Bind in Buckram - Colour Black

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MACDONALD COLLEGE

Technical Bulletin No. 1

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Technical
BULLETIN
No. 1

THE MILK SUPPLY OF MONTREAL

BY

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AND
W. SADLER

MACDONALD COLLEGE
(McGill University)
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1914

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Red=retailers
Green=milkmen
✦=Large dealers

CITY OF MONTREAL

Map of part of the City of Montreal, shewing the location of the large establishments visited (red stars); of shops, groceries, bars, restaurants, etc., from which samples were obtained (red dots); and where samples were secured from milkmen on the street (green dots).

THE MILK SUPPLY OF MONTREAL

A REPORT

OF A

BACTERIOLOGICAL INVESTIGATION

OF THE

CITY'S MILK SUPPLY

IN 1913-1914

—By—

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THE MILK SUPPLY OF MONTREAL

A Report of a Bacteriological Investigation of the Milk Supply of Montreal in 1913-14

Milk is an article of food in which every member of the community is interested. As milk or cream, or combined with other foods, it is used at all meals; as a substitute for mother's milk for infants, for the use of children, the sick, convalescents and the aged it constitutes the most important article of diet, as it contains all the essentials of a perfect ration, combined with facility of ingestion and ease of digestion. Hence it is most essential that milk of the purest quality should be used by those mostly dependent upon it, especially as the harmful effects of an impure supply, contaminated by injurious bacteria and toxines, are manifest in those least able to resist.

The enormous death rate of infants in Montreal due to intestinal disease is due in great measure to improper methods of feeding and to dirty milk. "Out of every hundred children born in the City of Montreal, thirty-two die before the end of their first year, and out of every hundred deaths at all ages occurring in this city fifty-three are children under five years of age, and of these 70 per cent. are under the age of twelve months. In 1910, more than 4,500 infants under one year of age died in the city." (1).

This appalling infantile mortality is only equalled by that of Chili where the deaths of children under one year amount to 32 per 100 births. In European Russia the rate is 26 per 100, in Austria, 22, in Spain, 18, in England and Wales, 15, in Australia, 10, and New Zealand, 8. These are averages for ten years, 1895-1904, and are here quoted to serve as a basis of comparison with the infantile mortality of Montreal.

These statements show the large number of deaths, and to this we may add that the larger percentage of this mortality is due to disease of the digestive organs, and whilst it is impossible to prove from these statistics that the high death rate is largely due to improper milk, there is ample evidence to show that the proportion of deaths is greatly reduced when infants are given the food that nature designed for them.

We may also see the result of supplying pure milk, or at least pasteurized milk, for the use of infants in a large city.

Prior to 1893, the death rate of children under five years in New York city was 96.2 out of every 1,000 births, and in the three summer months the death rate was 136.6 per 1,000 births per annum. With the increased use of pasteurized milk, supplied by the Nathan Straus milk depots, the death rate fell to 55 per 1,000 in 1906, and the summer rate to 62.7 per 1,000.

The apparent saving in one year was 11,635 lives.

Similar results have been obtained in England and in France.

This appalling loss of life and loss of potential worth in the metropolis of Canada is therefore of grave concern to the community, and the examples we have quoted show that this loss may be reduced.

For this particular reason, and also on account of the well known role that milk plays in the dissemination of such diseases as typhoid, diphtheria, scarlet fever, tuberculosis, etc., which, unfortunately, are only too common in the city, we were induced to undertake the present investigation, in an endeavour to find out something about the conditions under which milk is produced and retailed in the city of Montreal.

Numerous investigations of city milk by bacteriologists, hygienists and dairymen have been made during the last thirty years. The enormous number of bacteria in such milk has been noted by many, and caused Fleischmann, the leading German authority on dairying, to write that "All the results of scientific investigation which have found practical application in the treatment of disease, in disinfection and in the preservation of various products, are almost entirely ignored in milking." This statement is almost as true to-day, although much has been done in many cities in the United States and Europe to better the milk supply.

In undertaking the present investigation of the milk supply of Montreal, we have made a comprehensive study of the manner in which milk is produced, transported and retailed to the city consumer. The results of these studies are here set forth with nothing extenuated nor aught set down in malice.

The Problem. The problem of the milk supply, as we view it, consists of providing to the consumer an adequate daily amount of pure uncontaminated milk at a price which is commensurate with the quality of the product. All milk unfit for consumption by reason of adulteration, contamination, or age should be excluded from sale.

Acknowledgments.—We desire to acknowledge the kindness of Dr. E. Pelletier, secretary, and the mem-

bers of the Provincial Board of Health, whereby two of us were made dairy inspectors *pro tem.* Thanks are due also to Dr. A. J. G. Hood, chief food inspector of the city of Montreal, for numerous kindnesses, much information and hearty co-operation; also to Messrs. S. M. Tinning, J. H. McEvoy, and J. E. Bourbonnière, milk inspectors of the city's Food Inspection Department, without whose material assistance much of the rural sampling would have been impossible.

It is with thanks also that we acknowledge the services of Mr. J. Vanderleck, Ch.E., Lecturer in bacteriology, and Mr. Melville Duporte, B.S.A., M.Sc., in some of the routine work of laboratory analysis; and for much of the tedious clerical work in connection with the accompanying tables we are indebted to Miss M. E. Ball.

In view of the unusual nature of the work, we desire to express our appreciation of the courtesy with which we were received during our visits of inspection to farms, shipping stations, trains, wholesale milk establishments and various shops, restaurants, etc.

Conditions Under Which the Food Inspection Department Works.

In order to deal effectively and legally with the sanitary requirements in connection with the milk supply, it is necessary to have the local health laws carefully drawn up.

The by-laws concerning cowsheds and dairies and other regulations relating to the milk supply may be found in the Quebec Public Health Act (Chapter 3 of Article VII, Revised Statutes of Quebec, 1909) and are as follows:—

Cow-Sheds and Dairies.

46. Cows shall be kept in premises suitable for the purpose, that is to say a stable sufficiently large and lighted and fitly drained. (*a*).

47. Every stable shall be completely cleaned out and all the dung removed at least once in forty-eight hours. (*b*).

48. The milking and the handling of milk or of the milk utensils will be made in such a way that milk be secured against fecal or other contaminations. If by accident the milk should become polluted, the contents of the receptacle containing such polluted milk shall not be delivered to be used as food. (*c*).

49. Every owner of a tuberculous cow must at once notify the municipal sanitary authority of the fact. (*d*).

49*a*. Tuberculous cows shall be placed in a compartment completely separated from that occupied by the other animals and the sale of their milk is forbidden until a veterinary surgeon has given a written certificate that the udder is not attacked by the disease. Such certificate shall not be valid for more than three months at the most, unless it be renewed after an examination of the animal. For the purpose of the present by-law, in the absence of inspection by a veterinary surgeon, all cows that cough and become thin or have a disease of the udder shall be deemed to be tuberculous. Whenever the bacillus of tuberculosis will have been found in the milk of a cow, any certificate which might have been given by a veterinary surgeon will thereby be cancelled.

49*b*. The milk of cows attacked by any other disease shall not be sold so long as the disease or convalescence lasts. The same shall apply to the milk yielded during the thirty days preceding parturition and at least ten days following the same.

49*c*. Wells from which water for the cows is taken must never be dug in the soil beneath the stable; neither must they be at a lesser distance than forty feet from any stable or pig-stye or from any dung or refuse-heap, except in the case of an artesian or tubed well.

49*d*. It is forbidden to give as food to milch-cows either solid or liquid refuse from distilleries, breweries or vinegar factories or any substance in a state of putrefaction. Nevertheless, with regard to malt, municipalities may permit the use of dry malt after ascertain-

(*a*) The Board of Health of the Province advises municipalities to require from milkmen, to whom they issue licenses, that they comply to the following dispositions, which would be made a condition for the license:

"The number of animals in a cow stable shall be limited in such manner as to provide for each animal a cubic space of at least 800 cubic feet. This quantity may be reduced to 600 feet if the municipal sanitary authority so permits after ascertaining that that stable is, in its opinion, provided with sufficient ventilation.

"Cow stables shall be lighted by windows whose light area shall be equal to at least one-tenth of the floor space.

"The floor of the stable must be watertight and slope towards a gutter, which shall be carried outside the stable, unless the stable be connected with a sewerage system and the above gutter leads to it.

"Every drain connecting a stable with a sewerage system must be provided with a trap (water seal).

"The inside of the stable shall be whitewashed at least once a year, unless it be painted with oil paint, in which case it shall be thoroughly washed instead of being whitewashed."

(*b*) *Once a day* should be the minimum for any careful dairyman.

(*c*) The following dispositions would advantageously complete article 48:

"The udder and teats of the cow shall be cleaned and washed before the milking.

"The milking utensils shall not be brought into the stable until milking-time and shall be taken outside immediately afterwards." (It would be desirable that the milking of the cows be done in a place entirely separated from the stable.)

(*d*) To maintain the health of the cows, they should be taken out of the stable at least once a week. Whilst they are outside the stable should be aired, by opening the doors and windows, and be cleaned.

ing that the breweries are in a position to dry it properly. (*a*).

49*e*. The dairy in which milk intended for sale is placed and kept must be a separate and special apartment used solely as a dairy. Such dairy shall be at least twenty feet from any stable or pig-stye or any dung or refuse heap.

49*f*. The windows and doors of dairies and of all premises wherein milk is handled shall be protected by fly-screens from the 1st May to the 1st November.

49*g*. All cans, vessels or utensils used in connection with a dairy shall be used solely for such purpose and be cleaned and washed every time they have been used and be rinsed out with boiling water when about to be used again.

49*h*. Within forty-five minutes after milking, milk must be cooled. (*b*).

49*i*. It is forbidden to deliver to consumers milk over 24 hours old, except in the case of milk which, within 8 hours after milking in summer and 12 hours in winter, has been sterilized at 220 deg. Fahrenheit or which has undergone any other treatment which may be approved by the Board of Health of the Province of Quebec.

49*j*. It is forbidden to take out of the milkman's establishment:

(1) Any skim-milk, even if only partly skimmed, unless it be contained in cans, jars or bottles bearing the inscription "skim-milk" in letters not less than an inch in height;

(2) Any milk to which any foreign substance has been added, especially those called "preservatives";

(3) Any milk not containing at least 3 per cent. of butter and 9 per cent. of other solid elements or having a proportion of water exceeding 88 per cent.;

(4) Any milk whose smell or flavor betrays any fecal contamination;

And the milk shall be delivered to the consumer in the same condition as it was when it left the milkman's establishment, unless the change in the condition of the milk consists solely in its pasteurization or sterilization by heat in an intermediate establishment between the producer and the consumer, the installation and operation thereof having been found suitable by the sanitary authority of the place where the milk is consumed. (*c*).

49*k*. It is forbidden to use again the bottles and other vessels returned by consumers until such bottles or vessels have been previously washed with boiling water in the milkman's establishment.

49*l*. From the 1st of May to the 1st of October, it is forbidden to allow cans filled with milk to stand on the platforms of railway stations or on the platforms or wharves of other transportation companies more than 15 minutes before the departure of the train, boat and other vehicle for its destination, unless the cans be sheltered from the sun. On arrival at the station to which they are shipped, the cans, if not claimed within half an hour, shall be put into cold storage at the station. (*d*).

49*m*. Empty cans shall be washed by the shipper before leaving them at railway stations to be returned to the country. On demand, all cans shall be shown, by those who shall have them in their possession, to the representative of the municipal sanitary authority, and if the latter is of opinion that they have not been washed, they will be delivered to him to be shown as exhibits before the Courts of Justice or to be washed at the shipper's expense, but to be subsequently returned to the owner.

49*n*. Every owner of a milk-depot or of a shop in which milk is sold must see that such milk be kept in a refrigerator exclusively reserved for milk, cream and butter. Milk shall be kept in the can in which it was brought, unless the municipal board of health should otherwise permit after ascertaining that the vessel or vessels submitted for its approval can be washed and cleaned between the intervals when the milk is brought.

49*o*. In no milk-depot or store shall milk be kept in a room or place wherein it may be exposed to contamination by foul air and deleterious emanations. Every room in which any person sleeps and every place in communication with any sewage drain shall be deemed a place contaminated by deleterious emanations.

49*p*. For every infringement of the requirements of the by-laws from articles 46 to article 49*o* inclusive, the offender is liable to a fine not exceeding ten dollars and to an additional fine of ten dollars per day for each day, above two, during which the infringement continues.

The chief food inspector by virtue of these by-laws becomes an executive officer of the Board and can enforce these regulations in the province and in the city of Montreal. The inspector has no rights or

(*a*) Many authors do not admit that even dry malt is a good food. It would no doubt be better not to use it.

(*b*) Milk should be cooled to 50° Fahrenheit at least. Forty degrees Fahrenheit is the desired temperature. It is obtained by putting the filled cans in water containing ice. If milk is bottled immediately after milking (a method which is to be preferably recommended) the bottles are placed in boxes and around the bottles small pieces of ice are piled. Milk should never be allowed to reach a temperature of 60° Fahrenheit previous to being delivered to the consumer.

(*c*) For restrictions imposed when a contagious disease exists in the family of a milkman, see article 16.

(*d*) It would be most desirable that milk be transported in refrigerator cars.

privileges in the Province of Ontario, from which Montreal obtains about 4,000 gallons of milk a day. The city's milk inspectors do not have any right legally to inspect farms or advise Ontario farmers as to correct methods of producing and shipping milk.

Certain by-laws of the city of Montreal would seem to have precedence over those of the province. For example, a city by-law No. 105, Sec. 19 and 20 (passed in December, 1876) states that the chief food inspector must give licenses to milk dealers whenever applied for, the only qualification being that dairymen outside the city must agree to permit visits from the city's milk inspector. No penalties are mentioned for infringement.

By-law, Sec. 22, states that: "No person shall sell or offer for sale, or have in his possession for sale in the city, adulterated or unwholesome milk, or milk produced from diseased cows or cows fed upon substances deleterious to the quality of the milk, or milk being the vehicle of contagion or infection, whether the source of contagion be animal or human subjects, etc."

"Any milk sold, offered or held for sale in this city contrary to the provision hereof, may be seized and confiscated by the said milk inspector or any other health officer."

Evidently, the only penalty is confiscation.

The word "unwholesome" is capable of very broad interpretation, for we have noted that on several occasions when milk dealers were before the courts for selling milk with bacterial counts of twenty million bacteria to the cubic centimetre, they have been discharged.

We add the text of Order No. 15413 of the Board of Railway Commissioners for Canada, with reference to the transportation of milk.

It is ordered, that from and after the first day of October, 1911, milk be transported in baggage cars, upon the following conditions, namely:—

1. All the cans must have the name or initials of the owner on the cover or shoulder, in stencilled (not painted) letters, of a size not less than one inch.

2. All cans must bear the name of the shipping station in stencilled (not painted) letters, of a size not less than one inch, the same to be placed on the shoulder of the can.

3. Each can of milk shall have attached to it, in addition to the milk ticket as now in use, a shipping tag addressed to the consignee, and agents and train baggagemen shall not be required to receive cans for shipment unless so tagged, and shall not be required to accept cans for shipment not properly and legibly stencilled.

4. Covers of cans must be securely attached to the can, to prevent spilling or pilferage of contents, and where possible they shall be wired on and sealed with lead seals.

5. All cans shall be loaded by the shippers at the shipping point.

6. Empty cans shall be returned by the railway company to the shipping point without other charges than the payment of original tolls. Where the number of empty cans is twenty or less, the unloading at the shipping point shall be done by employees of the railway company. Where the number of cans is more than twenty and less than forty, the shippers shall provide one man at the shipping point for the purpose of assisting in unloading. Where the number of cans is forty or more, the shippers shall provide two men for the purpose of assisting in unloading: Provided that shippers shall not be required to attend at the shipping point to assist in unloading at more than one train each day. In the event of trains being delayed more than thirty minutes beyond the schedule time of arrival, all empty cans shall be unloaded by the employees of the railway company.

7. On and after the 1st day of September, 1912, the railway companies shall not be required to accept for transportation any cans of less capacity than eight gallons, whether containing milk, or empty.

8. On and after the 1st day of September, 1912, milk shipments shall be handled on memorandum forms, and receipts shall be taken from the consignee. This will be supplemental to the ticket system now in effect, the railway company providing the necessary shipping forms to all milk shipping stations. At stations where companies have regular agents, such agents shall fill in the form respecting the number of cans to be shipped from the information supplied by the shippers. Such memorandum shall then, in the hands of the train baggageman, accompany the shipment to its destination, where the company shall obtain receipts from the consignee.

9. At flag stations the billing shall be done by the shippers, who shall enter the various consignments on one form, in legible writing.

10. Shippers must have their milk at the point of shipment, properly way-billed, at least fifteen minutes before the arrival of the train on which milk is intended to be shipped.

11. Railway companies shall continue the issuance of milk tickets, which tickets shall be good only if presented within one year from the date of issue.

12. The railway company shall not be liable for the loss of, or damage to, or delay in any shipment of milk or empty cans, unless the same be caused by or result from the negligence of the railway company, or its servants or agents.

(Sgd.) D'Arcy Scott,
Assistant Chief Commissioner.
Board of Railway Commissioners for Canada.

Montreal Milk Inspectors and Farm Conditions.

By courtesy of Dr. A. J. G. Hood, we are permitted to give particulars concerning the conditions on the farms, as prepared for him by his staff of country inspectors.

These inspectors were requested to visit all the farms producing milk for city consumption; and on the basis of the score card adopted by the Food Inspection Department to present a condensed statement of their findings.

We include such in order that the position of the Health Department respecting farm conditions may be presented.

The score sheet given below differs materially in the apportionment of points awarded from the one used by us.

1st COPY
Form 726-2M-6-12.

DAIRY SCORE CARD.

No.....

SEAL

HEALTH DEPARTMENT
OF THE
CITY OF MONTREAL
FOOD INSPECTION

Name .....
Parish ..... County .....
Milk Sold to .....
Shipping Station..... Receiving Station..... Time.....
Received in City by.....
No. of Cows ..... No. of Milking cows ..... Kind .....
Gallons of Milk produced daily.....

Date Inspection.....191....	Max.	Allowed	Remarks.
Absence of disease on physical examination (2). Approved Tuberculin Test within one year (8).	10	.....	
Quality of food (5). Quality of water (5).	10	.....	
Cleanliness of Cows.	10	.....	
Stable location (2), watertight floor, preferably concrete (3), tight ceiling and walls (2), tie and manger (1), facilities for isolation, box stall (2).	10	.....	
Stable ventilation (3). Air space for each cow: 400 c. ft. (1), 500 c. ft. (2), 600 c. ft. (3). Light: 4 sq. ft. of glass per cow (4). 3 " " " (3). 2 " " " (2). 1 " " " (1).	10	.....	
Stable cleanliness: floor, ceiling, walls and manger (3), whitewashing or painted and disinfected every year: walls (2), ceiling (3). Number other animals (2).	10	.....	
Condition of barnyard, drainage (4), removal of manure every day to the field (6) or 50 ft. from the stable (3).	10	.....	
Milk room construction: ceiling, floor, tight walls and ceiling, window and screen (3), water supply (2). Cleanliness: floor, ceiling, walls, vat and cooling water (5).	10	.....	
Cleanliness at milking time (3), utensil adequacy (2), small top or hooded pails (2), thoroughly washed and inverted in pure air (3).	10	.....	
Supply of ice (4). Prompt and efficient cooling and storage at low temperature (6).	10	.....	
Total.....	100	.....	
Deducted for unsanitary or filthy condition.			
Final score.....		.....	
Inspector.			

Note.—For especially unsanitary conditions in any group, special discounts may be made from the recorded points, according to the probable danger of infection, contamination, or deterioration that may result from the continuance of the faulty conditions.

If filthy conditions exist, the score shall not exceed 49. If the water supply is exposed to dangerous contamination, if a dangerous infectious disease exist among or in the family of the attendants, or if a dangerous infection exist among the cattle, the dairy shall not be scored and the product shall be excluded from the market until the dangerous condition is removed.

If the recorded score is 80 or above the dairy is EXCELLENT.
If the recorded score is 70 or above the dairy is GOOD.
If the recorded score is 60 or above the dairy is FAIR.
If the recorded score is 50 or above the dairy is PROBATIONARY.
If the recorded score is 49 or below the dairy should be decidedly improved at once.

Following are the questions submitted to the inspectors, with their replies to the same:

1. What is required from the farmers? Cleanliness with regard to the stables and cows, and cleanliness and cooling of the milk.

2. How many rural districts? 6.

3. How many farms were inspected? 3,237.

4. How many were above criticism? None.

5. How many had impure food and water? 744, or 23 per cent.

6. How many had the necessary equipment for cleaning the cans? 6.

7. How many stables had insufficient ventilation? 2,913 or 90 per cent.

8. How many were insufficiently lighted? 2,249.

9. How many had no drainage? 2,554.

10. How many had cement floors? 493.

11. How many had the requisite amount of air space? 284.

12. How many had a suitable dairy? 911.

13. How many had ice? 1,368.

14. How many were dirty? 1,618 or 50 per cent.

15. How many herds were infected with tuberculosis? 10 per cent. and more.

16. How many cows were clipped? 35 per cent.

SCORING OF FARMS.

When the investigation was initiated we proposed to inspect in detail each individual farm from which we obtained a sample of milk. By the use of a score sheet we hoped to be able to collaborate the results from bacteriological analysis, with the number of points awarded in the scoring. Based on these premises, we felt that we would be in a position to conclude how and to what extent the conditions pertaining to the production and handling of milk on the farm influenced the bacterial content of the milk.

Experience soon proved that this would necessitate a very considerable expenditure of time.

We found that, in order to obtain a representative number of samples from each district and return with these to the laboratory to permit of analysis the same day, we should be obliged to forego to some extent the original idea with regard to detailed scoring.

The extent to which we were able to score was decided largely by the convenience or otherwise, for our purpose, of the railway service.

Accordingly, when for lack of time we did not use the scoring sheet, we made a general inspection, noting our observations.

Thus, by one means or another we are in a position to record the principal features regarding the conditions under which milk is produced and handled in the several districts visited.

In deciding upon the particular score sheet used, the main object was to have one simple in arrangement, easy of explanation and one which would emphasize the main points to be borne in mind by those who would produce a clean, wholesome milk.

The system of scoring adopted was as follows:

Sanitary Inspection of Dairies.

Owner or lessee of farm: .....
Town: . . . . State: . . . .
Total No. of cows:.....No. milking.....Quarts of milk produced daily:.....
Is product sold at wholesale or retail? .....
If shipped to dealer, give name and address: .....
Permit No.:..... Date of inspection .....191....

