Sedgwick says, it has been apparent in the past that there were many diverse ways of looking at it.

THE CHAIRMAN: In connection with Dr. Park's very illuminating contribution to the meeting this evening, I think we should always bear in mind the wonderful experience of Japan, where, until recently, they used no cow's milk, but where tuberculosis is as prevalent as in any other country. One fact of that kind is worth a bushel of guessing and supposing and theorizing. It is extremely interesting to find that this falls in so well with Dr. Park's researches.

No meeting of this kind would be complete without a word from the Department of Agriculture, because, while we are mostly

interested in the public health, we must not, in considering this great problem, forget the farmer. We must not forget the difficulties under which milk is produced. Dr. E. C. Schroeder, Superintendent of the Experiment Station of the Bureau of Animal Industry of the Department of Agriculture in Washington, will speak to us on "The Real Need for Pasteurization."

DR. SCHROEDER spoke as follows:

THE REAL NEED FOR PASTEURIZATION

LADIES AND GENTLEMEN: After listening to the addresses made by the preceding speakers, I realize that I have nothing radically new to say to you, and consequently I hope I will not draw too much upon your patience.

The objectionable and dangerous character of impure milk is due to any one, or to a combination of two or more, or to all of several dissimilar conditions, each of which presents a different problem when its detection, and correction or counteraction are taken into consideration. Hence, to illustrate the truth of what seems to me to be an undeniable fact, namely, that the pasteurization of milk is an expedient we are practically forced to adopt for the protection of the public health, I will divide impure milk into four kinds and give each kind a little attention.

The four kinds are, 1 adulterated milk; 2, dirty milk; 3, bacteria-laden milk; and 4, infected milk.

Adulterated milk is an article that has been fought with fair success for a long time. As an adulteration, whether it is the abstraction of the cream or the addition of water or other substances, including preservatives, is always a wilful, conscious act of fraud, the punishment for adulterating milk should be made so severe, and should be so rigidly enforced, that no dishonest person with ordinary common sense would care to expose himself to the danger of detection for the increased profits which the use of adulterants might bring. The detection of adulterants is a matter with which the chemical inspection of milk must deal.

Dirty milk is another article for which no toleration should be shown, especially when the amount of foreign matter it contains is large enough,—and this is not uncommon with mar-

ket milk,—to form a deposit, visible to the unaided eye, after the milk stands a short time in the containers in which it is sold. The examination of milk itself and the sediment that can be obtained from it in centrifuge tubes should be sufficient to determine whether it is equal to or falls below a satisfactory standard of cleanliness.

The elimination from commerce of milk that contains more than a reasonable permissible maximum of foreign matter is a question of inspection applied to cows, dairy-barns, milk houses, milkers, utensils, etc.

Bacteria-laden milk,—omitting the fact, since I have already spoken about dirty milk,—that an excessive bacterial content often is the direct outgrowth of an excessive amount of filth,—may be of two kinds; that which has not been properly cooled and kept at a low temperature, and that which has been kept too long after it was produced. In other words, warm milk and stale milk.

Bacteria-laden milk must be dealt with through bacterial counts, and I believe this can be done if we do not insist on counts numerically too low. A standard could be established for different climates and different seasons of the year by making a large number of counts with milk from a number of different dealers, known through inspection to have been produced, handled at every stage, and distributed under economically practicable and satisfactory conditions.

If the bacterical count cannot be economically kept below a reasonable maximum, a maximum below which milk becomes a source of abdominal diseases among infants which make the first two years of human life the period of highest mortality, then we will have to resort to pasteurization as the only, immediately available, sufficiently inexpensive, reliable expedient.

We now come to infected milk, and by this term I wish to designate the kind of milk that is contaminated with specific agents of communicable diseases.

Dirty and bacteria-laden milk are closely related, because the conditions that facilitate the introduction of extraneous substances, which invariably contain germs, into milk, are akin to the carelessness in handling which facilitates the rapid multiplication of bacteria. But infected milk is, strictly speaking, a separate and distinct product. No doubt dirty

milk is a commoner carrier of infection than clean milk, because the conditions that enable other foreign substances to find their way into milk also expose it more seriously to the introduction of specific infectious materials; but, on the other hand, the otherwise cleanest and best milk may be infected with specific agents of disease, and infected milk of the otherwise most satisfactory character is more dangerous than noninfected milk that contains an objectionable amount of dirt and bacteria.

The introduction of infectious materials into milk from the bodies of diseased cows is a danger that can be checked to a great extent by careful inspection, including the application of the tuberculin test to eliminate tuberculosis. But, if inspection and tuberculin test are really sufficient, I am strongly inclined to believe that this is due more to the fact that relatively few diseases of cattle are transmissible to man than to a thoroughly effective exclusion from milk of the specific agents that cause disease among cattle. In animals and human beings alike, we must remember that diagnosis,—the recognition of the dangerous character of a disease,—more commonly follows than precedes the period at which the dissemination of infectious materials begins.

When we come to the infection of milk, by human beings, with germs to which the human body is certainly susceptible, we have really reached the most complex question with which the fight for pure milk must deal. The protection of milk against infection through those persons who are visibly affected with communicable diseases presents no insurmountable difficulty, as they are usually quarantined under the supervision of health officers whose duty it is to protect the public health. But what about chronic disseminators of disease germs? How about persons whose natural resistance to infection does not reach actual immunity, but is great enough to enable them to pass through disease without showing sufficiently marked symptoms to make a diagnosis possible; that is, persons actually afflicted with communicable disease but who are looked upon as being merely a little indisposed? How about persons who continue to work during the early stages of an infectious disease before a diagnosis has been made; or persons who, after exposure to such infected persons among

their friends or in their families, continue to come in contact with milk? And how about convalescents and those who are associated with convalescents, when we know that the reason for terminating a quarantine is oftener a question of time than a specific determination that the convalescent and his associates are safe persons to be at large?

To ask these questions is not sounding an unnecessary alarm because hundreds of epidemics have been traced directly to infected milk, and because it is a noteworthy fact, a fact that is constantly becoming more impressive wherever epidemics are traced to their sources, that immediate personal contact and the use of raw, infected milk are very conspicuous among the causes about which definite statements can be made and on which the propagation of infectious diseases depends.

The long continued, chronic dissemination of disease germs by seemingly normal persons is a subject about which our knowledge is very meagre. We have some reasons for believing that such persons are dangerous intermittently rather than continuously, and if this is true, even a careful examination of all persons engaged in the dairy business will not safeguard milk against periodic infection. If there is a corrective measure that can be used against this danger, other than its counteraction by pasteurization, I must confess that I have not been able to see it.

As to persons whose resistance to an infectious disease is not sufficient to protect them wholly, though it is great enough to prevent them from becoming more than slightly ill, we have, so far as the infection of milk is concerned, a very similar problem to that presented by the chronic bearer of disease germs. That such persons must be common no one can doubt who has observed the enormous difference in the severity with which different persons are attacked by the same disease during a single epidemic. Every physician knows that the resistance of individuals exposed to an epidemic ranges from absolute immunity to a fatally high degree of susceptibility.

Between absolute immunity and a degree of susceptibility which permits the development of only a barely diagnosable affection, we no doubt have disease invaded individuals who serve as dangerous disseminators of that infectious material which enters human bodies from undiscoverable, mysterious

sources. Can anything but pasteurization protect against the infectious material that may be introduced into milk from such individuals?

We must bear in mind that the infection of milk is a very different matter from the infection of other articles of food. Milk is the only liquid article of human food that is at one and the same time an ideal culture medium for micro-organisms and that is very extensively used in a raw state. Other articles of food may also become infected, but if they are solid and have firm, dry surfaces, like bread for example,—as this is an article that can in a measure compare with milk relative to the extensive and practically indispensable need for it,—the disease germs remain on the exterior, where they are exposed to the potent germicidal action of light and do not multiply. Germs deposited on solid food that has a moist surface may multiply, but the multiplication is slow compared to that which occurs in milk, and, furthermore, most solid articles of food that have moist surfaces are washed or exposed to the sterilizing action of heat shortly before they are eaten. In milk the germs not only find an excellent culture medium, but they sink into it and are protected by its opaque character from the action of light, and when they grow the rapidity of multiplication is not limited as on a solid medium by the formation of stationary colonies.

As to the danger from those who are in the early stages of infectious diseases, before a diagnosis has been made, or even before the person is conscious that his health is declining, it is well to remember that all our infectious diseases have a period of incubation or a period of time that elapses between the moment of infection and the visible development of symptoms. Just how soon during the period of incubation an individual becomes a source of danger to those who are exposed to him is a subject about which we know very little. If we take a disease like diphtheria, the germs of which multiply in milk, we know that its diagnosis frequently depends on our ability to obtain cultures of diphtheria bacilli from the patient's throat, a region from which germs are easily expelled during coughing, sneezing and talking. The germs are frequently there in considerable numbers before the affected person is perceptibly ill, and they are often present in large

numbers in the mouths and throats of persons who remain free from symptoms of diphtheria. Of typhoid fever, the germs of which also multiply in milk, we cannot say with certainty that the sufferer does not begin to expel infectious material from his body sometimes during the occasionally long period of general depression which is often the forerunner of what is recognized as the real disease. As to convalescents from infectious diseases, it is especially in recent times that we have found reasons which justify the belief that a revision of our ideas, relative to the time when a convalescent can safely be released from quarantine, is urgently needed.

The more I study this subject the more I am impressed with the belief that the pasteurization of milk must come into general use. Inspection, bacterial counts, chemical examination, and whatever else we can do for the purification of the milk supply may reduce, but cannot prevent the infection of milk by unsuspected but dangerous human disseminators of disease germs.

I do not mean, however, when I urge pasteurization, that we should regard its practice as a reason for tolerating evils which only inspection, bacterial counts, etc., can correct. The proper kind of milk to pasteurize is that which is as safe and pure in the raw state as milk can reasonably and economically be made.

In conclusion I wish to say a few words about pasteurization. The pasteurization of milk to be reliable and satisfactory must be conducted under close official supervision. So-called commercial pasteurization, without official supervision, is not satisfactory, because commercially pasteurized milk has repeatedly been found to contain virulent tubercle bacilli. The living tubercle bacilli indicate that the milk was not raised to a sufficiently high temperature, or that it was not kept at an elevated temperature long enough, or that it was not heated evenly throughout its entire volume. When mistakes in one direction occur it is fair to assume that they also occur in the opposite direction, and this may explain why some persons have objected to commercially pasteurized milk because of its burned or scorched taste.

Proper pasteurization means the exposure of milk to a temperature high enough to destroy pathogenic bacteria in from

15 to 30 minutes, and no higher, and the maintenance of this temperature, in accordance with the precise degree used, for a period of from 15 to 30 minutes. It also means that the entire volume of the milk shall be heated evenly, and not some parts of it left almost cold while others are burned.

The official supervision of pasteurization has the appearance of a difficult problem. Dr. A. D. Melvin, Chief of the Federal Bureau of Animal Industry, suggested recently that a solution could possibly be found by imitating a method used in the Federal Meat Inspection. That is, if a dairyman has a sufficient amount of milk to pasteurize to make it reasonable to station an inspector at his establishment, let him do his own pasteurizing in his own place under the supervision of an inspector; on the other hand, if his supply is not sufficient to make this reasonable, have him send his milk to a central pasteurizing plant, where it can be pasteurized under proper supervision. The inspectors, in addition to supervising the pasteurization, could give careful attention to the general quality of the milk offered for pasteurization, and they should be empowered to condemn all milk not up to well defined, reasonable standards.

THE CHAIRMAN: Doubtless you remember that in the census of 1900 sixty-six per cent of our people were living under rural conditions, as defined by the census; that is, in places of 8,000 inhabitants or less. In the meantime, the trend towards the cities has been running strongly. The tide has been setting strongly to the cities, so that in the present census I suppose the figure will be nearer to fifty per cent. But even that means that at least half of our people live in essentially rural conditions. Some of us suspect that the milk supply of villages are not always, by any means, what they ought to be, especially those of us who go to the country in the summer, and we shall, therefore, listen with especial interest to Dr. LeSeur, Health Officer of Batavia, New York, who will speak to us on this subject.

DR. LESEUR spoke as follows:

MILK SUPPLY OF VILLAGES

I have no doubt that the majority of you are feeling very much as the little boy felt who had been attending a religious service with his parents. At this service several very pro-

found addresses had been given, and the little fellow was listening with a great deal of interest, so far as he was able to appreciate the addresses. When the last speaker came upon the platform to deliver his address, he began, "And now what shall I say?" The little fellow back there at the end of the audience said, "Say Amen." And I have no doubt you feel that if I were to say "Amen" to the magnificent presentation of facts that we have had this evening, and leave you to consider those facts in their relation to your milk supply, I would have said perhaps all that could, in reason, be said to an audience which has listened as patiently and as interestedly as you have to these addresses which have been so very worthy of your careful attention.

I cannot pass to the consideration of the subject assigned to me without expressing my profound appreciation of the work which has been done by your committee. Do not imagine that because you are isolated, some of you, so far as Boston or Chicago, that you are entirely out of the range of observation of the little country town. We are noting the work that you are doing, and are profoundly interested in it, because it affects so large a part of our population.

Do not imagine, either, because the late census shows that more of you are gathered in this little village of New York than in all the rest of the State, that you are entirely free from the dangers which naturally come to those who receive a large part of the milk supply from outside of the city in which they live. Therefore, the problem of milk supply is one of great interest to you.

I had a paper to be read, that I was going to read to you somewhat at length, but the hour is late, and I promise you that I am not going to read all this to you. But I have a few suggestions that have occurred to me with regard to the milk supply of villages.

I appreciate the honor conferred upon me by the chairman of your committee on this conference upon milk problems of the State of New York, under the auspices of the New York Milk Committee, for I recognize the value of milk as an important part of the food of the human family. Any effort made for the improvement of the quality supplied is worthy of the attention of all intelligent citizens. The scope of this sub-

ject is so wide and has been so intelligently and thoroughly covered by the essayists who have presented the various phases of the topic assigned them, that my work must necessarily be limited, and is, by request of the chairman of the committee, to be brief.

The topic assigned me, "The Milk Supply of Villages," is one which has not been given the care to which it is entitled, for it is a recognized fact that not only is the milk supply of villages a part of the food of the villages, but the environments of the smaller villages furnish the milk supply for the larger villages, towns and cities. I note in regard to the milk supply of villages, first, that there is inadequate supervision of the supply. Little or no suitable attention is given to the milk supply by the health officers of the respective villages. It is altogether too little thought of by the health officers of the respective villages. Milk is brought in convenient, rather than suitable receptacles, and is distributed too often in that which is easier, rather than that which is best, in the form of receptacle. There is inadequate supervision of the milk supply of villages by the consumers. The organization of this New York Milk Committee is the outgrowth of the feeling among the more intelligent citizens and their physicians that supervision of the milk supply is an important matter, and that it is not at present properly supervised. There should be throughout the state in every village, under the direction of some competent authority and by some competent organizer, consumers' leagues whose duty it should be to know that the milk supply is adequately supervised in all the stages of its production from the pasture to the pail and from the pail to the palate of the consumer.

Again the milk supply of villages lacks intelligent care with reference to buildings in which the cows are kept. Too often tumble down sheds with filthy surroundings are the homes of the cows that supply milk to villages. There is lack of intelligent care of the animals themselves. Their food and water is not as carefully provided as it should be. Too often the cows go down to the swamp and after a hole has been cut in the ice, drink the dirty water standing there, and from that make our milk supply. They lie in stables that are filthy and, a part of their excrement is transferred to the udder and from

thence to the milk pails, and so on to our tables and the bodies of our families. This could be prevented by intelligent supervision.

Again, the servants employed in caring for the cows that furnish our milk are not compelled to be tidy in their persons or clothing. It is not an easy matter to secure this necessary care on the part of farm hands, but it is possible by the exercise of authority and the use of intelligence, and I think all will agree that "it is a consummation most devoutly to be wished."

Again the pure food law should be amplified in its scope so as to include the protection of our milk supply, and by the addition of penalties even more drastic than those now provided, prevent any form of adulteration. Penalties should be made more severe for the contamination of milk by any form of dirt or filth. The number of the various bacteria should be subjected to an even more rigid inspection and complete combination than is possible under the existing law.

Again, the law should be more thoroughly enforced by an intelligent public sentiment. I apprehend that one of the purposes of this convention is the dissemination of knowledge among the masses in order to aid in the creation of an overwhelming public sentiment in favor of the protection of our milk supplies at whatever cost. It is most important that this work be prosecuted with the utmost vigor, and every possible means used to enlist the sympathy of the consumers of milk, for so many selfish interests are arrayed against any advancement in this direction that it is only by the united efforts of the intelligent consumers that we may hope for the accomplishment of this greatly to be desired object. Thoughtful citizenship is a necessity in the consummation of this work, for until the citizens of the state realize how important this matter is and how necessary it is for every individual consumer to lend his aid in this direction, we cannot hope to win in this important battle.

To recapitulate, then, we conclude that the milk supplies of villages at present have inadequate supervision, first by the health officers, and by the consumers; second, that there is a lack of intelligent care of buildings, animals and servants furnishing the milk supply; third, that the pure food law must

be amplified to prevent adulteration and contamination, and the law enforced by public sentiment which can only be the outgrowth of thoughtful citizenship.

I do not subscribe to the doctrine of my very distinguished friend from the West, that the city cow is to be, even in the far distant future, an established part of our domestic economy. I can see certain economic and certain mathematical and certain social difficulties. The difference between the size of the denticular orifice in a newly born infant, and the well developed udder of the mature cow, would make that rather difficult in cases unless there shall be a great modification in breeding. And I imagine that the great difference in the number of children and the number of cows in a given community would give rise to a difficulty that could not be very well overcome, for my experience in the feeding of children is that they require to be fed at about the same time of the day, and I can see a difficulty that would arise in the order of precedence as the children came up for their feeding. Of course, I do not mean to imply that, in the development that is possible in the cities of the west, these things may not come about. These things may finally be overcome, but, for the present, although it is a consummation most devoutly to be wished, it seems to me that it lies so far in the dim and distant future that the practical carrying out of it is impossible.

Our distinguished Health Commissioner—and I yield to no man in my admiration for the magnificent work that he is doing throughout the State—on the platform this evening, indicated that the advertising of the quality of the milk would go a long way towards the abolition of the difficulties which lie in the securing of a suitable supply. I may be pardoned if I have the presumption to suggest that, in addition to that which is in itself doubtless highly beneficial, there would lie this difficulty: If the milk was advertised in the market, why, the cheaper products would be the very milk upon which the poor people would take the gambling chance, and thereby be liable to increase the death rate. So I think we must not only insist upon having the milk marked and the receptacles guaranteed and sealed under state supervision, but we must inflict such penalties for the violation of the law that protects us from adulteration, as shall make it a misdemeanor and a crime

to furnish anything but absolutely clean milk. And that, like the domestic cow, is far in the future, and it is only by the eye of faith, perhaps, that we can see it. But, by the grace of God and the intelligence of the American citizen; and by just such work as this Committee here in New York is doing; and by our help up the State, if we can get the farmers to wake up to the importance of the work; and by the aid of such a Commissioner of Agriculture as we have heard to-day; and by the enactment of such laws as we know ought to be enacted; that thing can be and will be brought about.

THE CHAIRMAN: I see that this room is full of persons who are eager to discuss these questions, and experts are here by the dozen. The hour, however, is very late, and with your permission and that of the Chairman of the Committee, I am going to call upon only one of these experts, as representing you all, and that is Dr. Rosenau, late Chief of the Hygienic Laboratory of the United States Public Health and Marine Hospital Service in Washington and now professor of Preventive Medicine and Hygiene in Harvard University, to talk to us for five minutes or so upon the points which have been made here to-night. Dr. M. J. Rosenau.

DR. ROSENAU spoke as follows:

I thank you for calling upon me, but it seems to me that the hour is such that milk-imbibing citizens should be about to retire. Our pail of milk to-night has been filled with instruction and eloquence, and anything that I might add would make it slop over at this juncture.

I want to say, as long as I am on my feet, Mr. Chairman, that I want to congratulate you upon gathering around you this galaxy of authorities and orators, who have both entertained and given us instruction to-night. It has been a great satisfaction to me, as I know it must have been to the rest of the audience, to notice the unanimity with which the danger has been pointed out and the methods for its correction. Pasteurization is not proposed as a method to atone for filth, nor it is proposed to bolster up the dirty milk and make milk marketable that is otherwise unfit for consumption, but as a temporary expedient that is necessary on account of the conditions that we have to meet.

I think, in all the remarks that we have listened to, there was only one kind of milk mentioned. There is a milk that should be spoken of before the evening is out, and that is that milk

which, in order to arrive at the co-operation which is necessary and has been dwelt upon and emphasized by almost every speaker, it is necessary to inject into this subject—the milk of human kindness.

THE CHAIRMAN: I will ask Dr. Wile to present a series of resolutions which he has prepared, and which I am sure you will be glad to consider and probably approve. Dr. Wile.

DR. IRA S. WILE, Chairman Conference Committee: Mr. Chairman and Ladies and Gentlemen: I just wish to correct one statement that the Chairman has made. These resolutions have merely passed through the hands of the speaker, and were not prepared by him. In order that there might be harmony in action, and in order that no resolutions might be proposed that seemed to result from some man's wearing a chip on his shoulder, it was decided to eliminate the personal equation in the introduction of resolutions. These resolutions have gone through the hands of the Resolution Committee, and for that reason no one knows whence they came nor why, but I trust we shall know why they go and whither. The first resolution, Mr. Chairman, is as follows:

WHEREAS, 16,000 babies die annually in New York City, of which number 4000 are killed by bad milk and improper food, and

WHEREAS, there are 500,000 children in New York City under five years of age, whose future health and strength will depend in large measure upon their proper nourishment and development during childhood, and

WHEREAS, pure milk is the most important food in the diet of these children, now, therefore, be it

Resolved, That the problem of securing a clean, safe milk for babies and young children is the most immediate and pressing problem confronting the health authorities of this City, and be it further

Resolved, That it is the sense of this conference that steps should be taken to label milk so that mothers will know what milk is safe for their babies and what milk they must avoid.

Resolved, That it is the sense of this conference that milk from tuberculin tested cows kept under conditions which satisfy the highest medical and sanitary standards is safe for babies in a raw state.

Resolved, That it is the sense of this conference that milk from cows which have been physically examined for tubercu-

losis, and are kept on farms which score at least 75 per cent by the Health Department methods, although not so desirable as raw milk as above described, is safe for babies if pasteurized at a temperature not lower than 140 degrees F. and for a time not less than twenty minutes; provided such milk has a bacteriological count not higher than 100,000 per cc. before pasteurization and not less than 10,000 per cc. after pasteurization.

Resolved, That it is the sense of this conference that all other milk is not safe for babies; that it should be pasteurized as above described; and that it should be recommended for cooking purposes only and not for drinking purposes.

Resolved, That this conference recommend to the New York Health authorities that an effort be made immediately to secure a quantity of milk of Grades 1 and 2 above described, sufficient for the 500,000 infants and children under five years of age in New York City.

(On motion, duly seconded, the resolution was presented for discussion.)

A VOICE: Mr. Chairman, there are hundreds of farmers to-day ready to produce certified milk if they can get the price. The hardest thing to find to-day in the City of New York is the man who will buy certified milk and pay our price for it. Now, if the people will pay the price for milk, it does not require anything further, but the minute you ask the price for the goods that they can be produced for and brought to the City of New York, the City of New York is up in arms. Last year was no exception. Every man was up in arms because he was charged 9 cents a quart for milk.

THE CHAIRMAN: I believe there is a great deal in what the speaker says, and I only wish that he had discussed or had had an opportunity to discuss these papers somewhat earlier. Undoubtedly the price question is of prime importance, as I have myself two or three times this evening remarked, and as other speakers have remarked.

Are there any remarks germane to this resolution?

DR. G. LLOYD MAGRUDER of Washington, D. C.: Mr. Chairman, I would like to ask you for the reading again of that first classification.

THE CHAIRMAN: I will ask Dr. Wile, who is familiar with it, to read it.

(The resolution was again read by Dr. Wile.)

MR. MAGRUDER: Mr. President, I am not quite in favor of voting for that classification, because the mere fact of having it free from tubercle bacilli and keeping it cold is not an absolute guaranty that that milk is safe. We have had it shown to us here this evening that that kind of milk is not absolutely safe milk, because there are so many other conditions that affect the milk, such as a bacillus carrier and diseased persons around the milk. If we can have a bacteriological examination of the employees at the dairies, of their feces, of their urine, and their other excretions, so as to know that they are free from a hanging on of diphtheria, typhoid fever and other diseases, why, then we could safely take that classification. If we could also be sure that that milk was free from the streptococcus, then we might take it. We all know, who have kept pace with these things, that the streptococcus is a very serious infection. We know that to children it is very dangerous, and that the danger is so pronounced, as you well know, that in Boston Dr. Rosenau and others are investigating the influence of the streptococcus upon infant feeding. The same matter is referred to the Department of Agriculture at the present.

The mere fact of a tuberculin test, keeping it safe, keeping it cold and inspecting it, does not guarantee it. We have got to have it partially cooked. A perfect pasteurization—140 degrees for twenty minutes—is the only means that will give us the safe milk.

THE CHAIRMAN: Are there any other remarks?

MR. ALEXANDER CAMPBELL: Mr. Chairman, it seems to me that these resolutions are so important and the hour is so late that they cannot receive the consideration which they deserve. We have been delighted in listening to the gentlemen here, and it seems to me that a question of this character should have a little more deliberation.

As to certified milk, there is more certified milk being made to-day than there is a demand for. It is very easy to pass resolutions, but what are you going to do with the milk if the people don't want it. We are producing milk to-day at large expense and there isn't a man who is producing it that is getting his expenses out of it. Now, you talk about educating the people—

THE CHAIRMAN: (Interposing) Will you, then, move an amendment?

MR. CAMPBELL: I am not prepared for it. I would like to have time to think carefully over this matter.

Now, we have had certified milk before the community here for the last five or six years. The doctors are supposed to be trying to educate the people, but I believe that you will use your life up before you have much effect on the people. When you go before the people with milk the first question they ask you is: "What is the price?"

THE CHAIRMAN: Are there any other remarks? If not, are you ready for the question?

(The motion was not carried and the resolution was rejected.)

THE CHAIRMAN: Is it the wish of the Committee that these should be separated at all, one from another?

DR. WILE: No, just as it was presented.

THE CHAIRMAN: Dr. Wile has other resolutions to propose.

DR. WILE: In regard to the remark made by Mr. Campbell as to the hour being late, we should remember that the result of a conference is usually to confer and go out and forget it, and then the conference is ended. Now, in order to crystallize the sentiment, either for or against certain things, and that we may determine the consensus of opinion of this conference, these resolutions are offered. As interpreted by resolutions, it stands merely for the concensus of opinion of this particular group, and no more. Consequently, I do not know just how far the state legislatures will be moved by what may be enacted here to-night. But if this group conferring on milk questions comes out positively and unanimously in favor of certain definite things through the adoption of resolutions they may, at least, be the basis of securing more effective legislation along various lines.

The second resolution is as follows:

"WHEREAS, There is a great duplication of effort in the work of country milk inspection resulting in a multiplicity of inspections by State Boards of Health, State Boards of Agriculture and Inspectors sent out by municipalities, be it

"Resolved, That it is the sense of this conference that the work of country milk inspection be carried on by states and not by municipalities, and that municipalities adopt minimum standards and refuse to accept milk which falls below these standards, and be it further

"Resolved, That it is the sense of this conference that the methods of milk inspection carried on by states should be uniform."

THE CHAIRMAN: You have heard this resolution. What is your pleasure?

(It was moved and seconded that the resolution be adopted.)

DR. EVANS: I dislike very much indeed to occupy your time at this late hour, and yet it would seem to me that that is a resolution which, if it were to be effective beyond the State of New York, might be productive of consequences that were not of the best. I have in mind a place in which, in order to decrease the activity of local inspection on the part of the municipalities, it was deliberately decided that the thing to do was to bring about state inspection. That legalized state inspection, according to the judicial decisions in that state, would operate to remove the police power or control of the municipalities over the milk and place it in the hands of the state, and would also bring it back again into the hands of the state. It was thought that the state inspection would be crippled by making improper or inadequate provisions therefor.