		PERFECT SCORE.	SCORE.
	COWS.		
Condition and healthfulness.	Deduct 2 points if in poor flesh, and 8 points if not tuberculin tested	10	
Cleanliness.	Clean, 5; good, 4; fair, 2; bad, 0.....	5	
Water supply.	If clean and unpolluted, 5; fair 3; otherwise, 0.	5	
		20	
	STABLES.		
Construction.	For cement floor or other material equally as good (*a*)* in good condition, allow 2 points; fair, 1; poor, 0; wood floor (*b*) or other material in good condition, 1; fair, ½; poor, 0; good tie (*c*), 1; good manger (*d*), 1; box stall (*e*), 1.....	5	
Cleanliness.	If thoroughly clean, including floor (*a*), windows (*b*), and ceilings (*c*), 5; good, 4; medium, 3; fair, 2; poor, 1; bad, 0...	5	
Light.	Four square feet of glass per cow, 5; 1 point off for each 20 per cent. less than 4 square feet	5	
Ventilation.	Good ventilation system, 4; fair, 3; poor, 2; bad, 0.	4	
Cubic space per cow.	If 500 cubic feet or over per cow, 3; less than 500 and over 400, 2; less than 400 and over 300, 1; less than 300, 0.	3	
Removal of manure.	Hauled to field daily, 2; removed at least 30 feet from stable, 1; otherwise, 0.	2	
Stable yard.	In good condition (*a*), ½; well drained (*b*), ½; otherwise, 0...	1	
		25	
	MILK HOUSE.		
Construction.	Tight, sound floor, and not connected with any other building (*a*), well lighted (*b*), well ventilated (*c*), 2; if connected with another building under good conditions (*d*), 1; otherwise, 0; if no milk house, 0.	2	
Equipment.	Hot water for cleaning utensils (*a*), 1; cooler (*b*), 1; proper pails (*c*) and strainers (*d*) used for no other purposes, 1...	3	
Cleanliness.	Interior clean, 5; good condition, 4; medium, 3; fair, 2; poor, 1; bad, 0.	5	
Care and cleanliness of utensils.	Clean (*a*), 3; kept in milk house or suitable outside rack (*b*), 2; otherwise, 0.	5	
Water supply.	If pure and clean running water, 5; pure and clean still water, 3; otherwise, 0.	5	
		20	
	HEALTHY.		
Attendants.	Healthy.	5	
Cleanliness of milking.	Clean milking suits, milking with clean dry hands, and attention to cleanliness of udder and teats while milking, 10; no special suits, but otherwise clean (*a*), 7; deduct 4 points for unclean teats (*b*) and udder (*c*) and 3 points for unclean hands (*d*)	10	
	HANDLING THE MILK.		
Prompt and efficient cooling.	If prompt (*a*), 5; efficient (*b*), if 50 degrees F. or under, 5: over 50 degrees and not over 55 degrees, 4; over 55 degrees and not over 60 degrees, 3; over 60 degrees, 0; if neither prompt or efficient, 0.	10	
		25	
Storing at low temperature.	If 50 degrees F. or under, 5; over 50 degrees and not over 55 degrees, 4; over 55 degrees and not over 60 degrees, 3; over 60 degrees, 0.	5	
Protection during transportation to market.	If thoroughly protected (iced), 5; good protection, 4; partly protected, 2; otherwise, 0.	5	
		10	
	Total score	100	

*The letters a, b, c, etc., to be entered on score card to show condition of dairy, and when so entered to indicate always a deficiency.

Collecting.—A fundamental idea in our method of collecting samples was to have them represent (as far as possible) the milk when removed in the ordinary way from whatever vessel contained it. On farms, for example, one or two cans of mixed milk from several cows were shaken and the sample tubes filled either by pouring directly, or from the lid of the can. This is also true of the cans sampled at railway stations, in cars, and at several creameries and skimming stations.

At the various wholesale milk establishments in the city the same method was followed, except in the case of those samples which show the different stages of process to which the milk was subjected. In collecting these, sterile 10 c.c. pipettes were used, or else the milk was drawn from taps on the different machines, vats, etc.

In groceries, restaurants, cafes, bars and other retail places, the tubes were filled either directly from the cans as above noted, or from whatever glass, bottle, jug or other vessel from which the sample was chosen. The two of us who personally did all the collecting are sure that no fraudulent representations of the milk sold found their way into the laboratory.

The analyses here given show fairly comprehensively the city's milk supply:—

1. As it is produced and shipped.
2. As it arrives in Montreal.
3. During certain processes at wholesale dealers.
4. As retailed.

By reason of our arrival at the rural districts the day previous to the morning when the samples were collected, we were enabled not only to visit many farms at our leisure, scoring them on the form given on (p. 9), but also to get our collections back to the laboratory and plated usually within ten hours.

All samples taken in the city were dealt with the same day, usually within six hours.

The samples were placed in the collecting case manufactured by Peter Gray and Sons, of Boston, Mass.

This case is made of heavy copper, is double-walled, and contains sufficient felting between the walls of the case and cover to keep the samples cold for hours. It is fitted with a heavy strap with leather handle for carrying. The interior of the case is divided by vertical partitions into compartments, the two outer and smaller compartments being for ice and the inner one for the sample. These partitions have perforations near the bottom, allowing for the free circulation of the ice water throughout the bottom of the case. The centre compartment is reserved for copper test tube racks, eight in number, and each capable of holding four test tubes or a total of 32 samples.

When iced and closed a constant temperature of 34-36 deg. F., is maintained. Great care was also exercised to have the cases well iced, and the milk committee of the laboratory section of the American Public Health Association have reported that when samples are so iced "there is practically no change in the bacterial content, even for twenty-four hours, the counts varying hardly more than might be expected in duplicate plates."

Methods of Analysis.—The media used for the milk analysis were beef peptone litmus lactose agar, beef peptone litmus lactose gelatine and aesculin bile-salt agar, prepared as follows.

Beef peptone litmus lactose agar.—25 grams of Liebig's extract of meat were dissolved in 1,000 c.c. of water, 20 grams of peptone were added and dissolved, and then 12 to 15 grams of bar agar-agar. The flasks were placed in the steam sterilizer and after the agar was dissolved the medium was titrated with normal sodium hydrate and the reaction adjusted to + 1. After boiling, the medium was filtered either through a cotton wool filter or through "papier Chardin Hadancourt." One per cent. of lactose was added and the medium tubed and sterilized in streaming steam for twenty minutes on three successive days. Litmus was added at the time the plates were poured.

Beef peptone litmus lactose gelatine.—This was made in the same manner as the agar, but with 12-15 per cent. of gelatine.

The gelatine used was best gold label brand and Nelson's photographic gelatine No. 2, equal weights of each. White of egg or albumen was used for clarifying, and the medium was paper filtered. Lactose was added after clarification; litmus at the time of pouring the plates.

Aesculin bile salt agar.—12 to 15 grams of bar agar, 2.5 grams of sodium taurocholate and 10 grams of Witte's peptone were boiled in 1,000 c.c. distilled water. The solution was neutralized with a normal solution of sodium hydrate, cooled below 60 deg. C.; the whites of two eggs or an equivalent quantity of albumen added, the mixture boiled in streaming steam, and then filtered through paper. The acidity was then tested and the medium neutralized if necessary. One gram of aesculin and 1 gram of iron citrate was then added to the hot mixture. The reaction was again tested and if necessary made + 0.6.

This medium was used to obtain the number of organisms belonging to the *B. coli* and *B. lactis aerogenes* groups.

The litmus used was Merck's pure litmus, free from red colorifics, insoluble in alcohol and soluble in water. A sufficiently strong solution was made to give a good blue color when 1 c.c. of the solution was added to 10 c.c. of medium.

The litmus was sterilized by the discontinuous method, and added to the Petri dishes before the

medium was poured. The plates used varied in diameter from 10 to 14 centimetres. They were wrapped in paper and sterilized at 150-170 deg. C., for 3 to 4 hours.

Three plates were used for each medium, making a total of nine plates for each sample. The plates were nivellated on an enamelled lava table top; the gelatine plates on a brass chest through which cold water flowed.

Dilutions.—The method of making dilutions was that recommended by the Committee of the laboratory section of the American Public Health Association. Straight side pipettes were used. The dilutions varied from 1-100 to 1-100,000, the lower dilutions being for the aesculin plates.

We had extremely good plates. Owing to care in shaking and mixing in the plates, the colonies were well distributed, and hence rapidly counted.

It was impossible to estimate the number before dilution by microscopic methods, hence the number of colonies per plate was often greater than 200. Experience with samples from certain districts, however, soon gave us indications of the right dilutions to use.

Incubation.—The agar plates after they had set were turned upside down and placed in sets under small bell jars in the incubator at 37 deg. C.

The gelatine plates were put in sets in shallow trays and placed in a refrigerator which kept a temperature between 16 and 22 deg. C. During the winter months, the gelatine plates were kept at room temperature, which varied between 18 deg. and 22 deg. C.

Counting.—Agar plates were counted after forty-eight hours' incubation or longer; gelatine plates at the end of three, four or five days, depending on the growth of the colonies, particularly the liquefiers.

Facility in counting and differentiation was given by a simple apparatus consisting of a wooden frame similar to those used by photographers for retouching negatives. In the square opening, a glass plate ruled in square centimetres was fixed. Immediately under this plate was a piece of mirror canted to an angle of about 35 deg. If too bright, a sheet of paper was placed over the mirror.

The Petri dish was placed on the ruled glass, and counting was accomplished by the help of a lumberman's counter which registered up to 999. Usually the entire plate was counted. In this manner the total number of colonies, acid formers, liquefiers, chromogens, etc., were enumerated. The gelatine plates gave very good differentiation, and from previous experience of milk work, we were able to "spot" the various groups of organisms from their colony formation.

Tabulating.—From the notes and figures taken whilst counting, the results were tabulated on large cards, ruled, with the following headings:—

Number. Dilution. Where collected. Total agar. Total gelatine. B. coli. Liquefiers—sporulating, and non-sporulating. No. of acid on agar. No. of acid on gelatine. Grade.

The counts from each set of three plates were afterwards averaged and the number of organisms per c.c. calculated.

The significance of most of these headings is obvious; a few words of explanation about some is, however, necessary.

Under the head of *B. coli,* or colon group, we include all colonies which gave a brown or black coloration on aesculin bile salt agar. We know that this includes many varieties of colon which have been described by various writers under specific names (e.g., *B. communior*). It also includes the *B. lactis aerogenes* group which is found in large numbers in the faeces of cattle. We regard any member of these groups as indicating "manurial impurities" in milk. A large number of this group present in a sample shows either carelessness and uncleanliness in milking, subsequent keeping at a high degree of temperature, or as most frequently happens, a combination of both. A very large number of colonies appearing on the aesculin plates were isolated and put through the "flaginac test" of Houston, in order to control the identification of the black colonies.

Our "liquefier" group includes *all* organisms liquefying gelatine, and is divided into (*a*) those of the *subtilis mesentericus—mycoides*—types and other spore-forming organisms usually associated with the soil, and obtaining access to milk from the dusty air, or from fodder and bedding; and (*b*) the non-spore liquefiers like *B. vulgaris, B. lactis cloacae* (Conn) and its varieties and *B. fluorescens,* organisms associated with the breaking down of organic matter, and found in manure, bedding, etc.

The "acid on agar" and "acid on gelatine" include *all* organisms turning blue litmus red. The predominating species was the lactic acid bacillus.

We have not included the chromogens in the tables as published, but on our protocol sheets these were noted. Among the species most frequently found were *M. lactis aureus* (Conn), the yellow sarcines and other orange to yellow cocci, *B. fluorescens, B. pyocyaneus, B. prodigiosus, B. luteum and Cladothrix sp.,* etc.

Grade.—This refers to the grading recommended by the American Commission on Milk Standards, with certain additions which we have suggested. The names, "total," "colon," "liquefier," after the grade, imply that the milk is so graded because it falls in this grade on account of total count, colon count or liquefier count.

Although a number of pasteurized milks appear in our tables, all samples, whether raw or pasteurized, were graded according to the schedule given as "raw milk," thus giving pasteurized milks some advantage owing to the lower standard.

Reference to the results will show that on some occasions the colon count is higher than the agar count. The probable explanation is that our agar plates, on account of higher dilutions, were more likely to underestimate the actual conditions than the colon plates which were made with lower dilutions.

It will be noticed that contrary to the usual method of reporting results, in conventional gradations of thousands, half millions, etc., according to the total number of organisms per c.c., we have tabulated our figures exactly as they resulted from multiplying the average count of three plates by the dilution. One reason for so doing was to minimize error in computing averages and making comparisons, for it will be seen that the addition or subtraction of several thousands to each figure would necessarily make considerable difference in the total of a long column.

The percentage figures appearing at the bottom of the columns headed "colon" and "liquefiers" refer to the averages there given, expressed in per cent. of the average total counts on agar and on gelatine respectively.

No tests were made for chemical preservatives.

Milk Standards.

Although a vast amount of research has been published on milk, it cannot be said that there is universal agreement as to what should constitute a milk standard. Different countries have different standards as regards the chemical constituents, and compared with the average composition of milk, such standards are so low that, given a fat standard of 3.0 per cent., it would be possible for a dealer to add one gallon of skim milk to six gallons of milk with fat content of 3.5 per cent., to bring its combined fat content down to 3.0 per cent., the legal per cent. in many countries.

In the same way the hygienic standard, of even greater importance than the chemical, is extremely low, permitting the sale of milk grossly contaminated with dirt and with high bacterial content. No country has any hygienic standard, it being left for states, provinces and municipalities to evolve their own, when forced to do so by public opinion. Too drastic regulations, unsupported by public opinion, often fail, hence it is necessary to enact regulations which can be efficiently observed and carried out, and which are backed by the consensus of public opinion.

We find in most cases that the health regulations are in accord with the education of the community.

A sanitary milk standard is essential for the protection of the consumer, who should be able to secure milk free from disease-producing bacteria, and those organisms forming irritating acids and gas giving rise to intestinal disorders, and which will keep sweet for twenty-four hours at temperatures not exceeding 65 deg. F.

Such a sanitary milk can be produced by the exercise of cleanliness in each operation connected with milking, transportation and handling, along with refrigeration; or by heating the milk to a temperature which will kill all disease-producing bacteria and reduce the numbers of other organisms to such an extent that the milk will keep sweet for twenty-four to forty-eight hours.

The operation of heating milk, followed by its subsequent cooling, is known as "pasteurization," a word derived from Pasteur, who first used this method for combating certain defects of wines.

Much controversy has arisen as to the relative advantages and disadvantages of the two systems. The two main objections to pasteurization are, first, that this method tends to encourage the farmer to produce dirty milk, as he knows that the milk will be heated and the majority of bacteria killed, and therefore is apt to be careless in taking those precautions which minimise bacterial infection.

This disadvantage may be offset by regulations specifying the highest bacterial count which can be allowed in milk that is intended for pasteurization.

The second objection urged is that pasteurization causes certain changes in the composition of milk which reduce its food value and make it unsuitable for infant feeding. Heating milk to a *high* temperature undoubtedly causes changes, the principal ones being the expulsion of the contained gas, the caramelization or burning of the milk sugar, the precipitation of the calcium salts, the coagulation of albumen, the dispersion of the fat globules so that they will not rise to the surface and give a cream layer, the destruction of the ferments which aid in digestion, and others. These changes, however, are not produced if the degree of heat and the length of exposure are not excessive.

A temperature of 145 deg. F. for twenty minutes will not produce these changes, and this temperature destroys the tubercle bacillus and the organisms causing typhoid fever, diphtheria, cholera, and the group of bacteria that give rise to gastro-intestinal infections.

These facts and others have led various committees and public bodies to lay down certain regulations regarding milk standards, and one of these—the Commission on Milk Standards, appointed by a committee working in the interests of improving the milk supply of New York City—consisted of seventeen members; among these were the Director of the Hygienic Laboratory of the United States Public Health Service, the Chief of

the United States Bureau of Animal Industry, the Professors of Hygiene of Harvard and Wisconsin Universities, and several well-known milk chemists and directors of State Boards of Health. This committee, after a number of meetings, issued a report advocating the classification, labelling and dating of milk; recommending pasteurizing temperatures and suggesting certain chemical and bacterial standards.

The bacterial standard recommended was as follows:—

GRADE A. *Raw Milk.*—Milk of this class shall come from cows free from disease as determined by tuberculin tests and physical examinations by a qualified veterinarian, and shall be produced and handled by employees free from disease as determined by medical inspection of a qualified physician, under sanitary conditions such that the bacteria count shall not exceed 100,000 per cubic centimetre at the time of delivery to the consumer. It is recommended that dairies from which this supply is obtained shall score at least 80 on the United States Bureau of Animal Industry score card.

Pasteurized Milk.—Milk of this class shall come from cows free from disease as determined by physical examinations by a qualified veterinarian and shall be produced and handled under sanitary conditions such that the bacteria count at no time exceeds 200,000 per cubic centimetre. All milk of this class shall be pasteurized under official supervision, and the bacterial count shall not exceed 10,000 per cubic centimetre at the time of delivery to the consumer. It is recommended that dairies from which this supply is obtainable should score 65 on the United States Bureau of Animal Industry score card.

The above represents only the minimum standards under which milk may be classified in Grade A. The Commission recognizes, however, that there are grades of milk which are produced under unusually good conditions, in especially sanitary dairies, many of which are operated under the supervision of medical associations. Such milks clearly stand at the head of this grade.

GRADE B.—Milk of this class shall come from cows free from disease as determined by physical examinations of which one each year shall be by a qualified veterinarian, and shall be produced and handled under sanitary conditions, such that the bacteria count at no time exceeds *1,000,000 per cubic centimetre.* All milk of this class shall be pasteurized under official supervision, and the bacterial count shall not exceed *50,000* per cubic centimetre when delivered to the consumer.

It is recommended that dairies producing Grade B milk should be scored and that the health departments or the controlling departments, whatever they may be, should strive to bring these scores up as rapidly as possible.

GRADE C.—Milk of this class shall come from cows free from disease as determined by physical examinations, and shall include all milk that is produced under conditions such that the bacterial count is in excess of 1,000,000 per cubic centimetre.

All milk of this class shall be pasteurized, or heated to a higher temperature, and shall contain less than 50,000 bacteria per cubic centimetre when delivered to the customer. It is recommended that this milk be used for cooking or manufacturing purposes only.

Whenever any large city or community finds it necessary, on account of the length of haul or other peculiar conditions, to allow the sale of Grade C milk, its sale shall be surrounded by safeguards, such as to insure the restriction of its use to cooking and manufacturing purposes.

CLASSIFICATION OF CREAM.—Cream should be classified in the same grades as milk, in accordance with the requirements for the grades of milk, excepting the bacterial standards which, in 20 per cent. cream, shall not exceed five times the bacterial standard allowed in the grade of milk.

Cream containing other percentages of fat shall be allowed a modification of this required bacterial standard in proportion to the change in fat.

We have used this standard in discussing our results, but have added one other grade, *which is five times worse than Grade C.* Milk which is classed in this grade should not be sold for human food.

Another important consideration not mentioned by the "Milk Commission" is the *kind* of bacteria found in milk. Our analyses take note of the "colon" and "liquefier" groups of organisms, both of which are associated with manurial infection, and that which comes from the dirt and dust of stables, fodders and bedding, and we add this to the grades mentioned by the Commission, and to the Grade D which we suggest.

It is obvious that a high "colon" and "liquefier" content reveals the presence of dirt, and the bacteria in this are increased by the high temperatures at which the milk has been kept.

Further, the presence of the colon group in pasteurized milk indicates that this process has been improperly carried out.

These grades can be tabulated thus:—

GRADING OF MILK.

Grade.	Raw.	Before pasteurizing.	After pasteurizing.	Colon group.		Liquefier group.		Grade.
				Before pasteurizing.	After pasteurizing.	Before pasteurizing.	After pasteurizing.	
Grade A...	under 100.000	200,000	10,000	under 500	0	under 2,000	500	A
" B...	" 1,000,000	1,000,000	50,000	" 5,000	0	" 20,000	5,000	B
" C...	over 1,000.000	1,000,000	50,000	" 10.000	0	" 100,000	50,000	C
" D...	" 5.000,000	5,000,000	100,000	over 10,000	0	over 100,000	100,000	D

Lest it should be thought that this bacterial standard is too high and impractical, we would point out that—

1. The city of Chicago requires that milk and skimmed milk shall not contain more than 100,000 bacteria per c.c. from May 1st to September 30th, and not over 50,000 per c.c. between October 1st and April 30th.

2. The city of Rochester, N.Y., has a maximum standard of 100,000 bacteria per cubic centimetre.

3. The city of Boston, Mass., has a strict standard of 500,000 bacteria per cubic centimetre.

4. The city of New York has a maximum standard of 60,000 bacteria per c.c. for "inspected milk," and 50,000 bacteria per c.c. for pasteurized milk.

In all cases these standards are for samples as delivered to the consumer.

Area Supplying Milk to Montreal.

A great city consumes daily a large quantity of milk, and in consequence the area supplying this is often extensive. In the case of Montreal, sixty to eighty thousand gallons of milk are consumed daily. This quantity is obtained from the city of Montreal and from the Provinces of Quebec and Ontario, and is supplied from points mostly within a hundred-mile radius of the city.

Some dairymen within the city limits keep their own herds, but the total number of cows thus housed is less than 1,000.

The average daily quantity of milk from these will not be more 1,400 gallons.

While, in addition, a few herds are to be found just outside the city limits, this does not alter the fact that almost the whole of the milk is drawn from the country districts by various methods of transportation.

It has proved a difficult matter to obtain exact figures relating to the amount of milk consumed, but from the data at our disposal we make a conservative estimate when we say that the average daily consumption of milk in Montreal is at least 60,000 gallons, not taking into account the large quantities of cream distributed each day. It is very evident, therefore, that the quantity of milk produced in the city itself is small, representing not more than 2½ per cent. of the total quantity.

Twenty-five of the counties in the Province of Quebec are to a greater or lesser extent engaged in the production of milk for Montreal; while, as stated elsewhere, a considerable quantity comes from several districts in Ontario.

In the following table we give the number of shippers from the various counties, classified as to whether they send milk or cream direct or through the medium of a collecting depot, factory or creamery.

NUMBER OF SHIPPERS.

—	Milk.	Cream.	Via creameries, etc.
Jacques Cartier (Island of Montreal)	406	.....	.....
Argenteuil	190	5	.....
Chateauguay	186	85	.....
Huntingdon	132	12	183
Two Mountains	127	33	115
Terrebonne	119	18	165
L'Assomption	139	48	17
St. Johns	84	.....	92
Richmond	67	35	.....
Vaudreuil	88	1	.....
Chambly	57	.....	.....
Rouville	54	.....	.....
Isle Jesus	68	.....	310
Missisquoi	33	6	158
Bagot	7	84	.....
Beauharnois	16	6	.....
Drummond	14	67	.....
Nicolet	.....	39	41
St. Hyacinthe	1	31	.....
Shefford	9	46	.....
Laprairie	12	6	.....
Napierville	7	1	.....
Soulanges	5	1	.....
Sherbrooke	15	.....	.....
Brome	11	4	.....
Ontario	249	26	.....

Notes.

ISLAND OF MONTREAL.—The two centres responsible for the largest quantity of milk are St. Laurent and St. Leonard.

ARGENTEUIL COUNTY.—Over two-thirds of the shippers are in the district served by Lachute station.

CHATEAUGUAY.—Of the total milk shippers, one hundred and sixty are in the Ormstown and Howick districts. St. Philomene has a few milk shippers and sends more than half the cream.

HUNTINGDON.—With the exception of twenty-seven shippers, all the milk from this county is consigned from the various crossings on the Grand Trunk Railway, specified elsewhere.

The total milk from those shippers who supply the milk depot adjoining Huntingdon station is not as yet consumed in Montreal as fresh milk.

TWO MOUNTAINS.—St. Thomas, St. Scholastique and St. Eustache are the most important consigning stations, being responsible for the milk of one hundred and sixteen shippers. At St. Monique there is a creamery taking the milk from eighty-four farms, and at St. Eustache a similar depot has thirty-one patrons.

TERREBONNE.—A great proportion of the milk which arrives at the creameries is separated and shipped as cream.

L'ASSOMPTION.—Details not obtained.

ST. JOHNS.—About ninety-two of the shippers are patrons of a depot at Lacolle, the most of this milk being mixed and then reshipped to the city.