Generally speaking, the municipalities respond to the point of view of the consumer, and the states very frequently respond to the point of view of the producer, and unfortunately this point of view at times has been the only point of view. I believe that in certain states of the union, at least, a more active and more comprehensive inspection will be had if it is done by the municipalities than if it is done by states. Now, I think that that is all right for the State of New York, in all probability. It represents your judgment in this state and is quite acceptable for this state. But I dislike very much indeed to have it go forth as representing the views of this meeting as to what is best in all of the states or in states other than the state that you have immediately in mind.

THE CHAIRMAN: Are there any further remarks? If not, are you ready for the question?

(The motion was lost and the resolution was rejected.)

THE CHAIRMAN: Are there other resolutions?

DR. WILE: The next resolution is as follows:

"Resolved, That it is the sense of this conference that milk should not be retailed loose, but should be sold in bottles."

DR. SHREVE, Atlantic City: I would like to inquire what that means? Does it apply to milk that is retailed or wholesaled; how is that?

DR. WILE: That which is retailed. It does not apply to that which is wholesaled in the cans.

DR. SHREVE: Then, should there not be something in the resolution to limit that?

DR. WILE: The word "retailed" is used in it.

(The resolution was again read.)

THE CHAIRMAN: I suppose that means that it should not be sent out to the consumers in cans and put into the consumers' receptacles, and so forth. I take it that it means that the milk should be bottled milk when it reaches the consumer. It is rather a wide proposition, gentlemen. Many of these are rather wide, but I am only the presiding officer. It is my duty to put these before you.

A VOICE: I am from a little town called Carney, in west New England. We have an ordinance in that town covering retailing, wholesaling, etc., which provides that no milk shall be sold in stores or by wagon unless it is thoroughly bottled before the selling. We do not allow it to be sold in receptacles of any description. I, therefore, move the adoption of the resolution. (The motion was duly seconded.)

DR. HARDING, Cornell University: It seems to me that in the present state of our milk-handling proposition, at least in the smaller cities, the sale of milk in bottles is the weakest part of our health regulations, because the bottles come from the typhoid cases and go back to the bottling department with no adequate washing, and there they are refilled and go out to other consumers. To improperly treat the bottle is the most dangerous feature of our present milk handling, at least in the smaller cities of the state. Unless the bottle proposition is safeguarded by restrictions regarding the proper handling of bottles, it looks to me to be a fallacious resolution.

MR. BURLINSON: Mr. Chairman, I represent a considerable number of small milk dealers, and I would like to add to what the last speaker has said, in behalf of the City of New York, that the bottled milk would be quite a detriment and would be hurtful to the health of the people were it forced upon the people generally for one particular reason: It is well known that in delivering milk at the various residences the milk is left at times in the hallways, which, as far as a fear of warmth is concerned, are perfect ovens. The milk is left there in the small hours of the morning, from 2 to 3 or 4 or 5 o'clock, and possibly it gets into the hands of the

housekeeper at 6 or 7 o'clock, but sometimes not before 8 or 9 o'clock.

Not only that, but the milk that is delivered in bottles is, as a general thing, held in the house without ice until quite late in the evening, when the child, before it retires, is forced to drink this milk.

Now, then, on behalf of loose milk, or canned milk, as it is commonly known, I should say that it is possible for the housekeeper to get that milk in small quantities, even as little as 2 or 3 cents' worth, here in New York, and to use it just as soon as it is taken into the house.

So, without taking up any more of your time, as I might very well do in this connection, I will say that I think that there is a great deal to be said in behalf of the loose milk, or the canned, as against the bottled milk.

MR. CAMPBELL: I must say that I am rather surprised at the remarks of the last speaker in opposition to bottled milk. The great cry has been that loose milk should not be permitted to be sold in certain stores that it is now being sold in, from the fact that it is exposed to an atmosphere which is not of the best, and especially during the hot weather, when the flies are pretty thick and the cans remain on the floor without any ice to protect them and no cover on them, so that any one who pleased could come up and help himself.

I think the bottle has proven that it has been the only safe method of delivering milk to the family. How are you going to deliver loose milk to-day to the consumer? You have to leave it in an open pail. You have to dip it out of an open can. Your driver has to hold his hands over it when it is pouring rain and take the cover off the can and allow the drippings from the rain, off his hands and off his clothing, to get into the milk.

I think I know something about the bottle question. I had the credit of putting the first glass milk bottle upon the market more than thirty years ago. I built the first creamery in the United States that ever shipped bottled milk to the market, and I have had the pleasure, not only in this country but in Europe, of seeing a great deal of bottled milk served, and I think it is appreciated. Of course, it should be properly bottled. No milk should be bottled unless the bottles are thoroughly sterilized. That fact is understood and accepted, and I think that every responsible dealer to-day is equipped with the very best facilities for that purpose.

I am more than amazed to find any intelligent gentleman here proposing that milk be delivered in such a way that you can go out and get it by the 2 or 3 cents' worth after it is exposed, in

the majority of cases, to a very bad atmosphere in the City of New York, where it is sold.

A VOICE: The resolution does not say anything about where that milk shall be bottled. If you can sell it in bottles, regardless of where or how it is bottled, a man can buy a can of milk, put it into his wagon and bottle it as he goes about the city. I have seen milkmen bottle their milk as they go along. They will take it and serve it to one and pour it out, and come back and fill up the same bottle and give it to another. If the resolution stated where the milk should be bottled or that it should be bottled at the creamery, that would be different. If it said that it should be bottled at the place of production before it is sent to the city, that would be all right, but simply bottling does not amount to anything in the way of a precaution.

MR. CAMPBELL: I think, Mr. Chairman, that that would be covered by adding an amendment to the resolution that no milk shall be delivered in bottles unless they are properly sterilized.

MR. BALLOU, Washington: I move that the resolution be amended by inserting the word "proper" before the word "bottling."

(The amendment was duly seconded.)

DR. J. W. LESEUR, Health Officer, Batavia, New York: I only want to remark that I have heard it suggested by a distinguished sanitarian, who lives a long way west of New York, that the time is not far distant when thermos bottles will be provided at a price that will be within the reach of the masses.

A VOICE: Just a word. It seems to me that that is a very large phase of a large proposition, which is very loosely joined and very loosely jointed. I think it would be a mistake—and I say this without intending to criticise either side—to pass upon it at this late hour with so little consideration.

THE CHAIRMAN: Are there any further remarks? The question is upon the amendment, namely, to insert the word "proper" before "bottled," so that it shall read "proper bottles." Are you ready for the question upon the amendment?

MR. BALLOU: Mr. Chairman, I meant "proper bottling" and not "proper bottles," so that it shall read "that the proper bottling."

A VOICE: If the poor cannot pay 7 cents a quart for the milk, how are they going to pay for the bottling, when that will amount to 1 cent a quart alone?

The question being called for, a *vive voce* vote was had.

THE CHAIRMAN: The Chair is in doubt. I will ask those in favor to hold up their hands, and those opposed to do likewise. The ayes appear to have it.

The motion, then, is amended to read, "Resolved that it is the sense of this Conference that milk should not be retailed loose, but should only be sold after proper bottling." I think I have the sense of that, at any rate, if not the exact form. Are there any remarks upon the motion? Are you ready for the question?

A *viva voce* vote was taken.

THE CHAIRMAN: Again the Chair is in doubt. All those in favor are requested to hold up their hands, and those opposed to do likewise. The ayes have it, and the motion prevails, as amended.

DR. WILE: The last resolution to be presented, I presume, will create just as much enthusiasm as those which have gone before. The best part of these resolutions lies in the fact that they promote just the discussion that we are having. These resolutions are not framed to be passed. That was not the purpose of the committee in entertaining the resolutions. The purpose was that of having the practical crystallization of sentiment along some line, after discussion. Whether or not the resolutions are adopted in no way concerns the one who is introducing them, nor does it matter to the committee that has passed upon them, nor does it matter to the New York Milk Committee, nor to any other organization that I know of. But the results of your discussions here are all being carefully taken down by the stenographer and will be preserved for future generations.

The last resolution, Mr. Chairman, is:

"Resolved, That it is the sense of this conference that the sale of milch cows which have not been tuberculin tested and found free from tuberculosis should be prohibited throughout the United States."

My attention has just been called to a question that might be present in the minds of some of you. This does not mean that the use of cows for the purposes of beef is in anywise interfered with, but cows for the production of milk. That is the intent and purpose of this resolution.

THE CHAIRMAN: You have heard the resolution. What is your pleasure?

(It was moved and seconded that the resolution be adopted.)

MR. CAMPBELL: I would like to ask if you will be good enough to have the resolution read again.

(Resolution again read.)

MR. CAMPBELL: That would be a good thing to pass if you want us all to go out of the milk business.

THE CHAIRMAN: Are there any other remarks?

MR. DANA: I am President of the Western New York Milk Producers' Association. I have been somewhat amused in listening to the resolutions that have been passed here to-night. I am just a plain farmer, and I may not know, but it seems to me that we have turned down those propositions that have been sanctioned by the best authorities for years as being good. We have turned down the proposition of certified milk and left us at sea. Our eminent and distinguished men come here and turn down the proposition of bottling milk, and the idea that it is better to bottle milk in the street and to open the cans in the street, because, forsooth, some man might not sterilize his bottles.

Now, we are coming to the proposition that all cows offered for sale in the United States shall be tuberculin tested. Now, the great trouble with that thing is this: We are up against the practical proposition of furnishing milk to the cities of this state at a living price. It is not denied, as far as the contaminations are concerned, that the tuberculin test is, perhaps, ninety-eight per cent accurate, but I appeal to any of you gentlemen as to whether there has been an adequate post mortem examination to prove how accurate it is when it passes an animal.

The facts are these: An animal passes to-day, and to-morrow she does not pass. I tuberculin test my herd to-day, and next year I test it, and the next year I test it, and an animal is thrown out with lesions that it does not need a veterinarian to tell are old lesions. Those lesions exist and the cow passes test twice or three times anyway. I can mention numbers of instances in this state where men who had kept their herds absolutely clean came up against the proposition of a twenty-five per cent reaction.

Now, gentlemen, the proposition before us is that all cattle must be tuberculin tested. As a milk producer, I want to get behind that idea that, as far as practical work goes, there is only one safeguard that will allow the City of New York or any other city to have milk at a reasonable cost, and that is proper pasteurization.

In the last few years cows have cost us an advance of from \$40 to \$80. You test these cows and they will cost us from \$100 to \$150 and cannot be had. You test the cows of the State of New York to-morrow and only allow those cattle to be put into the dairies that pass the tuberculin test, and there aren't cows enough in the State of New York to produce your milk. There aren't cattle enough in the United States to produce your milk. And if you think the farmers of the State of New York and the farmers of the other states are fools enough to go on and do it merely *pro*

bono publico, you are mistaken. We have got some business sense and we have got to stand forth and protect ourselves.

If you want the best milk that care and vigilance and precaution can produce, the farmers of the State of New York and the dairymen of the State of New York are willing and anxious to produce such milk, if you will only give us a living price for it. Cornell University has gone over the state and ascertained the returns from the dairy farms and other farms, and the poorest paid men working on the farms in the State of New York to-day are the dairymen.

A VOICE: I move to strike out all after the word "Resolved" and to put in lieu thereof "That the interstate commerce of all cows not tested with tuberculin shall be prohibited."

THE CHAIRMAN: Will you kindly state that again?

A VOICE: That the interstate commerce of all cows shall be prohibited unless they are free from tuberculosis, as far as the tuberculin test and a physical examination may determine.

THE CHAIRMAN: I ask the Speaker to repeat his resolution, because I didn't quite understand it, and I am not sure that I do yet. I am inclined to think it is out of order, because it absolutely changes the sense of the whole resolution.

A VOICE: I offer that as an amendment.

THE CHAIRMAN: It would amend so absolutely against the sense of the resolution as to change it entirely.

MR. CAMPBELL: I move that we continue the discussion to-morrow, and go home.

THE CHAIRMAN: This motion is also out of order; are you ready for the question?

(The motion was lost and the resolution was rejected.)

THE CHAIRMAN: It is lost. Are there other resolutions?

DR. WILE: No, Mr. Chairman.

THE CHAIRMAN: The Chairman of the Committee on Resolutions informs me that these are all the resolutions he has to offer, and I hereby declare this conference adjourned.

An adjournment was taken until Saturday afternoon, December 3rd, at 2 o'clock.

THIRD SESSION

Saturday afternoon, December 3, 1910, 2 o'clock.

DR. WM. H. PARK, Presiding.

SUBJECT, MILK STANDARDS.

MR. STEPHEN G. WILLIAMS: Ladies and Gentlemen, will you please come to order?

The first part of the program will be devoted to some film pictures, with the title "The Man Who Learned," illustrating the milk supply as we get it, and as we may get it. I am sorry to say that Dr. Lederle, who was to preside at this meeting this afternoon, has been unable to attend, but Dr. William H. Park, whom you all know, will preside in his place, and will read Dr. Lederle's paper. I take pleasure in introducing Dr. William H. Park, presiding Chairman of the afternoon.

May I ask you all to be good enough to write your names in this book, which we will have handed around, so that we will know who has been present at these conferences.

THE CHAIRMAN: (Dr. William H. Park) Ladies and gentlemen: I commiserate you that I have to stand here in Dr. Lederle's place, and I also ask you to commiserate me that I have to try to tell his views, but I will try to carry on the exercises as if he had been here. Fortunately, I have his statement, that he was to have made here this afternoon, though it is in a somewhat abbreviated form.

Now, the first in order, I believe, is a moving picture to show us how clean milk is produced, as contrasted with other kinds.

(Moving pictures were here presented.)

THE CHAIRMAN: I believe all of you appreciated that motion picture, and it really is, to my mind, a very true picture. I remember, some three years ago, that I went to one of the rural resorts for a short time, where my sister was staying, and I noticed that no one drank the last drops in his glass of the dairy farm milk, and the reason was, that even a glassful showed, while standing on the table, a very perceptible amount of manure in the bottom. When I went out to look at the milking, I saw uncleanness greater even than that shown in the picture, but my friends and relatives asked me not to do anything, because they were having a very happy time at this farmhouse and didn't care to bring in any friction. Now, that milk was fresh and there was no disease

there. Although none of the children of the farm came to any harm, that milk, after coming to New York, would tell an entirely different story.

I remember also another day when I went up on the Harlem Railroad. We had been using some milk in the laboratory on some kitten experiments, and the kittens had died while on the milk, and I went up near Pawling to see the conditions. That was in July, and I found that milk being delivered into express cars, with the doors open, and with no ice, and at a temperature away above ninety, and that milk came to the City that way. Now, it seems to me that pictures like these will cause thousands of us in the City to demand better things. It will make those in the country realize that this milk is not in the physical condition, when it goes to the children in New York, that it is when it goes to the children on the farm. As Dr. Rosenau said last night, we need to add to the other kinds of milk, the "Milk of Human Kindness," and therefore we must remember that if we had to get up at three or four o'clock in the morning, we might not always be sweet tempered and do right, and we might forget the infants that were taking our milk. But we must protect our milk, and we must insist upon their giving us good milk, and I am sure that with proper reiteration, we will find that they will do the proper thing. Now, I have here a short statement which is believed to represent Commissioner Lederle's ideas. He expected fully to be here this afternoon, but at the last minute he telephoned to me, from his country place, that he could not come, as he was not well enough, and he asked Mr. Burton and me, to put together what we knew to be his ideas, from talking it over with him within the last week. So I believe I am giving his ideas in these few pages, although they have been put together by Mr. Burton and me, Mr. Burton being in charge of the country milk inspectors, under Mr. Raynor, who is in charge of the Country Division. This, as I say, sets forth the Commissioner's ideas, so far as we know them from conversations during the past few days.

THE PRESENT METHOD OF SANITARY CONTROL OF NEW YORK CITY'S MILK SUPPLY

The ideal aimed at by the Department of Health of this city—the ideal on which every effort of the Milk Inspection Corps is centered, is to have the milk supply a *safe* supply. "Certified" and "Guaranteed" Milk, I believe, need no defense. Such milk from tuberculin tested cows, handled by persons free from disease, bottled on the farm in sterile containers, kept

cold, delivered fresh, and having a minimum bacterial content, is *reasonably safe milk*. "Certified" Milk, however, represents less than 1% of the total supply of milk for this city. The problem, therefore, is to make *reasonably safe* the other 99%. This supply comes from 44,000 farms located in six states from points ranging from 50 to 400 miles from the city. Thirty-three Inspectors are detailed to the regular inspection of the dairy farms supplying the 1,600,000 quarts of milk which are shipped daily to New York.

The dairies where less than 50% of sanitary requirements exist, are excluded.

A veterinary certificate is required from each dairyman annually, showing that an examination has been made of the dairy herd and that all animals found diseased upon a physical examination, have been removed. Every dairyman reports weekly the presence of any infectious disease on the dairy farm. These are all investigated by Medical Inspectors, to see that all precautions have been taken to protect the milk from contamination.

Such inspection is *essential*, and that work must go on, *but is that milk safe?* Knowing as we do that a physical examination does not remove from a dairy herd those animals which are a menace to the milk; knowing as we do that in cases of disease, there is an uncertain period of incubation during which time precautions are not always taken; knowing that after an illness, there is an uncertain period of convalescence; and knowing further that in the case of typhoid, there are carriers of contagion,—which carriers, being intermittent carriers, we cannot protect ourselves or the milk against. I believe that it is our *duty* to make this vast milk supply *safe*, and to protect it from these many factors of contamination by careful and perfect pasteurization.

The duty of the Health Department in its relation to the Milk Supply has to do mainly with the death rate, especially the death rate among infants. The milk supplies just outlined give to all the option of two safe supplies for babies' use, and I believe that through the press and every other avenue of publicity, this statement should be given. "*Milk safe for babies must be*,—Grade No. 1—"Certified" or "Guaranteed" Milk, which may be fed raw. Grade No. 2—Pasteurized Milk,

and further that safe pasteurized milk for babies should be milk produced on farms where at least 75% of the sanitary requirements have been complied with." Such milk should not contain more than 100,000 bacteria per cc. before pasteurization; should be heated to at least 140 degrees F. for at least 20 minutes, and should not contain more than 10,000 bacteria per cc. when offered for sale.

Now, as I say, these are, as far as Mr. Burton and I know, exactly the Commissioner's ideas. I am personally very sure that they are. I myself just added a note under bacteriological count. Of course, in making these various bacterial standards, we do not mean that fifteen thousand bacteria are necessarily any more harmful than ten thousand. What we mean is that milk properly cared for and properly pasteurized cannot have more bacteria than that. That is, the bacteria are not so much what you might call, definitely, a danger, but they are a detective, they detect conditions, and those conditions, in many respects, are brought to our attention better by the bacterial count than in any other way, because we can go over a thousand farms in one afternoon's work, while inspectors can cover only a few. This is one means, as I say, of detection. I personally believe that the bacteria, in themselves, when present in too great a quantity and of the wrong types, are a very distinct danger, and these standards are made to represent conditions under which they detect.

I am very sorry indeed that Dr. Lederle is not here, to give you in a better way and more fully, the opinions which the paper that I have read is meant to represent.

We now have other speakers, and I am glad to say that they are here to go on with the work. We all know the great work that the experiment stations are now doing in these lines, and I am very glad indeed that this conference is opened by Dr. VanSlyke, Chemist, State Experiment Station, Geneva, N. Y. Dr. VanSlyke.

DR. VANSLYKE spoke as follows:

USEFULNESS AND LIMITATIONS OF SO-CALLED MILK STANDARDS

LADIES AND GENTLEMEN: I wish to say that the worst pictures that were thrown on the screen a short time ago were really short of the truth in a great many cases. I was born in the country, and if there is any one who can give me points on the condition of dairies, from an unsanitary standpoint, I would like to see him. Before I became a chemist, I remember

that my test for milk was to examine the bottom of the tumbler before I drank it, and it was not many years ago that I realized that it was possible for milk to be free from the taste which is characteristic of the odor of the stable. I supposed, for a great many years, that one of the normal flavors of milk was that characteristic of the stable, but I have learned, within the last ten or fifteen years, that that is not a normal constituent or a normal flavor, but that good milk is absolutely free from anything that is offensive in the slightest way to a normal taste.

It is the purpose of this paper, not so much to discuss with completeness the subject under consideration as to make an introduction which may serve as a basis for discussion.

It is now generally recognized that the value of milk as human food depends upon two classes of factors: (1st) chemical composition, by which we mean the thirty or forty compounds normally contained in milk; and (2nd) freedom from everything that tends to affect injuriously the health of consumers, whether micro-organisms, or toxins, or preservatives.

Up to about ten years ago the first set of factors served as the chief center of discussion; since then the emphasis has rapidly shifted to the second set of factors. Formerly pure milk meant simply normal or unadulterated milk; now it means rather milk biologically clean. The present-day discussions might easily lead an uninformed layman to think that milk consists simply of water and solids, the chief solids being dirt and bacteria and leucocytes.

When requested to take part in this conference, it seemed to the speaker that it might serve a useful purpose to discuss briefly some phases of milk purity from the old-fashioned standpoint of chemical constituents. A discussion of legal definitions, or so-called standards of pure milk should be peculiarly pertinent just now, in view of the fact that the late legislature of this state changed the legal definition which had been in force for about a generation. Formerly, milk as normally produced by cows was regarded as pure or unadulterated when it contained not less than 3 per cent of milk-fat and 12 per cent of total milk-solids. The recent change retains the minimum limit of 3 per cent for fat but lowers the percentage required for total milk solids from 12 to 11.50.

Let us now consider the immediate causes leading to this change and also some of the objections, especially in relation to the way in which the change affects the interests of consumers and producers.

The immediate and chief cause which made this change possible was the fact that some dairymen persisted in keeping herds of cows whose milk frequently contained less than 12 per cent of milk solids; they were producing milk for quantity and not quality. They were simply watering their milk through the agency of their cows. It was possible for such dairymen to meet the condition confronting them in one of two ways: (1st) By keeping cows that would produce milk of legal composition, or (2nd) by appealing to the legislature to lower the limit required for milk-solids. They chose the second method as being the easiest and cheapest. It was possible to accomplish their purpose because there was a quite general misunderstanding, or perhaps lack of understanding of the facts upon which the former legal definition was based; this was true not only of dairymen but particularly of members of the legislature. These details we cannot take time to discuss here, but attention may be called to one point to show how imperfect was the general understanding of what is meant by the expression, milk standard. Milk which meets legal requirements in composition is commonly but erroneously spoken of as "standard" milk in the sense that it is necessarily of excellent quality in respect to the amount of fat and solids present. Now, milk which comes just within the legal requirements is emphatically not excellent in quality, but it is in reality poor and far below the average of normal milk in composition. While we commonly see such expressions as the "State milk standard," "standard for pure milk," "legal milk standard," "milk of the state standard of excellence," they are used, if properly, not as implying excellence at all, but rather as expressing positive inferiority, or the lowest possible standard or limit that the law permits for pure or normal milk. The expression "legal definition of pure milk" is preferable because much less liable to mischievous misinterpretation than expressions in which "standard" is used in a way to permit the possible implication of excellence.

Before considering in detail the objections to reducing the

limit of milk solids from 12 to 11.50 per cent, we will mention briefly some of the more important general principles that have formed a basis in fixing minimum limits of purity for market milk.

In legally defining normal or pure milk on the basis of its percentage composition, it has been customary to select two factors, fat and solids, and to fix for each the lowest permissible limit. Two different factors have been selected, because more complete protection is obtained than if one alone were used since the percentage of fat and of solids are somewhat independent and do not vary together uniformly. For example, taking normal milk containing 5 per cent of fat and 14.5 per cent of solids; it would require the addition of 66 pounds of water to 100 pounds of normal milk before the percentage of fat is reduced to the lowest legal limit of 3 per cent, but the addition of only 21 pounds of water would reduce the solids below the permissible limit of 12 per cent and the diluted milk would still contain 4 per cent of fat. The basis of solids in addition to fat affords, therefore, added protection against dilution by water.

Now, the chief purpose of a legal definition of normal milk or of adulterated milk is to prevent, or rather limit, the two most common forms of adulteration (1) addition of water and (2) reduction of fat percentage by removal of cream or by addition of skim milk. It is possible, however, within certain limits, to manipulate milk rich in fat both by watering and by skimming or addition of skim milk so that it is difficult and often impossible to prove the fact of such manipulation by examination of the milk.

It is thus seen that in attempting, on the basis of fat and solids, to fix a line of division between milks that shall be regarded as pure and as adulterated, two general difficulties are met, because normal milk varies so widely in composition, and the relation of fat to solids also varies decidedly. On the one hand, the lowest limits for purity must be placed high enough to prevent too great opportunity for manipulating milks above average richness by watering or skimming. On the other hand, the minimum limits must not be placed so high as to put in the class of adulterated milk the normal product of too many herds of cows. In framing a practicable legal definition for milk,

these two difficulties cannot be fully met, and an arbitrary line of division must be drawn.

Whether or not the preceding statements have been made with satisfactory clearness, time does not permit a more detailed discussion of the points touched.

We will now consider some of the valid objections that may reasonably be brought against the adulteration of our legal definition of pure milk, by which the minimum requirement of 12 per cent of milk-solids has been degraded to 11.50 per cent.

(1) It makes not merely possible but inevitable an increased opportunity for the manipulation of normal milk by means of watering, removal of cream and treatment with skimmilk. It is therefore directly and chiefly in the interests of those who are engaged in the business of manipulating milk after it leaves the hands of the producer and before it reaches the consumer. For example, under the requirement of 12 per cent solids, it requires, in the case of normal milk containing 5 per cent of fat and 14.5 per cent of solids, the addition of 21 pounds of water to 100 pounds of milk to reduce the percentage of solids below 12; under the 11.50 per cent requirement, 26 pounds of water can be added to 100 pounds of such normal milk before the percentage of solids is reduced to 11.50 per cent. In the case of normal milk containing 4 per cent of fat and 13 per cent of solids, it is necessary to add 8 pounds of water to 100 pounds of milk before the percentage of solids is reduced to 12, but 13 pounds of water before 11.50 per cent of solids is reached. Stated in more general terms, the reduction of the legal requirement for milk solids from 12 to 11.50 per cent means that in milks above average composition it permits the addition of about 5 pounds more of water per 100 pounds of milk.

(2) If we are permitted to base a judgment upon all past experience, this opportunity for increased manipulation of normal milk will not be wholly neglected, and we are justified in looking for definite deterioration in the composition of much of our ordinary market milk.

(3) Producers will be encouraged and justified in going still further in the production of as much milk as possible which is just above the legal limit of 11.50 per cent of solids. The production of any article of good grade has never been en-

couraged by widening the opportunity for adulteration. So far as the consumer's interest is concerned, it makes little difference whether water is added to milk through a dipper by hand after the milk leaves the cow or whether the animal is made the instrument of the unholy practice. It is safe to predict that if this retrograde change is permitted to stand, we shall have within a few years many hundred more herds of cows producing milk containing less than 12 per cent of solids than ever before. It is a special application of the general law that water seeks its own level.

(4) Any condition that lowers the standard composition of a food product increases its cost to the consumer. Milk, normal or otherwise, containing 11.50 per cent of solids has less value for the consumer than normal milk containing 12 per cent of solids. The effect is in reality to increase the cost of milk to consumers. In the recent political campaign the high cost of living was skillfully used as an important factor in influencing consumers to express their disapproval of present conditions without any special reference to actual causes. It is somewhat surprising that the relation of this recent act of legislation to increased cost of living was not discovered and utilized by spellbinders to promote still farther the confusion of those responsible.

(5) The change was brought about in the special interest of comparatively few milk producers; it was essentially a demand by a few that all other producers and all consumers permit a change which is against the larger interests of the many.

(6) In this connection it should be said that the legal requirement of 3 per cent of fat and 12 per cent of solids as the minimum requirement for pure milk has been shown by long experience to be practicable and useful and reasonably efficient. This should be restored as soon as possible. It must also be fully recognized that no definition or minimum standard of an article so variable in composition as cow's milk can by any possibility of human ingenuity be so devised as to give complete satisfaction to all producers and consumers.

We believe that the time is fast approaching, if it is not already come, when our long-used method of regulating the composition of pure milk can be advantageously supplemented by introducing a method which permits the sale of milk under

a guaranteed percentage composition of fat, or of fat and solids both.

Time does not permit anything more than a brief, imperfect statement of some of the more obvious advantages of such a system.

(1) It would encourage the sale of milk on the basis of its food value. Intelligent consumers would come to appreciate the difference between poor milk and rich milk in a way they do not at present.

(2) It would encourage the production of a larger amount of richer milk when producers can sell milk on the basis of its value.