Five other railway stations load milk for Montreal.

RICHMOND.—Much more than half the milk and cream is carried from Richmond and Melbourne stations.

VAUDREUIL.—Vaudreuil, Como, and Point Fortune are responsible for thirty-six, sixteen and twenty shippers respectively.

CHAMBLY.—Boucherville, Longueuil and St. Hubert stations take the milk of fifty-two out of the total fifty-seven shippers.

ROUVILLE.—Abbotsford station consigns the milk of twenty-two shippers; Rougemont and Ste. Marie stations of thirteen and eleven shippers respectively.

ISLE JESUS (LAVAL).—One hundred farmers draw their milk to St. Vincent de Paul; one hundred and thirty-six to Ste. Rose. To the best of our knowledge, the whole of this is separated into cream before transmission to Montreal.

MISSISQUOI.—Cowansville, Frelighsburg and Farnham, of this county, discussed on pages 17, 18, 19.

BAGOT.—Ste. Rosalie, Ste. Helène, St. Simon and Upton are the stations from which sixty-seven out of the eighty-four cream shippers consigned their product.

BEAUHARNOIS.—St. Louis station is the only point from which milk and cream are consigned, except for two shippers whose milk is loaded at Valleyfield station.

DRUMMOND.—It is principally cream which is shipped from this county; St. Eugene, St. Guillaume and Lisgar being the chief stations concerned.

NICOLET.—Twenty-four and fourteen shippers despatch cream from Laurier and Ste. Perpetue stations respectively. To a creamery at St. Sylvestre forty-one farmers supply milk.

ST. HYACINTHE.—St. Hyacinthe, Ste. Madeleine and St. Damase stations deal with the cream of fourteen, eleven and six shippers respectively.

SHEFFORD.—Waterloo, Warden and Lawrenceville are the principal railway stations consigning cream.

LAPRAIRIE.—St. Isidore and St. Constant stations are the only ones engaged in milk traffic.

NAPIERVILLE.—Seven milk shippers consign their cans from Côte Ste. Therese station.

SHERBROOKE.—Lennoxville station despatches the milk from ten farms.

ONTARIO.—Chesterville is by far the most important milk-shipping centre. Bainsville, Lancaster, Inkerman, Moose Creek and Mountain also send considerable quantities of milk.

Transportation.—Milk is transported in 8-gallon cans, which are usually unsealed.

The farmers supplying milk for city consumption usually do their own hauling to the station. Early arrival frequently necessitates a considerable wait before the departure of the train. In the summer the milk must increase in temperature, owing to its being exposed to heat for long periods of time. No arrangements for storing milk are installed at any station.

Inasmuch as the farmer is obliged, by order of the Railway Commission, to help place the milk cans in the cars, farmers must await the arrival of the train, often losing much time. Frequently farmers combine, one man waiting for the arrival of the train and helping to load the cans. At Cookshire, for example, as there are few shippers, the farmers take turns at hauling and loading at about 4 a.m.

The following table gives the railway, train number, route, time of arrival and departure, hours on the trip, distance, and collecting stations of most of the trains carrying milk.

TRAINS CARRYING MILK TO MONTREAL.

Railway.	Train No.	From.	Departs. Week Days.	Departs. Sundays.	Arrives Montreal.	Hours on Trip.	Distance.	Principal Shipping Stations en route.
G. T. Ry.	3	Dixville.	——	2.06 p.m.	6.05	4	128.5	Lennoxville, Richmond, Ste. Hyacinthe, Ste. Madeline.
"	5	"	8.09 a.m.	——	1.10	5	"	Upton, Ste. Rosalie. Windsor Mills, Corris, Titus, Gore, St. Hubert.
"	53	Fort Covington.	5.50 "	——	8.50	3	74.2	Carrs, Smellie, Huntingdon, Dewittville, Ormstown.
"	Special	" "	7.20 "	——	10.00	2.40	"	Bryson, Howick, St. Martine, Ste. Philomene, St. Isidor.
"	57	" "	1.52 p.m.	——	4.45	3	"	Bryson, Howick, St. Martine, Ste. Philomene, St. Isidor.
"	12	Iroquois.	6.43 a.m.	——	10.35	4	99	Moulinette, Summerstown, Lancaster, Bainsville.
"	76	Brockville.	4.25 p.m.	——	8.35	4	135.6	Iroquois, Lancaster, Bainsville, Summerstown.
"	560	Vaudreuil.	7.10 a.m.	——	8.10	1	24	Ste. Anne de Bellevue, Dorval, Strathmore, Beaconsfield.
"	964	"	——	7.35 a.m.	8.40	1	"	Ste. Anne de Bellevue, Dorval, Strathmore, Beaconsfield.
"	7 East	St. Hyacinthe.	7.30 a.m.	——	8.45	1.15	36	Ste. Madeline, St. Hubert, Beloeil, St. Hilaire, St. Bazile, St. Bruno.
"	51	Iberville.	7.20 "	——	8.37	1.15	28	L'Acadie, Brosseau Point.
"	13	St. Lambert.	——	6.40 a.m.	7.05	0.25	6	Moose Creek, Maxville, Greenfield, and stations on Hawkesbury Line.
"	22	Moose Creek.	9.30 a.m.	——	11.45	2.15	78	Mountain, Inkerman, Winchester, Chesterville, Avonmore, Moncklands.
C. P. Ry.	30	Kempton, Kemptv'le.	8.47 "	——	12.30	3.50	108.5	Glen Norman, Dalhousie Mills, " "
"	Special	Chesterville.	——	6.00 a.m.	10.00	4	86	St. Epiphanie, C. Ronde, Mascouche, Terrebonne, St. F. de Sales, St. Vincent, Bordeaux.
"	365	Vaucleuse.	8.10 a.m.	——	10.00	1.50	39	Staynorville, Lachute, St. Hermas, St. Scholastique, St. Augustin, Ste. Therese, Ste. Rose.
"	424	Grenville.	7.51 "	——	11.00	3.09	58.5	Brigham, Farnham, Drummondville, St. Philipe, L'Acadie.
"	207	Cowansville.	9.37 "	——	12.05	2.30	57	Milk from Ste. Rosalie, St. Pie, Abbotsford, transferred at Farnham.
"	203	Foster.	9.13 "	——	11.25	2.12	70	Pt. Fortune, Choisy, Hudson, Como, Vaudreuil, St. Annes, Dorval.
"	518	Rigaud.	8.05 "	——	9.30	1.25	40	Lennoxville. Most of the milk on this line comes on No. 203.
"	15 C.P.	Cookshire.	4.19 "	——	8.30	4.10	129	St. Therese, St. Janvier.
"	440	St. Jerome.	7.58 "	——	9.20	1.20	32	St. Therese.
"	442	"	9.12 "	——	10.35	1.23	32	Chateauguay, Beauharnois.
N. Y. C. Ry.	23	Valleyfield.	6.40 "	——	8.10	1.30	35	Chateauguay, Beauharnois.
"	25	Athelstan.	6.41 "	——	8.50	2.09	52	Chateauguay, Beauharnois.
"	7	"	——	9.25 a,m.	11.40	2.15	52	
C. Vt. Ry	45	Frelighsburg.	7.00 "	——	9.45	2.45	45	
C. N. Ry.	5	St. Jerome.	5.45 "	——	8.45	3.00	36	St. Lin, Epiphanie, St. Paul el Hermite, Charlemagne, L'Assomption.
Q. M. & S. Ry.	3	St. Francois du lac.	3.28 p.m.	——	7.10	3.45	67	Longueuil, Boucherville, Varennes.
"	1	"	6.50 a.m.	——	9.40	2.50	67	Longueuil, Boucherville, Varennes.
Napierville J. Ry.	51	Lacolle.	6.30 "	——	8.25	1.50	20	

The cans are placed in the ordinary baggage or express car. No refrigerator cars are used, and as some hauls take four or five hours, and as the doors of the cars are frequently left open, the milk rises several degrees in temperature under summer conditions. The temperature of about a hundred cans was taken at Chesterville on July 23rd, 1913. A few cans were at 56 deg. F., some at 72 deg. and the average temperature was 61 deg.

The milk is unloaded at the various city terminals and is then conveyed by the dealers to their respective establishments, except in the case of those who peddle milk directly from the can.

About four waggon loads daily are drawn by road from the surrounding country to Longueuil. These cross the river by ferry and are driven to their destination.

From many districts within fifteen miles or so of Montreal much of the milk is driven in on waggons. Upwards of 200 shippers transport their milk in this way, the time consumed *en route* varying from one to four hours. This method of transportation applies to such places at St. Laurent, St. Leonard de P. Maurice, St. Leonard Pointe aux Trembles, Cote St. Michel, Cote St. Paul, Ville Emard, Verdun, and others.

The alternative of transportation by electric railway is provided for Sault aux Recollets, Longue Pointe and Cote Visitation, etc.

St. Vincent de Paul, seventeen miles from the city, is a collecting centre as well as a shipping station. At least 100 cans of cream are conveyed daily from here to Montreal by road.

After being handled in various ways, pasteurized, bottled, stored, etc., the milk is delivered to the consumer the following morning, when it is about twenty-four to thirty-six hours old. A great deal of milk receives no treatment whatsoever and is delivered to the consumer soon after arrival in the city, or next day.

Hours of delivery to the consumer include from 4 to 10 a.m.

Nearly all delivery waggons are covered, thus preventing, to a certain extent, the entrance of dust.

Milk sold from the can is measured to the customer in a quart measure of such shape as to form, when inverted, the cover of the can.

RURAL SAMPLES

Notes on the Principal Districts Shipping Milk to Montreal—Analyses of Samples Obtained in the Country, and Remarks on the Bacterial Content and Grading—Summary of all Rural Samples.

When samples were obtained at the farms, we noted whether they represented morning's or evening's milk or mixed morning's and evening's. On the tables, such particulars, when known, are given.

Samples taken from the cans at the railway stations, or as received at the various milk-collecting stations, depots, or creameries were frequently of milk about which we had no such particulars. Often these cans undoubtedly contained mixed milk, but unless we were quite sure, samples so taken were tabulated as unclassified; hence the term as used in the tables.

Frelighsburg.—This district is typically a dairy one. the farmers engaging almost entirely in the production of milk. Little milk or cream is sent to Montreal direct. Some farms are equipped with separators; the cream from these farms and in other cases the milk itself is largely purchased by a local factory. The proprietor of this arranges his procedure in accordance with the demands of the Montreal market.

Some of the milk is shipped to the city, the remainder being separated and the cream sent to Montreal, or when the demand does not warrant, it is made into butter. This product is disposed of by the "Cowansville Board."

At the factory the milk or cream respectively is heated to 140 deg. F. for three minutes, and is then cooled to 40 deg. F.

Separated milk, which is available when cream is produced, is returned to the farmers unpasteurized in the same cans in which the whole milk is brought to the factory. Herein lies a ready means of spreading throughout a whole district any trouble with which one particular farmer's milk may be infected.

At the time of our visit, waggons from across the American border collected cream from the farms in the Frelighsburg district twice weekly, thus constituting an alternative outlet for those who would otherwise have sent to Montreal.

Such should have been an advantageous state of affairs, but we were given to understand that these purchasers had practically no stipulations as to the conditions prevailing at the farms from which the

FRELIGHSBURG (A.M. SUMMER.)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers. Sporulating.	Liquefiers. Non-sporulating.	Grade.
Sample at Depot.								
31	330,000	300,000	60,000	60,000	10,000	160,000	.....	D Liq.
33	160,000	300,000	.....	100,000	.....	.....	100,000	C "
42	460,000	260,000	300,000	30,000	.....	60,000	.....	C "
44	230,000	860,000	60,000	230,000	.....	130,000	30,000	D "
Total...	1,180,000	1,720,000	420,000	420,000	10,000	350,000	130,000	.....
Average.	295,000	430,000	105,000	105,000	2,500	87,500	32,500	.....
					percentage .8	percentage 20.3	percentage 7.5	
Afternoon's milk sampled at farms.								
27	230,000	100,000	.....	.....	.....	30,000	.....	C Liq.
29	160,000	500,000	.....	60,000	.....	230,000	100,000	D "
32	460,000	460,000	60,000	.....	.....	60,000	30,000	C "
34	430,000	300,000	160,000	60,000	.....	.....	.....	B
36	200,000	700,000	30,000	230,000	30,000	100,000	100,000	D
38	130,000	500,000	30,000	130,000	.....	60,000	30,000	C Liq.
46	160,000	1,230,000	60,000	60,000	30,000	1,000,000	30,000	D
Total...	1,770,000	3,790,000	340,000	540,000	60,000	1,480,000	290,000	.....
Average.	252,857	541,428	48,571	77,143	8,571	211,428	41,428	D Liq.
					percentage 3.3	percentage 39.0	percentage 7.6	
GRAND TOTAL OF NIGHT'S AND MORNING'S—								
	2,950,000	5,510,000	760,000	960,000	70,000	1,830,000	420,000	
AV...	268,181	500,909	69,090	87,272	6,363	166,363	38,181	
					percentage 2.3	percentage 33.2	percentage 7.6	

cream was drawn. This considerably weakened the hands of the Inspection Department of the city of Montreal, for rather than comply with the regulations of the latter, many farmers would contract with the American buyers, even at a reduced rate of payment.

The average score at eight farms supplying milk to Montreal was 34, the highest being 59. Of these only two had milk-houses, and three had ice.

The four samples of morning milk had a relatively high bacterial content and a very large number of "liquefiers."

Seven samples of afternoon milk gave similar results. The colon content of two was over 15 per cent. of the total agar count.

One sample of mixed cream was very bad; nearly half the bacterial content was made up of sporulating and non-sporulating "liquefiers."

The milk was in Grade B, as regards agar count, Grade C for colon count, and Grade D for liquefier count.

The number of samples in Grade D was:—

Agar count	0
Colon count	2
Liquefier count	5

Cowansville.—As a dairying district this is most prolific, and the production of milk, cream and butter form the staple industry.

Two creameries are established, one in the vicinity of Cowansville, the other some few miles away.

The former of these is run in conjunction with two skimming stations to which the farmers bring their milk. Here separation takes places, the cream then being carted to the main creamery at Cowansville.

One of the skimming stations was visited and found to be in a very dirty condition; the building stood a few yards from the road and the whole of the installation was open to contamination by dust and its attendant impurities.

At the central creamery a good deal of milk is also received for separating; the cream, in addition to that obtained from the auxiliary stations is heated for two or three minutes at 145 deg. F., cooled, filled into cans and placed in ice water until shipment the following day. The farmers receive back a proportionate quantity of separated milk, unpasteurized, from a tank of questionable cleanliness, in the cans wherein the whole milk was brought.

The creamery some miles distant from Cowansville receives a daily quantity of 700-800 gallons of milk from some thirty patrons.

The general conditions of this establishment are more cleanly and the treatment of the produce better.

After separation the cream is pasteurized at 155-160 deg. F. for some ten minutes, is cooled to 50 deg. F., and is then stored in cans placed in ice water, until shipment to the city.

The same procedure as mentioned above is followed respecting the separated milk, and in common with other creameries this forms no exception as regards the unsatisfactory nature of the tank, and the general method of returning the separated milk to the farms.

The proprietors of the creameries do not purchase the raw products outright. These are received from the farmers who get the price obtained on the market for the various commodities, less a definite percentage retained by the creamery proprietors as their commission for treatment and marketing.

Owing to the important part played by creameries in disposing of milk, but few farms were visited. Speaking generally, however, conditions were much the same as in Frelighsburg, except that the farmers seemed more progressive, due possibly to the absence of an alternative market across the boundary.

Five samples of morning's milk gave an average agar count of a quarter of million, mostly lactic acid forms. One sample had a very high colon content, 32.500 per c.c. Five samples of afternoon milk were very bad, with an average of over a million bacteria per c.c.

Several analyses of cream before and after pasteurizing and when ready for shipment are instructive. The agar count was reduced from sixteen million to thirty thousand by the pasteurizing process. The various operations through which the cream passed before shipment increased the bacterial content to 200,000 per c.c.

Mention is made in the notes about a tank from which farmers take back skim-milk in the same cans in which the milk is brought. Skim-milk from the tank gave a bacterial content of sixteen million bacteria to the cubic centimetre. Such a high content must contaminate the cans and make cleaning difficult.

The average of twenty-one samples grades as follows:—

Agar count, Grade B.....	900,000 per c.c.
Colon count, Grade B.....	5,000 per c.c.
Liquefier count, Grade D.....	140,000 per c.c.

The number of samples in Grade D was:—

Agar count	1
Colon count	4
Liquefier count	3

Chesterville, Ont.—This town, on the main line of the C.P.R. to Toronto, ships about 2,000 gallons of milk to Montreal daily. The surrounding country is eminently a dairy one, there being four cheese factories within as many miles, also a condensing establishment, which, however, has not been running continuously during during the past few years.

Outstanding among the farms of this section is the "Allison Stock Farm," which has a model stable and a high-class herd of Holstein cattle. It may be said of most other farms that we visited that the stock was promising, the stables generally whitewashed, and the water supply good, bored or dug wells being usual. Most places had separate milk houses and a store of ice. Milking machines were not uncommon and seemed to be on the increase.

The average score of a dozen farms was over 40 per cent., the highest 82 and the lowest 10.

Twenty-four samples of morning's milk taken at the station gave an average agar count of 134,000; the liquefier count was high, the percentage in a number of cases exceeding twenty. These are the best series of results from any district.

The average of these fifty samples grades as follows:

Agar count, Grade B	134,000 per c.c.
Colon count, Grade B	3,250 per c.c.
Liquefier count, Grade C	50,000 per c.c.

The number of samples in Grade D was:—

Agar count	0
Colon count	2
Liquefier count	3

Lancaster.—General conditions much as in Chesterville. Lancaster and Bainsville, which are six miles east, together ship about 1,000 gallons daily. Twenty farms were visited, from which nineteen samples were collected. All are of morning's milk. No scoring of farms was attempted.

Nineteen samples from this district gave a general average of 1,300,000 per c.c. (agar count); but three bad samples contributed largely to this result.

Compared with other districts the colon and liquefier percentages were low.

The average milk grades as follows:—

Agar count, Grade C	1,300,000 per c.c.
Colon count, Grade B	3,700 per c.c.
Liquefier count, Grade D	110,000 per c.c.

The number of samples in Grade D was:—

Agar count	1
Colon count	2
Liquefier count	3

COWANSVILLE (SUMMER.)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers. Sporulating.	Liquefiers. Non-sporulating.	Grade.	
	P.M., sampled at Depot.								
62	2,400,000	2,015,000	1,915,000	1,780,000	750	50,000	.....	C	
72	2,630,000	3,980,000	.....	3,315,000	12,000	.....	150,000	D	
80	100,000		80,000		.....			A	
90	250,000	100,000	165,000	.....	.....	.....	15,000	B	
94	615,000	26,415,000	250,000	25,830,000	14,000	.....	100,000	D	Colon
Total...	5,995,000	32,510,000	2,410,000	30,925,000	26,750	50,000	265,000		
Average.	1,199,000	8,127,500	482,000	7,731,250	5,350	12,500	66,250	C	
					percentage .4	percentage .1	percentage .8		
	A.M. sampled at Depot.								
64	30,000	200,000	.....	.....	.....	.....	.....	A	
76	250,000	50,000	30,000	.....	.....	.....	.....	B	
78	800,000	130,000	600,000	50,000	.....	.....	.....	B	
86	100,000	80,000	65,000	.....	32,500	.....	.....	D	Colon
100	165,000	465,000	.....	150,000	750	.....	.....	B	
Total...	1,345,000	925,000	695,000	200,000	33,250	.....	.....		
Average.	269,000	185,000	139,000	40,000	6,650	.....	.....	C	
					percentage 2.4	.....	.....		
	Mixed N. & M.	milk—						D	Liq.
55	2,380,000	2,000,000	1,650,000	1,100,000	.....	.....	675,000	D	
65	7,365,000	14,550,000	3,565,000	9,215,000	40,000	.....	2,030,000	B	
68	850,000	415,000	580,000	365,000	.....	.....	.....		
Total...	10,595,000	16,965,000	5,795,000	10,680,000	40,000	.....	2,705,000		
Average.	3,531,666	5,655,000	1,931,666	3,560,000	13,333	.....	901,666	D	
					percentage .3	.....	percentage 15.9		
	A.M. or P.M. not specified.								
39		225,000		100,000		.....	25,000	C	Liq.
41		580,000		.....		.....	50,000	C	"
43	50,000	550,000	15,000	80,000	.....	65,000	15,000	C	"
47	330,000	65,000	50,000	.....	.....	.....	.....	B	
49	30,000	200,000	450,000	50,000	.....	.....	.....	B	
51	180,000	330,000	130,000	30,000	.....	15,000	.....	B	
63	315,000	330,000	150,000	215,000	.....	15,000	15,000	C	Liq.
59	430,000	315,000	430,000	215,000	750	.....	50,000	C	"
61	100,000	765,000	50,000	30,000	2,500	15,000	15,000	C	"
57	325,000	330,000	175,000	100,000	.....	30,000	.....	C	"
Total...	1,760,000	3,690,000	1,450,000	820,000	3,250	140,000	170,000		
Average.	220,000	369,000	181,250	82,000	406	14,000	17,000	C	Liq.
					percentage .1	percentage 3.7	percentage 4.6		
Grand Total.	19,695,000	54,090,000	10,350,000	42,625,000	103,250	190,000	3,140,000		
Average.	937,857	2,458,636	492,857	1,937,500	4,916	8,636	142,727	D	Liq.
					percentage .5	percentage .3	percentage 5.8		
69	2,450,000	1,750,000	1,330,000	780,000	26,500	.....	815,000		
71	15,930,000	6,600,000	7,030,000	6,030,000	43,000	.....	130,000		
66	115,000	250,000	115,000	50,000	.....	.....	.....		
98	16,080,000	18,180,000	2,615,000	17,080,000	.....	15,000	730,000		
88	30,000	65,000	30,000	.....	.....	.....	.....		
37	200,000	200,000	80,000	65,000	.....	.....	15,000		

69 Skim milk fresh from separator. 71 Skim milk as returned to patrons from tank. 66 Cream. 98 Cream from separator prior to pasteurising. 88 Cream immediately after pasteurising and cooling. 37 Cream as for shipment.