(3) It would readily find an application in the case of producers whose herds produce milk below the limits of legal requirements. By guaranteeing its composition the producer could dispose of it for what it is without reference to the limits of purity prescribed by law.

(4) A guarantee system inevitably tends to promote greater intelligence regarding the composition and value of milk on the part of both producers and consumers. Objection may be raised that the process of educating consumers about the composition and commercial value of milk must be so slow as to be practically hopeless, especially among masses in large cities. The same objection would apply with even greater force to the education of consumers in regard to the value of sanitary milk and the necessity of its care in the home. The delivery of clean milk in a city home is only one end of the problem; its care after that is quite as important, and is a matter of education. Because it is a slow and difficult process to teach consumers to care for milk in the home, it is not a valid reason why the problem of supplying clean milk should be abandoned. Similarly, the introduction of the system of selling milk on the basis of guaranteed composition should not be indefinitely delayed merely because its fullest usefulness requires that milk consumers should know something of the relation of composition to commercial value.

POWDERED MILK.

Though not strictly pertinent to the subject of this paper, a word may not be out of place at this time in regard to powdered milk. Several processes are being employed. The

product which is familiar to the speaker comes into market as a very fine, dry, cream-colored powder. It has a slight odor, suggesting the smell of buttered pop-corn when first-class butter is used. One pound of powder makes four quarts of milk, containing about $3\frac{1}{2}$ per cent of fat and 12.5 per cent. or more of solids. When put upon the surface of cold water and stirred with a rotary egg-beater, the powder goes into solution rapidly. The dissolved milk has a very slight but not unpleasant taste, not present in fresh milk. If the milk is very cold this taste does not appear to be so noticeable. Without the addition of any foreign substance, the process permits the milk to retain its fundamental properties; the fat globules retain their individuality and rise to form cream; the casein is precipitated by the action of rennet; the albumin is not coagulated by heat; the milk-sugar does not appear to be changed in any way; enzymes present in the milk are not destroyed. The degree of heat employed is sufficient to ensure practical destruction of all living micro-organisms. It is said that the product is good only when made from clean, fresh milk. The present retail cost is such as to make milk prepared from it cost about 10 cents a quart. Without further mention of details, it is obvious that milk-powder promises to furnish a solution of some of the vexing problems of milk supply in large cities.

THE CHAIRMAN: I think Dr. VanSlyke has convinced us not only of the usefulness of milk standards, but of the necessity for having experts who understand milk standards in order to prevent improper laws from passing, which those of us who do not know the special lines, may be utterly deceived in, and assent to, rather than dissent. I think the point that was brought out to-day, that it makes no difference to us, whether we add the water or whether the cow adds the water, is putting it in a very simple way. All of us know that farmers mix their milk. If a farmer happens to have some cows giving an exceptional amount of solids or solids and fat in the milk, he will mix it with other milk having an exceptionally low amount.

This interest in milk is so large that men have come to this conference from beyond the borders of the United States. I am very glad indeed that Dr. Amyot is here from Toronto. He has given a great deal of attention to this work, and will give us the next paper. I am very glad to be able to introduce Dr. Amyot.

DR. JOHN AMYOT, Health Officer, Toronto, Canada, spoke as follows:

THE SANITARY SIDE OF THE MILK QUESTION

LADIES AND GENTLEMEN: The side of the milk question that I am supposed to take up is the sanitary side. Cows' milk has long been used as a food. It is practically a food that has been applied to our needs. It is not a food that was intended for the human baby at all. It is good food for the adult, but it is a food which, when given to babies, is given at a risk. Cows' milk was not intended for babies. The requirements of the calf are quite different from the requirements of the human body. Milk varies in its composition and in its characteristics, according to the animal that it is intended to feed. The seal gives a milk that contains a very large quantity of fat—much more than any of the milks that we are accustomed to. The cow gives a much larger quantity of calcium salts than human milk contains. Now, it becomes necessary, at times, to feed the human baby on cows' milk, but that is done at a risk. In this country it is said that the child that is fed on cow's milk, runs about four chances to die to one that it would run if it were fed on its proper milk. Some go so far as to say that it runs nine chances to one to die when fed on cow's milk. Now, that is partly due to the composition of the milk. We all know that we can accommodate ourselves to untoward conditions. We have a certain amount of reserve in our physiological functions, that makes it possible for us to accommodate ourselves to conditions around us. The human baby can accommodate itself, but it sometimes fails, and undoubtedly a very fair percentage of babies that die, artificially fed, die because the food is not suitable to them. But that is not the serious part of it, because far the greater number of deaths in artificially fed babies, is from the changes that take place in the food that they are given, after it has left the cow. It has been stated here that only one per cent of the milk supply of New York is a certified milk. In other places, perhaps a little larger percentage may have been gotten. You know how certified milk is produced. You start by choosing the kind of cows that are to be used for the production of certified milk. Some times enough precaution is not taken, but

precautions can be taken in choosing the proper kind of cows. These cows are examined carefully to see whether they are suffering from any infectious diseases. They are tested to see whether there be any tuberculosis. Proper precautions are taken to exclude any possibility of infectious diseases among those people handling the milk on the farm, and they are kept under strict hygienic conditions. If a cow is to be healthy, it must be kept under as good conditions as we are ourselves, or even better. Then, the milk must be collected in vessels that are clean and sterilized by clean people, and protected from dust, and then, afterwards, kept free from putrefaction by keeping the milk cold at all times until it is delivered to the consumer.

Now, that involves a great deal of care and precaution. It is possible to get milk from cows practically sterile, with only a few bacteria per cubic-centimeter. If it is kept cold until it is delivered, these bacteria are thus kept from growing, and the milk can be delivered to the consumer with very little change in the number of bacteria.

Now, that milk is considered good safe milk, but there is even doubt as to that. A baby can take that milk with very little risk, except that it might not be the proper kind of food for the baby. But what happens with the other kind of milk, that is collected under all sorts of conditions? You saw those pictures on the screen. They were no exaggeration at all. You see very much worse conditions when you go around inspecting milk farms where milk is produced. The cows are herded together in a dirty barn yard, that is not cleaned more than once a year. The water stands in the yards, and the cows get muddy all over, and the cows are not cleaned until their hair falls off, or until they rub it off on the barn door, or after they get out to pasture. The stables are practically never swept. The gross matter is forked out, but the rest is left behind. The place is full of cobwebs and other dirt. The hay comes down from above, dropping to the floor, all over the place. You go into such a place when the cows are driven in, and you see dust flying all over it. You can hardly recognize a man at the other end of the stable, and it may only be forty feet long. The cans are washed out without any special precautions. A dipper full of warm water is put into them and

swished around, and that same dipper full is put into another can and swished around, and that water is dumped out of that into still another can. That is about as clean as the cans get, frequently; very little more is done. If they do wash it out, they put it out in the sun where the dust is flying, and there it remains until the milk is put into it, perhaps. The man who milks just spits on his hands before he milks, picks up a dirty stool, rubs the surface of the cow's udder, and the dirt that he gets on his hands off the stool, goes into the milk, so that the milk which gets into the pail is dirty, and no precaution is taken with it. At first, perhaps, there are only a few hundred bacteria per cubic centimeter, but just a few minutes later it may have fifteen or twenty thousand, and sometimes there are many more than that. Later there arises that "cowy" odor which is often incorrectly taken as a characteristic odor of pure milk. Milk without manure in it, does not have that "cowy" taste. When that sort of milk comes to town, you put it in a bottle, and the dirt settles at the bottom of the bottle, and you can see it. You can see, in an ordinary pint bottle, a considerable sediment at the bottom. Many people drink it without drinking the last half inch of it. If they would only stop to think what that material is! Now, that milk has gathered up bacteria from all sorts of sources, and, besides that, it is not kept cool. If it had been kept cool, it would not be so bad, because twenty or thirty thousand bacteria to the cubic centimeter, perhaps, would not do so much damage to the milk. But when it is allowed to remain warm, that milk is about as good a culture medium for bacteria as you could devise. Within five or six hours, if the milk is still kept warm, there are millions of bacteria. Now, when you get that number of bacteria in milk, you have changes taking place in the milk which make it unfit for food. Milk is one of the most perishable foods that we have, and that is the reason.

By the time the milk reaches the city, if no precautions have been taken with it, these bacteria have grown to millions. Now, one of two things might happen. It sometimes happens that those bacteria are not very harmful. They may be lactic acid bacilli, and in the great majority of cases, perhaps nine times out of ten, that is what it is, and the milk is merely sour when it arrives, and sour milk isn't such a deleterious milk,

after all. They prescribe it in the hospitals, and they add lactic acid bacilli to milk to make it sour. In cheese making it is used regularly in the milk before the milk has curdled, in order, later on, to ripen the cheese. The cheese at first is tough and hard, but these bacteria are present in it, and after a week—or perhaps three months—depending on the temperature, that cheese softens up and becomes ripe. It becomes ripe because of the growth of these bacteria and the action of the enzymes.

Now, these bacteria are perhaps not very harmful, and perhaps not at all, but we run one chance in ten, perhaps, that those bacteria are putrefactive ones. Now, we hear a great deal about ptomaine poisoning. That is what it is—the products of putrefactive organisms of various kinds, and we have all kinds in this milk, and we do not know when we are getting one or when the other, but they are there and they are producing putrefaction in the milk, and it is that putrid milk that does the harm. A healthy individual might get along very well on one or two doses of putrid milk, and receive no harm from it. We eat, sometimes, “gamy” food—“gamy” birds of various kinds, but no physician would ever prescribe that for a nephritic. Nevertheless, a healthy individual could take it, but it would not be a good diet for every day in the year. It is the same way with some of those odorous cheeses. You would not prescribe one as a regular diet, but you perhaps take one to-day and another one a few days from now. Nobody would prescribe limburg cheese, for instance, as a continuous diet.

Now, there are in such foods the products of putrefaction, and when we feed that material to babies, we run a chance of killing them. In the winter time, perhaps, it is less dangerous than in the summer time when the heat commences to worry them, and, perhaps, a worrisome tooth is commencing to come through.

They cannot withstand these things in their food so well. You know how a little worrying will even stop digestion, for the rest of the day, and cause a headache and bad humor. The same thing happens with a child. If a child has teeth coming through, or something of that kind that disturbs it, it is in an abnormal condition. Give such a baby putrid milk

and there will be trouble. If it is in good health, it can stand it, perhaps, but it cannot now. That is what accounts for the great mortality of infants in the summer months, when these things are most likely to take place. Remove them and you stop the mortality. There is a great mortality among babies in the months of July, August and September. If you will try looking after the milk supply and giving them fresh milk,—unputrid milk—you can bring that mortality down to that of the other months.

Now, it is the bacteria getting into the milk that causes the putrefaction. You will say, perhaps, that this does not happen very often. Now, there are places where you can go and see where it happens. Those of you who have visited dairies where they receive milk and send it out to their consumers, have seen all sorts of methods of getting this dirt out. It is surprising what they get out sometimes, on absorbent cotton, and screens of various kinds. You would be astonished at the dirt that you can scrape off from the inside of a can after centrifuging. Dirt, manure, hairs, pus, mucus and all such stuff gathers right on the inside of this centrifuge. That is the material that comes out of the milk. Now, it does not matter whether the cows are well taken care of or not, that is the sort of thing you see. Now, we have in our Province a very active agricultural college. They are trying to improve the quality of the cheese that is produced in certain districts. In certain districts where things are terrible, a cheese is produced in large quantities. They have had inspectors there for years, trying to show the farmers how to produce good, clear milk. After years, they have produced what is ordinarily considered good milk. But go into one of those factories when they centrifuge out fifteen hundred pounds of cream, and see what you get out of the centrifuge, after all the precautions have been taken. I have seen cases of that kind, where they took the stuff out in a scoop shovel, and put it into the furnace. That was called good milk, and it was good milk, as you see milk—better milk than you get in the city here. It was produced under the very best conditions.

You know, the whiteness of milk covers—a multitude of sins,—I was going to say. It covers them up and you cannot see them, and you conclude that there isn't very much in it. But

it is there, and it is gathered up from a variety of sources, and it is the putrefaction from the growth of these bacteria that does the harm.

That can be largely obviated by having the milk cooled immediately after it is gathered, and kept cold until it is delivered to the consumer. Then the consumer has to do his part of it. He has to take the responsibility. It often happens that after milk is gathered as cleanly as possible, and after many precautions are taken with it before it gets into the hands of the consumer, the consumer does not treat it properly. What does he do? He puts it upon his bureau or leaves it on the window sill, perhaps for days, or pulls out the plug of the bottle and leaves it in a dipper to undergo putrefaction. The consumer should be instructed. It is a hard matter to get people to take care of milk properly after it is delivered. You have heard of Straus's experience here. He tried to make them close their bottles, and he couldn't do it. So he made round bottomed bottles that could not lie upon a table until they had put the cork in. And then, often, they emptied it out into a tumbler.

They did all sorts of things to leave the milk exposed. A good deal of the damage is done right there. Even if the milk comes to the consumer after many precautions, he has to do his share in taking care of it. The public ought to be instructed as to that and I think that is one of the things that dairymen ought to do. They should send out literature from time to time and take advantage of every opportunity for instructing the public in these respects. Even though it is certified milk, it should be taken care of in the house until it is used, just as dairymen take care of it. It should be kept cold.

But that is not a very serious part of the milk question—not by a good deal, although it is bad enough. The serious part of it is that milk may be a cause of disease. Now, there are certain diseases that we know, quite definitely, that milk can carry. First of all is tuberculosis. Now, it was thought, for a good, long time, that the bovine bacillus and the human bacillus were equally virulent to the human being and equally infectious. Koch took an opposite view. But later investigation has shown that though the first belief was not correct, Koch's statement also is not correct, and that the bovine

bacilli can infect the human being just as the human bacilli can infect cattle.

Tuberculosis is present in cattle to a far greater extent than we ordinarily think. It is said that in Cuba, where the cattle are tested continuously, there is practically no tuberculosis among cattle, and that the farther north you go, the more you find it among cattle, until when you get up to the St. Lawrence River, you have got up to nearly forty per cent of the cattle suffering from tuberculosis. Of course, you will find herds that do not, and you will find others that have a very large percentage. Tuberculosis is a very destructive disease among cattle. It passes from one to the other very rapidly. Before you realize it, all in your herd may be infected.

Now, to produce the largest quantity of milk that they are capable of, cows are kept in barns and in unsanitary stables, where they have big, long troughs. The cow at the upper end of the trough may have tuberculosis and infect the others all the way down. They pick over the feed and infect one another in that way. There is a very large percentage of tuberculosis among dairy cattle, and where the dairy business is carried on to the greatest extent, there is where you find the most of it. You say, "Well, perhaps, there are only a few, and the cows that have tuberculosis in one part of the body do not have it in the milk." You have the results of the examinations of your Board of Health here in this city. Nearly seventeen per cent of a large number of milk samples examined showed living tubercle bacilli,—virulent, infective, living tubercle bacilli. You will say from that "Well, why isn't the whole population infected with tuberculosis?" A post mortem examination in the general hospital of Montreal, where an ordinary method of autopsy is used, shows tuberculosis in sixty per cent of human beings. This, of course, does not go through the whole body and affect every gland there is. A more delicate tuberculin test shows that ninety per cent have it, and perhaps there are more that have lesions somewhere. We won't all die of tuberculosis. We have means of guarding ourselves against tuberculosis. But yet the fact is that about ninety per cent of human beings have tuberculosis—small lesions, at least—and we do not all die of it. It does not always get the upper hand of us. We can fight it off. But when you consider that per-

centage, and consider also the number of milk samples that have tubercle bacilli in them, it is not surprising, and it is easy to connect the two circumstances together. Not every one who drinks down tubercle bacilli will necessarily develop tuberculosis. In one of our western cities an epidemic of typhoid fever took place from an infection of the water supply. Six thousand people were taken with diarrhœa within forty-eight hours, having been infected, presumably, by sewage in the water supply. Of those, four hundred and fifty developed typhoid fever afterwards. Now, the probability is that all of those six thousand were infected, and only four hundred and fifty came down with the disease. That sort of thing is happening with us every day. We may be infected very many times but the infection does not take hold of us. We do not actually show the lesions of the disease. We resist it, very often, but there is the danger of placing it in our system.

What I have spoken of at the present time is bovine tuberculosis. But cattle are infected by the human tuberculosis, and how many people handling cattle are free from tuberculosis? Many of them infect the cattle, do they not? If you go about examining and inspecting people that have to do with milk, you will find men who have tuberculosis handling milk. There is a good percentage of the population, ordinarily, with tuberculosis. That is always a possible source of tuberculosis in cattle. The human tubercle bacillus is the organism that is more serious if it gets into the milk. We are more likely to be infected by the human tubercle bacillus than by the bovine bacillus.

Then there is typhoid fever. There are various sources from which typhoid fever originates, and milk is one of the most fruitful. There is hardly a health officer in any city on the continent who has not come into contact with typhoid, due to milk. We have it here in New York City and we have it in Toronto and we have it in other towns. Cows do not have typhoid fever, but cows can wallow around in material that has typhoid bacilli in it and they can become infected and the bacilli can thus get into the milk. If there is a typhoid person on the farm, what care is taken with his excretions? They are thrown on the lot, and if it happens to be summer time, the flies walk all over it; and if they happen to fall near a well,

they seep into the water, and the well is infected, and thus the typhoid is spread. The typhoid man may actually wash the cans. If a man has typhoid fever, his hands will probably be infected with typhoid bacilli, and if he washes the cans with a few dipper fulls of water and swishes it around with his hands, he will, of course, infect the cans. I know of one case in the City of Hamilton, Ontario, where in an outbreak affecting thirty-five people, two deaths were due to just such washing out of the can, in a corner grocery. There was no typhoid on the farm in this case. The infection came from the corner grocery, presumably. It is hard to get absolutely positive evidence in these cases. Typhoid outbreaks very usually result from using infected water for washing out the cans. You know all the ways in which water can be infected. And how many wells in the country are in decent condition? I was going to say that ninety-nine per cent of them are infected. Perhaps that is too high, but I think that it is pretty nearly right. How often do you go into the country and pump water where you do not hear the water running and dropping back into the well again. I do not mean that little water drops out of the spout in the pump, to keep it from freezing, in the winter, but you can hear it dropping down through the boards. A man, perhaps, has walked over the lot where the typhoid material is, and then has come to the well, and the dirt from his hands goes down through the boards with the water into the well. Some wells in the country have only one board on them, with the pump tied to it. Toads, snakes, mice and everything else walk over it and go down the well. It is the common drinking place for every animal on the place. You can hardly find a farm well that is not infected. Sometimes they are only dirt wells. I have seen them with manure piled around them to keep them from freezing in the winter. That is not uncommon.

The condition of the bottles as they come back to the dealers from the consumers is one of the great causes of the inspection of milk supply. We know that the records prove that scarlet fever is spread in that way. Milk bottles come out of a house in which there is scarlet fever and they are sent back to the dairy, and the dairy does not wash them very care-

fully—sometimes with just cold water or warm water which is not sufficient to kill the infective agent.

Then, again, somebody on the farm may have scarlet fever or some other infectious disease. Many of you who are medical men and have had experience know that a lot of farmers allow cases of scarlet fever to run their course without ever having called a doctor at all. They often go through typhoid fever without ever having an examination made of the patient, or even knowing what it was, as they may just have felt out of sorts. Such cases are never reported. With diphtheria and influenza it is the same way. We do not get all our colds from drafts on the back of the neck. When we stand up in a street car holding a strap, we get the infection on our hands, and we get it in the drinking cup. The man who handles the milk does not take any precautions when he has a cold. He goes on milking the cows. He just rubs his hands over his nose, and he milks the cows, and those organisms go into the milk again and are spread everywhere.

Now, to go back to the cows themselves. The cows suffer from infection, just as we do. How many herds are there that haven't got cases of mastitis or inflammation of the udder or the milk duct. I have never seen a herd that didn't have some cases at some time or other. You will find fifteen or twenty per cent of the cows in a herd having inflammation of the udders. You see that regularly. Do they stop sending milk into town because of a slight inflammation of the udder? Not a bit of it. They send it right in, and that is where we get our pus organisms, that come regularly in milk. You will find them regularly in milk bottles.

You may say why is it that we go at milk, rather than other kinds of food? We cook every other kind of food that is nitrogenous, except milk. That is the only food that you do not cook. It is the only one that is taken raw, and it is the one that is a most favorable medium for the growth of the infective agents of various diseases. They are there in the milk, and anybody taking it runs a chance of getting them. When you think of all the possibilities of milk being infected, the strange thing is that it is not infected more than it is. How are you going to prevent it? Send from the City of New

York thirty inspectors over the State, among the thousands of milk producers, to see whether there is any typhoid or influenza or mastitis among the cows, or any scarlet fever on the farm, or on the route? Perhaps there is a larger number than thirty, but not many more. How can they go over hundreds of miles of territory? Depend upon the local medical health officer to advise as to who has the typhoid? By the time that you decide that a person has typhoid, he has had it two weeks, and he was infected two weeks before that. What are you going to do during all that interval? You see, you have been getting typhoid bacilli in your milk for several weeks, without knowing it. For every case of typhoid that the health officer reports, there are a great many others that have existed. I know of one case in which the health officer reported that there were only two hundred seventy-eight cases in the City. Then someone had the curiosity to go out and find how many there really were. Three hundred ninety-eight were found in four hospitals alone. That is, only two hundred seventy-eight had been reported, and yet there were three hundred ninety-eight in the hospitals. The hospitals did not even report them. It takes time to make the diagnosis and by that time the novelty of the thing has worn off and they do not report it. They are more likely to report the other diseases, like diphtheria and scarlet fever and so on, but there are very many that are not reported at all. I know of one dairy that had three inspectors going around, and that dairy stopped two milk supplies where there were typhoid fever cases on the farms, one of them ten days and the other fourteen days old before the City authorities knew anything about it. They stopped those, but how many had escaped them and their inspectors?

That is the situation that you cannot cope with by inspection. You cannot handle them that way, and you cannot inspect them thoroughly. Those of us who have had anything to do with certified-milk inspectors, know how difficult it is to get them to report on certified milk places, where they are trying to do the best they can. It takes them some time to make up their minds that their men are sick, and all during that time there is a possibility of infection.

That is the case with a greater portion of the milk that is

produced and sold in cities. That is the case with all of them, with reference to disease.

Now, we have got a means in our hands to get rid of these disease germs in milk. Make it all certified milk, if you can, but you cannot do that. People are not going to pay fifteen cents and twenty-five cents a quart for milk. They do not realize the necessity for it, and you have got to do something for them. They do not realize it, but you can prove to them that the bacteria are the infected agents. Fortunately for us, the organisms that are the most harmful, and most likely to be milk borne, are the organisms that can be killed when the milk is treated to a comparatively low temperature. All except the spore bearing organisms can be killed at a comparatively low temperature. Investigators are commencing to see now that pasteurization will do that. Heat the milk to 140 degrees Fahrenheit and keep it at that temperature for a short time. You can kill them at a higher temperature in a very short time—perhaps in three quarters of a minute,—but there are too many risks to do that. It may let a quarter of them go through without being sterilized or without being pasteurized or without having the organisms killed. The milk should be kept for some time at that temperature. It should be held there and the holding machine is the means that should be recommended. You know how difficult it is to employ men who are going to be reliable at all times, so the machine should be recommended. Get the milk in as clean a condition as can be. Inspect it, watch it, see that it comes into the City as cold as it can be kept, that it has been kept cold from the time it left the farm. See that it is gathered in as clean a condition as possible, and so carried to the City, and pasteurized by being brought up to the proper temperature.

Now, many object to that. They say, "Well, you can control tuberculosis," but if you do not do that, you take away the power of controlling tuberculosis. They will tell you, too, that the most important thing is that it will encourage dirty milk, and that it will stop investigation, but it does not necessarily do that.

Centrifuge it to get all the dirt that you can out of it. Heat it, and then they will say that you have spoiled its food value. I asked a superintendent of a hospital here in the City

one time if he ever saw rickets developing from pasteurized milk? "Oh, no," he said, "that is what we feed them. That is what we give them—pasteurized milk." It was putrid milk that caused rickets. Milk that had been heated and allowed to undergo putrefaction afterwards.

A little bit of heat applied to milk won't hurt it. Suppose it is heated a little bit. That is not very much when we consider the great safety that we are getting by the destruction of the putrefactive organisms.

One of the best preventives for the growth of bacteria in milk is the keeping of the milk cold. That is just as essential a matter in the production of good milk as any other, and it is just as important. Just as important as the heating of it, is the getting it cold immediately after it has been pasteurized. Sometimes the bacteria are all killed, sometimes there are some left. Those that are left you can keep quiescent for a great length of time by simply cooling the milk, and keeping it so. I say, pasteurize it. I do not see any other way. And when you consider the possibility of inspection, there isn't anything to do with public milk supplies other than to pasteurize them.

THE CHAIRMAN: I am sure we all appreciate Dr. Amyot's coming here from Toronto, and I think it is most interesting, too, that he, as health officer of Toronto, agrees so closely with the health commissioner of New York as to the kinds of milk that can be allowed with safety.

I am very glad, indeed, that we have with us Dr. Anderson, who has charge of the Hygienic Laboratory in Washington. He has had much to do with standardizing our work. I know that in many things in our laboratory I have to obey Dr. Anderson, because he has the power of preventing my giving out products, unless I carry out his standards. Sometimes I think they are a little severe, but I must confess that when I talk over the matter with him I always agree that they are correct. I am sure that he will have something of benefit to tell us. Dr. Anderson.

DR. ANDERSON spoke as follows:

THE UTILITY OF LABORATORY MILK STANDARDS

Laboratory standards for milk are of two kinds, (1) Sanitary, or bacteriological, to protect the public health by preventing the use of disease-carrying milk, and (2) commercial,

or chemical, to protect the consumer from fraud and the honest producer and distributor from dishonest competition.

The chemical standards were the first to be adopted. They are relatively easy of enforcement, but give us little indication of the sanitary methods used in the dairy or in handling the milk.

They are primarily for economic purposes and to prevent fraud; they inform us as to the amount of fat, total solids, etc., and the presence of preservatives, but convey little information as to the wholesomeness and purity of the milk.

Bacteriological standards, on the other hand, are an index of the excellence of dairy methods and have a distinct place in the control of milk from a public health standpoint.

The acquisition of the knowledge of the part played by bacteria as affecting the wholesomeness of milk gave rise to efforts to determine, by means of bacteriological examination, the purity of this food. These efforts at first were mainly in the direction of determining the maximum number of bacteria in milk that was consistent with proper dairy methods. This may be considered as the *quantitative* method of examination, as it is concerned only with the *number* of bacteria in milk and takes no account of the *qualitative* examination or determination of the *kind* of bacteria. This last, from a public health standpoint, is by far the more important; but on account of the technical difficulties involved in such an examination, and by reason of the fact that the milk in question has been used or has spoiled before such tests are completed, is less practicable and less widely used.

The impression seems to prevail in some places that quantitative bacteriological standards for milk are in themselves sufficient to indicate the purity and wholesomeness of milk; this is shown by the fact that 45 out of 85 cities have adopted a maximum bacterial standard, and in some cases these standards have been relied on to a large extent for the control of the milk supply at the expense of an extension of dairy inspection. Among these there is a distinct lack of recognition of the limitations of the value of bacterial standards.

A low bacterial count of a sample of milk does not necessarily mean that the milk is free from danger, for the contamination of milk with the infection of scarlet fever or with a

few typhoid bacilli is a far greater source of danger than the presence of millions of bacteria of the lactic acid type. But in spite of the possibility that milk with a low bacterial count may sometimes contain the infection of certain diseases, such milk, on account of the methods necessary to be used to maintain a low bacterial count, is much less apt to be harmful than milk containing large numbers of bacteria.

No other food that we use contains the enormous number of bacteria that milk sometimes does and in no other food is it so difficult to keep the number reduced to a minimum.

Milk containing large numbers of bacteria is not necessarily dangerous to health, but their presence indicates possibilities of danger and should not be countenanced; their presence points to a lack of proper methods of production and handling and such methods are apt to permit the access of infectious organisms. It therefore follows that the number of bacteria furnishes us with an index of the conditions under which the milk has been produced and handled.

The *number* of bacteria in milk is mainly dependent on five factors:

1. The care exercised in the dairy.
2. The methods used in handling and transportation.
3. The cleanliness of the containers.
4. The temperature at which it is kept.
5. The age of the milk.