CHESTERVILLE (SUMMER) MORNING'S MILK.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
54	30,000	515,000	30,000	215,000	.....	.....	15,000	B Liq.
58		180,000		100,000		.....	15,000	B "
75	30,000	565,000	15,000	230,000	.....	65,000	.....	B "
77	30,000	250,000	.....	65,000	1,000	.....	80,000	B
79		115,000		50,000	300	65,000	.....	B Liq.
83	125,000	800,000	150,000	280,000	3,000	.....	30,000	C "
85	100,000	115,000	30,000	.....	1,000	.....	50,000	C "
95	30,000	860,000	.....	330,000	300	60,000	.....	C "
102	1,075,000	2,800,000	150,000	350,000	4,300	.....	.....	C Total.
104		200,000		30,000		30,000	.....	C Liq.
105	15,000	300,000	15,000	115,000	300	.....	30,000	C "
107	200,000	2,515,000	50,000	1,215,000	.....	.....	880,000	D "
109	50,000	100,000	.....	30,000	.....	.....	15,000	B "
110	30,000	100,000	.....	15,000	.....	.....	15,000	B "
113	530,000	450,000	130,000	100,000	300	.....	15,000	B
115	15,000	115,000	.....	.....	.....	.....	15,000	B Liq.
119		115,000		15,000		.....	15,000	B "
121	65,000	80,000	15,000	15,000	300	.....	30,000	C "
122	100,000	115,000	15,000	100,000	300	.....	.....	A
124	80,000	150,000	15,000	30,000	3,000	.....	80,000	C Liq.
128	880,000	4,815,000	750,000	3,980,000	84,000	30,000	180,000	D Colon.
131		500,000		350,000	1,600	.....	100,000	C Liq.
140	115,000	200,000	15,000	100,000	300	15,000	.....	B
146	150,000	165,000	30,000	30,000	300	.....	.....	B Total.
Total...	3,650,000	16,120,000	1,410,000	7,745,000	100,300	265,000	1,565,000	
Average.	192,105	671,667	74,210	322,708	4,776	11,042	65,208	
					percentage 2.4	percentage 1.6	percentage 9.7	
	Evening's milk							
52	65,000	100,000	.....	30,000	.....	.....	.....	A
56	15,000	250,000	.....	50,000	600	.....	65,000	C Liq.
60	80,000	280,000	50,000	200,000	300	.....	15,000	B "
81	65,000	600,000	.....	.....	300	.....	15,000	B "
87	30,000	200,000	15,000	15,000	4,000	.....	50,000	C "
97	65,000	150,000	.....	65,000	.....	.....	15,000	B "
99	165,000	75,000	.....	25,000	.....	.....	.....	B Total.
101	180,000	2,830,000	30,000	15,000	1,000	.....	15,000	B
103	30,000	180,000	.....	30,000	7,300	.....	30,000	C
106		200,000		50,000		.....	.....	A
111		130,000		15,000		.....	15,000	B Liq.
114	30,000	130,000	.....	30,000	600	.....	15,000	B "
117		200,000		15,000	300	.....	.....	A
118	15,000	80,000	.....	30,000	3,000	.....	15,000	B
120	150,000	30,000	30,000	15,000	600	.....	.....	B
125	115,000	250,000	50,000	115,000	300	.....	15,000	B
126	30,000	165,000	30,000	80,000	600	.....	15,000	B
127	65,000	115,000	15,000	30,000	300	.....	15,000	B Liq.
133	65,000	50,000	.....	30,000	.....	.....	.....	A
138	30,000	80,000	.....	.....	2,000	.....	.....	B Colon.
142	215,000	130,000	50,000	30,000	.....	.....	30,000	C Liq.
144	180,000	200,000	50,000	80,000	1,300	30,000	15,000	C "
112		515,000		130,000	10,300	15,000	150,000	D Colon.
89		350,000		15,000	5,000	.....	15,000	B Liq.
132		250,000		130,000	2,600	.....	15,000	B
134	100,000	465,000	15,000	400,000	5,600	.....	130,000	D Liq.
Total...	1,590,000	8,005,000	335,000	1,625,000	46,000	45,000	640,000	
Average.	79,500	307,884	16,750	62,500	1,917	1,730	24,615	
					percentage 2.4	percentage .5	percentage 7.9	
	GRAND TOTAL OF NIGHT'S & MORNING'S—							
	5,240,000	24,125,000	1,745,000	9,370,000	146,300	310,000	2,205,000	
Average	134,359	482,500	44,743	187,400	3,251	6,200	44,100	
					percentage 2.4	percentage 1.2	percentage 9.1	

LANCASTER (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
	All morning's milk, sampled at Station.							
30	60,000	93,000	53,000	80,000	200	3,000	6,000	B Liq.
50	340,000	2,693,000	210,000	356,000	11,200	.....	430,000	D
73	20,000	83,000	6,000	66,000	.....	3,000	3,000	B Liq.
91	14,210,000	30,420,000	13,100,000	19,110,000	10,000	.....	795,000	D
93	30,000	13,000	10,000	3,000	130	.....	.....	A
116	3,000	10,000	3,000	3,000	.....	.....	.....	A
129	10,000	86,000	3,000	76,000	60	.....	10,000	B Liq.
130	90,000	196,000	56,000	153,000	600	3,000	13,000	B "
135	3,470,000	910,000	2,783,000	416,000	45,600	.....	63,000	D Colon.
136	126,000	503,000	70,000	120,000	1,700	.....	76,000	C Liq.
137	16,000	26,000	13,000	6,000	30	.....	.....	A
139	63,000	103,000	33,000	83,000	60	.....	10,000	B Liq.
143	700,000	430,000	566,000	306,000	600	.....	36,000	C "
148	4,933,000	6,000	120,000	3,000	30	.....	.....	C Total.
151	863,000	1,665,000	756,000	1,085,000	.....	10,000	535,000	D Liq.
153	6,000	80,000	.....	56,000	30	3,000	6,000	B "
155	160,000	326,000	76,000	236,000	800	.....	50,000	C "
157	13,000	15,000	3,000	.....	30	.....	.....	A
159	70,000	143,000	40,000	70,000	.....	6,000	43,000	C Liq.
Total...	25,183,000	37,801,000	17,901,000	22,228,000	71,070	28,000	2,076,000	
Average.	1,325,421	1,989,526	942,157	1,169,894	3,740	1,473	109,263	D Liq.
					percentage .2	percentage .07	percentage 5.5	

Howick.—Many of the farmers own pedigree Ayrshire herds, and a number of these have been subjected to the tuberculin test.

A few of the cowsheds are in bad condition, but the great proportion are unreservedly among the best of any district visited.

The majority of the farms are provided with milk rooms, usually with cement floors.

With more efficient treatment in respect to their milk, the Howick farmers would be in an enviable position.

Practically all the farmers ship their milk direct to the city.

Three of the nine samples of morning milk were very fair, four poor, one bad, and one extremely bad. The samples were taken immediately after milking, and with ordinary care in milking the number of bacteria on agar should not have exceeded 100,000 per c.c. No. 154 had a very high colon and liquefier count, pointing to great carelessness in the milking. Of the six evening samples which were twelve hours old, three were fairly good, one poor, and two very bad. No. 158 had a very high total bacterial content and a very large number of liquefiers. The results seem to point to lack of proper cooling and carelessness in milking.

A few samples gave low counts with less than one per cent. of colon; numbers over 100,000 per c.c. must be considered rather high for samples taken immediately after milking. No. 154 was extremely bad.

The same unevenness may be noticed with the samples of evening's milk, which were twelve hours' old at the time of sampling. The average count on agar is high, and evidently shows the lack of proper cooling.

The averages of fifteen samples are as follows:—

Agar count, Grade C	1,600,000 per c.c.
Colon count, Grade C	10,000 per c.c.
Liquefier count, Grade D	215,000 per c.c.

The number of samples in Grade D was:—

Agar count	2
Colon count	1
Liquefier count	3

Huntingdon.—This is one of the best districts inspected. The farms usually have good cowsheds, with cement floors, the stipulated amount of air space, and efficient ventilation.

The Ayrshire breed of cattle predominates, with various grades of the same.

A number of the farms until recently had had wooden cowsheds, but these were being rapidly superseded by new ones of approved construction, either completed or in course of building.

A great deal of the milk is shipped direct to the city, principally from Carr's, Smellies' and other crossings on the Grand Trunk Railway, while a small quantity is put on the train at Huntingdon.

In addition to this, a company which has a large bottled-milk trade in Montreal owns a well-equipped factory adjoining Huntingdon station, to which factory an increasing number of farmers are selling their milk. Here the milk intended for shipment to Montreal is pasteurized, cooled and bottled.

HOWICK (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
	Sampled at farm shortly after milking.							
150	201,500	253,000	95,000	45,000	2,630	.....	16,500	B
154	2,730,000	8,465,000	1,600,000	7,200,000	133,200	.....	630,000	D Colon.
160	171,500	140,000	156,500	65,000	430	.....	25,000	C Liq.
161	505,000	275,000	176,500	115,000	1,330	.....	30,000	C "
162	107,500	225,000	82,500	141,500	1,700	.....	38,000	C "
163	121,500	240,000	93,000	136,500	1,160	.....	68,000	C "
173	43,000	75,000	36,500	23,000	430	1,500	1,500	B
141	40,000	83,000	20,000	65,000	.....	.....	.....	A
70	21,500	53,000	13,000	28,000	.....	.....	3,000	B Liq.
Total...	3,941,500	9,809,000	2,273,000	7,819,000	140,880	1,500	812,000	
Average.	437,944	1,089,888	252,555	868,777	15,653	166	90,222	D Colon.
					percentage 3.5	percentage .01	percentage 8.2	
	Sampled at farm 12 hours after milking.							
28	50,000	121,500	31,500	101,500	1,200	1,500	16,500	B Colon.
45	6,500	126,500	1,500	100,000	100	.....	10,000	B Liq.
147	366,500	1,860,000	286,500	588,000	1,200	.....	76,500	C "
149	8,116,500	4,246,500	.....	23,000	4,130	.....	225,000	D
152	45,000	240,000	26,500	100,000	3,430	.....	21,500	C Liq.
158	11,895,000	16,453,000	.....	13,433,000	960	.....	2,063,000	D
Total...	20,479,500	23,047,500	346,000	14,345,500	11,020	1,500	2,412,500	
Average.	3,413,250	3,841,250	57,666	2,390,916	1,836	250	402,083	
					percentage .05	percentage .006	percentage 10.4	
GRAND TOTAL—(MORNING AND EVENING MILK)								
	24,421,000	32,856,500	2,619,000	22,164,500	151,900	3,000	3,224,500	
AV.....	1,628,066	2,190,433	174,600	1,477,633	10,126	200	214,966	D
					percentage .6	percentage .009	percentage 9 .	

The bottles are then packed in ice and put on the train.

As a milk depot purchasing the raw product from the farms, treating and preparing the milk for transportation to the city, this establishment is the only one we saw which could be considered suitable, and having the necessary facilities for efficient work.

It would seem from the analyses, however, that there is room for improvement in the pasteurization process.

The major portion of the milk purchased by the company is, for the present, condensed.

The quantity of milk drawn by Montreal from the Huntingdon district is so great that a train solely for this purpose is provided by the Grand Trunk Railway, starting from Fort Covington and taking on milk at Carr's Crossing, Smellies' Crossing, Huntingdon, Ormstown, Howick, etc.

Particulars of this train, with others, will be found on p. 16.

Thirteen samples of morning's milk taken one or two hours after milking, and four samples obtained eight hours after milking were analysed. Five of these contained less than 50,000 per c.c. (agar count), seven between this figure and 100,000, and the remainder gave higher counts.

The results from factory pasteurization are poor, as there is only a reduction of 80 per cent.

The afternoon and unclassified milks show similar results.

The average of all samples grades as follows:—

Agar count, Grade B	200,000 per c.c.
Colon count, Grade B	3,800 per c.c.
Liquefier count, Grade D	11,000 per c.c.

The number of samples in Grade D was:—

Agar count	0
Colon count	1
Liquefier count	3

Terrebonne and St. Francois de Sales.—These two stations are on either side of the Terrebonne river and opposite to each other. All the surrounding country and the island itself is inhabited principally by a farming population settled on farms of one hundred acres or less.

The buildings and methods have been until recently decidedly antiquated, but improvements are being made. It seems to us that the work of the Inspector of the Montreal Health Department is here making itself felt; for within the past few months a number of shippers have built milk houses, and apparently for the first time in their experience have used whitewash in their cowsheds.

HUNTINGDON (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers. Sporulating.	Liquefiers. Non-sporulating.	Grade.
	Sampled at Station shortly after milking, A.M.							
164		776,000		63,000		3,000	56,000	C Liq.
199		250,000		100,000		13,000	36,000	C "
145	246,000	6,086,000	90,000	183,000	6,300	43,000	110,000	D "
168	96,000	260,000	33,000	63,000	4,160	20,000	70,000	C "
181	30,000	206,000	3,000	83,000	3,700	.....	53,000	C "
194	96,000	90,000	30,000	30,000	76,800	.....	10,000	D Colon.
195	16,000	20,000	6,000	10,000	330	.....	.....	A
196	110,000	180,000	23,000	123,000	600	3,000	13,000	B
197	100,000	613,000	113,000	346,000	1,100	6,000	53,000	C Liq.
198	20,000	220,000	10,000	43,000	.....	.....	126,000	D "
200	136,000	300,000	30,000	166,000	1,500	3,000	96,000	C "
201	80,000	83,000	10,000	50,000	30	.....	13,000	B "
202	73,000	150,000	13,000	53,000	230	.....	10,000	B "
203	70,000	286,000	33,000	163,000	160	.....	23,000	C "
204	56,000	46,000	30,000	16,000	760	3,000	.....	B
209	30,000	255,000	20,000	35,000	2,230	.....	10,000	B
245	50,000	103,000	16,000	20,000	600	.....	10,000	B
Total...	1,209,000	9,924,000	460,000	1,547,000	98,500	94,000	689,000	
Average.	80,600	583,764	30,666	91,000	6,566	5,529	40,529	
					percentage 8.1	percentage .9	percentage 6.9	
	Sampled at Huntingdon Milk Depot on arrival from farms, A.M. or P.M. not specified.							
156	40,000	25,000	10,000	.....	.....	5,000	10,000	B Liq.
169	80,000	113,000	53,000	80,000	30	.....	6,000	B "
176	160,000	6,333,000	63,000	193,000	1,100	.....	4,850,000	D "
177	1,866,000	6,366,000	1,736,000	5,616,000	1,830	3,000	43,000	C
178	166,000	213,000	130,000	156,000	1,360	10,000	6,000	B
179	43,000	70,000	10,000	10,000	.....	.....	13,000	B
182	123,000	33,000	90,000	16,000	.....	.....	6,000	B
185	1,833,000	3,163,000	2,076,000	2,883,000	1,400	.....	40,000	C
187	30,000	106,000	6,000	30,000	360	.....	46,000	C Liq.
189	20,000	53,000	6,000	13,000	.....	.....	3,000	B "
190	53,000	90,000	23,000	33,000	100	6,000	16,000	C "
Total...	4,414,000	16,565,000	4,203,000	9,030,000	6,180	24,000	5,039,000	
Average.	401,272	1,505,909	382,090	820,909	561	2,181	458,090	
					percentage .1	percentage .1	percentage 30.4	
	Sampled at Station 12 hours after milking—							
207	50,000	50,000	3,000	25,000	30	.....	.....	A
208	93,000	140,000	23,000	33,000	1,760	.....	23,000	C Liq.
Total...	143,000	190,000	26,000	58,000	1,790	.....	23,000	
Average.	71,500	95,000	13,000	29,000	895	.....	11,500	
					percentage 1.2	.....	percentage 12.1	
Grand Total	5,766,000	26,679,000	4,689,000	10,635,000	106,470	118,000	5,751,000	
Average.	205,928	889,300	167,464	354,500	3,802	3,933	191,700	
					percentage 1.8	percentage .4	percentage 21.5	
	Showing process at Huntingdon Depot:— 165 as received. 166 after pasteuration—							
165	510,000	836,000	263,000	346,000	3,000	6,000	70,000	
166	96,000	103,000	76,000	46,000	.....	.....	10,000	

TERREBONNE AND ST. FRANCOIS DE SALES (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
	Sampled at Factory.								
183	3,000	50,000	.....	16,000	.....	.....	.....	A	
214	3,000	20,000	.....	.....	100	.....	.....	A	
216	50,000	216,000	40,000	150,000	60	.....	10,000	B	Liq.
221	2,030,000	5,633,000	1,580,000	5,513,000	9,900	3,000	146,000	D	"
Total...	2,086,000	5,919,000	1,620,000	5,679,000	10,060	3,000	156,000		
Average	521,500	1,479,750	405,000	1,169,750	2,515	750	39,000		
					percentage .4	percentage .05	percentage 2.6		
	Sampled at St. Francois de Sales Station, A.M. or P.M. not specified.								
175	60,000	43,000	53,000	10,000	.....	.....	10,000	B	Liq.
167	33,000	120,000	16,000	33,000	4,230	.....	33,000	C	"
184	33,000	130,000	20,000	85,000	30	.....	5,000	B	"
186	160,000	1,866,000	110,000	1,620,000	300	10,000	33,000	C	"
239	893,700	913,000	740,000	813,000	460	3,000	56,000	C	"
243		156,000		40,000	160	.....	10,000	B	"
244	6,000	6,813,000	.....	6,616,000	330	3,000	560,000	D	"
235	76,000	120,000	33,000	66,000	.....	.....	3,000	B	"
215	13,000	210,000	6,000	90,000	3,300	.....	26,000	C	"
218	96,000	253,000	86,000	90,000	1,260	.....	83,000	C	"
223		63,000		13,000		6,000	10,000	B	"
224	26,000	290,000	20,000	176,000	1,500	.....	26,000	C	"
240	13,000	56,000	13,000	20,000	100	3,000	.....	B	"
249	6,000	380,000	.....	280,000	1,500	.....	36,000	C	"
256	46,000	103,000	16,000	23,000	4,330	3,000	16,000	B	
260	40,000	693,000	26,000	223,000	5,330	.....	146,000	D	Liq.
262	3,000	40,000	.....	3,000	230	.....	40,000	C	"
Total...	1,504,000	12,249,000	1,139,000	10,201,000	23,060	28,000	1,093,000		
Average.	100,266	720,529	75,933	600,058	1,441	1,647	64,294	C	
					percentage 1.4	percentage .2	percentage 8.9		
	Sampled at Terrebonne Station, A.M. or P.M. not specified.								
211	3,000	153,000	3,000	83,000	1,900	.....	3,000	B	
212	16,000	473,000	10,000	106,000	6,000	.....	83,000	C	
217	3,000	16,000	.....	6,000	30	.....	.....	A	
219	6,000	46,000	.....	16,000	30	.....	3,000	B	Liq.
Total...	28,000	688,000	13,000	211,000	7,960	.....	89,000		
Average.	7,000	172,000	3,250	52,750	1,990	.....	22,250	C	
					percentage 28.4		percentage 12.9		
	A.M. or P.M. not specified.								
237	1,236,000	1,213,000	1,070,000	1,060,000	4,760	.....	23,000	C	
238	16,000	20,000	3,000	5,000	.....	.....	.....	A	
242	2,080,000	2,780,000—	2,043,000	1,190,000	13,850	.....	106,000	D	
247	5,566,000	8,866,000	5,540,000	8,816,000	3,060	.....	93,000	D	Total.
253	13,000	120,000	10,000	103,000	300	.....	16,000	B	Liq.
255	5,660,000		5,660,000		2,000				
258	2,240,000	19,150,000	2,036,000	3,713,000	738,200	273,000	2,000,000	D	
261	293,000	1,350,000	223,000	260,000	12,400	.....	60,000	D	Colon.
Total...	17,104,000	33,499,000	16,585,000	15,147,000	774,570	273,000	2,298,000		
Average.	2,138,000	4,785,571	2,073,125	2,163,857	96,821	39,000	328,285	D	
					percentage 4.5	percentage .8	percentage 6.8		
Grand Total.	39,496,000	52,355,000	19,357,000	31,238,000	815,650	304,000	3,636,000		
Average.	1,274,065	1,636,094	624,419	976,187	25,489	950	113,625	D	
					percentage 2.0	percentage .05	percentage 6.9		

TERREBONNE AND ST. FRANCOIS DE SALES (SUMMER)—Concluded.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers. Sporulating.	Liquefiers. Non-sporulating.	Grade.
	Samples of milk taken at St. Francois de Sales Depot, to be separated and shipped as cream.							
233	2,673,000	18,633,000	2,663,000	18,410,000	.....	.....	33.000	C
234	43,000	56,000	30,000	30,000	960	3,000	6,000	B
241	56,000	733,000	36,000	410,000	.....	.....	156,000	D Liq.
246	5,730,000		5,730,000		6,830			D Total.
248	116,000	783,000	23,000	766,000	600	3,000	503,000	D Liq.
250	15,000	80,000	5,000	7,000	500	.....	5,000	B "
251	116,000	153,000	110,000	113,000	30	.....	3,000	B "
257	73,000	726,000	20.000	663,000	7,100	.....	26,000	C
259	340,000	6,066,000	313,000	6,050,000	1,760	3,000	6,000	B
263	733,000	516,000	573,000	466,000	1,200	.....	10,000	B
Total...	9,895,000	27,746,000	9,503,000	26,915,000	18,980	9,000	748,000	
Average.	989,500	3,082,889	950,300	2,990,555	1,898	1,000	83,111	C Liq.
					percentage .19	percentage .03	percentage 2.6	
	NOTE.—These samples, as shown, are not taken from milk as sold in Montreal. The figures, however, have even a greater significance. The cream thus obtained is after a number of hours shipped to the dairy establishment in the city WITHOUT treatment. The bacterial content of cream when consigned to the city is as follows:—							
	Samples of cream taken from bulk at St. Francois de Sales Depot.							
222	260,000	1,283,000	223,000	780,000	19,130	.....	26,000	
228	21,300,000	22,586,000	21,300,000	22,330,000	38,400	.....	236,000	
227	16,000	150,000	10,000	93,000	2,330	3,000	16,000	
231	1,353,000	17,736,000	1,353,000	17,066,000	too full to count	3,000	626,000	
232	1,813,000	28,066,000	1,813,000	22,113,000	133,460	13,000	2,606,000	
Total...	24,742,000	69,821,000	24,699,000	62,382,000	19,320	19,000	3,510,000	
Average.	4,948,400	13,964,200	4,939,800	12,476,400	4,830	3,800	702,000	
					percentage .09	percentage .02	percentage 5.02	

We cannot refrain from saying that from the milk-producing point of view this district shows greater need for improvement than any district visited. New cow-sheds are desirable in the majority of cases, and in spite of the improvements above noted, better facilities for the production and handling of milk.

The herds are composed of all classes of "grades," and little attempt, if any, appears to be made in the direction of establishing any specific breed.

The milk produced in this section is almost entirely monopolised by one large wholesale dairy firm in Montreal; this firm deals principally in cream and owns a number of separating stations at various points, to which many of the farmers cart their milk.

We learned that the price paid for the product is less than the average price obtaining in other districts, and herein lies one likely reason for the lack of care in the production and handling of the milk by the farmers—the absence of adequate remuneration.

The recent erection of a municipal bridge over the Terrebonne river, by which the island is connected with the mainland for road traffic, brings the farms within access of the station. Apparently as a result of this, and knowledge of the fact that better homestead conditions mean a higher price for the milk and a choice of customers, an increasing number of farms are consigning their milk direct from the stations, thus ceasing to be patrons of the skimming depot.

Four samples of milk taken from cans at Terrebonne station gave relatively low counts on agar, with few lactic acid bacteria, but much higher counts on gelatine, with considerable numbers of colon and liquefiers. Seventeen samples taken at St. Francois de Sales station gave much higher figures, with an average agar count of a million and a half organisms per c.c.

The totals for this district are high, and in spite of its proximity to Montreal, the milk would have a very high count before it reached the consumer.

The average of all samples grades as follows:—

Agar count, Grade C	1,250,000 per c.c.
Colon count, Grade D	25,000 per c.c.
Liquefier count, Grade D	115,000 per c.c.