The *kind* of pathogenic bacteria that may be present in milk is principally dependent on two factors, viz:

- (1) The health of the cow that furnishes the milk, and
- (2) the health of the man who handles the milk.

It is difficult to see how, in either case, the present methods of laboratory examination can detect these specific bacteria, if present, before such milk has been used and has exerted its harmful effects. For example, to determine the presence of tubercle bacilli in milk coming from a tuberculous cow would require from four to eight weeks; of streptococci from an animal with garget, two or three days; in the few instances in which typhoid bacilli have been found in milk it required approximately a week to determine the fact; and by no laboratory methods that we have at present are we able to determine whether the infection of scarlet fever be present in milk.

It is relatively easy, however, through proper veterinary inspection to eliminate from the herds those animals that constantly secrete milk containing harmful bacteria.

Our knowledge of the potentiality for harm of bacillus-carriers and the large number of persons who come into contact with milk, taken with the elusiveness of certain infections such as scarlet fever which sometimes in milk, make it a much more difficult problem to be sure of the absence of infections which have their origin in man. Intermittent and irregular infection of milk, as by a bacillus-carrier, would be almost impossible to detect by laboratory examination, while it would be relatively easy to discover such sources of infection by an efficient and systematic inspection service.

The fact that such conditions are not revealed by laboratory examinations is the secret of the lack of complete success in the control of the milk supply from the laboratory standpoint.

This fact, however, should not deter us from making laboratory examinations of milk and the establishment and enforcement of bacterial standards, for it is well known that in milk with primarily small numbers of bacteria a great increase in its bacterial content will take place unless it be kept under proper conditions as to temperature, etc.; and milk containing large numbers of bacteria, even without the specific infections, has been shown by clinicians to be harmful to children using the same.

Having learned that a relation existed between the number of bacteria in milk and the conditions under which it was produced and marketed, it was but a step to formulate bacteriological standards as a means of safeguarding the milk supply.

The first attempt to adopt a quantitative bacterial standard for market milk was made by New York City in 1900 by the adoption of a maximum count of 1,000,000 bacteria per cubic centimeter; but on account of the complexity of the milk situation in that city, it was found practically impossible to enforce such a standard.

The education of dairymen throughout the country in regard to the importance of the use of proper methods in the production of milk has reached such a state that quite a number of cities have found it possible to establish, and enforce

with varying degrees of success, a maximum bacterial standard. From data on file in the Hygienic Laboratory, from 85 out of the 125 largest cities in the United States, from which information was to be had, the following table was prepared showing those that have adopted a maximum standard count. It will be noticed that a number of them also make qualitative examinations in addition to the ordinary counts.

City	Bacterial maximum	Remarks
Akron, Ohio	500,000	Supplemental inspection
Albany, N. Y.	None	Advises 50,000
Altoona, Pa.	None	
Atlanta, Ga.	100,000	
Baltimore, Md.	None	
Binghamton, N. Y.	300,000	For "ordinary" milk
	50,000	For "inspected" milk
Birmingham, Ala.	500,000	
Brockton, Mass.	500,000	Excludes milk containing pathogenic bacteria
Buffalo, N. Y.	500,000	
Cambridge, Mass.	500,000	
Camden, N. J.	None	State Board makes tests
Chattanooga, Tenn.	None	
Chester, Pa.	None	
Chicago, Ills.	100,000	May to September inclusive
	50,000	October to April inclusive (Health Department rule, not city ordinance.)
Cincinnati, Ohio	None	
Cleveland, Ohio	500,000	
Columbus, Ohio	500,000	
Covington, Ky.	500,000	To be enforced after Jan. 1, 1911
Davenport, Iowa	None	
Detroit, Mich.	None	For ordinary milk
	10,000	For certified milk
Dubuque, Iowa	None	
Duluth, Minn.	None	
Elmira, N. Y.	None	
Erie, Pa.	None	Conditions investigated when count runs over 100,000
Evansville, Ind.	500,000	Established by state law limiting to 500,000
Haverhill, Mass.	100,000	
Hoboken, N. J.	None	
Holyoke, Mass.	500,000	
Indianapolis, Ind.	500,000	Established by state law limiting to 500,000
Johnstown, Pa.	None	
Hartford, Conn.	None	
Knoxville, Tenn.	None	
Lawrence, Mass.	None	
Lincoln, Neb.	500,000	
Little Rock, Ark.	100,000	
Los Angeles, Cal.	500,000	

City	Bacterial maximum	Remarks
Lowell, Mass.	None	
Lynn, Mass.	500,000	
Malden, Mass.	500,000	Excludes milk containing pathogenic bacteria
Manchester, N. H.	500,000	
Memphis, Tenn.	None	Relies on frequent inspection of dairies
Milwaukee, Wis.	250,000	
Minneapolis, Minn.	500,000	
Nashville, Tenn.	500,000	Not an ordinance
Newark, N. J.	None	
New Bedford, Mass.	500,000	Warned at 50,000
New Haven, Conn.	None	Milk rejected when pus organisms or streptococci are found till conditions are remedied
New Orleans, La.	None	
Newton, Mass.	None	
New York, N. Y.	None	
Oakland, Cal.	100,000	From April to October inclusive
	75,000	From November to March inclusive
Omaha, Neb.	150,000	For ordinary milk
	20,000	For certified milk
		Prosecutes when count runs between 400,000 and 500,000
Pawtucket, R. I.	None	
Philadelphia, Pa.	None	
Pittsburg, Pa.	500,000	
Providence, R. I.	100,000	
Quincy, Mass.	500,000	
Reading, Pa.	None	
Richmond, Va.	500,000	250,000 subjects producer to warning
Rochester, N. Y.	None	Have tried to enforce 100,000
Salem, Mass.	None	
San Antonio, Tex.	100,000	Also rejects for pathogenic bacteria
Salt Lake City, Utah	500,000	
San Francisco, Cal.	None	500,000 subjects producer to warning
Schenectady, N. Y.	500,000	
Scranton, Pa.	300,000	Health office rule, not ordinance
Seattle, Wash.	200,000	For ordinary milk
	30,000	For certified milk
		Controlled by state law
Sioux City, Ia.	None	
Somerville, Mass.	500,000	
Springfield, Mass.	None	
Springfield, Ohio	None	
St. Joseph, Mo.	None	
St. Louis, Mo.	None	
St. Paul, Minn.	500,000	
Syracuse, N. Y.	500,000	Three consecutive high counts exclude milk
Tacoma, Wash.	200,000	For ordinary milk
	35,000	For certified milk

City	Bacterial maximum	Remarks
Toledo, Ohio	None	
Utica, N. Y.	None	
Washington, D. C.	None	Dealer cautioned when high count
Wheeling, W. Va.	100,000	Counts published in newspapers; claimed very effective
Wilkes-Barre, Pa.	100,000	
Wilmington, Del.	None	
Worcester, Mass.	500,000	
Yonkers, N. Y.	None	
Youngstown, Ohio	500,000	Rejects for pathogenic bacteria

The classification of milk as recommended by the conference appointed by the Commissioners of the District of Columbia to report on the milk supply of Washington, provided for three classes of milk:

Class 1.—Certified milk.

Class 2.—Inspected milk.

Class 3.—Pasteurized milk.

For the first two classes a maximum bacterial count was adopted, but it was only a part of and was supplementary to other requirements making such standards possible of attainment.

So while a bacterial standard was recommended for the city of Washington, it was after all only secondary to other requirements and was possible of enforcement only on compliance with those requirements, including the important ones of inspection of the cow and of persons handling the milk.

In my opinion it was a mistake not to recommend also a maximum bacterial count for pasteurized milk. A bacterial count of pasteurized milk is of greater value in the control of this class of milk than is a count of either of the other two classes and it is the only way in which we can gauge the efficiency of the pasteurization and the conditions under which the milk has been kept subsequent to pasteurization. In the control of this class of milk we have the only instance in which the bacterial standard is of greater value and importance than inspection. A maximum count of bacteria for pasteurized milk should be established as definitely and enforced as strictly as is the time and temperature of the heating, for it is the only index of the efficiency of the process.

What then is the utility of bacterial standards for milk? To my mind the great utility of quantitative standards for milk is to draw attention to the faulty dairy methods which would otherwise escape notice because of too infrequent inspections, and to stimulate methods of excellence among producers.

There can be no question as to the utility of such standards, but they should be considered only as an index as to whether other requirements, such as cleanliness, temperature, and the maintenance of an efficient inspection service, have been carried out. Such standards are of the greatest value in aiding the health authorities to detect whether improper dairy methods are employed between the dairy inspections, such as the use of unclean utensils, not cooling the milk sufficiently, or keeping it too long; but they must always be considered as a part of the inspection service and not as a substitute.

Bacterial standards are also of great value to the administrative officer in maintaining a high efficiency of his inspection service; for if his inspectors make too infrequent visits to the farms or are lax in their work, the result will surely be read in the laboratory.

A maximum bacterial standard is not applicable alike to every dairy shipping milk into a city of considerable size, since it is known that a great increase in the bacterial content of milk takes place dependent upon the conditions and distance of shipment. If it were practicable to have milk collection centers where these examinations could be made, and if the milk could be shipped under entirely proper conditions from those centers to the city, a definite bacterial standard might be feasible and would be of value.

It must be remembered that if the bacterial count be made from samples taken at the railroad station no account is had of what happens to the milk between the station and the consumer.

Qualitative bacteriological standards, such as the presence of streptococci or an excess of leucocytes, while not of as general utility as the quantitative standard, still have their place. They are of great value to the health authorities and to progressive dairymen who are able to have examinations made in accordance with such standards. By their use it is possible to

detect and exclude milk from diseased animals. Milk from cows suffering from garget or mammitis contains streptococci, or streptococci and pus, or a large amount of pus, and it is easily possible, when milk containing these is found coming from a certain dairy, by going back to the farm to find the responsible cow and so exclude her product.

The examination of market milk for tubercle bacilli, while not of great value in preventing the use of such infected milk, is of value, when the results are made public, as a means of educating the public, legislative bodies, and milk producers as to the danger of using milk from diseased animals and to emphasize the importance of veterinary inspection.

To recapitulate: Of the different standards now in use, the chemical is of value in preventing the grosser forms of adulteration and pollution but of slight sanitary significance.

Existing bacteriologic standards are of value in showing the care that has been taken of the milk, in detecting certain pathogenic organisms that can be demonstrated by laboratory methods, and also in checking the work of the inspectors. A maximum bacterial standard is almost indispensable in the control of pasteurized milk. To reveal the more important and elusive of the infections, an efficient inspection service is indispensable, and for this also certain standards are necessary. Each of these means of investigation is of use in checking the others. Even taken altogether and applied with the utmost care, they sometimes allow infection to slip through unnoticed, and every source of milk intended for public use should be rigorously measured by each of the standards mentioned, new standards being devised and old ones modified or discarded with each advance in knowledge.

THE CHAIRMAN: I would like again to call your attention, as Dr. Sedgwick did yesterday, to how most men working in these lines of work are getting together. Really, we have almost not enough difference of opinion to make it exciting. We are also agreed on these methods. One thing that Dr. Anderson spoke of will be interesting to New York especially, and that is the statement that pasteurized milk especially should have a bacterial standard. I think that within a very few months all of the milk that is pasteurized will either be of one type or in two types, one type approved of by the Health Department and under their

standard and the other type not approved but allowed, only because we will find no way to prevent it. So that those who are working in a proper way and under proper supervision will have at least the right to make such a statement, while others may still be permitted to sell milk that does not come under that standard. It will only be allowed because the law would prevent the department from stopping it.

Dr. Anderson spoke of New York's having adopted a bacterial standard for raw milk and dropping it. It never was made a legal standard. The reason it was dropped was the very reason that he mentioned later on, that there was no way to tell whether the farmer or the railroad or the dealer was at fault, and it seemed absurd to write a letter to the farmer, saying that his milk must be excluded, when we knew that it may have come down in an express car or in an un-iced car, and it was not the fault of the farmer, perhaps. We have recently, within a few weeks, under the direction of Mr. Raynor and Mr. Burton, started to have a group of inspectors, trained in laboratory methods, go from spot to spot throughout the State and send in milk from each farm on two days, and milk from the creamery, and milk from the trains, on the way, and upon arrival. In that way, we can place the blame where it belongs, whether upon the farmer, the railroad or the dealer; and in that way, I believe, we can get a more honest and a more true idea of the conditions; and in that way a standard can be utilized, by, of course, trying to use common sense in its interpretation.

Now, we have for the next speaker, a man who has approached the matter from a somewhat different side. We have for our next speaker Mr. H. O. Averill, Commissioner of Domestic Animals of the State of Connecticut.

MR. AVERILL spoke as follows:

THE MILK SUPPLY OF CONNECTICUT

MR. CHAIRMAN AND GENTLEMEN: I came to New York to attend these meetings for the purpose of absorbing information, and I assure you that I have been well repaid for my trip. I have been persuaded to appear before you, by Dr. Wile, your chairman, against my wishes and against my judgment. I regret that I have nothing to offer you that will aid you in solving these milk problems. I will give you, in a few words, a little in regard to the milk supply of Connecticut.

Connecticut is geographically a small state and is located on the map between the cities of New York on the West and

Providence and Boston on the East. Her Southern coast, along Long Island Sound is largely devoted to truck gardening, while summer cottages practically line the shore. Her valleys are dotted with large and prosperous manufacturing towns, giving steady employment to thousands of well paid and thrifty laborers. Her hill-tops are within easy riding distance by rail or auto from some large city and are yearly attracting more and more people from the urban districts to come out and buy homes and farms and enjoy the beautiful scenery, the pure air, the home grown vegetables and fruits, and the hunting and fishing for which our back towns are noted.

The "Nutmeg State" is noted far and wide as a manufacturing state but no sweeter grass grows than is found on our Litchfield County hills and in the upper valleys of the Connecticut and Housatonic Rivers a grade of tobacco is raised which for cigar wrappers is unsurpassed. Connecticut is also also a wonderful corn growing state as she holds the record for the highest yield for a single acre and also for the greatest average production per acre of any state in the union.

The census bulletins that have been published indicate very clearly that our urban population is rapidly increasing while our agricultural towns show an almost uniform loss of population. In other words the consumers of agricultural products are increasing while the number of producers and the amount produced are as steadily decreasing.

The average Connecticut farmer is extremely fortunate in being located within easy driving distance of a good home market in some one or more large manufacturing town or city where everything grown, or produced on the farm, may be sold at good prices.

The increasing local demands of the home markets for milk and the products of milk are gradually absorbing the milk from those sections of the state where formerly it was shipped either to New York, Providence or Boston.

From the Eastern part of the state considerable quantities of milk are daily shipped to Providence and Boston; Springfield takes from the Northern part while a large amount is shipped to New York by the New York, New Haven and Hartford Railroad from the Western part.

We have long known that typhoid fever is occasionally dis-

tributed by milk and it is now generally accepted that tuberculosis may be communicated to the human through the medium of the milk. It is also conceded that filthy and dirty milk has been the cause of many deaths of infants and children by intestinal troubles or diarrhœa. Milk is the only food that is taken by many babies and invalids and it enters very largely into the diet of nearly all persons of all ages. It is therefore plain to see that it is the duty of the State where the milk is produced and the municipality where the milk is consumed (as it certainly is their right), to insist that the conditions surrounding the production, handling and sale of milk shall be such as will result in the placing in the consumers' hands a product that shall be not only free from the germs of disease but shall be free from filth. I believe—and I think no one will disagree with me—that the healthy cow yields milk that is clean and wholesome. If the milk from such cows is found to be unclean and unwholesome when it reaches the consumer's table the trouble lies somewhere between the cow and the consumer's table and I am inclined to believe that, including the producer, the dealer and the consumer, the chances are fully one in three that the fault should be charged against the consumer for his carelessness or ignorance in caring for the milk after it is delivered to him.

In rare cases cows that are affected with tuberculosis yield milk that contains the germs of the disease. If the disease is in the advanced stages, or is generalized, or if there is localized disease in the udder, this will very likely be the case, but in my opinion the tubercle bacilli are more likely to get into the milk after it is drawn from the cow than they are to be drawn from the cow's udder.

Dr. Schroeder, Superintendent of the Experiment Station of the United States Department of Agriculture,—Bureau of Animal Industry—has demonstrated that "Tuberculous cows, wholly free from visible symptoms of tuberculosis frequently expel tubercle bacilli from their bodies per rectum." Cows kept in a filthy stable must inevitably become more or less soiled by lying in the filth and as it is impossible for even a clean man to milk a cow whose flanks and udder are dirty and not let more or less of the filth get into the milk, we can see how easy it is for this filth to become the medium for carrying

the germs into the milk. The strainer may remove all the filth that is visible, but the liquid filth and the germs will pass through with the milk, into the can.

It is stating a self evident proposition to say that the consumer has a right to demand that the producer and dealer shall furnish him milk that is clean and pure. The producer and the dealer, on the other hand are justified in demanding that their customers shall take proper care of the milk after it is delivered to them and shall pay a living price for it. The men who produce and the men who sell dirty milk for clean milk are either ignorant, careless or dishonest. The man who adulterates his milk with filth or gives his customer 2% milk from the bottom of the can may be simply ignorant, but the man who puts clean water into his milk is dishonest. However, we can readily see that the former may be endangering the lives of many babies while the dishonest man's milk may be perfectly wholesome.

The problem which confronts us in our campaign for pure milk is: how can we teach the ignorant, warn the careless and punish the dishonest milk-man.

The milk producer in Connecticut has no occasion to feel that the interests of milk consumers are being neglected for his stable is liable, at any time, to be visited by one of the inspectors employed by the State Dairy & Food Commissioner, by a local city or borough milk inspector, by an employee of the board of health in the city outside of the state where his milk is sold, by a representative of the dealer to whom he sells his milk, by the local town health officer, or by the Commissioner on Domestic Animals if any of the others notice any animal showing suspicious symptoms of tuberculosis.

With all these inspectors in the field there is no conflict of authority. The Dairy and Food Commissioner has authority to order the owner of dairy stock to remove or abate, within a specified time, any unsanitary condition that may be found to exist, under a penalty of a fine of twenty-five dollars. The city or borough inspector can simply recommend certain changes and then tell the farmer that if he fails to make them he can sell no more milk in that city. The dealer can likewise tell the farmer to either "put up or shut up." The local health officer has the right to take samples of all milk sold in his

jurisdiction and send them to the state bacteriological laboratory where they are analyzed. The state bacteriologist sends to the health officer reports on all specimens received from him and also sends, on small slips, an individual report to be given to each dealer showing the analysis of the milk collected from him. At the bottom of this slip is printed a statement indicating what the requirements are and what is good and what is a poor analysis of milk. Each person will thus obtain his own report and know whether his milk is showing a good or a poor analysis.

If the state bacteriologist finds a specimen that is impure either with too little butter fat or with indications of watering or with a very high bacterial content, or with dirt in the milk he immediately reports the facts to the Dairy and Food Commissioner who sends an inspector to examine the sanitary conditions surrounding the production and handling of the suspected sample, or to take samples of the milk. When samples are taken by the Dairy and Food Commissioner they are immediately sealed in the presence of the farmer and one sample is left with him and one is sent to the Connecticut Agricultural Experiment Station to be analyzed. The analyses as reported by the chemist at the Experiment Station are *prima facie* evidence by statute and when these reports show that the milk has been adulterated or that the milk contains a preservative the Dairy and Food Commissioner informs the proper prosecuting officer and the offending party is prosecuted.

During the eleven years and more that I have been commissioner my work has taken me into farmer's stables all over the state and I do not hesitate to say that there has been a very marked improvement in the sanitary conditions surrounding the production and handling of milk in nearly every section of the state. Barns and stables have been remodeled; cement floors have been laid; additional windows have been put in to admit more sunlight into the stables; stable walls and ceilings are whitewashed to better reflect the light; more attention is being paid to ventilation and to removing the milk from the stable and cooling it as soon as possible after it is drawn.

I regret to have to admit that in some sections, too remote from local markets and shipping facilities to permit the selling

of whole milk, the farmers are lagging behind in the matter of changing conditions and practices to conform to the modern requirements. These exceptions, however, clearly demonstrate the good work accomplished by the milk inspector. Prof. H. W. Conn, State Bacteriologist, informs me that the analyses which have been made under his supervision, of milk coming from sections where they have had systematic work done by inspectors, show a marked improvement. Dairymen are much less likely to be forgetful, careless or dishonest if they know they are being watched by inspectors and dealers.

THE CHAIRMAN: I am sure we all disagree with one statement of Commissioner Averill, that he had nothing to bring to us. I am sure that we can want nothing better than to get the facts, and to get the experience of other states and other towns and other places.

So I am glad that we have, for the next speaker, one who represents a smaller community. We have had the Commissioner of New York, we have had the Commissioner of Toronto, and the health officer, and we have now Mr. Lyman Root, Ex-Health Officer of Stamford, Connecticut, to speak to us.

Mr. Root spoke as follows:

STANDARDS OF MILK UTENSILS

MR. CHAIRMAN, AND LADIES AND GENTLEMEN: I am to speak to you briefly upon a topic that has not been touched upon directly during any of the sessions of this conference. My topic is "Standards of Milk Utensils."

The fundamental principle that underlies all the ways and means of milk production, which we have been discussing from so many points of view, is this:—Every possible method and precaution must be employed to keep the milk clean and cool.

I am asked to speak of the necessity of using milk utensils so constructed that milk put into them may suffer no contamination. I am convinced that many of the difficulties which dairymen have to overcome with sour and ill-flavored milk, come from poorly made and carelessly cleaned pails, cans, coolers, etc.

The almost universal fault in the making of dairy utensils is that their joints and seams are left open with cracks and crevices impossible to clean. Handles are usually riveted on

with a perceptible opening around the plate. Milk, soapy water and dirt of every description can easily enter these openings, and a goodly portion becomes permanently lodged there, for no amount of scrubbing can entirely remove it. Take an old pail or can that has seen years of service, in even a well kept dairy and pry up the tin at the rim and look under the wire. The matter which has accumulated there resembles in appearance and odor that which is removed from a stopped up kitchen drain pipe. And why should it not?

I have brought for your inspection the lid and top of a can which has been in use for one year. I washed it as clean as possible then placed it on a hot stove. Part of the substance which came out of the cracks took fire and burned; but enough remains to show you what I mean. This putrifying mass is laden with those forms of bacteria which we are most anxious to keep out of our milk. The covered pail is recognized as a necessity wherever the best is sought. In my judgment the hooded pail is to be preferred as it protects the opening and does away with a strainer in the cover of the pail. It seems more sensible to keep hairs and particles of dirt from falling in at all rather than to have them caught on a strainer and washed over and over by the milk. In the latter case all the really harmful part gets into the pail just the same.

What I wish to emphasize most strongly is the necessity of having the seams and joints of every utensil absolutely tight. They should be flushed with solder inside and out and smoothly finished. This is particularly important in large cans. The milk stands in them for a long time and during transportation they are exposed to dirt and cinders and are handled by uncleanly workmen.

It is a matter for congratulation that the common sense milk bottle is so rapidly becoming the standard.

I need hardly speak of the obvious advantages to the consumers of milk when good utensils are used. Would that they were more discriminating and appreciative. The cry that is raised by the man on the farm is "they cost too much." Let him remember that his pails rust out first in the seams and rim rather than on the flat surfaces. Tinware with no opening in which a drop of water can lodge will wear years longer than that which cannot ever be thoroughly dried. If time is valued

compare the moments spent in an endeavor to keep cracks and corners clean even to the eye, with that required to wash off a smooth surface. And let him consider also the occasional loss of several cans of milk because it is sour or has a bad taste, and let him weigh the relative value of his reputation for thrift and reliability against that of his careless neighbor who clings to old-fashioned methods. These purely selfish reasons justify some additional first cost. The menace to health which the use of battered and filthy tins involves is enough to rouse some sense of responsibility in the least altruistic if he will but stop to understand.

There has been some improvement to be seen in dairy supplies as they have come from the manufacturer during the past few years. But their standard is still too low. I am pleading for this standard in the hope that some action may be taken that shall influence the manufacturers. Year by year we shall see changes in detail of construction; but the one simple and absolute necessity is that every seam and crevice be closed with solder. Surely this is not an unreasonable demand.

I might say that while I was milk inspector of the City of Stamford, I visited all the dairies and visited them frequently, and I found out when they were going to get new cans and I arranged with the Iron-clad Can Company and also with the Dairymen's Manufacturing Company of Jersey City, to fill the seams of these cans with solder, which makes them very much stronger and much more lasting, and they charged me fifteen cents for the flushing of those seams and the numbering and lettering of the cans. So you see it is not very expensive when you count the advantages of it.

Now, I have procured here a can that has been used one year, and, speaking of improvements, notice this can (indicating can). This can was made a year ago. You will not find that now. I asked the Dairyman's Manufacturing Company to send me a lid with it and I am sorry they did not do it. In the old way they folded a seam there, making the metal rim a little stiffer. They folded that along there (indicating). Well, you see how that is continuously full of milk (indicating). That is not soldered down at all. You will notice that those seams are always rusty when they get damp.

Now, that seam (indicating) is left off entirely, and that is

one of the most important things. That is one of the best improvements in connection with the milk can business. These edges along here are cut off, and it is interesting to notice at the bottom edge, how it will rust around, just a little.

They are making these cans beautifully. Oh, how I wish that something could be done or some influence could be brought to bear to induce those people to fill that seam as that one is filled. Now, notice how that is open all the way around there? You set them out on a sunny day in the sun and see how bright they are. In fact, when I was milk inspector, the cans were set out on a platform at the rear of the place, where there were flats, and the tenants entered a protest against them and I had to remove those cans, because of the sun shining on them. They can be cleaned by turning them bottom side up over a jet of steam. The steam going up into a forty quart can does not thoroughly sterilize it. What I was going to say was that you would have thought they would have put a two inch band on this can around here (indicating) if they wanted to make the best can they could, and that after they put in that band, they would have soldered all around it, so the milk would run off. But they didn't; they soldered it around the bottom, so the milk would run in there and could not run off. Now, why is that (indicating) the most important seam on the can? That seam right there, I mean. Let me tell you. You will see two men take hold of this can of milk when they are filling the bottles, and when they get it almost full, they tilt that off. Now, that seam gets full of decayed milk. I have seen them pour it over into the can again, and stick the end of the can down in the milk and wash it off, and I have seen the milk of a different color where it had been dripping in.

Now, don't you see the great importance of that? Can you not see the advantage of these two important things on the milk can, this one here and this one here, around the rim? (Indicating.)

Here is another thing: This is one of the common things. That is in position for the milk to be in, with the lid left that way. (Indicating.) It is all full of milk now. I have stood and watched them and seen the rusty milk drop out of the rim into the can.

What we need to-day is to bring an influence to bear that

shall procure the closing of that seam. If there is any one here who can think of any objection to what I am urging, I hope they will let it be known, for personally, I cannot think of any. The can is stronger and it can be kept clean more easily, and it will last quite as long. I see everything that will warrant our insisting upon cans being made in that way, and I can see no objection to them.

THE CHAIRMAN: I know that all the practical persons here will realize that these are not little things. It is a hard thing to get these apparently small matters attended to. I know that in the Milk Commission of New York we had a woman appointed chief inspector, because she will see the smaller things which are so important, whereas just a man would pass them over as being hardly worthy of his attention. Those of us who have examined bacteriologically a little old milk know how a drop of it may have a hundred million bacteria. When such a drop of milk gets into a can of good, fresh milk, you can see what the result will be.

We have come now to the time of discussion, and the Chairman has asked me to ask you to limit the discussion of the whole matter to only one individual, leaving later discussions to come under the various resolutions which the Chairman will give me, and so I am going to ask, with your permission, that Prof. Harding, of the Geneva Experiment Station, who has done so much and written so much on this line of work, close the discussion for us.

PROF. HARDING spoke as follows:

Mr. Chairman and Ladies and Gentlemen: I realize that the hour is late and that you have had a long session, and that you have here important questions before you, but I think, at this time, some things ought to be said on the side of the individual who is so frequently told "Put up or shut up," the milk producer.

Now, the situation in which the milk producer finds himself is this: To produce a thoroughly satisfactory grade of milk, such as you gentlemen desire to have furnished in New York City, requires four cents on the farm, to give the farmer a reasonable return for his investment in time and labor. He is actually getting a little more than three cents in the State of New York to-day. That milk which he is producing is almost exclusively purchased on the basis of what it weighs or what it may weigh. Every pound of fertilizer which he puts into that milk is worth to him, on the market, nearly two cents, and he asks, when he is producing this milk, what it can be economically produced for, and then you ask him to take out that for which you are not willing to pay him, and

reject it without raising the price. Now that is the situation that really encourages him to "put up." Doesn't it encourage him to "shut up," and, as a result, is he not going out of the dairy business rapidly?