The number of samples in Grade D was:—

Agar count	2
Colon count	4
Liquefier count	6

ORMSTOWN (SUMMER), P.M.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
280	80,000	56,000	26,000	.....	.....	.....	3,000	B Liq.
282	240,000	323,000	46,000	.....	3,400	.....	80,000	C "
284	1,070,000	396,000	1,026,000	60,000	830	.....	36,000	C
285	40,000	20,000	30,000	.....	30	.....	13,000	B Liq.
286	5,533,000	6,606,000	.....	.....	30	6,606,000	.....	D
287	150,000	70,000	110,000	.....	130	.....	.....	B Total.
288	3,000	23,000	3,000	.....	160	.....	.....	A
289	33,000	10,000	20,000	3,000	.....	.....	.....	A
290	273,000	83,000	40,000	13,000	260	.....	10,000	B
291	33,000	43,000	13,000	.....	100	.....	10,000	B Liq.
292	85,000	103,000	16,000	.....	2,100	.....	20,000	B Colon.
293	110,000	116,000	43,000	26,000	4,560	.....	30,000	C Liq.
294	3,000		.....		.....			A
295	233,000	83,000	206,000	46,000	30	.....	.....	B Total.
296	66,000		46,000		60			A
298	6,000		.....		60			A
Total ..	7,958,000	7,932,000	1,625,000	148,000	11,750	6,606,000	202,000	
Average.	497,375	610,153	101,562	11,384	734	508,154	15,537	D Liq.
					percentage .1	percentage 83.2	percentage 2.5	

NOTE.—In the averages, the high percentage of sporulating liquefiers is entirely due to one sample of milk.

Ormstown.—Farms visited had hitherto supplied milk to a local creamery for butter making. The owner of this, on commencing to ship milk to Montreal, had rendered himself and his patrons subject to inspection.

Speaking generally, the farms were of a type and in a condition similar to those of Howick and Huntingdon, and the holders appeared to be keeping them in fairly good order. Well-equipped milk rooms were noted in many cases.

Ayrshires, Holsteins and grades were the usual cattle in favour.

Sixteen samples of evening's milk were analysed; of these three were very good, six fair, five poor, one bad and one very bad. The colon content of two samples was over 3,000 per c.c.; and the liquefier content of over half a million per c.c. was due to the enormous number of these organisms in sample No. 286. No. 286 was remarkable because the gelatine count was made up entirely of liquefiers.

The average of the sixteen samples grades as follows:—

Agar count, Grade B	500,000 per c.c.
Colon count, Grade A	700 per c.c.
Liquefier count, Grade D	500,000 per c.c.

Lachute.—This is one of the two largest centres for the shipment of milk to Montreal.

The milk consigned from Lachute station is drawn from a radius of about eight miles. There are no milk-collecting stations, depots or creameries, but some of the farmers purchase from their neighbours, and for a stipulated commission haul the milk to the station.

In all there are at least seventy-five shippers who are responsible for a daily production during the summer months of 2,400 gallons of milk, in addition to a quantity of cream; the latter being produced by those farmers who have separators.

Special arrangements are made by the C.P.R. for the convenience of farmers; a baggage car is provided and placed on a siding; the milk carts are driven up and from a raised platform can be unloaded into the car before its attachment to the train.

A large number of farms were visited and found to be in moderately good order. The majority were equipped with milk rooms. In one instance a separator, fixed in the cowshed, was being used daily. This, however, was shortly afterwards transferred to a milk room.

Our time permitted of the complete scoring of only seven farms, the average score of which was 52; the highest score was 69, the lowest 38.

Six of the seven had milk rooms, and in each case the facilities for the cooling and storage of milk were good.

These forty-five samples, with few exceptions, were taken from the cans at the railway station en route to the city.

Eleven samples gave agar counts of less than 50,000, but the general average was high, being over a million and a half per c.c. It is interesting to note that on two farms, well-managed, with modern methods of avoiding contamination, the agar count was 20,000 per c.c.

The highest colon number was 198,000 per c.c. Liquefiers were very numerous in many samples.

The average of the forty-five samples grades as follows:—

Agar count, Grade C	1,600,000 per c.c.
Colon count, Grade C	10,000 per c.c.
Liquefier count, Grade D	300,000 per c.c.

The number of samples in Grade D was:—

Agar count	4
Colon count	6
Liquefier count	15

LACHUTE (SUMMER), A.M. OR P.M. NOT SPECIFIED.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
	Sampled at Station—								
171*	323,000		233,000		1,760			B	
174*	40,000	113,000	10,000	70,000	.....	13,000	.....	B	
191	26,000	65,000	3,000	15,000	.....	40,000	5,000	C	Colon.
192*	5,206,000	14,820,000	5,166,000	14,120,000	198,000	.....	646,000	D	
220*	73,000	140,000	23,000	80,000	.....	.....	10,000	B	Liq.
252*	76,000	110,000	30,000	70,000	1,830	10,000	5,000	B	
267*	120,000	415,000	53,000	330,000	.....	10,000	20,000	C	Liq.
268	213,000	713,000	16,000	.....	.....	576,000	.....	D	"
269	553,000	2,350,000	296,000	2,065,000	90,000	50,000	120,000	D	
271	46,000	66,000	3,000	36,000	130		6,000	B	Liq.
272	116,000	1,843,000	90,000	1,063,000	4,730	40,000	843,000	D	"
273	66,000	85,000	16,000	20,000	.....	40,000	15,000	C	"
300	463,000	2,400,000	450,000	2,216,000	7,130	6,000	143,000	D	"
301	23,000	190,000	16,000	150,000	100	15,000	10,000	C	"
302	1,106,000	60,000	1,010,000	23,000	360	5,000	5,000	C	Total.
303	20,000	35,000	3,000	20,000	.....	10,000	.....	B	Liq.
304	20,000	30,000	3,000	23,000	.....	6,000	.....	B	"
305	106,000	53,000	83,000	33,000	130	3,000	.....	B	
306	46,000	60,000	20,000	50,000	130	10,000	.....	C	Colon.
307	335,000	160,000	240,000	100,000	160	13,000	36,000	C	Liq.
308	295,000	106,000	235,000	83,000	260	6,000	6,000	B	
309	2,120,000	3,466,000	2,043,000	3,216,000	200	66,000	50,000	D	Liq.
310	86,000	1,416,000	66,000	1,063,000	.....	6,000	16,000	C	"
311	3,683,000	9,810,000	3,563,000	5,366,000	31,460	.....	4,443,000	D	
312	63,000	76,000	16,000	56,000	30	6,000	3,000	B	Liq.
313	206,000	123,000	60,000	56,000	1,260	13,000	13,000	C	"
314*	213,000	265,000	173,000	170,000	60	10,000	70,000	C	"
315	30,000	60,000	10,000	25,000	.....	5,000	5,000	B	"
316	103,000	716,000	100,000	136,000	.....	3,000	13,000	B	
317	3,700,000	35,400,000	3,653,000	.....	18,230	23,000	3,566,000	D	
318	53,000	53,000	13,000	30,000	60	10,000	6,000	B	Liq.
320	560,000	60,000	70,000	43,000	.....	16,000	20,000	C	"
321	26,000	96,000	10,000	80,000	30	10,000	.....	B	"
322	13,680,000	22,000,000	13,613,000	20,700,000	16,860	35,000	405,000	D	
324	60,000	86,000	13,000	63,000	30	.....	10,000	B	Liq.
325	176,000	106,000	53,000	66,000	30	6,000	.....	B	
326	21,360,000	74,853,000	21,340,000	74,820,000	58,860	20,000	266,000	D	
327	900,000	4,700,000	370,000	4,050,000	2,630	30,000	410,000	D	Liq.
328	73,000	213,000	33,000	143,000	60	23,000	10,000	C	"
329	40,009	80,000	13,000	73,000	30	.....	.....	A	
330	116,000	136,000	96,000	83,000	130	3,000	56,000	C	Liq.
331	46,000	180,000	16,000	.....	460	180,000	.....	D	"
332	383,000	3,110,000	380,000	2,850,000	1,530	50,000	350,000	D	"
338	14,820,000	29,113,000	14,493,000	.....	3,900	53,000	86,000	D	
339	26,000	1,106,000	3,000	363,000	2,260	36,000	66,000	D	Liq.
Total...	71,795,000	211,038,000	68,199,000	134,019,000	442,830	1,457,000	11,734,000		
Average.	1,595,000	4,796,318	1,515,533	3,045,886	9,840	33,113	266,681	D	
					percentage .6	percentage .6	percentage 5.5		

*Sampled at Farm.

Richmond, Que.—There are nineteen shippers who send daily about 750 gals. to Montreal in a car reserved for the purpose. This is identical with the one in use at Lachute; there is no loading platform and the siding is inconveniently situated. The filling of the car is completed en route to the city.

Shortage of time allowed of no farms being visited. All samples were taken from cans as they were put on board.

Of the eighteen samples, seven were under 50,000 per c.c., and the general average for the agar count was, in round numbers, 140,000—considerably better than many districts but too high. The non-sporulating liquefiers were in large numbers, which indicates the presence of much dirt, and cleaner methods should reduce these figures very considerably.

The average of the 18 samples grades as follows:—

Agar count, Grade B	140,000 per c.c.
Colon count, Grade B	850 per c.c.
Liquefier count, Grade C	80,000 per c.c.

Chateauguay.—At the time of our visit only five farms were supplying milk to Montreal. In addition, twenty-five cans of cream, each containing five gallons, and sealed, were shipped daily.

Those farms supplying cream each have a separator, but one conveyance collects and draws off all the cans to the station.

A number of farmers have built good milk-rooms, and, show promise of becoming readily adapted to the city regulations.

The herds are composed of Holsteins, Ayrshires, and French Canadian cattle, with their various grades.

Of the eight samples from this district analyzed, one was excellent, four fair, and three poor. Five of the samples showed a high liquefier content. Colon content, with one exception, was very low.

The average of the eight samples grades as follows:—

Agar count, Grade B	118,000 per c.c.
Colon count, Grade A	450 per c.c.
Liquefier count, Grade C	60,000 per c.c.

RICHMOND (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
	Sampled at Station.								
364	620,000	640,000	426,000	110,000	1,130	.....	166,000	D	Liq.
365	65,000	130,000	15,000	65,000	.....	.....	.....	A	
369	15,000	80,000	.....	.....	.....	.....	.....	A	
370	273,000	586,000	160,000	383,000	1,160	13,000	66,000	C	Liq.
371	73,000	186,000	46,000	96,000	1,700	.....	26,000	C	"
372	80,000	265,000	15,000	50,000	30	30,000	65,000	C	"
373	100,000	140,000	33,000	43,000	5,130	13,000	10,000	C	"
374	30,000	93,000	6,000	23,000	2,360	6,000	3,000	A	
375	393,000	780,000	46,000	36,000	1,760	.....	743,000	D	Liq.
376	3,000	190,000	.....	105,000	.....	.....	55,000	C	"
377	146,000	316,000	.....	73,000	1,860	.....	76,000	C	"
381	35,000	96,000	.....	60,000	.....	.....	13,000	B	"
383	3,000	50,000	.....	3,000	.....	.....	6,000	B	"
386		83,000		43,000		3,000	13,000	B	"
387	73,000	130,000	.....	86,000	100	.....	20,000	B	"
388	10,000	146,000	.....	86,000	.....	3,000	40,000	C	"
389	440,000	676,000	440,000	616,000	230	.....	23,000	C	"
390	40,000	163,000	.....	96,000	.....	.....	43,000	C	"
Total...	2,399,000	4,750,000	1,187,000	1,974,000	14,460	68,000	1,368,000		
Average.	141,111	263,888	69,823	109,667	850	3,778	76,000	B T'l.&C'n	
					percentage .6	percentage 1.4	percentage 28.8	C Liqs.	

CHATEAUGUAY (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
340	90,000	193,000	13,000	93,000	330	.....	83,000	C Liq.
341	236,000	890,000	186,000	430,000	200	3,000	80,000	C "
343	50,000	156,000	36,000	90,000	.....	23,000	.....	C "
347	226,000	263,000	116,000	53,000	700	.....	43,000	C "
349	53,000	176,000	46,000	86,000	2,130	.....	56,000	C "
353	3,000		.....		30			A
354	85,000	250,000	20,000	.....	300	.....	140,000	D Liq.
357	203,000	110,000	.....	20,000	60	.....	6,000	B "
Total...	946,000	2,038,000	417,000	772,000	3,750	26,000	408,000	
Average.	118,250	291,143	52,125	110,286	469	3,714	58,286	C
					percentage .3	percentage 1.2	percentage 20.0	

NOTE.—Sampled at Station.

RURAL SUMMER.—GRAND TOTAL AND ABSOLUTE AVERAGE

	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.	
						Sporulative.	Non-Sporulative.
Frelighsburg.....	2,950,000	5,510,000	760,000	960,000	70,000	1,830,000	420,000
Cowansville	19,695,000	54,090,000	10,350,000	42,625,000	103,250	190,000	3,140,000
Chesterville	5,240,000	24,125,000	1,745,000	9,370,000	146,300	310,000	2,205,000
Lancaster	25,183,000	37,801,000	17,901,000	22,228,000	71,070	28,000	2,076,000
Howick.....	24,421,000	32,856,500	2,619,000	22,164,500	151,900	3,000	3,224,500
Huntingdon	5,766,000	26,679,000	4,689,000	10,635,000	106,470	118,000	5,751,000
Terrebonne	39,496,000	52,355,000	19,357,000	31,238,000	815,650	304,000	3,636,000
Ormstown	7,958,000	7,932,000	1,625,000	148,000	11,750	6,606,000	202,000
Lachute	71,795,000	211,038,000	68,199,000	134.019,000	442.830	1,457.000	11,734,000
Richmond	2,399,000	4,750,000	1,187,000	1,974,000	14,460	68,000	1,368,000
Chateauquay.....	946,000	2,038,000	417,000	772,000	3,750	26,000	408,000
FINAL TOTAL.....	205,849,000	459,174,500	128,849,000	276,133,500	1,937,430	10,940,000	34,164,500
AVERAGE	823,396	1,759,289	515,396	1,057,983	7,538	41,915	130,898
					percentage .9	percentage 2.3	percentage 7.4

NOTE.—It will be seen from the foregoing tables, of which the above is the synopsis, that the averages in this table are obtained from;—Agar, 250 samples; Gelatine, 261 samples; Colon, 257 samples.

MACHINE MILK (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
89	.....	350,000	.....	15,000	5,000	.....	15,000	
132	.....	250.000	.....	130,000	2,600	.....	15,000	
134	100,000	465,000	15,000	400,000	5,600	.....	130,000	
143	700,000	430,000	566.000	306,000	600	.....	36,000	
170	363,000	116,000	320,000	63,000	560	.....	20,000	
180	2,900,000	1,216,000	2,756,000	460,000	3,130	3,000	630,000	
188	713,000	223,000	620,000	183,000	3,130	6,000	3,000	
267	120,000	415,000	53,000	330,000	.....	10,000	20,000	
269	553,000	2,350,000	296,000	2,065.000	90,000	50,000	120,000	
Total...	5,449,000	5,815,000	4,626,000	3,952,000	110,620	69,000	989,000	
Average.	778,428	646,111	660,857	439,111	12,291	7,667	109,900	
					percentage 1.5	percentage 1.2	percentage 17.0	

Machine Milk.—At nine of the farms visited milking machines were installed. In some cases our samples were taken directly after milking.

Those who have had experience with these machines know the difficulty of cleaning and sterilizing the rubber connections. Many experiment stations have investigated the sources of contamination in the machines, and at these stations excellent results have been obtained where scrupulous cleanliness has been observed, and where all the parts needing cleaning are kept in antiseptic fluids. It has always been a question if the average farmer could carry out the necessary details to prevent bacterial contamination, and these results seem to show that hand milking gives milk with lower bacterial content. We do not wish to criticize the labour-saving advantages or the mechanical perfection of the operation, or its effect on the cow; but from the standpoint of bacterial content, machines under farm conditions, give milk with larger numbers of bacteria than the old method of milking.

A single comparison, typical of others, is here given:—

Total Count.

Machine milk	700,000 per c.c. agar count
Average of six farms in neighborhood	36,000 per c.c. agar count

Colon Count.

Machine milk	600 per c.c.
Average of six farms in neighborhood	230 per c.c.

The average of nine samples grades as follows:—

Agar count	Grade B
Colon count	Grade C
Liquefier count	Grade D

Remarks on the Bacterial Content of Milk on Arrival at Montreal.

Reference to the average totals from the various districts shows that the averages of the two hundred and fifty samples of milk obtained at farms and rural stations were as follows:—

Total count	800,000 per c.c.
Colon count	7,500 per c.c.
Liquefier count	170,000 per c.c.

According to the grading, such milk would be placed in

Grade B—On account of its total content.
Grade C—On account of its colon content.
Grade D—On account of its liquefier content.

Comparing the bacterial content of this milk, which we have termed rural milk, with the milk which we sampled on arrival at a number of the large dealers in Montreal, we find that the averages of some fifty samples of the latter are as follows:—

Average agar count	1,100,000 per c.c.
Average colon count	50,000 per c.c.
Average liquefier count	140,000 per c.c.

According to the grading this milk would be placed in

Grade C—On account of its total content.
Grade D—On account of its colon content.
Grade D—On account of its liquefier content.

In other words, if this comparison is legitimate, the milk has deteriorated one grade during transportation, due to the temperature to which it has been exposed in transit.

Bringing the figures and grades together gives us the following table:—

At the Farm.	Grade	Grade	On Arrival at the Milk Dealer.
Agar Count 800,000	B	C	1,100,000
Colon Count.....7,500	C	D	50,000
Liquefier Count...170,000	D	D	140,000

Conditions under which Milk is kept and Retailed in the City of Montreal.

Under the heading "Transportation" we mentioned that a great deal of the milk retailed in the city receives no treatment whatsoever, and is delivered to the consumer soon after its arrival or next day. When considering the most reputable dealers, most of whom attempt pasteurization, it will be seen that the amount of milk so treated is relatively small in comparison with the total amount consumed each day. Thus in the absence of pasteurization and by reason of the ease with which milk can be spoiled by contamination or improper storage, a few notes on conditions under which it is kept will be of interest. The larger dealers we consider separately.

The samples we obtained from carts on the streets are mostly of smaller vendors. Inasmuch as these men are mostly rid of their supply by 10 a.m., and have no facilities for storage in case this is not so, we can regard their milk as essentially "milk on arrival" (see p. 35). It grades chiefly as "C" and "D." We would point out, however, that we found no waggons with ice-compartments, which are desirable in summer when the cans have been on the train for some time. Also the smaller dealers have not adequate facilities for thoroughly cleaning the cans before their return.

This latter condition must favour a cumulative infection during the lifetime of these receptacles. Very few, if any, small dealers attempt bottling.

Groceries.—Taken as a class, the grocery stores of Montreal distribute a large amount of milk, in fact, they are probably second only to the milkmen in this regard. Yet a large number of them keep milk more as a convenience to their customers than as a means of profit. There are few shops whose appearance is so good a guide to their clientele as the corner grocery, hence we find that in different quarters of the city these undergo characteristic variations. When collecting samples in the summertime, however, it was our criticism, the correctness of which is borne out by analysis, that in spite of class variation those refrigerators which are accorded so prominent a place in most shops are too full of miscellaneous vegetables and fish, contain too little ice and are opened too often to do justice by the milk entrusted to them. During our winter collecting we found many of them devoid of ice, and the milk often in a can behind the counter or near the door and without a lid. Here it remains until sold, providing it does not go sour first.

Miscellaneous Shops.—In addition to bona fide groceries there are many shops selling not only bread, milk, bacon, and other comestibles, but also tobacco, candy, soft drinks, dry goods, and so many combinations of these wares that we have called them "miscellaneous." Such places rarely have bottled milk, sometimes not even a standard can or two, but produce it when requested in jugs, pans, and unexpected containers of many kinds. Happily, though, these shops are rather numerous in certain sections, they do not distribute large quantities.

Bars.—As to bars, of which in the summer we visited many, and in the winter none, there is not much to be said. The milk is in most instances kept in bottles, these being on ice. The amount of milk retailed by bars and saloons is comparatively small.

Restaurants and Cafes.—We found that these terms applied to a variety of places; and in using the specified nomenclature we adopted the name inscribed on window by the proprietor. Frequently the so-called restaurant or cafe proved to be a bar or saloon, having facilities for "quick lunches." Where such was the case the milk was kept as stated above.

Where the restaurant or cafe was devoted exclusively to the serving of meals—these including the Chinese restaurants—the milk was stored in the eight-gallon cans in which it had been sold by the milk dealer.

Usually no precautions whatever were taken to insure the maintenance of a low temperature, and frequently we took our sample from a can standing in the kitchen.

Quick Lunch Rooms and Dining Rooms.—In many of these the milk is stored in cans, and not infrequently we found that the proprietor had a large jug containing milk either on the counter or on a nearby shelf. When this prevailed, the milk was obviously invitingly open to infection by bacteria, flies, etc.

Better Class Dining Rooms.—These dining rooms are those which, apart from casual visitors, are frequented by professional and business men in the city.

The milk was usually stored in refrigerator rooms, and provided that the initial quality is satisfactory it should reach the customer in good condition.

Residential Hotels.—Included under this heading are the leading hotels in Montreal. In some cases very good facilities were afforded as regards refrigeration, and practically every hotel visited and classified as above had refrigerator rooms.

As in the case of the better-class dining rooms, the condition of the milk when received by the customer appears to depend almost entirely upon the quality when purchased by the proprietor.

MONTREAL'S LARGER DEALERS

Notes on their Equipment, Treatment of Milk, Tables of Analysis and Remarks.

The following six dealers represent the largest establishments engaged in the milk and cream distribution of Montreal.

A short account is given of their buildings, plant and methods, the analysis of milk and cream as received, treated and delivered, and remarks on the bacterial content and grading.

Dealer "A," has a clean, well-maintained establishment, constructed of concrete and tile on the inside, and fitted with modern machinery.

With the exception of the product from one particular farm, which is destined for a special institution, all milk is pasteurized. Its treatment is as follows:—

It is received, examined for any taints or odors, and weighed; pumped to a glass-lined tank of 1,200 gals. capacity; piped through a clarifier into a pasteurizer of the flash type, there heated to 165 deg. F., thence into enamelled vessels and held at 145 deg. F. for thirty minutes; cooled by passing through brine-jacketed pipes; bottled mechanically and stored at nearly freezing temperature until the following morning when it is delivered.

Cream is mixed in a large rectangular tank fitted with steam coils and heated to 145 deg. F. for fifteen minutes. After cooling it is put in cans set in ice water. Bottling and distribution follow.

No aeration is given either milk or cream.

Stable accommodation for a number of horses is on the premises, though we found neither objectionable odors nor many flies in the building where the milk is handled.

The mixed untreated milk had a high bacterial content, very large numbers of acid bacteria, and was probably rather old and at a high temperature. Clarification, that is to say, passing the milk through a separator, does not decrease the number of bacteria, although it contains less gross impurities. This is explained by the fact that the centrifugal force breaks up masses of organisms, and large numbers of bacteria are separated. Some authorities (Russell) do not think clarification worth the trouble, unless the milk is exceptionally dirty. In fact, by this process the counts of liquefying organisms obtained from manure, bedding, etc., is apparently increased by the usual methods of analysis.

The pasteurized milk was high in bacterial content —over 100,000 per c.c.—and compares unfavourably with the untreated milk of an individual shipper, which is sent to a hospital. Efficient pasteurization should reduce the content of a milk containing 1,000,000 organisms in the c.c. to 50,000 per c.c.—and should destroy the lactic acid bacteria; in fact, the presence of this class in pasteurized milk (provided there is no re-infection) is evidence that the process has not been properly carried out. These remarks also apply to the pasteurized cream, though in this case the results are better.

Although the pasteurized milk is stored at almost freezing temperature, the bacterial content makes a big jump during delivery. Two samples taken at the time of delivery showed one and two millions respectively as the total count on agar.