That this is not an exaggerated statement of the situation, is proved by the investigation which has been carried on at Cornell University. In the matter presented to us yesterday, it was pointed out that among the agricultural population, the men who were devoting themselves to the milk business in the State of New York were the men who were making the least, and whose financial returns were the lowest of all classes of agriculture in the state. That being the situation, the question of standards is now before us. Milk standards is the subject of our discussion for this afternoon. Now, the object of any milk standard, as I take it, is to produce results. What you want is a better milk, and the reason you devise standards of various sorts is to facilitate the preparation and sale of that better milk. That is the kernel of the whole situation. Now, do we not need the standards that are simplest and which are most readily understood by all parties connected with the use of those standards? Have we not failed to make progress in many instances, because we have devised standards which were so technical that the people on the producing side of the proposition were entirely at sea regarding the relation of those standards to themselves? It is rather a far cry from a definite standard of so many bacteria per cubic centimetre to the question of how the farmer shall manipulate his dairy business. I realize that there has been a strong movement on the part of those most interested in milk hygiene, to furnish the farmer with ready-made directions for running his business. I think as fine an illustration of that as I ever saw was at Atlantic City, at the first meeting of the Certified Milk Commission. They were engaged there in formulating the details of the milk business. They had reached the stage where it was being "resolved" that in the collection of milk bottles from the houses throughout the city, the milk dealers should provide a separate wagon to haul those bottles that had come from places where contagious diseases had existed, and that a separate place should be provided, to sterilize those bottles before they were allowed to be taken into the regular depots, so as to avoid, thereby, the danger of contaminating the regular milk bottles. I see Mr. Francisco chuckling a little, and I want to say that it certainly was amusing.

At Geneva we have been doing some experimental work in the milk handling business. We have been trying to find what the factors are that will actually elevate the quality of the milk to a higher

standard. Now, it may be that there is a vast difference between a city of 15,000 and a city like New York, and that any results obtained on that small scale can hardly be transplanted to a city of this size, but still the fundamental things which will affect the situation in one place may often be applied in another. Experiments, of course, were not conducted solely for your benefit. Perhaps it is unkind to put it that way, but the fact is that you are thoroughly able to do things by yourselves, while in the State of New York and surrounding states, a large number of the cities of the second and third class are at present doing little or nothing to improve their milk supplies. There needs, you will see, to be a compact and workable method to protect the milk supplies in this state and surrounding states.

The principles that were applied in this experiment were these: An effort was made, first, to find out what the facts were regarding the quality of milk being supplied to the public, and then presenting these facts to the consumer, the consuming public, so that they might buy their milk more intelligently. There is no reason why they should not be able to buy their milk as intelligently as they buy their cotton cloth, or any of the other commodities that they use, which are offered to them in various grades. The Board was supposed to find out the sanitary conditions under which the various milks which were offered to the public were produced, the influences which they had been exposed to, and, in some tangible way, to present it to the consuming public, so that they might deal with the producers on the basis of the quality of the goods produced.

The great difficulty in the situation of the milk supply of New York City, and all other cities, practically, of the state, is the fact that the poorest milk receives the same financial rewards, practically, as the best milk.

As a result of our experience at Geneva, I feel sure that the milk supply of New York City could be brought up to any desired standard of excellence, provided it was paid for on the basis of the actual quality of the goods produced. (Applause.) The first thing is to find out the actual situation regarding the milk supply, and to express that in some intelligible way. Scoring is an old practice, and we adopted the score card as a means of expressing the situation as found by the inspectors of the dairies furnishing the milk to our city. We found that a third of it would class as poor milk, the rest of it, perhaps, as medium, with a little streak of good milk at the top. (Indicating on diagram.) That (indicating) represents the milk which is filthy; that (indicating) represents milk which is fairly good but not tuberculin tested, and

deficient in some features, but what we naturally would call a good milk supply.

This (indicating) is a sort of intermediate grade of milk, between. It is dirty, without being filthy. That is the situation we found in the Geneva milk supply.

At a meeting of the producers, so-called, the situation was explained to them and the condition in which we had actually found the milk supply was explained to them. They were told to produce the milk in any way that they wanted; that that was their business. It was explained to them that the facts as to their milk production would be given to the consuming public, and that it was hoped the consuming public would evince some intelligence in regard to its purchase; that we believed that if they wanted to parade the streets with a sign on their wagon, "This wagon sells poor milk" that it was their privilege, but that we did not believe it would be a good financial proposition.

We held these men, as I say, to results. We left them entirely free in regard to their methods of obtaining those results. I have been for nearly thirty years in close contact with one phase or another of the dairy business, and I do not yet know enough about the dairy business to be prepared to advise a farmer on the details about running his dairy. I doubt whether there are half a dozen men in this audience who know enough about the dairy business to take a dairy farm as a specific proposition—and tell the dairyman how to run his business, unless they have previously given time to study the situation. Because the actual details of running a dairy business vary widely with the conditions under which production actually takes place.

These scorings were computed at every quarter, but the last quarter of each year is given so as to give you the results briefly. That is a transformation which had been brought about in the milk supply of Geneva in the twelve months, simply by telling the men that we were giving them a fair deal. (Indicating diagram.) If they produced a good line of goods, credit would be given to them for it. About half of this milk was being sold by the men who produced it, so that they had a direct pecuniary interest in the result. It meant business for them to be on the list that was producing good milk.

These results, I may say, were not given to the public until towards the close of this year. First the producer and the retailer were furnished with the facts as to the standing of the dairies, the retailer being furnished with the standing of the various plants, so that the contracts between those men might be brought on a definite basis of results and guaranteed results. Ordinarily the

milkmen make a contract with the producers and the dealers, which states that they shall produce good milk, and if it turns out that the milk is bad, why, you cannot do anything about it. You have no clear, good basis on which to make a contract. This was the basis that we arrived at, and I may say that, during this year, a part of the milk was handled by a large company, and more than half of it was handled by small retailers. This was the situation in 1909. (Indicating chart.) This sharp drop from there to there (indicating) is due to the fact that about half of the milk was contracted for this year on a sliding scale, consisting of a standard price for good milk, in the good class, and a half a cent additional for milk in the excellent class, and a cut of half a cent if milk is in the medium class. The practice makes good milk a good business proposition, and when the milk comes up to that standard, and the price is forthcoming at once, it makes the production of that milk profitable. The farmers, out of self-respect, make an article as good as they can for the price that they receive.

This situation has continued until, in 1910, not at the end of the year, but at the close of the third quarter of the year, this is our situation: (Indicating chart.) In this year the milk was practically all contracted for on the basis of our official score. The contract between the men is on the sliding scale, based upon the official score. If the milk is in the excellent class, a certain extra price is given; if it falls to the medium class, the price is cut. This is the effect of the law of supply and demand. The farmers rose to the situation just as rapidly as the financial returns made it possible for them to do so.

Now, we came to another aspect of the situation. The price had risen until the wholesale price of milk had gone up to three and a half cents for good and four cents for excellent grades. At the same time, milk was being produced within six miles of Geneva, that sold during a part of the year, I believe, for two and a half cents at the milk station. There you have the situation. There was a strong tendency for the milk outside to break into our market because the difference in price gave a dealer the idea that it would be a good plan to buy this cheap milk, which could be bought at around three cents or a little over, and retail it in our market, trusting to the foolishness of the consuming public to buy a cheap milk at a cent a quart less than the best milk would sell for.

Now, there is enough intelligence in this city, as to milk, to warrant the effort to sell the one per cent of high grade milk that is used. When you figure one per cent on the basis of a city of 20,000, it does not leave a very large number of people to buy high grade milk, and if the other ninety-nine per cent prefer to still buy

for seven cents, when good milk costs eight cents, you are facing the situation that is going to happen. I have asked what the result would be. I believe the results will be that the retailer who buys milk on the basis of its sanitary quality, and pays accordingly, will get the highest quality of it, purchasing it, of course, as economically as he can. He may, in turn, find himself in deep water financially if he brings his milk up to a grade higher in sanitary quality than the public has intelligence enough to buy. So, in the last analysis of the milk situation, the stumbling block in the improvement is the disinclination of the consuming public to pay for sanitary milk, what it reasonably costs to produce it. Now, this result came very largely as a surprise to me, because I had no conception that the situation had improved so rapidly. By leaving the details of the business of milk making entirely in the hands of the producer and holding him accountable for results, the quality of the milk has greatly improved. Our inspector went once or twice per quarter to see the dairies. The financial returns of those dairies depended, of course, upon the inspector's finding everything all right. The dairymen could not afford to take chances by being slack in their methods, because the inspector was likely to drop in at any time, and it might cost him quite a good many dollars, for half a cent in the price of milk, for a quarter, is a factor that cannot be overlooked in the present economics of milk production. The result was that those producers were pretty careful at all times to see to keeping things so that there would be no danger of falling into the grade below and losing the quarter's rate on their milk. In other words, instead of fighting the inspector, as has been done in too many cases, they have gotten on extremely pleasantly with all concerned.

THE CHAIRMAN: The last address reminds me of a very short story. A friend of mine who had a colored servant, severely reprimanded him for some failure to follow his directions. The colored man said, "Master, you can't expect a Daniel Webster brain for a dollar a day." I think that consumers should know that they have got enough to keep intelligent men on the farms, and we have got to pay them enough to enable them to have the proper help to do their work. I know that for three-quarters of a cent more we can get very good conditions on a great many farms, but we have got to pay them or the men cannot afford to produce good milk, and there is no reason why they should be forced to do it.

Now, we have come to the matter of the results of this meeting, and I am going to ask those of you who have anything to discuss, as to these resolutions, to do so in the very briefest time possible, as we have very little time at our disposal.

I want to have you remember that in acting on these resolutions, in a way, you are sizing up your own judgment, because we may attempt something to-day, and next year find that something else is better, and that another conference is adopting resolutions setting forth more enlightened views. So, although I do not ask you to adopt resolutions which, as I understand, are impersonal and not made up by the Chairman of the Resolution Committee, I ask you to think carefully before you either vote them down or vote for them.

Now, I believe that Dr. Wile has something to read.

DR. I. S. WILE, CHAIRMAN, Conference Committee: Mr. Chairman and Ladies and Gentlemen, the Committee on Resolutions has a number of resolutions that have come through its hands. I merely wish to add to what Dr. Park has already stated, that in presenting these resolutions, as Chairman of the Resolutions Committee, there is absolutely nothing personal in the resolutions. The identity of the proposers of all the resolutions is carefully concealed, instead of having them proposed by several different men on the floor.

The first resolution, Mr. Chairman, is as follows:

"Resolved, That the State Agricultural Law should be amended so as to prohibit gross or fraudulent misrepresentation concerning the composition, or sanitary quality of milk or cream, offered for sale, and the Commissioner of Agriculture should be authorized to define different grades of milk or cream and publish such definitions, and any person who designates any milk or cream to be in any grade when it does not conform to the definition of that grade, shall be deemed guilty of fraudulent misrepresentation."

(It was moved and seconded that the resolution be adopted.)

A VOICE: I would like very much to hear the resolution read a second time.

(Resolution again read.)

THE CHAIRMAN: Is there any discussion on this?

A VOICE: Mr. Chairman, we are all supposed to act intelligently on these things or not vote at all. Can the Chairman tell us what that means?

THE CHAIRMAN: I think the speaker has the same amount of intelligence as the Chairman. It seems to me thoroughly clear in its general intent, which is that we shall first prohibit misrepresentation, and then brand the man who does misrepresent.

A VOICE: How are we going to arrive at any such standard?

THE CHAIRMAN: The time is very short, and the Chairman has not seen these except at this minute, and I can hardly explain them to the committee. Is there any other discussion?

MR. ROOT: I am in the same predicament as my friend. I am a purchaser of milk and a dealer, and I have been for the past thirty-five years, and I can't understand that resolution. We are dealing with nature now, and there are such variations in nature and in the changes in milk—the milk that the same cow will give from time to time,—that to arrive at that standard seems to me to be an impossible proposition.

DR. WILE: That resolution seems perfectly clear, inasmuch as the Department of Agriculture has already established grades of milk, the Department of Health of the City of New York has already established grades of milk, and various states and municipalities have established grades of milk. There does not seem to be any difficulty in understanding what "grades of milk" means. (Applause.)

DR. ROSENAU: I would like to know whether this would meet with the approval of the Department of Agriculture of the State of New York?

DR. WILE: I may say that the resolution does meet with the approval of the Department of Agriculture of the State of New York.

THE CHAIRMAN: It seems to me that it is a matter of detail as to the defining of these grades. As Dr. Wile says, it has been done, and I am sure it can be done.

(The motion was carried and the resolution was adopted.)

DR. WILE: The second resolution, Mr. Chairman, may even cast a little better light upon what the previous resolution means, although it has come from an entirely different source. It is as follows:

"Resolved, That pending the adoption of national standards, the Conference on Milk Problems of the New York Milk Committee endorse the classification of milk recommended by A. D. Melvin, Chief of Bureau of Animal Industries of the United States Department of Agriculture, approved by the Milk Conference of the District of Columbia of 1907, and published in Circular 114 of the Bureau of Animal Industries and in Bulletins 41 and 56 of the U. S. Public Health and Marine Hospital Service.

This classification designates three kinds of milk; Certified, Inspected and Pasteurized.

1. Certified milk must be produced in accordance with the requirements of the American Association of Medical Milk Commissions.

2. Inspected milk must be a wholesome, clean article, obtained under sanitary conditions from cows shown to be free from tuberculosis by the tuberculin test and containing not more than 100,000 bacteria per cubic centimeter.

3. Pasteurized milk must be a clean, inspected milk, which has been properly pasteurized under an official standard in establishments which shall at all times be subject to inspection and tests by public inspectors."

MR. DANA: I move the adoption of the resolution.

(The motion was duly seconded.)

THE CHAIRMAN: Is there any discussion?

MR. DANA: I am heartily in favor of the adoption of that resolution, because, in connection with the excellent address and remarks of Prof. Harding, it seems to be directly in line. It gives the dealer in New York City or in the smaller city the opportunity to buy and place upon his wagon inspected milk, and it gives him the right to so advertise. Then he goes to the producer and pays a premium to get it. The housewife who buys that milk knows what she is getting.

In the milk dealing that has been engaged in in the past, the lowest possible quality of milk has fixed the price of milk. Now, I know, in the City of Rochester, there is a dealer there who is willing to pay a premium for good milk, if he can only be assured that he will be protected in the sale of that milk, and that other men would have to buy equally as good milk if they sold it as inspected milk. (Applause.)

(The motion was carried and the resolution adopted.)

DR. WILE: In view of the paper of Dr. VanSlyke, the next resolution will undoubtedly elicit some discussion.

"Resolved, That it is the sense of this meeting that it is desirable that state standards for the chemical standards for milk should as rapidly as possible be brought to conform with the Federal standard of 3.25 per cent fat and 8.5 per cent solids not fat."

(It was moved and seconded that the resolution be adopted.)

THE CHAIRMAN: It is now before you. Is there any discussion? It is a somewhat technical subject.

DR. WILE: I may say, Mr. Chairman, that this resolution has been submitted to Dr. VanSlyke and meets with his approval.

(The motion was carried and the resolution was adopted.)

DR. WILE: The next resolution is as follows:

“Resolved, That it is the sense of this conference that all milk which does not come from tuberculin tested cows kept under conditions which satisfy the highest medical and sanitary standards, should be pasteurized.”

THE CHAIRMAN: Does anyone move the adoption of this resolution?

A VOICE: Mr. Chairman, I do not see any necessity for that resolution. We have just passed a resolution, a few minutes ago, adopting a classification which thoroughly takes care of it. You have the certified milk, the inspected milk and the pasteurized milk, and so I move to lay it on the table.

THE CHAIRMAN: This goes further than the other.

A VOICE: But the other covers it satisfactorily.

(The motion to lay it on the table was seconded.)

THE CHAIRMAN: It has been moved and seconded that it be laid on the table. The motion that it be laid on the table is not debatable.

(The motion was carried and the resolution was laid on the table.)

DR. WILE: Mr. Chairman, the next is rather a long resolution:

“WHEREAS, Dairy products are among the most valuable assets of the world, billions of capital being invested in them in the United States alone, and

WHEREAS, Milk, cream, butter and cheese are the most generally employed articles of food and have been proved by indisputable evidence to be readily contaminated by disease producing germs, thus greatly impairing the public health and increasing the general mortality rate, and

WHEREAS, The dissemination of disease by dirty products has been pointed out by numerous writers the world over and has in this country been especially demonstrated in Circulars 114, 118 and 153 of the Bureau of Animal Industry of the U. S. Department of Agriculture and Bulletins 41 and 56, Bureau of Public Health and Marine Hospital Service, and

WHEREAS, These facts have been confirmed by numerous authorities here and in Europe and have been recognized within

the past month by the U. S. Department of Agriculture, the U. S. Department of the Interior, the U. S. Department of Commerce and Labor, the U. S. Navy Department and by the Commissioners of the District of Columbia,

Be it Resolved, That the United States Congress be requested to appoint a joint committee to investigate the question of dairy products in their relation to the public health, in order that proper standards for dairy products may be adopted by the United States Congress, and

Be it further Resolved, That a copy of these resolutions be sent to the President of the United States, to the Vice-President, to the Speaker of the House of Representatives, to the Chairman of the Public Health Committee of the United States Senate and to the Chairman of the Committee on Agriculture of the U. S. House of Representatives."

(It was moved and seconded that the resolution be adopted.)

THE CHAIRMAN: Gentlemen, it is before you for discussion. Has anyone anything to say?

(The motion was carried and the resolution adopted.)

DR. WILE: The next resolution is as follows:

"WHEREAS, It has been demonstrated by the papers and the discussions at this conference, held at the invitation of the New York Milk Committee, that it is imperative that definite standards and regulations should be adopted to govern the production and handling of dairy products for the prevention of disease and the saving of lives,

"Resolved, That the New York Milk Committee be requested to invite between twelve and twenty recognized experts on milk problems to meet in conference, and that those experts be asked to make a unanimous report recommending proper milk standards on which Congress or State authorities may formulate milk legislation."

(It was moved and seconded that the resolution be adopted.)

THE CHAIRMAN: Is there any discussion? This is a rather important matter. Are we assuming this responsibility?

A VOICE: I move to strike out the word "unanimous."

(The motion was seconded.)

THE CHAIRMAN: It has been moved and seconded that the word "unanimous" be stricken out.

A VOICE: Mr. Chairman, I think the word "unanimous" is a very wise provision. It is intended that this report should have great weight in the formulation of legislation. Now, if it shows that the highest authorities cannot agree, it would be well to investigate until they can agree, before having that resolution go out.

DR. SHROEDER: We would like to know on what matters a committee of this kind can actually come to one conclusion, so I think the word "unanimous" should by all means remain in the resolution. It constitutes the very strength of that resolution.

DR. MAGRUDER: Mr. President, I can endorse that statement from personal experience. We have had issued from Washington Circular 113, Bureau of Animal Industry, known as "Sanitary Milk Inspection." It is the report of the Washington Milk Conference. That report was issued after a conference of all the contributors, and it was unanimously adopted, and for that reason that little pamphlet of thirty or forty pages is a world wide authority. If we can get equal authority for a report here, and have the unanimity of it appear, it will then cause so much light to be thrown on this subject, as to be eminently desirable.

A VOICE: Mr. Chairman, I think the producers would be very glad if we could unite on anything of that kind.

THE CHAIRMAN: The question is on the amendment to strike out the word "unanimous."

(The amendment was lost.)

THE CHAIRMAN: The word "unanimous" remains. Now the vote is on the motion itself, that the resolution be adopted, as originally read.

(The motion was carried and the resolution adopted.)

DR. WILE: The last resolution that I have to introduce, Mr. Chairman, is a resolution that was offered at a previous meeting, but owing to the fact that one or two words were not quite clear in the minds of some of the members present, it was not adopted. It has been reintroduced at the request of one of the men who formerly rejected the proposition, and we wish to see what the opinion of the conference is to-day. The resolution is as follows:

"WHEREAS, 16,000 babies die annually in New York City, of which number 4000 are killed by bad milk and improper food, and,

"WHEREAS, There are 500,000 children in New York City under five years of age whose future health and strength depends upon their proper nourishment and development, and

"WHEREAS, Pure milk is the most important food in the diet of those children,

"NOW, THEREFORE, BE IT RESOLVED, That the problem of securing a clean safe milk for babies and young children is the most immediate and pressing problem confronting the health authorities of this city, and be it further

"Resolved, That it is the sense of this conference that steps should be taken to label milk so that mothers will know what milk is safe for their babies and what milk they must avoid.

"Resolved, That it is the sense of this conference that milk, from tuberculin tested cows, produced and kept under conditions which satisfy the highest medical and sanitary standards is reasonably safe for babies in a raw state.

"Resolved, That it is the sense of this conference that milk from cows which have been physically examined for tuberculosis, and are kept on farms which score at least seventy-five per cent by the Health Department's methods, is safe for babies if pasteurized at a temperature not lower than 40 degrees F. and for a time not less than 20 minutes; provided that such milk has a bacteriological count not higher than 100,000 per cc. before pasteurization and not more than 10,000 per cc. after pasteurization.

"Resolved, That it is the sense of this conference that all other milk is not safe for babies; that it should be pasteurized as above described; and that it should be recommended for cooking purposes only and not for drinking purposes.

"Resolved, That this conference recommend to the New York Health Authorities that an effort be made immediately to secure a quantity of milk of Grades 1 and 2 above described, sufficient for the 500,000 infants and children under five years of age in New York City."

DR. MAGRUDER: Mr. Chairman, as I remember that resolution, I would like to move that it be adopted, because it has been changed in such a way that it would not be possible to object to it. Here we have the words "milk producers" inserted. Before we had "permitted." Now we have it that it is to be properly produced and kept, which makes it perfectly satisfactory. Then, we have that clause in regard to its being reasonably safe, which carries out the idea that you have advanced. I earnestly hope that the resolution will be adopted.

MR. CAMPBELL: There are some good things in the resolution, but the words in which you recommend that a certain portion of the milk that is produced be not used for drinking purposes, it seems to me, would deprive about nine-tenths of the population from getting a drink of milk.

THE CHAIRMAN: I don't think you understood this correctly.

MR. CAMPBELL: Possibly I have not.

THE CHAIRMAN: It is for babies; not for the mass of the people.

MR. CAMPBELL: I understood that it read that the supply of milk outside of certified milk, be recommended as unfit for drinking purposes.

THE CHAIRMAN: No, the certified milk and the inspected milk which was pasteurized—those two will be safe.

MR. CAMPBELL: It is all right, then.

MR. WHITAKER: Mr. President, doesn't that, in a way, conflict with a resolution that has been already adopted? The resolution calls first, for milk of tuberculin tested herds, produced under conditions which meet with the approval of the highest authority. That is very strong language. Certified milk is strictly a medical proposition. This resolution does not allow for what we have already countenanced as inspected milk.

THE CHAIRMAN: As I understand it, this really is following out what Mr. Campbell asked for. We cannot have all the herds of New York State tuberculin tested. It is impossible to hope for that. During that time, we will have clean milk from physically tested herds, which will be safeguarded by pasteurization.

MR. WHITAKER: Isn't that ground covered sufficiently in the resolution already adopted?

THE CHAIRMAN: It allows them to use, for infant feeding, milk which does not come under the two higher standards, if it is decent milk and pasteurized.

MR. CAMPBELL: It does seem to me, Mr. Chairman, that these matters are getting mixed. The United States Government, as we have just heard here, has fixed upon three grades of milk: certified, inspected and pasteurized. Please do not give us too many. We want to get clean milk, and it seems to me there can be but two kinds, clean milk and milk that is not clean.

THE CHAIRMAN: Of course, we are up against a fact. We have one per cent of certified milk. We have about one per cent of inspected milk. We have ninety-eight per cent of milk which is not certified or inspected, of which much is consumed by infants. Now, this is to safeguard the better part of the dairy milk, until we can get more of it. The idea of this is, if we believe in it,

to help out the Health Department and to put into immediate effect something which will be good for the children.

MR. DANA: Mr. Chairman, I think there is confusion here somewhere. The resolution formerly adopted was with reference to the great body and mass of market milk, while this resolution is with reference to a segment of milk, known as baby milk.

DR. GREEN: Mr. Chairman, I wish to utter my protest against advising any mother to feed her child raw milk, no matter from what source the milk is secured. Certified milk is the best and most free from infectious germs. Those of you who are familiar with the matter know that the cows in the herd, although they are tuberculin tested when the annual test is made, are not altogether free from tuberculosis. A number of cows are almost invariably withdrawn from the herd because they show tuberculous infection. It seems to me absolutely imperative that no mother should be told that just because a milk is certified milk, it is not at all necessary for her to heat it. This resolution distinctly says that it is to be fed raw. I think it is unnecessary to say that it should be fed raw, because it certainly is not, at times, free from infectious germs.

THE CHAIRMAN: This, I think does not say to feed it raw.

DR. GREEN: It says that milk should be given raw, as I remember the reading of it.

THE CHAIRMAN: It says that it is reasonably safe for babies in a raw state. Now, it is my idea, that we are adopting the opinion of the majority of infant feeders, but many, like Dr. Coit, pasteurize their certified milk.

DR. GREEN: Then why say they may take it raw? Anything that is only reasonably safe should not be given to infants.

THE CHAIRMAN: Because, if we say "reasonably safe" we are covering the opinion of a majority.

DR. SHROEDER: I would advise leaving that clause in there. We specifically state that it is reasonably safe, and we do not say it is absolutely safe, and we must bear in mind that we have one very important fact to deal with, and that is the enormous prejudice that there is in favor of raw milk among physicians, and it is a good thing to be able to point to a reasonably safe article. It supplies a present demand. I personally demonstrated on this platform yesterday that I will consider no milk, except milk pasteurized under official supervision, as safe. I would not feed the best raw milk that is made to a person in whom I am interested, and yet, I advocate retaining that clause, because, as I said a moment ago, we are up against that fact, the prejudice on the part of a

large number of physicians in favor of raw milk. We have got to have something of that kind.

THE CHAIRMAN: It would be very difficult for the Health Department to say that no physician should have raw milk. If the majority of those feeding infants think that raw milk is preferable to heated milk, all we can do then is to say that it must be pure and safe as possible.

MR. CAMPBELL: That word "reasonable," Mr. Chairman, is something or nothing. You can't tell what it means. Now, it has been plainly demonstrated here that even in the production of certified milk, just as this gentleman, Dr. Green, has said, every time you get your herd submitted to the tuberculin test, there are always a few animals that are found to respond, and yet you have been taking that milk and you have been distributing it under the words "certified." Now, what are you going to do with that? Isn't this the safe thing? There has not been a man on this platform, either yesterday or to-day, who has not recommended the pasteurization of milk, and if it is good for one milk, it is good for all. There isn't a mother who does not heat the milk when she feeds it to her baby, and I say that milk to-day, from the evidence that has been produced here, if it is properly and scientifically pasteurized, is safer than any mother can cook it in her own home. This word "reasonable" should not be left in there. It does not mean anything. You could say that there are a number of kinds of milk that are reasonably safe. What we want are facts now, and not opinions.

A VOICE: Will you please read the resolution now?

(The resolution was again read.)

DR. GREEN: I move an amendment to the resolution, by striking out the words "in a raw state."

(The motion was seconded.)

THE CHAIRMAN: The amendment is now open to discussion.

DR. GREEN: The discussion, Mr. Chairman, is just this: That that phrase "in a raw state" states the condition in which it is to be fed to children, and people will think they may give this milk to the children. If the phrase "in a raw state" were left out of that, they would not give it to their children so much in a raw state.

DR. HAMILL: I would like to ask the gentleman who just spoke why certified milk is not "reasonably safe," and I would like to have him define what he means by "reasonably safe." It seems to me that milk which is safeguarded to the extent which certified milk is safeguarded, and milk that experience has shown to be as

safe as certified milk has been shown to be, can certainly be classified as a reasonably safe milk.

Aside from that, I would like to ask another question: Is pasteurized milk, as commercially pasteurized to-day, a safe product? I would like very much to be informed on that subject.

A VOICE: The gentleman is out of order. He is not speaking to the question.

THE CHAIRMAN: I think, Dr. Hamill, you are out of order.

DR. HAMILL: Well, I will put it in another form, if I may, and I will state, that from investigation, the pasteurized milks, as they are commercially pasteurized to-day, I am convinced, are no more safe than certified milk, and much of it is less safe than certified milk.

THE CHAIRMAN: This is not commercial pasteurization. This is another matter.

DR. HAMILL: Well, this has to be milk which is not pasteurized commercially?

THE CHAIRMAN: It must be pasteurized at least for 20 minutes at 140 degrees, under proper safeguards.

DR. HAMILL: I do not wish to say for a moment, Mr. Chairman, that I do not approve of the pasteurization of milk, but I think we are considering two phases of the problem here, both of which deserve proper consideration, and I therefore rise to speak on the subject because I do not understand what the gentlemen who are using the term "reasonable" mean by the term "reasonable."

DR. ROSENAU: Mr. Chairman, I move that the further discussion of the resolution be suspended for this evening.

THE CHAIRMAN: This is the last resolution, the Chairman of the Resolutions Committee informs me, and this is certainly a very important resolution. It seems to me that we ought to discuss it a little more.

MR. HUTCHINSON: Isn't it a fact that a temperature of 140 degrees F. maintained for 20 minutes, will reduce the bacteria from 120,000 to 10,000?

THE CHAIRMAN: It will reduce it further. It will reduce it down to 2,000 or 3,000.

DR. HARDING: I believe that the danger of cattle reacting from these certified milk herds is the basis for this objection to the raw milk proposition. Now, those of you who are familiar with the arrangement of the rules covering it and calling for the test at specific intervals, know that the intervals for the test were chosen with due consideration for the fact that there would in some cases be reactions, and that the period of tests should be sufficiently fre-

quent so that these animals could be taken out of the herds before their infection had progressed to a point where there was any danger to the milk produced by the animals. There is a distinct difference between having lesions of tuberculosis in an animal, and having milk from the animal containing tubercle bacilli. The arrangement of the rules governing certified milk endeavors, by means of the frequent tests, to catch the animals before there is any danger of infection taking place from the animal infected. So the fact that there are occasionally reactions in the herd does not necessarily mean that the milk contains the bacilli of the disease.

I believe that the motion is a sensible one and a sane one, stating, as it does, that the certified milk is a reasonably safe milk. We must not lose our sense of proportion and balance in discussing these fine points, or we shall simply make ourselves ridiculous to the men with whom we are trying to work.

DR. GREEN: No one has come to the question at issue, Mr. Chairman, at all.

MR. DANA: To a layman, it seems rather peculiar that it would be better to take 100,000 bacteria and kill them and feed them to children, than to feed them milk with only 10,000 live bacteria in it. I would rather eat a thousand live bacteria than make my stomach a graveyard.

MR. PHILLIPS: We are talking about questions of technique, and we are forgetting that the lives of babies are at stake. Many of the mothers of the present time do not know what constitutes a safe milk for their babies, and it is essential for us, at this meeting, to forget some of the little details and do all we can towards giving these mothers a milk label which is endorsed by the Health Department, and which will enable every mother in this city to know that the milk which she purchases is reasonably safe for her baby. I do not think Dr. Green would say that a milk from a farm scoring seventy-five per cent and pasteurized in the manner that has been described here, is ideal. None of these conditions are ideal, but those first two classifications are reasonable. The poor cannot afford to buy certified milk, and some other grade of milk must be established for the poor, which is reasonably safe for babies.

I sincerely hope, speaking from a personal standpoint, that these resolutions can be adopted.

A VOICE: Mr. Chairman, I think the whole thing is misunderstood. There isn't anybody in this room who would attempt to say that certified milk is not reasonably safe.

THE CHAIRMAN: Yes, Dr. Green does so.

A VOICE: I did not understand him to say that. The very fact that the father of certified milk, as I believe he is called, feels better by pasteurizing his certified milk, is very good evidence why it would be wise to omit the word "raw." Dr. Coit pasteurizes certified milk. Why does he do it? It is reasonably safe, surely. Now, why does anybody object to that?

THE CHAIRMAN: Might I just answer that by saying that Dr. Coit approves thoroughly of selling certified milk raw?

A VOICE: Of course, because it is safer than any other milk. At the same time, it is still better if it is pasteurized, according to Dr. Coit.

THE CHAIRMAN: May I just say a word myself? As to the question of tuberculosis: We have examined very many specimens of certified milk herds, and have not been able to detect tubercle bacilli, although, of course, it is true that at the end of the year, or at the end of six months, there are usually two or three or four per cent of the cows that react. As Mr. Harding says, it is so slight an infection that it cannot be found by testing, although there may be a few there.

(The question was called for.)

THE CHAIRMAN: First we vote on this amendment of Dr. Green's, that the words "in a raw state" be stricken out.

(The amendment was lost.)

THE CHAIRMAN: The question is now on the motion that the resolution be adopted as originally read.

(The motion was carried and the resolution adopted.)

DR. WILE: That, Mr. Chairman, is the last resolution.

An adjournment was taken until 8:15 o'clock this evening.

FOURTH SESSION

Saturday Evening, December 3, 1910, at 8:15 o'clock.

HENRY L. COIT, M. D., Presiding.

SUBJECT, MILK COMMISSIONS.

The Chairman, Dr. Henry L. Coit, Ex-President of the American Association of Medical Milk Commissions, spoke as follows:

LADIES AND GENTLEMEN: I deem it an honor to be asked to preside at this meeting held under the auspices of the New York Milk Committee, but I did not promise to make an address although I am so listed in the program.

I find some other defects in your program. I notice that I have the appellation of "President of the American Association of Medical Milk Commissions." This is an error: I had the honor of being the first president of that association, consisting of five hundred physicians who are banded together for missionary work along the line of clean milk. The president is Prof. Milton J. Rosenau of Harvard University, who is present with us to-night.

I notice also that Mr. Francisco is listed as the President of the Association of Certified Milk Producers. Mr. Francisco is not the President of this Association although he was its first presiding officer.

The statement that this was to be a "Milk Commission" meeting disconcerted me at first, because there is nothing in the program on milk commissions. I had in my mind only the Medical Milk Commission, but, properly interpreted, this New York Committee is a milk commission. A National Commission, appointed by a Legislature, such as that represented here by the gentleman from Canada is logically a milk commission. That appointed by the Mayor of the City of New York a few years ago to study the milk question, of which Dr. Jacobi, Dr. Holt and Dr. Park were members, was a milk commission. So that any milk committee with authority, appointed by some agency higher in authority, is a milk commission properly so called.

The general discussion to-night will be upon methods of ob-

taining clean milk as exemplified in the efforts of those who are qualified by their knowledge to solve this problem. The Medical Milk Commission, which I am proud to represent as its author, is a special commission with a special purpose with reference to clean milk. It had its origin in this country and antedated all other concerted medical, municipal and federal agencies to obtain clean milk.

A Medical Milk Commission has its existence by the initiative of a representative medical society. Following the first, organized in New Jersey twenty years ago, there were in 1906 twenty-two such Commissions in the United States. At this time Dr. Clark, an altruistic physician in Cincinnati, presenting statistics on milk borne epidemics before the Academy of Medicine, urged the appointment of a Medical Milk Commission like that in New Jersey. His statistics on the dreadful mortality from typhoid, diphtheria and scarlet fever were a justification for the earnest endeavor. Suddenly his voice grew thick and he fell to the floor dead. The tragic death of Dr. Clark led the Academy to appoint a Medical Milk Commission.

This Commission became very active and earnest in its efforts. Dr. Otto P. Geier of Cincinnati, an intimate friend of Dr. Clark, became the Secretary of the Commission. He began to interest himself in the work Dr. Clark had inaugurated. He corresponded with all the Medical Milk Commissions in the United States. He wrote to me suggesting a conference of these Commissions and I joined him in bringing about the first national conference of milk commissions which was held in Atlantic City five years ago. There were about two hundred physicians, sanitarians and Government representatives present.

This conference resulted in a permanent national federation of these Commissions and proposed to extend their missionary work to other cities.

The Medical Milk Commission has one main purpose and that is to get clinically clean milk which may safely be used for hospitals, invalids and infant feeding. It has been found that its initial efforts will arouse the interest of the people, who will demand a cleaner market milk of the municipal authorities.

Average market milk, whether in bulk or cans, is not clean

enough for infant feeding; very little of it contains less than half a million bacteria per cubic centimeter and much of it many millions plus the toxins. The milk made under the supervision of a Medical Milk Commission, if the system is properly applied, would be clean enough to use without cleaning it by heat. As a matter of fact, it is not always clean enough to use raw for all purposes for which milk is required.

I have been misrepresented here by a speaker to-day concerning my use of Certified Milk. As the originator of the scheme for getting Certified Milk, I wish to say that it was my purpose to get milk clean enough to use raw but as a physician, with many medical problems to solve with milk, I have the right to do anything I choose with milk after I get it. The use of milk by a physician in a sick-room or in the hospital or in the nursery is outside the sphere of this discussion. As a physician, I may peptonize, sterilize or boil milk if it seems best.

As the so-called father of Certified Milk, I represent the principle of cleanliness enforced in the dairy, and the principle of caution and care enforced in the transportation and in the delivery of the milk, so that, as it comes to us, it has had nothing done to it which will impair its nutritive value or its keeping qualities. It has been said that I use pasteurized milk to feed my own children. There is one of my children here to-night who was brought up on raw Certified Milk. I have another in college who was brought up on raw certified milk and she is of a physical type of which I am proud.

I want to say that I do not believe in cooking milk if I can get milk clean enough to use raw. (Applause.) But if I have a patient and I find that it is necessary to boil milk, even if it is Certified, I have a right to do it. My function, as a physician, is to get that patient well. If, in my judgment, the milk is better cooked, as it is in Amsterdam, Berlin and Budapest, I think I have a right to do it, but my ideal is far above such methods.

There are two or three general functions of the Medical Milk Commission: First it is recognized historically and logically and should become the leader in milk crusades. Its second function is to arouse interest both in the ranks of the medical profession and on the part of the public, concerning

this matter of pure milk. The third function of the Medical Milk Commission is to establish medical control over milk designed for clinical purposes.

The physician knows best what he needs in the sick-room; he knows what he needs in the hospital and he knows what he needs in the nursery. Therefore, the Medical Milk Commission has one high function, and that is to establish a control over methods for the production of the highest grade of milk. I had the honor of calling that grade of milk by a distinctive name which is now recognized by our seventy Medical Milk Commissions, by the federal government and by several state laws.

Another legitimate function of the Medical Milk Commission is to teach the proper use of milk so that the rich and poor alike know how to use clean milk. This can be done for the poor through charity or philanthropy and thus establish a crusade against infant mortality, by giving clean milk and instructions to mothers.

This matter of obtaining clean milk is of vital importance. It touches human life at many points. It has to do with mortality, morbidity and poverty. It has to do with economic and social problems. I have been interested in the question for twenty years but I do not expect to live long enough to see the milk problem solved. It is, to my mind, almost insoluble. It is a problem in cleanliness. Cleanliness has been said to be next to godliness and they may be said to be closely related as problems.

It is just as difficult to get cleanliness applied to the production of milk and have it brought clean to our doors, as it would be to have universal godliness. It is a problem that will never be completely solved, because it requires renewed vigilance every day of the year.

I wish to express one thought in the interest of the dairyman, and that is—that all persons and agencies connected with the milk industry shall be reasonable in their demands upon him. The dairyman's financial problems should be respected, his effort to make a living should be considered and he should not be asked to sell his milk at a price that will not give him a living profit. We should also, in our requirements for obtaining clean milk, be harmonious.

General market milk is a far more important problem before the public than obtaining clinically clean milk by the doctor because it is through the market milk that epidemics come about, and it is by this means that morbidity is established. We should have no conflict. Let us clearly understand the function of the municipal Board of Health with respect to the milk problem, the special function of the Medical Milk Commission and the function of a citizens' committee.

The greatest duty is where there is greatest need and that is where the question touches the interests of the masses.

To summarize: The problem of getting clean and safe market milk is to be solved by

A. Requiring the dealer to pay the farmer a living price for his milk and for the work necessary to make it clean.

B. Making it a municipal function to educate the dairyman in efficient methods of dairy hygiene.

C. A rigid and continuous enforcement, through score-card inspection, of necessary rules in dairy hygiene and the exclusion of causes of disease in either workmen or animals.

I am glad to learn that this conference has already taken the step which will establish a permanent committee to study these problems and accomplish results, and I congratulate you upon the success of the meetings that have preceded this one to-night.

THE CHAIRMAN: I have great pleasure in introducing to you George M. Whitaker, Acting Chief of the Dairy Division of the United States Department of Agriculture, who will speak to you on "Milk Standards and How to Enforce Them."

MR. WHITAKER spoke as follows:

MILK STANDARDS AND HOW TO ENFORCE THEM

MR. CHAIRMAN AND LADIES AND GENTLEMEN: The Chairman set the example in criticising the printed program, and I will follow his example by saying that I am not Acting Chief of the Dairy Division, but only Chief of a sub-division which has to do with market milk—the market milk section, so-called.

When Dr. Wile asked Secretary Wilson to be here to-day and the Secretary deputized me to represent him, in a way, the subject assigned to me to speak upon was "Milk Standards and How to Enforce Them." In listening to the excellent pro-

gram this afternoon, I find that some of the things that I had prepared to say have already been said; consequently, I shall have to crave your indulgence if I seem guilty of repeating what has already been said.

In times past, we have been accustomed to regard *quality* in milk as merely a matter of food content. The science of bacteriology has broadened the meaning of the words *quality* and *good* as applied to milk and practically given them a new definition which many people have not yet fully realized. *Quality*, as applied to milk, relates to four conditions, any one of which being poor will render the milk of poor quality.

First. Good milk must have a satisfactory amount of food material.

Second. Good milk must have no foreign substance, either preservative or visible dirt.

Third. Good milk must have very few bacteria and none of the pathogenic kind.

Fourth. Good milk must be produced by healthy animals, under clean and sanitary conditions.

Hence, there must be four standards for milk:

1. A reasonable amount of food material, that is, milk solids.
2. An absence of foreign substances: Preservatives, or visible dirt.
3. A bacteriological standard and, possibly, as an incident to that and by way of helping enforce it, a temperature standard.
4. A score card standard.

First. The standard for food material, that is, the minimum amount of milk solids which merchantable milk may contain, has two purposes. Such a standard is of assistance in enforcing laws against adulteration with water, because added water within 5 or 10 per cent cannot be detected by the chemist with a sufficient degree of certainty to warrant his staking his reputation in swearing on the witness stand that a given sample of milk is watered. Furthermore, a standard as regards food material has a second purpose, namely, an attempt to protect the consuming public from milk unduly impoverished, and also to protect a large portion of the producing public against competition with milk having a low amount of food matter. The objection to this standard is the claim that law goes beyond

its proper function when it attempts to punish a man for the sale of a "natural product," "just as nature produced it." The modern cow is not a natural product but the result of an evolution. A milk producer can, within certain limitations, have any kind of milk he desires, so far as amount of food material in it is concerned. If he starts out with an intention to produce 14 per cent milk he can select a herd which will produce 14 per cent milk. The same is true as regards 12 per cent and other milks. If then a producer deliberately selects a herd which will produce milk below in food material what the law says is an allowable minimum, I see no hardship in his being prosecuted therefor. I believe that the standard should be high enough to keep from the market milk lowest in food value. A very low standard is to that extent no standard.

Second. As to foreign substances, nothing need be said as no one defends milk doped with embalming substances, or polluted with cow manure.

Third. As to the bacteriological standard, the objection is sometimes made that it does not discriminate between desirable and undesirable bacteria; but I hazard the assertion that all forms of bacteria are undesirable in sweet market milk; furthermore, many of the so-called good and bad kinds of bacteria are intimately associated, and if milk contains large numbers, the presumption is that many of them are of the bad kind. The dirtier the milk the more bacteria. An excessive number of bacteria means bad conditions in producing or handling, therefore a bacteriological standard is justifiable. As bacteria multiply rapidly in warm milk a temperature standard is a valuable assistant in helping to keep milk within the proper limits bacteriologically.

Fourth. My suggestion for both a bacteriological standard and a score card standard may be criticised on the ground that at the last analysis both mean the same thing. This may perhaps be correct where conditions warrant frequent bacteriological tests of milk. Where milk from a given herd can be examined regularly every week or two, if it prove uniform in number of bacteria, the probability is that the bacteria counts and the score card results will confirm each other. But usually it is not feasible to make such frequent investi-

gations of milk. Furthermore, an investigation of a dairy with the score card is something that the producer can understand and profit by. Again, a dairy with a low score is one that has elements of bacteriological danger, but the bad possibilities may not materialize, so frequently the score card inspection is not only a help to a dairyman, but a prevention of bacteriological contamination.

The arguments for state law and state enforcement are:

1. State law would give uniformity: Its provisions would apply equally to all people in the state. If it is wise for governors, state commissions, and national conventions to consider uniformity of legislation as between state and state, uniformity of legislation *within* the state certainly has merit.

2. State law would be more permanent than city law: It is usually easier to change a city than a state law. A comparatively small and trivial wave of personal unpopularity or bad feeling, or the exaggerated "drive" of a yellow journal, may upset a good city law, but be powerless against a state law.

3. Selfish interests would be apt to have less relative influence in the state than in the city. The dairy conditions in Cincinnati, Ohio, were at one time deplorable, due to the feeding of distillery slop, or swill. The physicians recognizing the undesirability of such feed, fought hard to get an ordinance prohibiting its use, but the distillery influence in local politics was stronger than the medical or health influence. Then an effort was made to get a state law prohibiting the feeding of distillery swills to dairy cows. This succeeded because the distillers could not control as much relative power at the state house as at the city hall.

4. Where the milk supply of a large city comes from many towns or where several cities receive milk from the same locality, the state law has certain manifest advantages.

5. State law, as a rule, would command better talent in its construction than local law.

6. A state inspector would give his undivided attention to enforcing dairy laws, while in many of the smaller cities the inspector has several kinds of work to do.

7. A state-wide law would be tested in more courts, have to stand more hammering by more lawyers, and the weak points would be sooner detected and remedied.

8. Where localities were apathetic in the matter of inspection, state law would override such neglect.

9. State law in many cases would result in savings through centralized planning and execution of the work.

10. A state law would save some communities from the vagaries of zealous but poorly informed local officers.

11. The tenure of office of a state officer might be more secure than that of a city officer, and a state officer might be more independent and unhampered than a city officer under local political influence.

12. The title of state officer frequently carries more weight, influence, and dignity than that of city officer.

13. The state officer can have more efficient laboratories at his disposal than is possible in small cities.

The advantages of municipal control are:

1. The enforcement of law comes nearer to the people, and sentiment favors a reasonable amount of home rule.

2. Home rule being nearer to the people may be a more accurate reflection of local sentiment and may be better enforced.

3. Sometimes a reform can begin in a small way through local legislation where a state law would be impossible. For instance, something like 100 cities in the country now have a law requiring that all milk brought into their several municipalities shall come from tuberculin tested herds.

Another set of arguments for or against food laws is based upon expediency. Where law has been of city origin and efficiently enforced by the local health department for a long time, it might be unwise for the state to come in and supplant the work of those excellent local officers, possibly by inferior service. The question of adjustment of expense is an important one in considering the expediency side of the case. In most places it would mean a large addition to the state expenses, a financial relief to the cities where good work is already being done, increased efficiency without enlarged outlay where little or nothing is being done.

It is a very interesting fact, however, that in many cases with which I am familiar (regardless of all theories or arguments) where there has been an agitation to change from city to state control, the movement has grown out of a desire to

pull down and render less efficient the work of some capable city health officer.

In considering the relative desirability of different systems, remember that after all the greatest efficiency depends upon the *man* rather than upon the actual statute, or its source. An honest officer, full of intelligent enthusiasm and desiring to be of service to his community, will do commendable work and secure good results with mighty poor laws. As I recall the various places where I am somewhat familiar with existing conditions, there is always associated with good work and praise-worthy results, the mental picture of an active, intelligent *individual*, rather than the recollection of any commendable law.

In many cases, great improvement would be made by state law enforced by state officers. On the other hand, some of the most efficient officers that I know of are city officers enforcing city laws—faithful, intelligent, energetic men doing more in and for their various communities than we could reasonably expect a state system to do. It would seem wrong to crowd these men out of their positions and possibly turn over the work to those who would be less efficient. Remember, also, that dairy inspection is almost entirely a health proposition. The work accomplished must finally be acceptable to the health sentiment and authorities.

It occurs to me to suggest, with considerable hesitancy and conservatism, whether or not the final solution of the problem will be along the line of *co-operation* of state and municipality, with the state at the last analysis responsible for results and having supervisory powers over the cities, with authority to send inspectors into all places, especially those that are not up to the state standard, but allowing any municipality to take advanced steps if it so desires.

THE CHAIRMAN: While you were all very indulgent of myself and Mr. Whitaker for our transgression, I will ask the remaining gentlemen on the program to keep, if possible, within the prescribed limit of twenty minutes, in order that we may hear Dr. Park, who, although he is the last, is not the least on the program.

It gives me great pleasure to introduce to you Mr. J. B. Coleman, Deputy Attorney General of New York State.

MR. COLEMAN spoke as follows:

STATE REGULATION OF MILK PRICES

MR. CHAIRMAN AND MEMBERS OF THE NEW YORK MILK COMMITTEE AND LADIES AND GENTLEMEN: I want to thank the New York Milk Committee for this opportunity of addressing you this evening, and I esteem it an honor to be called upon to address an assemblage of earnest, zealous men and women, such as you appear to be, for I do not think that any other kind would come, on a Saturday evening, to a hall down in the lower part of the city here, unless it were earnest and zealous and impressed with the necessity of solving the problems that have been before you during this milk conference. At the very outset of this discussion, I want to assure you that I am not a partisan in any sense of the word, or prejudiced or biased against the methods of any milk dealer, whether it is a corporation or an individual.

When the Attorney General of the State of New York requested me to accept a position as special deputy for the purpose of going into the investigation of the milk traffic in New York City, I went into that investigation with an entirely free and open mind, and, during the whole course of that investigation, the only brief that I held was the brief of the people of the State of New York, and that means all the people of the State of New York, and it is the welfare of the people of the State of New York that I represent before you this evening.

Now that investigation developed one fact which stood out plainly and clearly, and that was that there existed a combination of milk dealers in New York City and vicinity, that fixed the prices that they would pay to the producers for milk, and also fixed the prices that they would charge the consumers for milk. With the aid of this combination, they were able to underpay the producers and to overcharge the consumers.

Now, on account of the limited time that I am given in which to discuss my subject, it will be impossible for me to call attention to any great portion of the evidence that went into that investigation, but I will say that producer after producer went on the stand in that investigation and stated that he was selling his milk at the cost of production, or a little less than the cost of production. Now, these men were not the ordinary farmers. They were not guessing. They brought their

books into court and they took their figures from their books. They were men who were farming and producing milk on a scientific basis. They were men who told us every item that went into the cost of production, the amount it cost them during the preceding year, and the amount that they realized. Their testimony was uniform that the producer to-day is producing milk and selling it at about the cost of production.

I do not want to overstep my time if it is possible not to. Let us see for a moment what this combine does to the producer. Many years ago, in this State there was a milk exchange. I think it was called the Milk Exchange, Ltd. It transgressed the laws of this State in reference to forming combinations in restraint of trade, because it fixed the price that its members would pay to the producers. That milk exchange and its acts were declared illegal by the Court of Appeals of this State, and they were driven out of the State. They betook themselves to New Jersey, and there they re-organized, and when the clamor had died out, which had arisen as a result of their case in this State, they sneaked back into New York City and kept on doing the same acts that had been declared illegal by the Court of Appeals. They kept on performing those acts right up to the time of the investigation, and at the beginning of the investigation they attempted to brazen the matter through, saying that it was an outrage that substantial business men, as they were, should be investigated. But after a short time, they saw the light, and the investigation became a little warmer, and their courage wilted, and they sneaked back to New Jersey, and there, I am informed, they are performing the same acts that the Court of Appeals in this State said were illegal. Those acts consist in meeting every month and fixing the price that the dealers will pay to the producers for milk. So much for this combine, as to the producers' end of it. Let us look for a moment at the consumers' end. In November, 1909,—on the first day of November, I believe it was,—practically every milk dealer in New York City raised the price of bottled milk from eight to nine cents. Of course, they had no understanding that they were all to raise it. They simply all came to the same conclusion at the same time, that they were not realizing a sufficient profit from the sale of their milk. It was

simply a curious coincidence that every milk dealer, practically, in the City, should raise the price of milk an exact amount on the same day.

The investigation was inaugurated in the latter part of the same month. The investigation became more thorough as time went on, and in February of 1910, every milk dealer in New York City dropped back to the eight cent price, with one exception. In February, a winter month, a month during which the cows cannot feed on the grass that is growing in the fields, they made this reduction in the price. The reason that they gave for lowering the price of milk at that time was that there was a superabundance of milk in the market. They continued at that price until the investigation closed up. The legislature continued unusually long in session last year, and they had an extra session towards the latter part of June. July came along and legislature adjourned. There was no fear of hostile legislation then, at least for another year, and the price of milk, in the middle of July, a summer month, when you and I should think that milk should be more abundant than in February, and be cheaper, was raised again to nine cents, and that is where it is now in New York City.

Now, it may be that in all of those cases there was no agreement among the dealers, but I doubt it. The reason given for the raise in the price of milk on these various occasions was that the milk dealer was not realizing sufficient profit from the milk business to enable him to sell it at eight cents a quart. We had Marvin Scudder, an expert accountant, and a man of great reputation in that line, examine the books of the milk dealers, principally the larger ones. I will take the two largest milk dealers whose books he examined, and give you the figures that he gave on the stand and swore to. Those figures were not contradicted by the dealers whose books he had examined.

Borden's Condensed Milk Company was organized about ten years ago. Twenty-five million dollars was the capital stock, during the year of 1909, of which \$15,428,000 was issued for trade marks, patents and good will. This, as Mr. Scudder testified on the stand, was merely a balancing entry. You and I would call it water.

During the year ending September 30th, 1909, before the

nine cent milk went into effect at all, they made profits of \$2,617,029.40. These were net profits. Everything had been charged off, even a large amount for depreciation. That means that for that year, on the capital invested in that company, they paid 28 per cent dividends. That was done on eight cent milk.

During their ten years of existence, they have paid on their preferred stock, every year, six per cent, and nearly every year, on their common stock, ten per cent, and they rolled up a surplus of \$8,824,230.00, on eight cent milk.

Now, I will take up Sheffield. That is probably more illuminating, because the figures are smaller, and we can understand them, perhaps, better.

The Sheffields were organized about eight years ago. The capital stock was five hundred thousand dollars. Two hundred thousand dollars was issued for tangible assets. The balance was issued for good will—merely a balancing entry, as Mr. Scudder testified again, or “water,” as you and I would call it. For the year ending February 28th, 1909, after deducting all charges and expenses of every kind and nature, Sheffield made profits of \$221,000.00, and further showed net earnings for the eight months ending October 31st, 1909, after deducting all charges and expenses of every kind, of \$257,000.00.

Remember that these figures were given for the period up to October 31st, 1909, the day before the price was raised to nine cents. Those net earnings of \$257,000.00 were for eight months. That is one hundred and twenty per cent in eight months on the original capital invested, of two hundred thousand dollars, and yet they could not make sufficient profit on eight cent milk, and it was necessary to raise the price.

This company has been in existence about eight years. During the entire time that it has been in existence, it has nearly every year paid, on its entire stock, including water, twelve per cent dividends. In the year 1909, up to the time of the investigation, they paid twenty-two per cent, and during that eight years, on the original investment of two hundred thousand dollars, they have rolled up a surplus of \$962,000.00 on eight cent milk. The poor milkman is indeed to be pitied!

Now, for the situation, what is the remedy? It is a prac-

tical impossibility for any law against companies to reach the situation that we find here in the milk trade to-day. There is no combination in the form of any written agreement. The milk dealers are too shrewd for that. It is what might be termed a gentlemen's agreement. A number of milk dealers sit down at a table together at lunch or dinner, and they discuss the price of milk, and one says "I think milk ought to be nine cents a quart," and another one says, "I think so, too; I think it is worth nine cents"; and they all think the same way. They do not enter into any form of agreement, even a formal verbal agreement. That is not necessary, and it would be of no advantage to them. They know they couldn't enforce such an agreement in Court, so what is the use of doing a useless thing? They simply come to this consensus of opinion as to the value of milk, and they all go out and raise or lower the price of milk next day, according to that consensus of opinion. But there has been no agreement, and that enables each of them to go on the stand and say that he never agreed to raise or lower the price of milk.