Dealer "B."—While at the time of our visit this plant was slightly inferior to the one previously outlined, a number of improvements had been begun which, when completed, would make the place first class. A particular feature in connection with the system in use here is that, in addition to the usual inspection which the farms supplying milk undergo at the hands of the city inspectors, they are also kept up to a certain standard by inspectors of the company.

About 2,000 gallons of milk are handled daily, by far the greater part going in bottles to retailers and consumers.

Milk is received shortly before noon, examined as to quality, put into a receiving tank, and from here pumped to another vat, whence it flows by gravity through a clarifier into a pasteurizer. The temperature of the pasteurizer, like many of the same type, is unstable, varying from 130 deg. F.-180 deg. F. After this heating the milk is held at 140 deg. for thirty minutes in a container provided with steam coils. Cooling takes place in a brine-jacketed coil, which is connected with the bottling machinery. The bottles are capped by hand and automatically conveyed to cold storage rooms, where they are kept artificially refrigerated until distribution.

Twenty-eight lots of milk from five districts were sampled as they arrived at the dealer's establishment. Ten samples from the St. Scholastique district averaged 41,000 per c.c., with a colon percentage of 4.3 and a somewhat higher liquefier percentage. The worst district was Ste. Therese, three samples averaging over twenty million to the c.c.

The mixed milk from the tank contained 860,000 bacteria per c.c. (agar count); after clarification the

agar count was much lower, but the gelatine count averaged higher, with larger numbers of the colon and "liquefier" groups.

The pasteurization was effective, reducing the number of organisms to an average of 21,000 per c.c—the best results obtained from any of the larger dealers. 4,000 per c.c. of the bacterial content of this pasteurized milk consisted of spore forming bacteria. The subsequent operations, after bottling, doubled the number to 45,000 per c.c. A sample taken from a bottle as delivered to the consumer, gave an agar count of 65,000 per c.c.

The results obtained by this dealer were better than those of his competitors, and approach more nearly the standards exacted by the more progressive American cities.

Two samples of cream had low counts compared with the usual run of samples, but were noteworthy for the rather high colon and liquefier percentages.

DEALER "A" (SUMMER) PROCESS.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
66	730,000	11,800,000	630,000	8,660,000	53,000	.....	130,000	
40	1,930,000	8,330,000	1,630,000	4,030,000	83,000	33,000	130,000	
68	220.000	670,000	190,000	250,000	500	3,000	140,000	
51	118,500	132,700	29,600	18,300	31	.....	2,900	
64	76.000	316,000	3,000	6,000	3,000	6,000	30,000	
49	2,400,000	8,600,000	900,000	900.000	80,000	60,000	900,000	
42	7,800	28,600	7,200	1,900	None in 1-10 cc	.....	200	
330	2,315,000	1,515,000	2,315,000	450,000	41,600	.....	380,000	
403	1,250,000		750,000		300			

66 Mixed milk untreated
40 Mixed milk after clarification
68 " preliminary pasteurization
51 " pasteurized

64 Milk untreated of one special supplier
49 Mixed cream untreated
42 Cream pasteurized, 20 hours old
330, 403 Sampled during delivery from milk waggon on street

DEALER "B," CITY (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
202	860,000	1,513,000	830,000	390,000	57,330	30,000	16,000	
204	410,000	2,275,000	403,000	890,000	62,000	.....	30,000	
205	290,000	1,083,000	220,000	623,000	62,500	3,000	33,000	
209	30,000	10,000	16,000	.....	30	3,000	.....	
207	36,000	10,000	6,000	3,000	.....	3,000	.....	
208	6,000	20,000	.....	10,000	.....	5,000	.....	
194	5,000	126,000	5,000	103,000	1,300	.....	3,000	
195	86.000	63,000	60,000	36,000	530	.....	3,000	
	Ice cream—							
196	230,000	2,930,000	130,000	1,230,000	177,600	.....	460,000	
197	30,000	1,030,000	30,000	.....	119,300	.....	200,000	
	Taken from carts during delivery:—							
316	65,000	15,000	15,000	.....	.....	.....	15,000	

202—Mixed milk from tank, before clarification.
204, 205—Mixed milk after clarification.
209—After clarification and preliminary heating.
207, 208—After heating for 30 minutes at 140°F.
194, 195—Milk from bottles as put into cold storage.

DEALER "B" CITY (SUMMER).

Supplies separated into their districts. Compare this table with country milk.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers. Sporulating.	Liquefiers. Non-sporulating.	Grade.
	St. Scholastique—							
116	63,000	1,926,000	63,000	1,763,000	230	.....	123,000	D Liq.
128	26,000	120,000	13,000	36,000	30	.....	3,000	B "
129	10.000	70,000	.....	43,000	1,460	.....	6,000	B
211	16,000	23,000	6,000	.....	60	30,000	.....	C Liq.
214	23,000	1,203,000	20.000	376,000	10,560	.....	16,000	D Colon.
220	80,000	33,000	46,000	13,000	.....	.....	.....	A
222	30,000	206,000	30,000	120,000	30	.....	.....	A
223	113,000	383,000	90,000	136,000	4,000	6,000	70,000	C Liq.
224	50,000	73,000	13,000	33,000	1,860	.....	6,000	B
225	6,000	30,000	3,000	13,000	100	.....	.....	A
Total...	417,000	4,067,000	284,000	2,533,000	18,330	36,000	224,000	
Average.	41,700	406,700	28,400	253,300	1,833	3,600	22,400	C Liq.
	St. Francois de Sales—							
213	46,000	106,000	33,000	30,000	300	.....	10,000	B Liq.
215	650,000	316,000	580,000	120,000	5,400	53,000	.....	C
216	15,000	86,000	10,000	3,000	600	6,000	6,000	B
217	56,000	440,000	16,000	363,000	30	.....	.....	A
Total...	767,000	948,000	639,000	516,000	6,330	59,000	16,000	
Average.	191,750	237,000	159,750	129,000	1,582	14,750	4,000	B
	Rosemere—							
132	410,000	1,430,000	380,000	1,283,000	28,430	.....	233,000	D
133	6,000	80,000	6,000	3,000	260	.....	13,000	B Liq.
134	580,000	3,566,000	573,000	3,263,000	2,200	.....	190,000	D "
136	66,000	1,226,000	60,000	1,200,000	1,700	.....	.....	B Colon.
189	.....	46,000	.....	20,000	.....	.....	3,000	A
191	180,000	3,330,000	180,000	1,646,000	28,630	3,000	86,000	
Total...	1,242,000	9,678,000	1,199,000	7,415,000	61,220	3,000	525,000	
Average.	248,400	1,613,000	239,800	1,235,833	12,244	500	87,500	
	Dubois—							
130	6,000	76,000	3,000	40,000	130	10,000	13,000	C Liq.
131	3,000	33,000	.....	13,000	.....	.....	6,000	B "
192	17,200,000	6,846,000	17,096,000	6,313,000	29,400	10,000	420,000	D
193	23,000	796,000	10,000	716.000	30	.....	3,000	B Liq.
221	150,000	83,000	103,000	36,000	30	3,000	.....	B Total.
Total...	17,382,000	7,834,000	17,212,000	7,118,000	29,590	23,000	442,000	
Average.	3,476,400	1,566,800	3,442,400	1,423,600	5,918	4,600	88,400	C
	St. Therese—							
203	61,000,000	67,200,000	61,000,000	64,016,000	29,130	.....	1,313,000	D
206	393,000	1,920,000	350,000	220,000	30,400	20,000	23,000	D
212	53,000	86,000	43,000	46,000	5,000	3,000	3,000	B
Total...	61,446,000	69,206,000	61,393,000	64,282,000	64,530	23,000	1,339,000	
Average.	20,482,000	23,068,666	20,464,333	21,427,333	21,510	7,666	446,333	D
GRAND TOTAL	81,254,000	91,733,000	80,727,000	81,864,000	180,000	144,000	2,546,000	
AB'S'L'E AVE.	3,009,407	3,276,178	2,989,888	2,923,714	6,666 percentage .2	5,143 percentage .1	90,928 percentage 2.7	

Dealer "C."—In its construction and material equipment this plant does not differ greatly from *"A"* and *"B."* We found it less cleanly, however, and the dairy rooms much more infested with flies. These probably were due to the close proximity of the stable. Three thousand gallons of milk are dealt with daily, and about 300 gallons of cream. On its arrival, milk is unloaded from the cans into a large tank. From here it flows through a clarifier into a preliminary pasteurizer, which heats it to 140 deg. F. Another continuous pasteurizer of identical construction (Farrington type) is connected with this one. Here the temperature is 10 degrees higher. The apparatus has a capacity of 500 gallons per hour, and requires one-half hour to fill; for this reason it is supposed that the milk is heated to 150 deg. F. for thirty minutes. We doubt that the process is continued six hours. Passage through a pair of coolers arranged in tandem, and mechanical bottling, complete the process. The milk is then stored at 40 deg. F. until delivery. We calculated that the product was sixty hours old when it left the establishment.

The cream goes through the same process, except that instead of being bottled at once it is put into cans set in ice-water. Bottling takes place at midnight before the morning of distribution.

Samples.—The sample from the large tank was of high bacterial content, particularly the gelatine count which favoured the lactic acid bacteria. Pasteurization was very uneven, the first machine giving better results than the second. The bottled milk and milk in cold storage gave counts under the 100,000, but with efficient pasteurizing much better results might be secured. The fact that considerable numbers of the lactic acid bacteria were found after pasteurizing indicates that the temperature of 140-150 deg. F. was not held for a sufficient length of time.

The pasteurized cream was very poor. Evidently the fear of too much heating, or churning when in the pasteurizer induced the operators to reduce the heating temperature.

The sample of whole milk sterilized for infants was very good, containing only 10 organisms per c.c.

Dealer "D" has a dairy constructed largely of concrete and fitted with ample machinery, but does not treat milk in as efficient a manner as the equipment would permit. Any attempt at pasteurization is omitted, the process consisting solely of clarification, cooling and bottling.

The milk is received in a vat; the temperature of the mixed milk was 60 deg. F. at the time of our visit. From here it flows through a clarifier and into a series of

DEALER "C," CITY (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
76	600,000	13,900,000	500,000	8,400,000	140,000	.....	300,000	
74	1,300,000	18,900,000	800,000	11,300,000	50,000	30,000	100,000	
72	80,000	310,000	60,000	40,000	.....	.....	50,000	
70	307,500	202,500	297,500	30,000	10	.....	1,500	
62	16,500	98,000	8,000	36,500	15	3,000	.....	
69	.....	84,000	.....	14,000	50	.....	7,000	
71	700,000	13,300,000	500,000	5,100,000	.....	.....	.....	
65	572,800	1,850,000	plate alkaline	.....	600	.....	.....	
67	10	10	.....	.....	.....	.....	.....	

76—Mixed milk entering clarifier.
74—After clarification.
72—After preliminary pasteurization.
70—After pasteurization—going to cooler.
62—Milk as bottled.
69—Bottled milk from cold storage.
71—Mixed cream before pasteurization.
65—Cream sampled from cold storage (pasteurized).
67—Whole milk sterilized for infants.

DEALER "D."

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
47	80,000	280,000	80,000	250,000	16,000	.....	30,000	
34	100,000	250,000	100,000	200,000	2,300	.....	16,500	
53	100,000	330,000	100,000	150,000	3,000	.....	15,000	
31	25,000	750,000	25,000	580,000	330	.....	15,000	
77	6,650,000	171,800,000	5,750,000	.....	662,000	.....	550,000	

47 Mixed milk from receiving vat. 34 Mixed milk after clarification. 53 Mixed milk after cooling and bottling.
31 Special milk. 77 Cream, after return of delivery van.

three Farrington-type pasteurizers used as coolers and kept refrigerated by circulating brine. The temperature is then reduced to about 40 deg. F. Mechanical bottling follows, the caps being put on by hand. After storage at 40 deg. F. the product is delivered the following day.

Hence, at the time of delivery the greater part of the milk is from 24-36 hours old, unpasteurized, and not kept as cold as can be desired.

There is also produced a special product from the proprietor's own herd. The herd in question is not a permanent one, consisting of a floating population. bought and sold as the requirements dictate. It is not subjected systematically to the tuberculin test. However, the samples of its milk which we analyzed were decidedly better than the average country product, even at the time of milking.

Samples.—The sample of mixed milk from the receiving vat gave a fairly high count: after clarification the count was higher, and the number after passing through coolers and bottling machine remained about the same. The figures resemble closely those of the other large dealers. Milk from the herd kept at the establishment gave much better figures.

The cream count of a sample taken from a bottle on return of the delivery vans was extremely high, and the percentage of colon excessive.

Dealer "E."—This concern devotes itself almost entirely to cream and its products. About 25,000 lbs. are handled daily, much of this being sold, the remainder being either utilized as ice cream or converted into butter. Only a small quantity of milk is sold.

Samples.—Of the twenty samples of cream taken as they arrived at this establishment not one had a smaller agar count than 100,000 to the c.c.—only three had agar counts under the half million. The general average for the twenty samples was 116,000,000, a colossal number. The number of organisms belonging to the colon and liquefier groups was also excessive, a million and a half of each of these groups per c.c. certainly represents careless handling of the milk and a large quantity of manure and dirt gained during the milking process.

Pasteurization reduced these figures to an average of 195,000 per c.c., a reduction of more than 99 per cent. a very good result; but the number remaining must be regarded as being too high for a well-regulated dairy.

A sample of cream taken from a can as retailed to grocers, etc., gave a count of over a million and a half.

Plant.—Externally the plant is commodious, moderately new, and of brick construction. On the side facing the street are many windows; they are fewer elsewhere.

Internal appearances are different. The floor is concrete in parts, wooden in others. When seen by us, most of these latter places were half-rotten with milk slops and water. The basement where pasteurization and churning take place is dark, dirty and damp. Most of the ground floor is used as the office. The manufacture of ice cream is carried on upstairs on floors two and three, which are happily somewhat cleaner than the basement, though little less wet. All the freezing machines, with one exception, are old, dirty and fed by pipes which are quite uncleanable.

A small annex to the main plant furnishes a storage for cans and utensils. It is here the cans are washed, though the surroundings are not calculated to inspire the greatest cleanliness.

Material arriving in quite an acid condition is made into butter without further treatment. The remainder is pasteurized for 30 (?) minutes at 142 deg. F. in non-continuous machines. Cooling is effected in the same vats. A certain varying quantity of the product is used for ice cream, the balance being allowed to ripen naturally when it goes to the churns.

Samples of cream taken from the cans arriving in the receiving room.

Dealer "F."—Has improved since our visit on July 17th, 1913, so that our observations do not apply at present with perfect accuracy. However, we feel that the quantity of milk then handled warrants a description of conditions as we found them.

The building was dilapidated, wooden-floored and filthy; men slept in it. There were no machines; no process, not even cooling was attempted.

Milk arrived and was stored in cans set in ice-water until delivery, which was mostly direct from the can. Any milk sold in bottles was put into them by hand. From one enamelled utensil we scraped a pink bacterial growth.

Cans were washed in a wooden vat, from the joints and corners of which oozed a greyish-white slime. They were then drained and went through the formality of steaming, a jet of steam playing into them for a few seconds. When ready to be returned to the shippers they stank. The floor of the room where this took place was so slippery as to be almost unsafe.

Many restaurants, cafes, etc., obtain their milk supply from this establishment.

Samples.—This establishment sends out very poor milk; an average of three quarters of a million bacteria per c.c. when delivered is much too high.

The cream count on agar averaged over nineteen million per c.c. for the agar count, with more than three million liquefying bacteria. The gelatine counts were much higher.

DEALER "E," CITY (SUMMER).

Samples taken as the Shippers' cans arrived at the Dairy premises.

CREAM.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
166	590,130,000	478,330,000	277,330,000	464,360,000	3,960,000	.....	1,260,000	
167	48,330,000	223,400,000	45,700,000	14,600,000	953,300	.....	660,000	
168	1,600,000	82,460,000	1,430,000	81,330,000	1,768,000	.....	1,030,000	
169	2,960,000	322,000,000	2,660,000	140,060,000	4,000	.....	660,000	
170	460,000	122,660,000	330,000	120,530,000	1,906,600	.....	230,000	
172	104,330,000	189,330,000	Alkaline spreaders mask	178,360,000	2,300,000	.....	4.630,000	
173	11,200,000	6,800,000	2,700,000	4,760,000	646,600	.....	1,560.000	
174	109,400,000	52,000,000	109,400,000	51,160,000	145,000	.....	230,000	
175	100,000	17,700,000	60,000	14,260,000	312,000	.....	.....	
176	236,330,000	280,800,000	236,060,000	279.360,000	1,426,000	.....	1,300,000	
177	106,330,000	116,060,000	99,850,000	115,200,000	1,953,300	.....	300,000	
178	136,800,000	260,000,000	71,500,000	257,960,000	1,140,000	.....	1,360,000	
179	293,330,000	388,800,000	291,600,000	335,560,000	1,134,000	.....	3,160,000	
180	23,960,000	110,960,000	23,460,000	58,000,000	uncountable	.....	260,000	
181	210,000,000	180,200,000	167,860,000	175,000,000	3,290,000	.....	560,000	
182	300,000	61,660,000	200,000	760,000	43,000	.....	1,260,000	
183	207,660,000	127,400,000	207,100,000	126,160,000	1,220,000	100,000	530,000	
184	2,130,000	41,000,000	1,900,000	11,660,000	52,000	.....	400,000	
185	48,300,000	213,200,000	40,800,000	236,100,000	68,600	.....	700,000	
188	190,330,000	399,530,000	190,300,000	379,000,000	9,654,600	.....	10,600,000	
Total...	2,323,980,000	3,674,290,000	1,770,240,000	3,044,180,000	31,977,600	100,000	30,690,000	
Average.	116,199,000	183,714,500	93,170,526	152,209,000	1,683,031	5,000	1,534,500	
186	330,000	430,000	.....	.....	.....	60,000	.....	
171	60,000	100,000	.....	.....	.....	.....	.....	
Total...	390,000	530,000	.....	.....	.....	60,000	.....	
Average.	195,000	265.000	.....	.....	.....	30,000	.....	
187	14,030,000	2,130,000	3,900,000	800,000	600	.....	260,000	
377	1.630,000	3,900,000	1,580,000	3,530,000	1,300	.....	50,000	

187—Ice Cream. 377—Cream as retailed.

DEALER "F," CITY (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
39	60,000	830,000	.....	.....	.....	230,000	.....	
41	100,000	1,200,000	.....	300,000	.....	.....	300,000	
Total...	160,000	2,030,000	.....	300,000	.....	230,000	300,000	
Average.	80,000	1,015,000	.....	150,000	.....	115.000	150,000	
57	26,760,000	216,500,000	1,500,000	210,100,000	210,000	130,000	6,300,000	
59	11,914,600	10,917,000	.....	.....	1,260	.....	16,600	
Total...	38,674,600	227,417,000	1,500,000	210,100,000	211,260	130,000	6,316,600	
Average.	19,337,300	113,708,500	700,000	105,050,000	105,630	65,000	3,158,300	
286	515,000	1,075,000	200,000	675,000	11,600	.....	75,000	
287	1,050,000	1,050,000	815,000	.....	3,000	.....	65,000	
Total...	1,565,000	2.125,000	1,015,000	675,000	14,600	.....	140,000	
Average.	782,500	1,062,500	507,500	337,500	7,300	.....	70,000	

39 Mixed milk ready for delivery.
41 " "
57 Cream as received.
59 "
286 Milk from cart, in act of delivery.
287 " "

RESULTS OF, AND NOTES ON, SAMPLES TAKEN WITHIN THE CITY OF MONTREAL DURING THE SUMMER MONTHS OF 1913

NOTES.

All these samples were taken on the street, and include milk from the large dealers, as well as from the smaller peddlers.

Ninety samples were analyzed. As may be noted below, the average agar count was four and a half millions per c.c.—the colon number 70,000, and the liquefier count in round number, a million per c.c.

The average shows that this is a bad quality of Grade C milk, or, in other words, it approaches in some particulars very close to Grade D.

Classifying these samples, they would be placed in Grade D as follows:—

Total number of samples	91
Grade D—On account of total content	15
Grade D—On account of colon content	29
Grade D—On account of liquefier content	42

Samples From Grocery Stores (Summer).—Two hundred and forty-eight samples were obtained from grocery stores. In the majority of cases, these samples were obtained from cans kept in refrigerators: only in a few instances were there separate compartments for milk; in some cases there was no ice supply. The temperature of these refrigerators was seldom below 60 deg. F.

The average agar count of these samples was fifteen and a half million to the c.c., the "colon" content 80,000, and the liquefier count nearly 700,000 to the c.c., which would bring this milk in Class D, and hence unfit for sale.

If we analyze these results we find that of the 248 samples, 90 would be disqualified for exceeding the five million, Grade D; 122 would exceed the colon grade D of over 10,000 per c.c., and 140 would exceed the liquefier (Grade D) of one hundred thousand per c.c.