With such a situation, ladies and gentlemen, it is impossible to pass any law against combinations that has any teeth to it, or that can touch those men or get at that agreement. There is no prosecuting officer in the country that can get at them.

In the first place, he has to find out where that meeting was held, and when he finds out where it was held, he has to find out what was said at it, and the only way he can find out either of those two things, is, in case someone who was at the meeting turns traitor. And the milkmen seem to be a pretty loyal body of men!

Now, my remedy would be the appointment of a Milk Commission by the Governor, this Commission to be industrial, rather than political. To that end I would recommend that the State Grange and the Chambers of Commerce of the different cities pick out candidates and send in their names to the governor, so that he would have them to select this commission from.

It should be the duty of this Commission to inquire into and to find out the value of milk in the various localities of this State. Every Milk Dealer in the State should be re-

quired to get a license, which should be issued by this Commission which should have the absolute right to fix the maximum price at which milk should be sold to the consumers in any locality and the minimum price at which it should be bought from any producer in any locality, and if any dealer violated these price lists and did not comply with the rules of the Commission, his license would be taken from him, and, of necessity, he could not engage in the business of milk dealing.

Now, the first objection, and probably the objection which would suggest itself to any legal mind, is, is such a law constitutional? I can't go into any extended discussion of the constitutionality of such a law before you this evening, but I will say that it appears to me that the United States Supreme Court has already held that such a law would be constitutional. Of course, it is elementary that any law which makes a price for any corporation that has a public franchise, whether it be a railroad corporation or a gas corporation, is constitutional. If it be a railroad corporation, a legislature can regulate the price of the fares, and if it be a gas corporation, the cost of the gas. Such a law is constitutional, and the United States Supreme Court, in the celebrated Eighty Cent Gas case held that the law was constitutional and that the Legislature had the right to fix a price at which gas should be sold. The theory in those cases was that the corporation was exercising a public franchise, and that, for that reason, the State had a right to say what should be a proper charge, and to say that that corporation should be satisfied with a reasonable profit.

Now, in the case of *Mund vs. Illinois*, the U. S. Supreme Court has said that even in the case where a corporation did not have a public franchise, the same thing may obtain. The State of Illinois had passed a law which said that no warehouse man should charge more than so much for storing grain. There was no question of a public franchise there, and it was contended that the State of Illinois could not pass such a law as would limit the warehouse man in the price that he would charge for storing grain. The United States Supreme Court said that this was a business that related to the public welfare and that although no special franchise was granted, nevertheless the State shall say under what terms that business shall be carried on in that state. When Legislatures create ficti-

tious personages—these corporations—these entities that have no life except what we give them through our Legislature,—the Legislature that creates them can regulate their whole life and actions after it has created them. If that is not the case, it is undoubtedly true that the creature is greater than the creator.

What was the situation that developed last year with reference to the meat traffic? It appeared that the only remedy that the people had against the exactions of the Meat Trust was to deny themselves the meat that they needed in their daily life. Isn't it a pitiable commentary on the state of our law that the only remedy that we have against these corporations which we have created, is to stop using the articles which they purvey, the necessities of life? In the case of milk, it is impossible for us to stop. Children must have milk or they will die. There are only two parties in the final analysis to this question. One is your trust, your rapacious corporation, trying to squeeze out of the public every cent that they can get and the other is the child of the tenement, with its poor, weak, tired little face, becoming weaker and more tired every day. I have seen them in the summer time in the tenements. I have seen my own child when he was sick in the summer, and I would have gone crazy if I could not have given my child the milk that I knew he needed.

Now, when you come here and make it a purpose of your meeting to compel all milk to be bottled in the city and pasteurized, and put up the price to nine or ten cents a quart, you have these children in the tenements suffering for milk. That is a situation that must be remedied by the Legislature, and I say, before you gentlemen and ladies this evening, that if the representatives of the people do not remedy the situation that exists with reference to the selling and purveying of the necessities of life, so as to stop these middlemen corporations from squeezing the people, the people will take the thing into their own hands, and they will act in no uncertain way.

THE CHAIRMAN: It gives me pleasure to introduce to you Dr. Charles E. North, Chairman of the Committee on Sanitation, Bacteriology and Public Health of the New York Milk Committee. Dr. North will speak to you on "The Present System of Milk Control."

DR. NORTH spoke as follows:

THE PRESENT SYSTEM OF MILK CONTROL

I have tried to write a very short paper on a very big subject. If my statements seem a little bald, the fact that I have tried to cut out all trimmings is my excuse.

Connecticut sends 32,600 quarts of milk daily to New York City, from 550 dairy farms. This is a little over $1\frac{1}{2}\%$ of the city's supply. There is a State Dairy Commissioner in Connecticut, but he has no appropriation or inspection force at his disposal for dairy inspection work. The State Board of Health of Connecticut maintains a laboratory and tests samples of milk sent to them by local officers of health. Two years ago four towns in the State made some attempt to control their milk supplies. At present there are twenty towns in the state that have milk inspectors. There is no regular official inspection of dairies by the officers of the State Board of Health.

Massachusetts contributes 6% of this city's supply, amounting to 11,700 quarts of milk daily, from 250 dairy farms. The State Department of Agriculture has five dairy inspectors and an appropriation of Eight Thousand Dollars. The State Board of Health maintains one milk inspector. The matter of milk inspection is left chiefly in the hands of local officers of the various cities and towns. This question of State versus City inspection is being considered by a special commission and there is hope that an adequate system will be brought into existence in the near future.

Vermont ships to New York City 25,600 quarts of milk every day, which is $1\frac{1}{4}\%$ of the entire supply. The State Board of Health maintains a laboratory and conducts examinations of samples submitted by local boards of health and publishes the results with the names of the milk dealers in its annual report. This publicity alone has enabled the State Board of Health to exert a marked influence over milk producers in the state. Neither the State Board or the Department of Agriculture maintains a force of milk inspectors and has no available appropriation for this purpose.

New York State furnishes 84% of this city's milk supply, amounting to 1,724,000 quarts of milk daily, which is produced on 37,000 dairy farms. There are 67,457 dairy farms

in the State. No control is exercised over milk production by the State Department of Health. The State Department of Agriculture, which is a very active one, does its best with its appropriation of somewhat over twenty-three thousand dollars for dairy purposes, and a staff of milk inspectors which varies from eight to twelve.

New Jersey sends 126,000 quarts of milk daily to the city or 6% of the entire supply. This comes from 2,700 dairy farms. There are about 10,000 dairy farms in the State of New Jersey. The appropriation of the Department of Health for dairy purposes is \$8450. This Department maintains three regular milk inspectors who are sent out chiefly on complaints received from local health officers. The State Department of Agriculture does not take any part in the control of milk production.

The State of Pennsylvania ships 130,500 quarts of milk daily to New York City, which is somewhat more than 6% of the city's supply. This comes from 2800 dairy farms. There are a total of 55,000 dairy farms in Pennsylvania. There is no inspection by the State Department of Health nor by the State Department of Agriculture and the matter of dairy inspection is left in the hands of the local health officers.

Summarizing these results we face the fact that New York City receives its milk from 44,000 dairy farms located in six states, and that these states have not a sufficient appropriation of money or a sufficient staff at their disposal either in their departments of health or their departments of agriculture, to exercise any effective control over the milk production.

The question whether the State or the City should exercise control over milk production is an unsettled one. There is no question, however, that the states supplying milk to New York City do not exercise efficient control.

If we refer for a moment to state control over dairy cattle we are met with a peculiar condition of affairs. Most of the states have quarantine laws against the importation of diseased cattle from another state and requiring the tuberculin testing of cattle which are brought in from another state. The states have reached the conclusion that the importation of dairy cattle suffering from tuberculosis is so serious a menace against the health of cattle within the state that they must

establish laws against such importation. And yet, within each state cattle wander about at random from one farm to another and are bought and sold and shipped around the state, transferring tuberculosis from herd to herd and keeping up the infection. New York State is afraid of the Pennsylvania brand of tuberculosis, but apparently has no fear of its home product. New Jersey is in great dread of tuberculosis from New York State, but the New Jersey brand of bovine tuberculosis is passed around from farm to farm with the utmost freedom. Now it seems to me that if it is a bad thing for the tuberculous cow to cross the state line, for the same reasons it is a bad thing for the tuberculous cow to cross the line fence between two dairy farms. And if it is proper that one state should have quarantine laws against the importation of tuberculous cattle from another state, it seems to me equally proper that measures should be taken to prevent the transfer of tuberculous cattle from farm to farm.

If states should keep their tuberculous cattle at home, there is no reason why dairy farmers should not be made to feel the necessity of keeping their tuberculous cattle at home. There are numerous physical and commercial reasons in favor of having tuberculous cattle bought and sold and shipped around the state but from a public health standpoint and particularly from the standpoint of preventing the spread of tubercular infection among the cattle it is certain that a state law prohibiting the transfer of cattle known to be tuberculous or which have not passed the tuberculin test from leaving the farm on which they have been located until they have successfully passed such a test, is the only means of bringing to an end the continued infection which now takes place.

If our states do not control sanitation and if they do not control tuberculosis, can our cities and towns be expected to do so?

It is easier to bring about reforms in a small town than in a large city, and to the small town, therefore, one might naturally look for an illustration of what results can be achieved and what measures are most effective in milk reform.

The milk millennium has almost arrived in the town of Montclair, New Jersey, having a population of twenty thousand persons. The fashion for clean milk was first set for the town

perhaps by Stephen Francisco, coöperating with the Essex County Milk Commission, headed by Dr. Coit, father of certified milk. The Board of Health of Montclair composed of unusually enlightened men, has employed during the past six years a succession of health officers trained by Professor Sedgwick of the Massachusetts Institute of Technology. Together they have carried on a milk campaign which has accomplished great results. Four chief weapons have been used:—(1) A rigid dairy inspection and scoring by the score card system. (2) Regular bacteriological examinations and a bacteriological standard to which the milk must conform. (3) The compulsory tuberculin testing of dairy cattle. (4) The regular publication of the results of dairy inspections, bacteriological analyses and tuberculin tests with the names of milk dealers so that the citizens could know the character of the herd, the character of the dairy, and the character of the milk sold by each dealer. Of the four measures used perhaps the publicity is the greatest. The results of this campaign are as follows: Six years ago there were 33 milk dealers and only one herd of tuberculin tested cattle. 32 dealers sold milk for 8c. and some of them for 7c. One dealer sold milk for 12c. To-day, there are only 11 milk dealers. 20 have fallen by the wayside, and if they are still in business are furnishing milk which Montclair has discarded to neighboring towns. Of the 11 dealers to-day, 8 sell tuberculin tested milk, 3 have failed to have their herds tested and proceedings are taken against them by the Board of Health. The price of milk has advanced during the six years so that now the average price in Montclair is 10c. per quart.

I want to read you the reports of the bacteriological analyses made of the milk of these 13 dealers, averaged from the monthly analyses of the last six months. Each bacterial count represents an individual dealer:—4650; 5933; 6267; 11,100; 23,867; 25,167; 31,333; 34,200; 50,417; 79,833; 84,200; 288,117. The question of pasteurization has not yet become an issue in Montclair because of their success in securing tuberculin tested milk.

The following cities in this country have ordinances requiring the tuberculin testing of cattle whose milk is to be sold in a raw condition:—Chicago; Milwaukee; Minneapolis; New

Orleans ; Berkeley, Cal. ; Duluth, Minn. ; Toronto, Canada ; and there are probably others.

Bacteriological standards for raw milk are demanded of course by all certified milk commissions. They are also demanded by Chicago, Milwaukee, and Boston, and are under consideration by a large number of other cities and towns. Pasteurization is made compulsory in Chicago for all milk coming from cattle which have not successfully passed the tuberculin test. It was recommended by the Milk Commission appointed by Mayor McClellan and by the District of Columbia Milk Commission for milk produced in the same manner. It is recommended as a sanitary measure by the majority of sanitarians worthy of the name, who have investigated the milk question, for all milk of a questionable character.

If we turn now to the control exercised by our local department over the milk supply of this city, we find that their efforts have been limited chiefly to the *inspection* of dairies. Since the states have not carried out dairy inspection, the city has been compelled to do so. New York, in common with other cities, has been compelled to extend the influence of its health department far beyond its natural geographical limits. The health inspectors of Boston and New York meet on common ground in western Massachusetts ; the men of Albany, Syracuse, Rochester and Buffalo meet the men of New York where the milk sheds of those cities overlap. Dairy farmers exercise their choice as to which market they will ship milk and that city which passes the most rigid rules for the control of milk production pays the penalty by the loss of a portion of its supply.

The appropriation for milk inspection and the force of milk inspectors at the disposition of our city Department of Health has been insufficient. At least three times as many country milk inspectors as we now have are necessary to properly inspect the 44,000 dairy farms supplying our milk. At least twice as many city milk inspectors as we now have are necessary to inspect the twelve thousand stores and milk shops located in Greater New York ; but if we assume that the activities of milk inspection have been expanded to their full limits, I want to ask whether even then the consumers of milk in New York City can receive proper protection against milk borne infections?

New York has no bacteriological standard for milk. The laboratory examination of milk for bacteria is fully recognized when properly carried out as a reliable method for determining the sanitary character of milk. This thought is well expressed by the Milk Commission of the County Medical Society in one of its publications, in these words, "The most practical standard for the estimation of cleanliness in the handling and care of milk is its relative freedom from bacteria." Chicago has now obtained legal recognition for the bacteria count of milk by bringing successful prosecutions against those milk dealers who market milk containing excessive numbers of bacteria. The numbers of bacteria in New York's milk supply are at times enormous. Milk prosecutions are made on a butterfat basis but a dealer may sell milk containing millions of bacteria without prosecution. Such classification as has been suggested in our ordinances is purely a voluntary one and there is no compulsory bacteriological standard. The milk dealer and the milk consumer are at liberty to produce and to purchase milk containing bacteria without limit. I want to say, therefore, that in view of the knowledge which we have at the present time of the relation of bacteria to milk, I believe New York City should have bacteriological standards for raw milk, for pasteurized milk, and also for milk before it is pasteurized. Such standards may be made liberal at first and more strict as improvements are brought about.

A large portion of this city's supply comes from cattle which have tuberculosis, and is produced under conditions which certainly expose it to other infectious diseases. New York City has no ordinances making the tuberculin testing of cattle compulsory. Some of our milk contains tubercle bacilli, some of it does not. No man can tell from the appearance of the milk bottle which is which. It is admitted that the state authorities and that our own health department are unable to control bovine tuberculosis or to prevent milk from being shipped to the city containing these tubercle bacilli. The raw milk supplied to the consumers of New York at the present time is a mystery. It carries no label to indicate whether it is good or bad. The public is in the dark. They have the right to assume that since the Department of Health issues permits and allows this milk to be delivered at the door, it is safe. Certi-

fied milk and guaranteed milk carry their credentials on the bottle, and are endorsed by the Health Department as safe. Pasteurized milk must be labeled "Pasteurized," but the citizens do not know as yet whether this label is a badge of honor or a mark of disgrace.

For five years I was a producer of certified milk. At the present time I am actively coöperating with the New York Milk Committee and the New York Dairy Demonstration Company in showing that a clean, tuberculin tested milk, can be produced at a moderate cost. The importance of pushing forward sanitary measures and encouraging the production of clean raw milk, I fully appreciate; and yet, I want to say that if it were in my power, every quart of milk sold on the streets of New York City to-morrow morning would be thoroughly pasteurized with the exception of the certified and guaranteed milks; and I do not feel at all sure that the pasteurization of the certified and guaranteed milks would not be a good thing.

I have just come from the investigation of an extensive typhoid epidemic which I traced to milk which was produced under all of the certified conditions; and yet this milk was the cause of 30 cases of typhoid fever and two deaths, because one of the men handling the milk proved to be a chronic carrier of typhoid germs. If this milk had been pasteurized, the epidemic would not have occurred.

Many of the large milk dealers of New York City have seen the handwriting on the wall and have had the courage in the face of public opposition, to place their industry on a pasteurized basis. They have found that this not only gives stability to their business but that it is actual life insurance to the consumers of their milk.

I wish to urge upon our Department of Health that it should no longer hesitate. I believe that pasteurization of all milk not fit to use in the raw state should be made compulsory. I believe that the adoption of this measure immediately by our city would be the greatest single step that has ever been taken in the interest of public health.

THE CHAIRMAN: I am going to introduce one of the most enthusiastic and one of the earliest workers in the pure milk crusade, and one who has a way of accomplishing great things in the pure milk movement, although nobody knows how it happens. He has

promised me to keep within the time limit, and I have a surprise for you at the end of the session, so you will please remain in your seats. It gives me great pleasure to introduce Dr. G. Lloyd Magruder, of Washington.

DR. MAGRUDER spoke as follows:

THE NECESSITY OF A CONFERENCE FOR THE IMPROVEMENT OF THE NATIONAL MILK SUPPLY

MR. CHAIRMAN, AND LADIES AND GENTLEMEN: Dr. Coit and I have gone along together in this crusade for good milk. He happens to have ante-dated me one year. He commenced in 1893 and I commenced in 1894. We have worked for results together from that time until the present time, and, fortunately, we have had some magnificent results.

The action of the "New York Milk Committee" in calling this conference for the consideration of measures for the improvement of the National Milk Supply is to be highly commended. The accumulated facts as to the dissemination of diseases by dairy products, and the methods of prevention are now sufficient to warrant the prompt adoption of standards and regulations that can be universally applied.

The repeated outbreaks of milk-borne diseases and the high infant mortality during this past year augments the urgency for this action. The present outbreak of typhoid fever at the U. S. Naval Academy is the most recent incident of milk infection. The U. S. Military Academy at West Point had a similar experience in 1903. This is the more regrettable, because with the proper precautions which are now available, many of these incidents could have been avoided.

Being a general practitioner of medicine, I have been deeply interested in the sanitary affairs of the City of Washington. This interest has been accentuated by the fact that I have been repeatedly consulted as to the dangers of contracting typhoid fever by persons contemplating a residence in Washington. I have participated in and watched the campaign for Pure Milk since 1894. Much study has been given to this subject and many most valuable publications have been issued. It may serve a useful purpose to briefly review some of the work done in Washington and point out some of the conditions that still exist there and elsewhere.

More detailed accounts of the efforts for pure water and

pure milk are contained in four government publications, and in articles in the *Journal* of the American Medical Association.

The four government publications are:—

1. "Report on Typhoid Fever in the District of Columbia," submitted by the Medical Society of the District of Columbia to the Committee on the District of Columbia of the United States House of Representatives, June 14, 1894, and published by Congress as a congressional document in 1894.

2. "Sanitary Milk Production." Report of a Conference appointed by the Commissioners of the District of Columbia. Issued August 20, 1907, by the United States Department of Agriculture as Circular 114 of the Bureau of Animal Industry.

3. "Milk and its Relation to the Public Health," issued in January, 1908, by the United States Treasury Department as Bulletin 41 of the Hygienic Laboratory of the Public Health and Marine Hospital Service (revised and issued January, 1910, as Bulletin 56).

4. "The Dissemination of Disease by Dairy Products, and Methods for Prevention," issued April 28, 1910 as Circular 153, Bureau of Animal Industry, Department of Agriculture.

The articles in *The Journal* of the American Medical Association are:

1. "The Milk Supply of Washington, D. C.," read by me in the Section of Hygiene and Sanitary Science of the American Medical Association in June, 1907, and published in the *Journal*, September 28, 1907, Vol. XLIX, pp. 1088-1093.

2. "Further Observations on the Milk Supply of Washington, D. C.," also read by me in the same Section of the Association, June, 1910, and published in the *Journal*, August 13, 1910, Vol. LV, pp. 581-589.

These publications showed that the Washington water supply was not the cause of the high typhoid rate. They demonstrated that the contaminated water supplies on the dairy farms, and contaminated milk, were important factors.

Copies of these and other government publications can be obtained by applying to the respective departments. It will be seen that all of them with the exception of the two papers read before the American Medical Association are the products of a number working together either in committee, in conference, or by the assembling of monographs.

The influence for good of the above mentioned and other publications emanating from the National Capital has been not only local but has been widespread throughout the United States and Europe, and has even extended to Australia.

The Report on Typhoid Fever in the District of Columbia was prepared by a Committee of the Medical Society. By invitation the report was presented to the Committee on the District of Columbia of the House of Representatives. It was found that there were four principal causes for the occurrence of the disease: (a) Potomac water-supply; (b) pollution of the soil by the leakage from privies, defective sewers and the backing up of sewage from tidal movements; (c) to drinking of well or pumpwater; (d) drinking of contaminated milk.

Among the recommendations of the committee, which were unanimously adopted by the medical society, were the construction of works for the filtration of the Potomac or Washington water—the only method of purification—the abandonment as rapidly as possible of all wells within the city limits; the repairing of defective sewers; the extension of the water supply and the sewers; the making of house connections to these; careful inspection of all dairies in the District from which the milk-supply was drawn; and the enactment of a law by which no milk shall be sold in the District without a permit from the health office. The inspection should cover an examination at the dairies of all possible sources of infection, including the water-supply.

The city authorities, recognizing the importance of these recommendations, immediately sought remedial legislation. The United States Congress was prompt to respond and passed the Milk Law of 1895, which was approved on the 2nd of March of that year. This law required the inspection of all city depots and dairy farms and a permit from the health officer of the District of Columbia before milk could be sold for consumption in the City of Washington.

The records of these inspections were kept upon cards known as "Score Cards." Washington has the honor of initiating inspection and the introduction of "Score Cards." This is attested by Mr. E. H. Webster, then Chief of the Dairy Division, Department of Agriculture, in Bulletin 41 B. P. H. and M. H. S.

The use of score cards has proved to be very popular as well as valuable. Many States and cities have adopted them. The United States Department of Agriculture reports that it has supplied them and explained their use to about 300 cities in 39 states, and that they are being widely used.

When we consider the magnificent results that have thus been obtained by the Department of Agriculture, coupled with the beneficent results accruing from drug and food inspection by the same Department, it seems that it is now time to recognize the value of the work for the conservation of the public health, and discontinue the refrain that more attention is paid to sick hogs than to human beings.

The enforcement of inspection has proved to be an important educational factor.

Washington City also furnishes an excellent illustration of the effects of intelligent inspection. The inspectors and the producer have learned to understand each other. Many of the farmers welcomed the criticisms and proceeded to remedy defects, as it was found that much could be done at an insignificant outlay of time and money. Much higher scores were given in many cases upon the second inspection.

As a result of this educational inspection a portion of the milk is now delivered in Washington from tuberculin tested cows with less than 10,000 bacteria per c. c., and sometimes as few as 2500 per c. c.

Inspection has worked well; it should be perfected and extended. It should be conducted by national, state, and municipal authorities and not left to the enthusiasm of public spirited citizens and physicians. Strong efforts should be made to secure uniform requirements that duplication of work can be avoided.

While the law of 1895 has accomplished much, there is in the light of advanced knowledge an imperative demand for additional legislation. The Courts in many instances have leaned towards the violator of regulations. On this account authoritative standards must be secured.

The Classification submitted by Dr. A. D. Melvin, Chief of the Bureau of Animal Industry, and adopted by the Washington Milk Conference has been so universally commended that it is now as generally accepted as though it had been a legally

adopted standard. Many health officers in this country have used Circular 114 for the purpose of formulating laws and regulations to govern the milk supplies under their jurisdiction.

The following editorial from the *London Lancet* Vol. 11, 1907, No. XIII, shows in what estimation the circular was held in England.

FEDERAL TEXT BOOK ON PURE MILK QUESTIONS

“The Agricultural Department at Washington has issued a volume of reports containing the results of the conference of experts called together by the department to consider the various questions now agitating the country in regard to the purity of the milk supply. The conference consisted of 35 recognized experts in the study of the questions involved. This volume will be the recognized text-book of the health authorities of this country for the present, as it carries the weight of authority of these experts and the indorsement of the Department of Agriculture. In brief, these experts agreed upon a definite milk program and have recommended that public safety should be assured by legislation establishing three classes or grades of milk—namely, certified, inspected, and pasteurized. They would not tolerate any trifling with the public in the sale of so-called certified milk. They would require that such milk should come from dairies subject to periodical inspection and that the milk should be frequently analyzed; that the cows should be proved to be free from tuberculosis by the tuberculin test and from all other communicable diseases; that the milk should be handled by persons free from infection; that the milk should contain not more than 10,000 bacteria to the cubic centimeter; and that it should not be more than twelve hours old when delivered to the consumer. The conference would permit the sale of such milk under the label ‘certified,’ and would allow the sale raw, under the label ‘inspected,’ of milk that had been similarly produced but did not quite come up to the requirements for certification, provided that such milk came in all cases from tuberculin-tested cows and did not contain more than 100,000 bacteria to the cubic centimeter. Such milk, and such only, do these experts believe should be sold raw. All other milk should be pasteurized. The declaration of the conference is as follows: ‘Milk from the dairies not able to

comply with the requirements specified for the production of milk of classes 1 (certified) and 2 (inspected) is to be pasteurized before being sold,' and then sold under the designation 'pasteurized milk.' All milk of unknown origin shall be placed in class 3 and shall be subjected to clarification and pasteurization at central pasteurization plants which shall be under the personal supervision of officers of the health department. The term 'pasteurization' is explained to mean the heating of the milk to a temperature of 150° F. for twenty minutes, or 160° for ten minutes, and immediate cooling to 50°."

The members of this conference were members of citizens' associations, scientists from the various Government laboratories, other representatives from Government departments, milk producers and dealers, and medical men of Washington.

The series of monographs in Bulletin 56—"Milk and its Relation to the Public Health," has fulfilled the prediction that this work would serve as a guide for the world. The daily quotations from it attest its value.

Year after year since the spring of 1907 without success have efforts been made to secure from Congress the legislation recommended by the Washington Milk Conference. This agitation has, however, produced good results. Much better milk is now delivered.

The greatest step forward has been made in the last few weeks. Encouraged by the universal commendation of the recommendations of the Washington Milk Conference, and fortified by the knowledge that high bacterial counts are proofs of old or dirty milk, the Department of Agriculture on October 14 issued the following order:

**"SPECIAL ORDER TO THE CHIEFS OF BUREAUS, OFFICES, AND
INDEPENDENT DIVISIONS**

"In order that no milk containing extraneous matter, raw milk from cows not known to be free from tuberculosis, or milk of unknown origin may be sold within certain buildings occupied by the Department of Agriculture in Washington, D. C., it is hereby ordered that no milk shall be sold within any building occupied by the Department of Agriculture which is not equal to the classification as defined in Bureau of Animal Industry Circular 114.

"The determinations as to the standards of such milk shall be made by the Dairy Division, Bureau of Animal Industry.

"Officers of the various bureaus and divisions in which milk is used will see that this order is enforced.

"Effective October 25, 1910.

"(Signed)

JAMES WILSON,

"Secretary of Agriculture."

This action has already been followed by the Interior Department, Department of Commerce and Labor, Navy Department, War Department, State Department and Treasury Department.

The influence of another publication, Circular 118, Bureau of Animal Industry, has also been very great. This circular contains the work of Schroeder and Cotton upon "The Un-suspected but Dangerously Tuberculous Cow." This work furnished the evidence for the "Third Interim Report" the final report of the British Royal Commission upon the Relation of Human and Animal Tuberculosis and the authority for the issue, May 29, 1909, by the Board of Agriculture and Fisheries of Great Britain of "The Tuberculosis Order of 1909." This order provided that after January 1, 1910, milk sold in Great Britain should come from "tuberculin tested cows or should be sterilized." Dr. Sims-Woodhead stated to Dr. Schroeder at the International Congress on Tuberculosis held in Washington in 1908, that the above mentioned Committee had repeated and confirmed the experiments of Schroeder and Cotton in every particular. Numerous other investigators have confirmed these experiments.

The following extracts from an editorial in the *London Lancet* of June 25, 1910, show its estimation for Circular 153, Bureau of Animal Industry, one of the recent publications of the Department of Agriculture.