SAMPLES TAKEN FROM MILKMEN IN THE ACT OF DELIVERING MILK BETWEEN 6 AND 10 A.M.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
12	27,300,000	4,400,000	6,900,000	1,100,000	.....	50,000	2,300,000	D	
14	15,300,000	39,500,000	14,900,000	26,000,000	290,000	.....	.....	D	
16	19,500,000	12,500,000	17,500,000	10,900,000	1,890,000	.....	200,000	D	
120	330,000	250,000	100,000	.....	.....	.....	50,000	C	Liqs
123	28,200,000	72,330,000	9,460,000	8,930,000	496,000	130,000	760,000	D	
277	880,000	680,000	800,000	430,000	1,600	.....	180,000	D	Liqs
278	2,065,000	4,865,000	1,630,000	1,380,000	13,000	.....	30,000	D	Colon.
280	450,000	230,000	150,000	65,000	600	.....	15,000	B	Liq.
281	6,765,000	6,830,000	6,150,000	4,830,000	57,000	65,000	1,365,000	D	
282	6,100,000	7,350,000	5,615,000	4,780,000	22,600	.....	100,000	D	
283	1,930,000	2,450,000	765,000	75,000	4,600	.....	425,000	D	Liqs
284	365,000	850,000	180,000	200,000	1,300	.....	80,000	C	"
285	3,365,000	5,080,000	2,980,000	2,450,000	6,300	50,000	150,000	D	"
286	515,000	1,075,000	200,000	675,000	11,600	.....	75,000	D	Colon.
287	1,050,000	1,050,000	815,000	.....	3,000	.....	65,000	C	Total.
315	2,965,000	4,780,000	2,480,000	930,000	5,000	.....	200,000	D	Liqs.
316	65,000	15,000	15,000	.....	.....	.....	15,000	B	"
317	2,080,000	2,830,000	330,000	250,000	23,600	.....	130,000	D	
318	130,000	300,000	50,000	50,000	300	.....	15,000	B	
319	800,000	69,300	410,000	120,000	.....	10,000	23,000	C	Liqs.
320	4,800,000		4,350,000		.....			C	Total.
322	4,100,000	4,300,000	3,650,000	480,000	300	.....	115,000	D	Liqs.
323	1,400,000	880,000	1,300,000	215,000	2,600	.....	.....	C	Total.
325	280,000	1,400,000	15,000	800,000	.....	.....	50,000	C	Liqs.
326	11,200,000	46,500,000	10,700,000	45,415,000	17,600	.....	580,000	D	
327	30,000	600,000	.....	430,000	3,600	.....	30,000	C	Liqs.
328	150,000	64,500,000	65,000	.....	300	.....	42,000,000	D	"

SAMPLES TAKEN FROM MILKMEN IN THE ACT OF DELIVERING MILK BETWEEN 6 AND 10 A.M.—Continued.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
329	365,000	725,000	180,000	300,000	24,000	.....	.....	D	Colon.
330	2,315,000	1,515,000	2,315,000	450,000	41,600	.....	380,000	D	
331	65,000	350,000	30,000	100,000	.....	.....	150,000	D	Liqs.
332	615,000	1,750,000	615,000	1,000,000	4,000	.....	50,000	C	"
333	330,000	2,580,000	100,000	380,000	.....	.....	65,000	C	"
334	1,565,000	11,165,000	1,465,000	8,580,000	2,000	.....	115,000	D	"
335	900,000	4,950,000	550,000	1,250,000	300	.....	115,000	D	"
336	2,730,000	5,230,000	2,365,000	2,465,000	501,000	.....	480,000	D	
337	1,800,000	13,250,000	1,650,000	10,825,000	1,933,300	.....	200,000	D	
338	800,000	750,000	750,000	465,000	.....	.....	65,000	C	Liqs.
339	230,000	1,665,000	150,000	150,000	6,300	.....	80,000	C	Colon.
341	5,930,000	10,715,000	5,515,000	1,500,000	39,300	265,000	900,000	D	
342	2,565,000	4,665,000	2,265,000	1,015,000	11,000	.....	765,000	D	
343	530,000	2,450,000	50,000	200,000	10,000	.....	80,000	C	Colon.
344	1,015,000	2,425,000	800,000	175,000	351,000	.....	575,000	D	
345	8,400,000	100,330,000	7,750,000	96,250,000	86,000	.....	750,000	D	
346	1,465,000	8,900,000	1,300,000	6,250,000	31,000	.....	150,000	D	
347	14,750,000	7,480,000	14,600,000	7,465,000	8,000	.....	4,380,000	D	
348	1,780,000	2,000,000	1,600,000	1,350,000	121,600	.....	450,000	D	
349	.....	4,100,000	.....	1,780,000	3,600	.....	15,000	B	Colon.
350	1,215,000	3,900,000	665,000	515,000	3,000	.....	50,000	C	Total.
351	480,000	80,000	365,000	15,000	.....	.....	15,000	B	"
352	3,315,000	5,250,000	3,030,000	2,350,000	62,000	.....	750,000	D	
353	5,115,000	5,100,000	5,015,000	4,300,000	22,600	.....	425,000	D	
354	730,000	4,550,000	500,000	815,000	48,300	.....	350,000	D	
355	130,000	100,000	100,000	50,000	600	.....	.....	B	Total.
356	915,000	2,800,000	800,000	2,415,000	18,600	.....	200,000	D	
357	1,130,000	3,050,000	.....	1,250,000	.....	.....	1,500,000	D	Liqs.
358	315,000	425,000	165,000	.....	300	.....	15,000	B	Total.
359	800,000	.....	730,000	.....	58,600	.....	.....	D	Colon.
360	850,000	4,765,000	400,000	2,600,000	30,000	.....	550,000	D	
361	1,680,000	80,000	1,415,000	30,000	.....	.....	.....	C	Total.
362	100,000	350,000	100,000	200,000	.....	.....	.....	A	
363	5,815,000	.....	3,550,000	.....	86,000	.....	.....	D	
364	30,000	.....	.....	.....	.....	.....	.....	A	
365	1,030,000	450,000	1,015,000	150,000	.....	.....	50,000	C	Total.
366	.....	125,000	.....	.....	.....	.....	.....	A	
367	115,000	80,000	30,000	15,000	.....	.....	15,000	B	Total.
368	4,300,000	liquefier	3,615,000	.....	18,300	.....	.....	D	Colon.
369	1,350,000	3,875,000	900,000	1,950,000	2,000	.....	25,000	C	Total.
370	150,000	575,000	150,000	175,000	300	.....	50,000	C	Liqs.
371	1,200,000	3,350,000	1,180,000	600,000	.....	.....	200,000	D	"
372	200,000	200,000	65,000	50,000	1,000	.....	150,000	D	"
373	215,000	600,000	80,000	180,000	300	.....	100,000	C	"
374	33,515,000	70,200,000	32,500,000	31,200,000	600	.....	1,350,000	D	
375	15,000	330,000	15,000	115,000	.....	15,000	100,000	D	Liqs.
376	665,000	.....	565,000	.....	2,600	.....	.....	B	Total.
377	1,630,000	3,900,000	1,580,000	3,530,000	1,300	.....	50,000	C	"
378	15,000	80,000	15,000	50,000	.....	.....	.....	A	
379	50,000	15,000	15,000	.....	.....	15,000	.....	B	Liqs.
380	250,000	900,000	165,000	550,000	.....	.....	100,000	C	"
381	15,000	150,000	15,000	100,000	.....	.....	.....	A	
382	1,580,000	800,000	465,000	415,000	4,300	.....	150,000	D	Liqs.
383	200,000	815,000	80,000	300,000	5,000	.....	50,000	C	"
384	1,950,000	500,000	1,950,000	.....	.....	.....	50,000	C	Total.
385	3,150,000	1,180,000	1,650,000	315,000	300	.....	115,000	D	Liqs.
386	3,000,000	2,650,000	2,930,000	715,000	14,600	65,000	180,000	D	
387	250,000	215,000	.....	115,000	.....	.....	30,000	C	Liqs.
388	3,300,000	21,000,000	3,180,000	18,000,000	600	.....	350,000	D	"
389	130,000	500,000	50,000	.....	2,000	.....	.....	B	Total.
402	300,000	.....	80,000	.....	2,300	.....	.....	B	"
403	1,250,000	.....	750,000	.....	300	.....	.....	C	"
404	98,575,000	5,615,000	88,750,000	2,630,000	32,000	.....	350,000	D	
461	1,715,000	3,230,000	1,630,000	1,150,000	.....	.....	130,000	D	Liqs.
465	34,000,000	48,300,000	32,550,000	24,600,000	.....	.....	11,100,000	D	
Total...	407,000,000	672,694,300	328,365,000	353,900,000	6,442,700	665,000	77,268,000		
Average.	4,522,222	8,008,265	3,648,500	4,213,095	70,799	7,917	919,857		
					percentage 1.5	percentage .09	percentage11.4		

GROCERY STORES (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
33	6,110,000	15,566,000	5,816,000	12,270,000	29,600	.....	3,300,000	D	
36	200,000	3,460,000	60,000	2,630,000	2,000	.....	230,000	D	Liqs.
37	130,000	100,000	33,000	.....	.....	.....	.....	B	Total.
43	365,000	22,130,000	335,000	9,630,000	2,900	.....	240,000	D	Liq.
73	2,700,000	18,300,000	850,000	12,650,000	75,000	.....	650,000	D	
78	1,200,000	18,100,000	800,000	12,200,000	80,000	.....	.....	D	Colon.
79	50,000	550,000	.....	500,000	300	.....	6,000	B	Liq.
80	360,000	600,000	100,000	100,000	3,000	.....	100,000	C	"
83	4,300,000	59,160,000	3,100,000	35,830,000	25,600	.....	860,000	D	
86	16,000	2,080,000	6,000	446,000	1,000	63,000	110,000	D	Liq.
94	7,156,000	17,160,000	6,980,000	8,300,000	6,030	420,000	6,200,000	D	
113	215,000	615,000	30,000	550,000	600	.....	15,000	B	Total.
115	400,000	6,465,000	250,000	9,450,000	10,300	15,000	400,000	D	
126	2,830,00	18,660,000	1,960,000	12,260,000	6,000	30,000	130,000	D	Liq.
141	1,325,000	66,750,000	975,000	57,175,000	5,595,000	.....	8,250,000	D	
144		4,160,000		560,000	1,000	.....	260,000	D	Liq.
145	530,000	530,000	200,000	230,000	300	.....	.....	B	Total.
146	200,000	1,900,000	60,000	630,000	10,600	60,000	530,000	D	
147	260,000	1,830,000	100,000	1,600,000	18,600	.....	60,000	D	
149	330,000	300,000	130,000	.....	300	130,000	.....	D	Liq.
150	400,000	2,530,000	160,000	730,000	8,600	30,000	260,000	D	"
151	330,000	1,560,000	30,000	1,160,000	300	.....	60,000	C	"
152	300,000	400,000	100,000	160,000	300	.....	60,000	C	"
153	48,060,000	73,330,000	31,660,000	.....	32,300	.....	7,700,000	D	
154	1,030,000	20,160,000	530,000	4,100,000	43,300	.....	30,000	D	Colon.
155	130,000	60,000	30,000	30,000	1,000	.....	.....	B	
156	330,000	2,030,000	230,000	130,000	15,600	.....	.....	D	Colon.
158	430,000	11,160,000	260,000	10,160,000	5,000	.....	30,000	C	Liq.
159	260,000	800,000	130,000	500,000	2,600	.....	30,000	C	"
161	1,560,000	35,830,000	1,200,000	34,960,000	4,300	.....	.....	C	Total.
165	16,500,000	700,000	14,200,000	330,000	32,300	.....	160,000	D	
190	560,000	500,000	130,000	200,000	600	.....	60,000	C	Liq.
198	230,000	2,230,000	30,000	330,000	1,300	.....	200,000	D	"
201	5,460,000	8,960,000	5,460,000	5,660,000	7,000	.....	560,000	D	
230	950,000	1,960,000	950,000	200,000	600	.....	30,000	C	Liq.
233	830,000	2,230,000	830,000	1,300,000	.....	.....	.....	B	Total.
235	1,230,000	30,000	1,100,000	.....	.....	.....	.....	C	"
240	430,000	1,060,000	130,000	830,000	7,000	.....	100,000	C	
241	50,000	360,000	50,000	60,000	300	.....	160,000	D	Liq.
242	700,000	260,000	460,000	60,000	1,000	.....	30,000	C	"
244	1,500,000	1,730,000	1,360,000	130,000	600	.....	1,260,000	D	"
248	4,460,000	4,260,000	4,060,000	2,560,000	6,600	.....	60,000	C	
251	1,660,000	1,830,000	1,530,000	1,400,000	1,600	30,000	100,000	D	Liq.
259	200,000	1,130,000	130,000	560,000	2,600	30,000	30,000	C	"
260	16,330,000	51,430,000	3,600,000	.....	162,000	.....	22,660,000	D	
261	400,000	1,160,000	300,000	200,000	1,600	30,000	230,000	D	Liq.
269	1,000,000	3,830,000	860,000	1,430,000	12,600	.....	560,000	D	
270	160,000	360,000	30,000	130,000	300	.....	30,000	C	Liq.
271	4,460,000	4,630,000	3,330,000	4,560,000	4,600	30,000	30,000	C	
273	830,000	15,330,000	730,000	5,830,000	69,000	60,000	530,000	D	
288	1,015,000	7,180,000	630,000	1,000,000	31,000	15,000	250,000	D	
289	3,100,000	11,615,000	765,000	4,830,000	48,600	30,000	50,000	D	Colon
290	215,000	750,000	50,000	150,000	6,300	.....	.....	C	"
291	1,365,000	2,165,000	1,115,000	465,000	6,000	.....	215,000	D	Liq.
292	680,000	12,250,000	615,000	9,915,000	95,600	.....	400,000	D	
293	4,365,000	9,515,000	4,365,000	9,250,000	6,300	15,000	15,000	C	
294	31,665,000	36,800,000	31,030,000	35,165,000	185,000	.....	1,465,000	D	
295	230,000	880,000	100,000	280,000	7,000	.....	180,000	D	Liq.
296	113,500,000	110,000,000	21,565,000	106,665,000	158,600	150,000	450,000	D	
299	200,000	980,000	80,000	115,000	600	.....	65,000	C	Liq.
301	7,465,000	6,865,000	6,965,000	4,980,000	40,600	15,000	150,000	D	
302	12,330,000	6,930,000	12,080,000	6,415,000	14,300	65,000	80,000	D	
303	1,380,000	1,325,000	715,000	350,000	20,000	.....	275,000	D	
305	115,000	500,000	30,000	15,000	3,300	.....	.....	B	
306	65,000	250,000	.....	30,000	.....	.....	.....	A	
309	18,780,000	10,015,000	13,750,000	7,250,000	58,600	15,000	615,000	D	
310	430,000	80,000	330,000	.....	1,300	.....	15,000	B	
311	1,625,000	3,865,000	200,000	665,000	10,600	100,000	1,115,000	D	

GROCERY STORES (SUMMER)—Continued.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
313	765,000	1,400,000	200,000	715,000	300	.....	150,000	D	Liq.
314	47,815,000	28,815,000	39,950,000	27,580,000	30,300	15,000	165,000	D	
391	430,000	1,100,000	200,000	560,000	5,300	.....	.....	C	Colon.
394	9,000,000	28,530,000	7,660,000	11,700,000	49,600	.....	100,000	D	
399	18,530,000	41,800,000	16,000,000	15,230,000	196,300	.....	60,000	D	
406	12,030,000	31,665,000	11,350,000	29,415,000	105,000	215,000	1,480,000	D	
407	27,500,000	4,350,000	27,500,000	2,465,000	27,600	.....	1,380,000	D	
408	1,180,000	5,000,000	980,000	3,015,000	1,600	80,000	1,265,000	D	Liq.
409	1,415,000	2,165,000	1,015,000	1,330,000	600	50,000	65,000	D	"
425	1,465,000	1,250,000	1,180,000	115,000	4,000	80,000	700,000	D	"
426	3,915,000	5,180,000	3,500,000	4,265,000	1,000	30,000	415,000	D	"
429	4,630,000	2,165,000	4,400,000	1,480,000	4,600,000	150,000	130,000	D	"
438	12,800,000	9,300,000	11,880,000	5,365,000	44,300	.....	80,000	D	
440	250,000	630,000	230,000	400,000	2,000	30,000	100,000	D	Liq.
442	2,365,000	5,730,000	1,780,000	2,930,000	10,300	.....	615,000	D	
445	700,000	4,950,000	400,000	1,150,000	40,600	.....	1,275,000	D	
446		62,400,000		39,500,000	106,600	.....	175,000	D	
453	165,000	1,530,000	130,000	1,215,000	4,300	.....	100,000	C	Liq.
455	4,550,000	8,815,000	4,330,000	6,500,000	23,300	.....	.....	D	Colon.
456	500,000	2,000,000	330,000	630,000	600	115,000	230,000	D	Liq.
457	200,000	315,000	80,000	30,000	.....	30,000	100,000	D	,,
459	2,680,000	23,830,000	2,115,000	2,400,000	44,600	80,000	2,550,000	D	
466	28,500,000	31,165,000	28,030,000	28,830,000	.....	.....	365,000	D	
467	86,000,000	88,330,000	81,665,000	83,330,000	.....	.....	65,000	D	
470	3,880,000	3,430,000	3,300,000	1,765,000	.....	.....	230,000	D	Liq.
471	105,065,000	93,830,000	104,730,000	90,165,000	81,300	.....	450,000	D	
472	1,430,000	3,680,000	1,400,000	1,615,000	3,000	.....	.....	C	Total.
474	50,230,000	15,000,000	47,500,000	1,280,000	54,000	.....	1,000,000	D	
475	17,750,000	23,930,000	16,950,000	5,850,000	42,000	.....	5,580,000	D	
476	4,330,000	3,900,000	4,200,000	3,600,000	365,000	.....	.....	D	Colon.
477	5,780,000	10,830,000	765,000	5,000,000	1,300	80,000	450,000	D	
480	315,000	865,000	280,000	450,000	2,600	15,000	80,000	C	Liq.
482	1,065,000	1,115,000	1,065,000	1,030,000	216,600	15,000	15,000	D	Colon.
483	1,365,000	1,780,000	700,000	565,000	160,600	.....	1,050,000	D	
484	3,480,000	6,415,000	2,565,000	4,050,000	140,300	.....	1,300,000	D	
485	480,000	1,115,000	300,000	950,000	6,600	15,000	15,000	C	
486	103,330,000	210,000,000	101,330,000	209,980,000	2,500,000	.....	15,000	D	
487	3,900,000	5,030,000	2,550,000	2,415,000	176,600	.....	2,630,000	D	
488	215,000	550,000	215,000	450,000	.....	.....	25,000	C	Liqs.
489	14,830,000	46,315,000	12,750,000	45,000,000	3,600	.....	550,000	D	
490	58,580,000	57,830,000	57,665,000	55,500,000	211,000	.....	130,000	D	
491	31,280,000	104,830,000	30,330,000	103,665,000	130	80,000	1,900,000	D	
492	1,380,000	2,200,000	1,080,000	365,000	4,300	.....	.....	C	Total.
493	6,350,000	4,780,000	5,250,000	1,215,000	181,600	.....	2,000,000	D	
494	7,580,000	14,165,000	6,915,000	11,165,000	35,300	65,000	430,000	D	
496	8,480,000	35,315,000	7,600,000	33,830,000	50,000	.....	150,000	D	
497	2,615,000	5,250,000	1,780,000	4,050,000	3,300	.....	1,750,000	D	Liq.
500	630,000	3,265,000	515,000	2,165,000	27,300	30,000	1,300,000	D	
501	5,915,000	9,750,000	5,750,000	9,000,000	300	50,000	1,250,000	D	
502	100,000	680,000	15,000	150,000	.....	.....	100,000	C	Liqs.
504	2,450,000	4,000,000	2,200,000	950,000	7,000	.....	30,000	C	
505	4,365,000	5,350,000	3,815,000	300,000	8,300	.....	115,000	D	Liq.
506	780,000	1,880,000	580,000	1,350,000	3,600	15,000	80,000	C	"
507	600,000	1,600,000	260,000	430,000	19,000	.....	60,000	D	Colon.
508	330,000	1,915,000	330,000	1,480,000	.....	.....	80,000	C	Liq.
509	2,860,000	5,200,000	960,000	700,000	28,600	.....	430,000	D	
511	315,000	930,000	250,000	330,000	1,000	50,000	180,000	D	Liq.
512	90,215,000	85,000,000	90,000,000	83,830,000	129,000	.....	150,000	D	
514	20,830,000	15,580,000	18,865,000	14,080,000	213,300	.....	50,000	D	
515	16,750,000	20,415,000	16,250,000	18,830,000	7,000	30,000	380,000	D	
516	35,330,000	35,500,000	33,915,000	33,730,000	186,600	350,000	465,000	D	
517	200,000	215,000	15,000	30,000	300	.....	65,000	C	Liq.
518	650,000	2,930,000	300,000	1,900,000	1,600	115,000	80,000	D	"
519	68,050,000	38,000,000	66,665,000	5,250,000	14,000	.....	50,000	D	
520	.....	530,000	.....	215,000	300	.....	.....	A	
521	18,265,000	52,800,000	16,330,000	14,400,000	151,600	.....	150,000	D	
525	3,150,000	7,380,000	2,600,000	6,050,000	1,000	50,000	1,080,000	D	Liq.
526	19,500,000	75,665,000	15,000,000	59,600,000	140,000	.....	14,400,000	D	
527	13,280,000	47,165,000	11,165,000	17,080,000	116,000	.....	.....	D	

GROCERY STORES (SUMMER)—(Continued).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
528	350,000	1,230,000	315,000	315,000	600	.....	.....	B	Total.
530	11,630,000	415,000	10,315,000	200,000	200,000	50,000	30,000	D	
531	50,530,000	10,500,000	36,350,000	3,100,000	36,600	.....	130,000	D	
532	315,000	900,000	130,000	215,000	5,000	.....	65,000	C	Liq.
533	54,000,000	8,665,000	47,600,000	4,750,000	109,000	.....	1,100,000	D	
534	41,830,000	8,500,000	31,130,000	6,165,000	103,000	.....	1,215,000	D	
535	1,380,000	3,330,000	1,200,000	680,000	35,300	.....	115,000	D	
536	16,380,000	8,250,000	15,365,000	7,580,000	15,000	.....	.....	D	
539	5,400,000	1,165,000	3,880,000	.....	38,600	.....	130,000	D	
540	500,000	850,000	265,000	415,000	300	.....	.....	B	Total.
541	6,750,000	6,365,000	2,430,000	750,000	209,000	30,000	430,000	D	
544	230,000	465,000	215,000	180,000	9,300	15,000	.....	C	Colon.
547	35,300,000	12,665,000	30,230,000	5,915,000	29,300	15,000	30,000	D	
548	150,430,000	174,000,000	143,300,000	171,165,000	242,300	.....	350,000	D	
549	50,000	330,000	.....	130,000	.....	15,000	15,000	C	Liq.
551	17,665,000	11,415,000	17,550,000	10,450,000	7,600	.....	150,000	D	
553	59,865,000	47,500,000	58,180,000	44,830,000	11,600	15,000	6,415,000	D	
554	1,700,000	1,700,000	1,380,000	265,000	24,000	.....	30,000	D	Colon.
555	1,800,000	4,780,000	930,000	100,000	1,300	.....	30,000	C	Total.
556	2,700,000	3,165,000	2,330,000	1,315,000	6,600	.....	.....	C	
557	900,000	1,630,000	850,000	765,000	3,300	.....	50,000	C	Liq.
558	7,800,000	6,780,000	4,480,000	2,000,000	73,300	.....	230,000	D	
559	330,000	1,015,000	265,000	265,000	8,000	50,000	250,000	D	Liq.
560	130,000	280,000	130,000	150,000	600	.....	15,000	B	
561	30,230,000	15,500,000	6,715,000	6,830,000	45,300	.....	230,000	D	
562	250,000	430,000	65,000	200,000	1,300	50,000	80,000	D	Liq.
563	4,100,000	4,715,000	3,130,000	2,030,000	63,600	.....	1,700,000	D	
564	165,000	1,730,000	30,000	80,000	1,000	.....	365,000	D	
565	1,280,000	965,000	1,165,000	765,000	1,600	.....	65,000	C	
566	3,580,000	21,500,000	1,880,000	1,700,000	32,000	30,000	350,000	D	
567	3,100,000	3,180,000	1,450,000	2,080,000	75,000	15,000	150,000	D	
568	49,500,000	15,330,000	45,500,000	12,330,000	117,600	.....	130,000	D	
570	30,000	265,000	15,000	50,000	.....	15,000	30,000	C	Liq.
572	965,000	600,000	500,000	250,000	18,300	15,000	80,000	D	Colon.
573	1,815,000	2,565,000	1,230,000	650,000	28,600	.....	1,600,000	D	
575	3,000,000	1,315,000	2,380,000	350,000	13,300	.....	50,000	D	Colon.
576	7,230,000	36,000,000	2,750,000	33,915,000	1,600	880,000	100,000	D	
577	800,000	2,665,000	630,000	465,000	.....	.....	30,000	C	Liq.
581	76,000,000	28,330,000	69,080,000	25,330,000	250,000	.....	1,630,000	D	
584	180,000	165,000	80,000	50,000	1,300	15,000	.....	B	
585	91,000,000	40,330,000	90,780,000	15,000,000	1,600	.....	230,000	D	
586	3,815,000	4,215,000	450,000	315,000	7,300	.....	500,000	D	Liq.
587	16,830,000	43,165,000	16,515,000	39,165,000	9,600	.....	300,000	D	
588	3,930,000	5,230,000	3,400,000	3,500,000	102,300	.....	80,000	D	
589	241,330,000	285,330,000	240,915,000	285,330,000	290,000	.....	1,600,000	D	
590	9,330,000	4,215,000	7,830,000	480,000	1,233,300	.....	2,765,000	D	
591	12,615,000	25,000,000	12,230,000	23,500,000	168,300	.....	.....	D	
592	2,300,000	12,000,000	1,815,000	4,330,000	300	.....	.....	C	Total.
593	13,980,000	12,830,000	12,400,000	11,165,000	150,000	.....	900,000	D	
594	700,000	1,000,000	465,000	565,000	600	.....	80,000	C	Liq.
595	230,000	1,115,000	115,000	115,000	50,000	.....	180,000	D	
596	60,000,000	77,665,000	57,915,000	18,000,000	133,300	15,000	630,000	D	
597	14,080,000	14,165,000	13,730,000	11,830,000	25,600	.....	.....	D	
599	143,830,000	146,330,000	127,500,000	132,330,000	17,300	80,000	10,830,000	D	
600	1,265,000	3,400,000	1,150,000	865,000	.....	.....	.....	C	Total.
601	815,000	2,200,000	565,000	430,000	600	.....	130,000	D	Liqs.
602	148,000,000	110,665,000	147,900,000	107,015,000	3,600	.....	30,000	D	
603	265,000	275,000	265,000,000	50,000	600	.....	.....	B	
605	21,830,000	18,165,000	21,600,000	16,580,000	2,300	.....	1,150,000	D	
606	4,000,000	2,050,000	3,700,000	1,580,000	11,000	.....	.....	D	Colon.
607	148,165,000	181,665,000	148,065,000	165,000,000	5,000	.....	.....	D	
608	20,730,000	42,000,000	3,100,000	31,665,000	77,300	65,000	3,165,000	D	
610	2,830,000	4,165,000	1,880,000	3,030,000	300	.....	280,000	D	Liqs.
611	880,000	1,715,000	330,000	415,000	5,000	.....	130,000	D	"
612	2,630,000	2,465,000	1,430,000	830,000	300	.....	165,000	D	"
613	22,130,000	18,000,000	9,230,000	13,000,000	323,300	.....	150,000	D	
614	120,830,000	101,665,000	120,250,000	97,500,000	40,300	.....	980,000	D	
615	146,665,000	349,165,000	145,565,000	345,665,000	116,600	.....	115,000	D	
616	165,000	800,000	150,000	250,000	12,300	.....	50,000	D	Colon.