"The circulars which are issued from time to time by the Bureau of Animal Industry of the United States Department of Agriculture have one special feature in common apart from their high scientific value, and that is their clearness and directness. Circular No. 153, which has recently been published, deals by means of a series of short papers with the question of preventing the spread of disease by dairy produce, and most attention is directed to the difficult subject of tubercu-

losis, as well as incidentally to enteric fever and other milk-borne diseases. The first paper is by Dr. G. Lloyd Magruder of Washington, who supplies some telling plates relative to unwholesome cow-houses, ungroomed cows, and deposits from dirty milk, and who lays great emphasis upon the importance of the pasteurization of milk as an immediate preventive measure."

The cattle of America are not, it is alleged, so commonly affected with tuberculosis as those of Europe, but, notwithstanding this, the Bureau of Animal Industry found that 33 per cent of the centrifuge slime examined at public creameries showed tubercle bacilli. Dr. J. R. Mohler lays stress upon the risk of contracting tuberculosis from milk, and draws attention to the fact that the figures as regards primary intestinal tuberculosis in children may range from 2 per cent (Bovaird) to as high as 45.5 per cent (Heller) of the tuberculous cases examined. He reminds his readers that there is conclusive evidence to show that tuberculous infection may be taken through the intestinal tract without leaving any lesion in the abdominal cavity, the first tuberculous deposits being found in the lungs or the thoracic glands, a circumstance which raises the question as to how far pulmonary tuberculosis in infants, even in the absence of intestinal lesions, may not be due to tuberculous milk. If this be so, the fact that from 15 to 25 per cent of all milch cows in the District of Columbia are tuberculous is a very serious matter. Dr. Mohler then goes on to deal with the risk of tuberculous infection from butter and cheese, both of which have been shown experimentally to be capable, if made from tuberculous milk, of causing tuberculosis in guinea pigs. His chief recommendations are that milk should either come from tuberculin-tested cattle or be efficiently pasteurized, and that all milch cows on dairy farms should be tattooed or otherwise marked. To the same interesting circular Dr. E. C. Schroeder, superintendent of the experimental station at the Bureau of Animal Industry, furnishes some very cogent reasons why we should protect ourselves against infected dairy products. He points out that tuberculosis has a unique place among pathological conditions, inasmuch as it is one of the relatively small number of infectious diseases that attack more than one species of animals,

and that it is the only known infectious disease from which no vertebrate species is immune. Although tuberculosis has received more attention than any other disease from investigators in pathology, bacteriology, and hygiene, our knowledge of it is in some respects extremely rudimentary. As he observes, we know so little about its period of incubation that we are unable to determine whether those are right who believe that tuberculosis arises from infection that may enter the body at any time of life, or those who believe that it almost constantly develops from latent tubercle bacilli taken into the body during the milk-drinking period of life. This is perhaps the crux of the whole tuberculosis problem, and it ought probably to be accorded more weight by those who are inclined to attribute all tuberculosis to discovered exposure to human infection.

On the question of infectivity and hereditary influence the report contains some valuable remarks. We know, Dr. Schroeder says, that the revelations of post mortem examinations prompt the conclusion that few persons escape the tubercle bacillus, while it is agreed that tuberculosis develops with peculiar frequency when the drain on the mental and physical forces is greatest rather than during periods following exceptional exposure to infection. But we know further, says this authority, that the children of tuberculous parents succumb to tuberculosis—not necessarily as children—more commonly than those of healthy parents. This is a disputed conclusion. With regard to infectivity Dr. Schroeder thinks that tuberculosis is not so common amongst persons unusually exposed to infection as we might expect; and that men with tuberculous wives and women with tuberculous husbands, when their family records as regards tuberculosis are clean, contract the disease so rarely that their presumably intense exposure cannot be said to infect them more frequently than persons in general become infected. The tubercle bacillus is, he believes, peculiar in that it is prone to remain alive and virulent for long periods in circumscribed, closed tuberculous lesions and that it may remain in the body indefinitely without causing conditions which may be identified as tuberculosis. Finally, he argues that tubercle bacilli in dairy products are either in a fresh or well-preserved state, and that they are directly introduced into the body with the use of indispensable articles of food, while tuber-

cle bacilli in sputum are exposed to conditions which he considers almost certainly sterilize them before the sputum can be pulverized and float in the air. What ever chances adults may be disposed to take as regards exposure to tubercle bacilli in milk and dairy products, we must, he pleads, consider our obligations to the children in the matter of pure milk, and he also is obviously in favor of pasteurization.

This report is of peculiar interest in that it shows how strong is the feeling in scientific circles in America as to the danger of contracting tuberculosis from milk. Notwithstanding the late Professor Koch's arguments at the Washington Congress in 1908, it is clear that the American pathologists at the Bureau of Animal Industry are satisfied as to the danger to be anticipated from milk, and have decided that pasteurization is one of the best means of mitigating such dangers, at any rate until greater advances have been made in the direction of securing a pure milk-supply.

Notwithstanding these accumulated facts have received the highest endorsements, there is still manifested great indifference and negligence by many physicians, hospital directors, national, state and municipal associations and authorities, as to the gravity of the dangers lurking in contaminated dairy products.

The indifference of hospital directors as to the milk supplies has been shown to exist in many cities. Very high bacterial counts have been observed. The following were found in milk furnished to Washington hospitals: 2,000,000 bacteria per cm.; 2,800,000; 3,500,000; 4,000,000; 5,000,000; 10,000,000; 10,000,000; 15,000,000; 50,000,000; 111,000,000. (See Bulletin 41, Bureau of Public Health and Marine Hospital Service, page 431, *et seq.*)

These counts were called to the attention of the hospitals early last spring. Yet in May last, but three institutions were using milk with less than 200,000 bacteria. In the other institutions the counts ranged from this number to 34,100,000. At one hospital it is reported that two members of the staff forbade the use of any but raw milk. The last counts showed that two samples of the milk delivered there contained 3,400,000 and 2,700,000 bacteria. The difference in price of a fraction of a cent to two cents, stands between these supplies and

a perfectly pasteurized supply with an average of less than 10,000 bacteria per c. c., or a carefully inspected tuberculin tested raw milk, with an equally low count.

THE CHAIRMAN: I submit to you that we should not treat with scant courtesy a gentleman who has been delegated from a foreign country to come to this meeting, so I urge you to remain a little longer, as we are almost through, and I beg of you to remain until the close of the meeting.

It gives me great pleasure to introduce the Hon. W. F. Nickle, Member of the Legislative Assembly of Ontario, Canada.

MR. NICKLE said:

Mr. Chairman, Ladies and Gentlemen: Brevity is at all times the soul of wit, and when, after a two-days' conference, a quarter of eleven is reached, the man certainly becomes most brilliant who is most brief. I certainly cannot let this opportunity pass, as the representative of the Government of the Province of Ontario, without thanking you, Mr. Chairman, and the members of the New York Milk Committee, for the courtesy that was extended to my Province in asking that a representative be sent to this conference; and to express my sense of gratification for the many, many, excellent papers that have been read. I trust that in the future, when further conferences are held, the Province of Ontario and the other Provinces of the Dominion, will not be forgotten.

As I said in the beginning, Sir, at this late hour I am not going to discuss at any great length the work that is being done in the Province of Ontario. It does not concern you very closely, and yet it does concern you to a certain extent, as your state forms the Southern boundary of our Province for some distance, in the neighborhood of Ogdensburg, and along the Niagara Peninsula. Farther west we meet the State of Michigan along the Detroit River and at the Sault; so Ontario, to a certain extent, bounds you.

Through the lowering of your tariff, a considerable quantity of cream and milk is finding its way into your state, and if it should come to a fuller reciprocity in natural products I think that you may look for much more of our dairy products.

I am here as one of the representatives appointed by the Government of Ontario, to look into the question of the milk supply of that Province. Alarmed at a decreasing birth rate and an increasing death rate in children, the Government felt that it was essential that something should be done, and it appointed a Commission to inquire into the production, distribution and care of milk.

On that Commission was a Scientific Expert who acted as Chair-

man, a farmer who was President of the Eastern Dairymen's Association, another farmer from the western part of the Province, where milk is not so extensively produced, and your speaker. The conclusions the Commission arrived at were as follows:

That the present laws governing the production, care and distribution of milk for human consumption are cumbersome and ineffective and should be consolidated and amplified.

That the general principles governing the production, care and distribution of milk for human consumption should be fixed by the Legislature.

That inasmuch as the administration of such laws is and must remain in the hands of the municipalities, such amplification should be in the direction of giving municipal authorities larger powers of licensing and supervision.

That a general definition of adulteration should be adopted, but that municipalities should be given power to fix a standard of food value, said standard to be not less than three per cent. butter fat and twelve per cent. solids.

That in the interests of public health and common decency more attention should be paid to the cleanliness of stables and healthfulness of cattle, and to this end the consuming municipalities should be empowered to make inspections at the sources of supply and be urged to appoint veterinarians to act in conjunction with the medical health officer.

That with a view to lessening the alarming infantile mortality in the Province, municipalities should be empowered to establish and maintain or assist in the establishment and maintenance of infants' milk supply depots.

That firm measures should be taken to combat the ravages of tuberculosis, which constitutes a serious menace both to the bovine and human species; and that as an initial step, along with an educational campaign, all cows suffering from tuberculosis of the udder or showing clinical or physical evidences of the disease, or whose milk is shown by bacteriological or microscopical examination to contain tubercle bacilli, should be promptly removed from dairy herds.

That pasteurization is not a provincial ideal, but may be a municipal expedient if carried out in accordance with proper scientific regulations.

That in cities of over 50,000 population no milk should be sold in shops except in bottles or other sealed packages.

That cans, bottles or other utensils used in handling milk should be used for no other purpose and should be promptly rinsed by the consumer on being emptied.

That producer, distributor and consumer should alike be educated to the importance of cleanliness in handling milk and to the value of prompt chilling and keeping in a cold place.

The Report of the Commission is in a small volume. The object was to write in such simple language that he who ran might read. There was no idea of being technical. Our idea was to educate, not to terrorize. We do not think that we have blazed the way to truth, but we do hope that we have blazed the way somewhat toward it. Not only did we avoid being technical, but we endeavored to be practical. We recognized that it is much easier to solve problems on paper than on the statute books of a country. Hence we endeavored to so mould our recommendations that practical legislators, who have to weigh all phases of public opinion, would not hesitate to adopt them and crystallize them into laws. I am glad to tell you that the report was promptly acted upon and legislation passed giving municipalities the right to inspect at the sources of supply, a point which I believe has been much debated in your country. This, however, is only the beginning, and I anticipate that at the coming session further legislation will be enacted embodying many if not all of the other recommendations which I have just read to you.

As you will readily understand, we have, like you, Federal and State, or, as we term it, Dominion and Provincial authorities. Since the issuance of our Report, which was for the Provincial Legislature, action on the milk question has been taken by the Dominion authorities, who have adopted regulations for the entire Dominion.

Under the authority of an Order in Council of His Excellency in Council bearing date the 3rd day of November instant, and in virtue of the provisions of the 26th section of the Adulteration Act, the following standards of quality have been established for milk and its products:—

MILK AND ITS PRODUCTS

1. MILK, unless otherwise specified, is the fresh, clean and unaltered product, obtained by the complete, uninterrupted milking, under proper sanitary conditions, of one or more healthy cows, properly fed and kept, excluding that obtained within two weeks before and one week after calving, and contains not less than three and one quarter (3.25) per cent, of milk fat, and not less than eight and one half (8.50) per cent of milk solids, other than fat.

2. SKIM MILK is milk from which a part or all of the cream has been removed, and contains not less than eight and one half (8.50) per cent of non-fat milk solids.

3. **PASTEURIZED MILK** is milk that has been heated below boiling, but sufficiently to kill most of the active organisms present; and immediately cooled to 45° F., or lower, and kept at a temperature not higher than 45° F., until delivered to the consumer, at which time it shall not contain more than 10,000 bacteria per cubic centimetre.

4. **STERILIZED MILK** is milk that has been heated at the temperature of boiling water, or higher, for a length of time sufficient to kill all organisms present; and must be delivered to the consumer in a sterile condition. Sterilized milk shall not be sold or offered for sale, except in hermetically closed containers bearing the words "This milk should be used within twelve (12) hours after opening the container."

5. **CERTIFIED MILK.** Milk sold as certified milk shall comply with the following requirements:—

(a) It shall be taken from cows semi-annually subjected to the tuberculin test, and found without reaction.

(b) It shall contain not more than 10,000 bacteria per cubic centimetre from June to September; and not more than 5,000 bacteria per cubic centimetre from October to May, inclusive.

(c) It shall be free from blood, pus, or disease producing organisms.

(d) It shall be free from disagreeable odor or taste.

(e) It shall have undergone no pasteurization or sterilization, and be free from chemical preservatives.

(f) It shall have been cooled to 45° F., within half an hour after milking, and kept at that temperature until delivered to the consumer.

(g) It shall contain 12 to 13 per cent of milk solids, of which at least 3.5 per cent is fat.

(h) It shall be from a farm whose herd is inspected monthly by the veterinarian, and whose employees are examined monthly by a physician.

6. **EVAPORATED MILK** is milk from which a considerable portion of water has been evaporated, and contains not less than 26 per cent of milk solids, and not less than 7.20 per cent of milk fat.

7. **CONDENSED MILK** is milk from which a considerable portion of water has been evaporated, and to which sugar has been added. It contains not less than 28 per cent of milk solids, and not less than 7.7 per cent of milk fat.

8. **CONDENSED SKIM MILK** is skim milk from which a considerable portion of water has been evaporated, with or without the addition of sugar.

9. **BUTTERMILK** is the product that remains when butter is sep-

arated from ripened cream, by the usual churning processes; or a similar product, made by the appropriate treatment of skimmed milk.

10. GOAT'S MILK, EWE'S MILK, &c., are the fresh, clean, lacteal secretions, free from colostrum, obtained by the complete milking of healthy animals other than cows, properly fed and kept, and conform in name to the species of animals from which they are obtained.

CREAM

1. CREAM is that portion of milk, rich in milk fat, which rises to the surface of milk on standing, or is separated from it by centrifugal force, is fresh and clean, and contains (unless otherwise specified) not less than eighteen (18) per cent of milk fat.

2. WHEN GUARANTEED TO CONTAIN another percentage of milk fat than eighteen (18) per cent, it must conform to such guarantee.

3. CREAM must be entirely free from gelatine, sucrate of lime, gums or other substances added with a view to give density, consistency or apparent thickness to the article.

4. CREAM must contain no preservatives of any kind, nor any coloring matter, other than is natural to milk.

5. EVAPORATED CREAM, CLOTTED CREAM, CONDENSED CREAM or any other preparation purporting to be a special cream, except ice-cream, must conform to the definition of cream, and must contain at least twenty-five (25) per cent of milk fat.

MILK FAT OR BUTTER FAT

1. MILK FAT, BUTTER FAT, is the fat of milk and has a Reichert-Meissl number not less than twenty-four (24) and a specific gravity not less than 0.905 $\left(\frac{40^{\circ}\text{C}}{40^{\circ}\text{C}}\right)$

BUTTER

1. BUTTER is the clean non-rancid product made by gathering in any manner the fat of fresh or ripened milk or cream into a mass, which also contains a small portion of the other milk constituents, with or without salt, and contains not less than eighty-two and five-tenths (82.5) per cent milk fat, and not more than sixteen (16) per cent of water. Butter may also contain added coloring matter of harmless character.

CHEESE

1. CHEESE is the sound, solid, and ripened product made from milk or cream by coagulating the casein thereof with rennet or lactic acid, with or without the addition of ripening ferments and seasoning, and contains, in the water-free substance, not less than

forty-five per cent of milk fat. Cheese may also contain added coloring matter of harmless character.

2. **SKIM MILK CHEESE** is the sound, solid and ripened product made from skim milk by coagulating the caseine thereof with rennet or lactic acid, with or without the addition of ripening ferments and seasoning.

3. **GOAT'S MILK CHEESE, EWE'S MILK CHEESE, &c.,** are the sound, ripened products made from the milks of the animals specified, by coagulating the caseine thereof with rennet or lactic acid with or without the addition of ripening ferments and seasoning.

ICE CREAMS

1. **ICE-CREAM** is a frozen product, made from cream and sugar with or without harmless flavoring and coloring materials and with or without gelatine gum tragacanth, or other harmless stiffening materials, in amount less than two (2) per cent; and contains not less than fourteen (14) per cent of milk fat.

2. **FRUIT ICE-CREAM** is a frozen product, made as described under ice-cream, but containing sound, clean and mature fruit. It must contain not less than twelve (12) per cent of milk fat.

3. **NUT ICE-CREAM** is a frozen product, made as described under ice-cream, but containing sound, non-rancid nuts. It must contain not less than twelve (12) per cent of milk fat.

MISCELLANEOUS MILK PRODUCTS

1. **WHEY** is the product remaining after the removal of fat and caseine from milk in the process of cheese-making.

2. **KUMISS** is the product made by the alcoholic fermentation of mare's milk or cow's milk.

3. **MILK POWDER** is the soluble powder product made from milk and contains, unless otherwise specified, not less than ninety-five (95) per cent of milk solids, and not less than twenty-six (26) per cent of milk fat.

4. **SKIM MILK POWDER, SEPARATED MILK POWDER** is the soluble powder product made from skim milk, and contains not less than ninety-five (95) per cent of milk solids.

The standards above defined take effect on the 12th day of December, 1910.

I had hoped that there might be greater unanimity in some things, but, so far as the conference has gone, it has given me a

NOTE.—The following note is suggested as an addition to definition 3:—
Pasteurization should be effected by heating in a closed vessel for not less than 20 minutes at a temperature of 140°-145°F; or for not less than 15 minutes at a temperature of 145°-150°F. When milk is heated above 150°F., certain ferments and other constituents of the milk are more or less altered, and the digestibility of the resultant milk is injuriously affected."

great insight into the problems that you have in this great city. I trust that Ontario, with her smaller cities and proportionately greater rural population, may soon get this matter well in hand; that in future it may redound through better milk and better and stronger men in Ontario, to our advantage and to your own as well. Because on this Continent, let us remember, are two nations always striving, let us hope harmoniously, for their people's benefit, and perhaps unconsciously for better things for all.

Again, Mr. Chairman, I thank you for this opportunity of placing before this meeting in outline what has been done in Ontario and Canada, and to thank you on behalf of my Government, for the privilege you have given me of speaking.

THE CHAIRMAN: It gives me great pleasure to introduce to you Dr. William H. Park, Director of the Research Laboratories of the New York Board of Health.

DR. PARK spoke as follows:

I asked the Chairman, for your sake, to let me off, but he, not yielding to my judgment, has asked me to say a word. And I remember that I, as Chairman this afternoon, announced that there were a number of resolutions to be acted upon afterwards, to the end that too much time might not be taken up by the speakers. It is now a quarter to eleven, and I shall endeavor to be very brief.

There are only two points that I want to touch upon, because I have had a special interest and a special connection with them. The first that I was going to speak on, is should medical milk commissions or should the city authorities control and guarantee the certified milk? Until recently, I knew of no city that had attempted to control the very highest class of milk. The Medical Milk Commissions have been recognized as looking after that. In this city, however, it is almost impossible to cover the whole milk question, and to devise classes of milk in such a way that there shall be no loophole without our knowing it.

Why should not the city take the place of the Medical Milk Commission? I saw, a year ago, one of the largest and best of the certified milk farms, become a guaranteed farm under the city. In the future it will come to be more and more a matter for decision as to whether the city shall finally take over control of the milk question.

Now, I simply give you here my own opinion without its being in any way the opinion of the Health Department. I happen to be on three Medical Commissions, and in only one Health Department, so I am three quarters a Medical Commissioner. It seems to me, from my observation in the Department and in the Commissions, that at least for the present, the Commissions can much

better handle this matter than the Health Department. The Medical Milk Commission of Manhattan, outlines the inspection and the work in the laboratory, and it outlines the bacteriological work that is done. The state aids in the tuberculous testing of the certified herds, in that way relieving at least the smaller producers from the expense of the bacteriological and the tuberculin testing.

I believe that the Medical Milk Commission, being made up of members who are interested in milk only for these special purposes, can give more undivided attention to that matter than can the Health Department. At times the Health Department would be thoroughly interested, and at times it would not be thoroughly interested, and at such a time. I think the highest grade of milk would fall, possibly, to the level of the better class of the general supply. The Medical Milk Commission would be more directly interested. They have not any special plans except in this one special respect, and so I hope that the certified milk question will remain for some years under the Medical Milk Commissions.

On the other hand, I rather doubt whether we should continue, as in New York, to have a Medical Milk Commission looking after the inspected grades of milk, and there I should say that the city should take that up, and that the Medical Milk Commission should not look after the second grades.

In New York, the Health Department is not ready to take up this inspected milk. Several years ago it became absolutely necessary that the milk commission should do it for the sake of the hospitals, but I believe it is within the province of the Health Department to give good milk to the city, although possibly not to control the very best class of milk until, at least, they have inspectors enough to do the necessary work.

It means that we must take into the Health Department one or two men to look after the certified milk, or the guaranteed milk. It seems to me it would be better to make the milk dealers bear the expense, and the Medical Milk Commission can, in a perfectly proper way, look after the production of the certified milk, and in a way that the Health Department can hardly do at the present time.

As to what the Department is trying to do here in the city, Dr. North very frankly and very justly stated, or at least implied, that the Department had rather been holding back for a few years; that New York had started out very bravely some years ago, but had rather held back in the last few years. Now, those of you who do not live in New York hardly appreciate the difficulty of moving a great body. We have all sorts of opinions. We have the newspapers on one side or the other; you have the Board of Health

with one member feeling one way as to its laboratories, and another another way.

Now, to get back to the question I started out upon, as to the official movement. We have a Commissioner who started a great deal of this forward movement seven or eight years ago, and I think under Dr. Lederle, who commenced the milk business both as a Commissioner and as a Chemist, and also since then, in charge of a laboratory which looks after the interests of the milk dealers, we are in a position to go forward in a very wise way, and ask the different men on the different Commissions to stand together, and help, in every way, to bring forward this work.

And that should be, so that if we have another conference next year, Dr. North may again give some praise to the official work that has been done by the Health Department.

THE CHAIRMAN: Although this meeting is largely in the interests of our younger citizens, I am very glad to have the opportunity to recognize here to-night one of the most venerable workers in the pure milk movement, and one of the oldest citizens of New York, Dr. Abraham Jacobi, who was present but who has gone. We all delight to honor him whenever we have an opportunity to, but he is not here now.

I would like to recognize a number of people here,—Dr. Hamill, of Philadelphia, Mr. Francisco, Mr. Walker, from Boston and a number of other men, who were to be called upon, but the time will not permit. It seems to me, however, that in view of the reference made by Dr. Magruder, of Washington, to this (indicating) as the greatest book in the world on the subject of milk, we ought to hear one last word from the Editor of that book.

I want to introduce that distinguished gentleman, Prof. Rosenau, Professor of Hygiene in Harvard University, who edited this book.

PROFESSOR ROSENAU: I thank you, Mr. Chairman, for calling upon me, but I think that there are a number of resolutions that Dr. Wile has to offer, and I think it would be more profitable to start at them now.

THE CHAIRMAN: I want to summarize, in four words, what, to me, seems to be the gist of what has been said to-night, in the matter of making a success of this pure milk crusade. I want to make an acrostic in four words.

The *Money* which is necessary to forward our efforts, whether they be educational or in the direction of the production.

Next comes *Interest*, to stimulate co-operation and effort.

Law which must safeguard the effort, and

Knowledge, so that the effort may be directed properly.

Money, Interest, Law and Knowledge,—M-I-L-K.

I would like to recognize Dr. Schroeder, of Washington.

DR. SCHROEDER: Mr. Chairman, I have a resolution to present which is not a very long resolution, and I do not think it will require any discussion, and I think it should be unanimous. It is a resolution which is not presented in the ordinary way, because the personal element could not quite be eliminated from it. It reads:

“WHEREAS, Dr. Ira S. Wile, Chairman of the Conference Committee, has devoted a large amount of his time, during the past weeks in arranging the details of this conference, and,

“WHEREAS, In a large measure, the success of the conference has been due to his efforts, be it

“Resolved, That a Vote of Thanks be tendered to him for his services.”

(The resolution was seconded and carried unanimously.)

THE CHAIRMAN: Dr. Wile has some resolutions to offer.

Dr. Ira S. Wile, Chairman of the Conference Committee. (Applause.)

DR. WILE: Mr. Chairman, as Chairman of the Committee on Resolutions, I can, of course, take no cognizance of any resolution that has not passed through the Committee. (Laughter.) There are but four resolutions to be presented at this session. Two of them will probably create some measure of enthusiasm.

The first resolution is designed to crystallize the efforts of this conference, so that there will be something to show for it, and so that, after we go out from this hall, we shall not simply leave the words behind and the acts undone. Therefore the following resolution is presented, Mr. Chairman:

“Resolved, That the following committee be appointed to arrange for a National Organization to promote the Study for the Improvement of the Public Milk Supply, such Committee to have power to increase its own membership, and such committee to consist of:

Emil Berliner, Washington, D. C.; Jesse Burke, Philadelphia, Pa.; Henry L. Coit, M.D., Newark, N. J.; William A. Evans, M.D., Chicago, Ill.; George W. Goler, M.D., Rochester, N. Y.; V. Everit Macy, New York City; G. Lloyd Magruder, M.D., Washington, D. C.; Charles E. North, M.D., New York City; Wilbur C. Phillips, New York City; Milton J. Rosenau, M.D., Boston; E. C. Schroeder, M.D., Washington, D. C.; William T. Sedgwick, M.D., Boston; Prof. Henry C. Sherman,

New York City; Ira S. Wile, M.D., New York City; Stephen G. Williams, New York City."

THE CHAIRMAN: You have heard the reading of the resolution, are there any remarks?

(On motion, duly seconded, the resolution was adopted.)

DR. WILE: Mr. Chairman, the next is as follows:

"Resolved, That all resolutions adopted at all sessions of the conference be referred to the Committee just formed, with powers."

(On motion, duly seconded, the resolution was adopted.)

DR. WILE: Mr. Chairman, the next resolution is as follows:

"Resolved, That all interstate commerce in milch cows be prohibited unless such cows have successfully passed a tuberculin test."

This resolution differs from the one that was offered last night in that the wise suggestion that was made from the floor has been embodied in it, that the words "interstate commerce" should be used instead of "sale."

The resolution which was voted down last night was so worded as to preclude the selling of the cow by one farmer to another. This deals merely with the interstate sale.

(On motion, duly seconded, the resolution was adopted.)

DR. WILE: The last resolution, Mr. Chairman, is as follows:

"Resolved, That we favor the establishment of a State Commission which shall have the right to inquire into and fix the maximum price that shall be charged for milk by dealers to consumers, in a given locality, and the minimum price that shall be paid by dealers to producers of milk, in a given locality, and no dealer should be allowed to engage in the milk business without obtaining a license from the Commission, these licenses to be revocable by the Commission for violation by the dealers, of the prices established."

(The resolution was duly seconded.)

MR. WILLIAMS: I would like to say a word on that. If I understand that resolution rightly,—and I am not sure that I do—it would bind this Conference to the approval of a law authorizing a State Commission to set the minimum price at which a man might sell his produce, and he could not sell it for anything lower than that price. Therefore, if no one wished to purchase it at the

prices at which he would be obliged to sell it, as directed by the Commission, he would be obliged to throw away his stuff, or store it indefinitely.

If I correctly understand the meaning of that resolution, I cannot imagine that such a law would by any means be held constitutional, and I think it would be an absurdity. I am not quite sure, however, that I heard the resolution correctly.

THE CHAIRMAN: Will you kindly read it again? (The resolution was again read.)

MR. WILLIAMS: That resolution does seem to me to mean what I thought it did; namely, that a Commission should state that in a certain locality, the price of milk should not be over a certain price, and that, on the other hand, the dealer should not be allowed to buy milk in a certain locality at less than a certain price. Therefore, if anyone came along to buy the poor farmer's milk at more than two cents a quart or three cents a quart, the poor farmer would have to throw it away or store it indefinitely, which he is not in a position to do.

THE CHAIRMAN: I am glad to recognize the Chairman of the New York Milk Committee in this discussion, but I cannot recognize others for general discussion, because of the lateness of the hour.

DR. PARK: How would that affect interstate commerce? I am not a lawyer. Maybe Mr. Coleman could answer that.

MR. COLEMAN: In my opinion, a law of that kind would not be unconstitutional. On the other hand, a gentleman who spoke this evening on the subject, believes that it would be. It is like many legal questions; there are two sides.

(The motion was lost and the resolution was not adopted.)

THE CONFERENCE THEN ADJOURNED.

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