GROCERY STORES (SUMMER)—Continued.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
617	750,000	1,180,000	200,000	230,000	1,000	.....	65,000	C	Liq.
618	16,080,000	8,580,000	15,715,000	7,500,000	116,300	.....	150,000	D	
619	4,550,000	4,165,000	2,830,000	2,830,000	10,000	15,000	30,000	C	
620	3,580,000	2,000,000	2,315,000	530,000	106,600	.....	200,000	D	
623	1,100,000	3,800,000	700,000	3,315,000	6,300	15,000	430,000	D	
624	1,065,000	1,050,000	600,000	130,000	32,000	.....	15,000	D	
625	5,230,000	17,165,000	5,080,000	15,900,000	52,300	80,000	365,000	D	
626	1,130,000	2,850,000	650,000	1,865,000	28,000	.....	100,000	D	
628	1,580,000	2,700,000	50,000	115,000	4,600	.....	65,000	C	
629	265,000	365,000	150,000	165,000	1,600	.....	.....	B	
632	12,665,000	8,665,000	12,250,000	7,915,000	70,000	.....	130,000	D	
633	10,915,000	5,000,000	7,815,000	3,000,000	24,000	.....	400,000	D	
634	73,000,000	7,500,000	72,300,000	1,500,000	31,600	.....	265,000	D	
635	450,000	830,000	350,000	265,000	300	.....	130,000	D	Liq.
637	7,300,000	4,165,000	4,965,000	330,000	156,600	.....	265,000	D	
642	19,815,000	40,165,000	18,330,000	35,665,000	128,300	130,000	330,000	D	
643	30,000	325,000	30,000	75,000	600	.....	50,000	C	Liq.
645	2,230,000	4,500,000	300,000	215,000	1,000	.....	80,000	C	
646	17,165,000	9,830,000	17,115,000	2,315,000	8,300	.....	200,000	D	
647	128,165,000	85,265,000	128,065,000	85,000,000	5,600	.....	15,000	D	
648	100,000	200,000	25,000	50,000	300	30,000	.....	C	Liq.
649	37,580,000	56,000,000	36,830,000	54,080,000	113,300	150,000	915,000	D	
651	465,000	6,400,000	15,000	1,065,000	2,000	.....	80,000	C	Liq.
653	3,700,000	39,330,000	500,000	24,500,000	133,300	130,000	1,700,000	D	
654	.....	100,000	.....	30,000	.....	.....	.....	A	
663	61,630,000	11,830,000	59,850,000	365,000	56,600	.....	130,000	D	
664	180,000	950,000	180,000	330,000	.....	.....	15,000	B	
665	1,400,000	1,065,000	1,180,000	400,000	5,300	.....	.....	C	
666	1,800,000	4,265,000	1,750,000	1,565,000	.....	.....	.....	C	
667	13,715,000	3,730,000	13,315,000	1,100,000	166,600	.....	450,000	D	
668	18,400,000	14,000,000	18,100,000	13,000,000	133,300	.....	150,000	D	
669	15,765,000	17,330,000	15,480,000	15,665,000	113,300	.....	30,000	D	
670	3,250,000	5,250,000	1,100,000	1,200,000	126,600	.....	415,000	D	
671	8,465,000	5,330,000	7,650,000	2,915,000	17,300	.....	50,000	D	
672	28,565,000	15,665,000	28,280,000	12,830,000	58,300	.....	265,000	D	
673	8,565,000	4,830,000	330,000	265,000	43,300	.....	1,415,000	D	
675	6,250,000	7,165,000	5,965,000	5,665,000	63,300	.....	215,000	D	
677	29,630,000	8,500,000	28,680,000	7,500,000	291,600	.....	450,000	D	
678	130,000	665,000	115,000	65,000	15,000	15,000	.....	D	Colon.
679	815,000	3,450,000	365,000	3,180,000	19,600	.....	.....	D	"
683	730,000	765,000	365,000	500,000	15,000	.....	.....	D	"
692	1,100,000	2,480,000	530,000	65,000	13,300	30,000	15,000	D	"
Total...	3,798,292,000	4,574,076,000	3,378,750,000	3,561,676,000	19,764,860	5,133,000	165,341,000		
Average.	15,566,770	18,443,854	13,847,336	14,361,597	80,019	20,697	666,697	D	Total.
					percentage .5	percentage .1	percentage .3		

Samples Obtained at Bars.—These samples were all collected at the bars of hotels and saloons. Most of these bars have good refrigerator facilities.

The averages of 59 samples in round numbers were as follows:—

Agar count	8,000,000 per c.c.
Colon count	400,000 per c.c.
Liquefier count	800,000 per c.c.

Samples in Grade D as follows:—

Total number of samples	59
Grade D for total count	21
Grade D for colon count	34
Grade D for liquefier count	34

City Restaurants and Chinese Restaurants.—Sixty samples were obtained from eating houses which called themselves restaurants; included in this total were eleven Chinese restaurants.

The averages of the sixty samples in round numbers were as follows:—

Agar count	13,000,000 per c.c.
Colon count	300,000 per c.c.
Liquefier count	600,000 per c.c.

The averages of the Chinese restaurants were:—

Agar count	8,000,000 per c.c.
Colon count	40,000 per c.c.
Liquefier count	600,000 per c.c.

Samples in Grade D were as follows:—

Total number of samples	60
Grade D for total count	19
Grade D for colon count	35
Grade D for liquefier count	36

BARS AND SALOONS (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
1	360,000	4,200,000	300,000	.....	6,000	100,000	160,000	D	Liq.
3	9,600,000	2,700,000	4,200,000	560,000	70,000	400,000	160,000	D	
7	3,000,000	55,600,000	700,000	40,160,000	310,000	.....	30,000	D	Colon.
15	27,800,000	92,000,000	27,800,000	66,600,000	19,900,000	100,000	12,000,000	D	
17	8,800,000	16,100,000	8,000,000	11,800,000	20,000	.....	400,000	D	
19	10,400,000	108,300,000	9,100,000	105,000,000	180,000	30,000	330,000	D	
21	600,000	100,000	200,000	30,000	6,000	60,000	30,000	C	Colon.
35	780,000	3,715,000	715,000	2,930,000	58,000	.....	1,450,000	D	
38	5,100,000	30,330,000	4,230,000	19,100,000	168,600	.....	160,000	D	
45	15,030,000	49,000,000	11,830,000	700,000	31,100	.....	810,000	D	
46	4,290,000	772,000	4,200,000	217,000	29,000	.....	35,000	D	Colon.
55	900,000	25,800,000	700,000	10,200,000	1,183,000	.....	1,000,000	D	
63	24,750,000	103,750,000	4,865,000	50,030,000	126,500	.....	2,780,000	D	
91	250,000	1,500,000	100,000	1,215,000	2,300	.....	30,000	C	Liq.
93	1,715,000	14,165,000	1,015,000	10,850,000	55,300	.....	2,965,000	D	
96	430,000	3,560,000	100,000	800,000	2,300	.....	60,000	C	Liq.
99	175,000	415,000	65,000	380,000	31,000	.....	.....	D	Colon.
105	165,000	1,180,000	65,000	500,000	158,600	.....	165,000	D	
107	230,000	415,000	100,000	300,000	19,500	.....	115,000	D	
140	3,600,000	.....	1,160,000	.....	5,300	.....	660,000	D	Liq.
200	100,000	160,000	30,000	60,000	.....	.....	.....	A	
219	230,000	6,100,000	130,000	2,130,000	.....	.....	.....	B	Total.
226	130,000	1,400,000	130,000	450,000	.....	.....	.....	B	"
228	30,000	.....	30,000	.....	300	.....	.....	A	
229	130,000	.....	.....	.....	.....	.....	.....	B	Total.
234	1,200,000	4,000,000	700,000	3,330,000	10,600	30,000	160,000	D	
238	98,660,000	74,000,000	69,530,000	63,000,000	12,000	300,000	2,060,000	D	
243	60,000	560,000	.....	.....	2,000	.....	.....	B	Colon.
245	19,630,000	41,100,000	19,260,000	1,600,000	57,600	.....	1,030,000	D	
246	230,000	100,000	200,000	60,000	.....	.....	.....	B	Total.
253	7,800,000	3,900,000	5,100,000	2,560,000	.....	30,000	1,660,000	D	
254	200,000	160,000	30,000	60,000	1,600	.....	60,000	C	Liq.
256	230,000	630,000	130,000	530,000	300	.....	.....	B	Total.
264	130,000	630,000	.....	260,000	22,300	.....	.....	D	Colon.
272	60,000	60,000	30,000	.....	1,000	.....	.....	B	"
312	44,665,000	72,600,000	43,580,000	71,665,000	35,600	.....	.....	D	
398	43,830,000	109,330,000	40,000,000	65,360,000	288,300	.....	460,000	D	
411	1,080,000	3,930,000	1,065,000	3,465,000	1,600	30,000	265,000	D	Liq.
412	dried out	6,580,000	.....	5,165,000	6,300	65,000	450,000	D	"
413	500,000	32,900,000	380,000	31,630,000	10,000	15,000	150,000	D	"
415	750,000	3,680,000	250,000	2,080,000	6,300	.....	230,000	D	"
416	330,000	1,030,000	130,000	365,000	6,000	.....	65,000	C	Colon.
418	8,030,000	41,365,000	7,750,000	40,000,000	183,000	.....	180,000	D	
420	8,915,000	5,950,000	8,365,000	5,330,000	14,600	130,000	.....	D	
421	1,250,000	90,330,000	1,115,000	88,250,000	190,300	15,000	965,000	D	
424	2,030,000	1,730,000	1,480,000	580,000	.....	.....	80,000	C	Total.
431	.....	80,000	.....	15,000	1,600	.....	.....	B	Colon.
432	1,430,000	15,080,000	1,315,000	7,665,000	75,000	.....	4,415,000	D	
434	816,600	103,830,000	816,600	100,000,000	370,000	.....	1,080,000	D	
436	13,665,000	16,830,000	10,865,000	13,915,000	26,000	50,000	100,000	D	
439	1,865,000	5,450,000	1,800,000	4,780,000	69,600	.....	.....	D	
452	12,015,000	33,000,000	11,250,000	29,000,000	61,000	.....	1,930,000	D	
454	7,900,000	12,950,000	7,830,000	8,150,000	8,600	.....	.....	D	
458	11,715,000	35,500,000	11,180,000	16,765,000	6,300	.....	415,000	D	
464	5,465,000	24,530,000	4,800,000	11,480,000	27,600	.....	.....	D	
478	23,880,000	30,350,000	21,530,000	10,065,000	350,000	.....	6,730,000	D	
495	5,480,000	7,465,000	5,000,000	4,830,000	52,300	.....	250,000	D	
20	500,000	500,000	33,000	30,000	40,000	30,000	.....	D	Colon.
22	3,500,000	4,000,000	1,500,000	300,000	30,000	.....	150,000	D	
Total...	446,406,600	1,305,392,000	356,779,600	916,297,000	24,330,200	1,385,000	46,225,000		
Average.	7,831,695	22,901,614	6,259,291	16,075,386	412,376	24,298	810,965		
					percentage 5.2	percentage .1	percentage 3.5		

RESTAURANTS, CHINESE RESTAURANTS (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
9	86,800,000	93,100,000	65,500,000	84,000,000	6,260,000	160,000	4,800,000	D	
10	58,100,000	92,600,000	54,500,000	83,500,000	40,000	.....	2,500,000	D	
13	74,500,000	40,200,000	68,500,000	16,600,000	8,800,000	160,000	100,000	D	
48	4,500,000	3,600,000	4,100,000	2,800,000	1,600	30,000	130,000	D	Liq.
108	4,315,000	13,500,000	3,850,000	11,330,000	65,000	15,000	115,000	D	"
117	530,000	700,000	100,000	460,000	.....	30,000	.....	B	Total.
163	6,200,000	51,800,000	5,200,000	23,460,000	600	.....	.....	D	"
164	1,030,000	160,000	330,000	100,000	2,600	.....	.....	C	"
239	130,000	1,000,000	100,000	460,000	4,300	.....	130,000	D	Liq.
258	200,000	1,160,000	100,000	100,000	11,600	.....	.....	D	Colon.
263	830,000	8,230,000	260,000	1,660,000	121,600	.....	400,000	D	
266	1,630,000	9,600,000	1,330,000	8,500,000	75,000	60,000	930,000	D	
267	160,000	14,960,000	160,000	5,960,000	412,600	.....	460,000	D	
721	2,600,000	360,000	2,000,000	60,000	46,000	30,000	.....	D	Colon.
297	19,530,000	8,915,000	17,765,000	3,815,000	303,300	50,000	300,000	D	
298	1,150,000	9,415,000	915,000	1,280,000	53,000	.....	80,000	D	Colon.
307	32,230,000	18,080,000	18,780,000	7,330,000	93,000	65,000	1,430,000	D	
390	3,360,000	100,000	.....	.....	300	.....	.....	C	Total.
392	2,300,000	21,000,000	2,060,000	8,000,000	66,600	.....	2,400,000	D	
393	13,330,000	53,730,000	10,500,000	23,360,000	97,300	.....	1,100,000	D	
397	7,730,000	17,430,000	6,660,000	8,330,000	4,600	.....	260,000	D	
401	2,100,000	1,200,000	380,000	650,000	.....	.....	.....	C	Total.
405	565,000	615,000	530,000	465,000	.....	65,000	15,000	C	Liq.
410	4,030,000	26,080,000	3,850,000	25,000,000	131,300	.....	30,000	D	Colon.
419	1,080,000	2,700,000	400,000	450,000	3,300	15,000	65,000	C	Total.
422	1,700,000	2,965,000	1,630,000	2,215,000	2,000	15,000	180,000	D	Liq.
111	1,300,000	64,165,000	580,000	56,165,000	1,600	.....	300,000	D	"
583	1,415,000	2,365,000	750,000	250,000	66,000	15,000	530,000	D	
423	65,000	4,280,000	50,000	1,465,000	36,300	.....	815,000	D	
427	.....	38,200,000	.....	36,665,000	485,300	.....	1,815,000	D	
430	.....	13,165,000	.....	4,580,000	62,600	.....	1,215,000	D	
433	5,130,000	5,480,000	3,700,000	5,250,000	2,300	.....	3,080,000	D	
435	150,665,000	236,165,000	150,665,000	216,665,000	51,000	.....	665,000	D	
441	65,000	2,980,000	50,000	415,000	20,000	100,000	300,000	D	
443	22,915,000	37,630,000	22,165,000	30,830,000	18,600	80,000	265,000	D	
444	4,100,000	650,000	3,880,000	.....	96,000	.....	.....	D	Colon.
448	465,000	10,680,000	180,000	1,815,000	70,300	30,000	815,000	D	
451	180,000	5,580,000	150,000	4,665,000	20,000	15,000	130,000	D	
460	915,000	2,000,000	650,000	1,080,000	11,000	100,000	500,000	D	
462	5,350,000	12,480,000	4,800,000	6,250,000	8,000	.....	315,000	D	
469	30,030,000	26,375,000	28,815,000	23,500,000	600	.....	2,325,000	D	
473	68,665,000	146,900,000	55,850,000	106,500,000	35,000	.....	165,000	D	
481	50,000	80,000	15,000	30,000	500	30,000	.....	C	Liq.
498	9,580,000	26,665,000	6,465,000	17,665,000	99,000	.....	6,350,000	D	
522	8,865,000	14,050,000	5,830,000	1,315,000	114,000	.....	80,000	D	
523	1,465,000	5,630,000	1,050,000	4,215,000	122,600	30,000	230,000	D	
524	300,000	1,600,000	115,000	950,000	3,600	50,000	1,150,000	D	Liq.
537	400,000	465,000	250,000	265,000	1,300	.....	.....	B	Total.
538	5,530,000	3,430,000	4,015,000	1,815,000	7,300	.....	15,000	D	"
552	8,915,000	6,000,000	8,580,000	5,333,000	.....	.....	.....	D	"
569	50,000	215,000	50,000	65,000	4,000	.....	30,000	C	Liq.
579	3,150,000	165,000	2,200,000	15,000	.....	30,000	.....	C	Total.
582	67,165,000	88,330,000	65,580,000	34,500,000	70,000	.....	580,000	D	
627	115,000	575,000	165,000	.....	2,000	.....	25,000	C	Liq.
640	15,930,000	12,000,000	15,000,000	6,830,000	190,000	.....	1,150,000	D	
641	850,000	1,250,000	415,000	150,000	16,300	.....	30,000	D	
650	11,250,000	10,915,000	10,580,000	9,415,000	966,600	.....	180,000	D	
652	465,000	1,000,000	230,000	150,000	8,300	.....	100,000	C	Colon.
674	1,530,000	1,930,000	1,330,000	1,580,000	1,000	.....	15,000	C	Total.
580	315,000	700,000	230,000	400,000	16,000	.....	15,000	D	Colon.
Total...	757,815,000	1,277,295,000	663,785,000	900,673,000	19,202,700	1,175,000	37,575,000		
Average.	13,065,776	21,288,250	11,444,569	15,011,217	320,045	19,583	626,250		
					percentage 2.4	percentage .09	percentage 2.9		

RESTAURANTS, CHINESE RESTAURANTS (SUMMER)—Concluded)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
	Chinese Restaurants (included also above)							
390	3,360,000	100,000	.....	.....	300	.....	.....	C Total.
392	2,300,000	21,000,000	2,060,000	8,000,000	66,600	.....	2,400,000	D Colon.
405	565,000	615,000	530,000	465,000	.....	65,000	15,000	C Liq.
410	4,030,000	26,080,000	3,850,000	25,000,000	131,300	.....	30,000	D Colon.
419	1,080,000	2,700,000	400,000	450,000	3,300	15,000	65,000	C Total.
423	65,000	4,280,000	50,000	1,465,000	36,300	.....	815,000	D Colon.
430	.....	13,165,000	.....	4,580,000	62,600	.....	1,215,000	D "
441	65,000	2,980,000	50,000	415,000	20,000	100,000	300,000	D "
448	465,000	10,680,000	180,000	1,815,000	70,300	30,000	815,000	D "
460	915,000	2,000,000	650,000	1,080,000	11,000	100,000	500,000	D "
473	68,665,000	146,900,000	55,850,000	106,500,000	35,000	.....	165,000	D Total.
Total...	81,510,000	230,500,000	63,620,000	149,770,000	436,700	310,000	6,320,000	
Average.	8,151,000	20,954,545	6,362,000	13,615,454	39,700	28,181	574,545	D Total.
					percentage .4	percentage .1	percentage 2.7	

QUICK LUNCH COUNTERS (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
2	5,500,000	15,300,000	4,100,000	6,800,000	33,000	.....	900,000	D
18	114,600,000	96,300,000	5,100,000	41,800,000	6,800,000	1,300,000	32,000,000	D
24	408,500,000	217,200,000	408,500,000	52,200,000	3,350,000	.....	2,800,000	D
27	450,000	8,900,000	450,000	8,350,000	36,000	.....	100,000	D Colon.
32	360,000	8,260,000	33,000	1,660,000	47,000	.....	1,660,000	D
50	150,000	560,000	50,000	100,000	.....	30,000	30,000	C Liq.
75	450,000	3,200,000	200,000	2,800,000	8,000	.....	200,000	D "
106	2,580,000	21,830,000	2,215,000	20,630,000	37,000	15,000	765,000	D
110	100,000	6,500,000	50,000	3,280,000	.....	.....	150,000	D Liq.
118	7,530,000	1,630,000	6,630,000	830,000	20,000	.....	100,000	D
124	6,200,000	7,930,000	5,700,000	30,000	600	.....	.....	D Total.
135	2,560,000	760,000	2,030,000	660,000	3,000	.....	.....	C "
138	115,000	765,000	30,000	750,000	6,000	.....	30,000	C Colon.
139	415,000	630,000	250,000	580,000	3,000	.....	.....	B Total.
142	5,830,000	7,560,000	5,300,000	6,360,000	3,000	.....	900,000	D
143	30,000	8,400,000	.....	1,800,000	4,300	30,000	80,000	D Liq.
227	260,000	400,000	200,000	230,000	300	.....	.....	B Total.
237	430,000	1,600,000	300,000	1,200,000	7,000	.....	60,000	C Colon.
247	660,000	430,000	260,000	160,000	34,300	.....	.....	D "
252	260,000	900,000	200,000	630,000	10,000	.....	100,000	C
257	660,000	41,000,000	330,000	38,400,000	230,000	.....	160,000	D
262	100,000	2,830,000	.....	530,000	17,300	30,000	130,000	D
300	430,000	3,900,000	415,000	3,030,000	600	.....	450,000	D Liq.
324	230,000	200,000	130,000	.....	5,600	.....	.....	C Colon.
395	138,160,000	648,000,000	140,000,000	647,330,000	208,000	.....	.....	D
414	6,780,000	28,450,000	6,500,000	26,665,000	215,600	.....	450,000	D
450	65,000	430,000	30,000	100,000	6,300	.....	80,000	C Colon.
499	37,980,000	67,665,000	36,665,000	66,500,000	136,000	15,000	650,000	D
545	565,000	2,150,000	30,000	1,550,000	1,300	100,000	150,000	D Liq.
546	1,700,000	5,380,000	1,180,000	1,765,000	6,300	50,000	165,000	D "
92	1,365,000	6,550,000	765,000	2,465,000	476,600	.....	280,000	D
109	165,000	8,580,000	65,000	7,400,000	2,300	.....	30,000	C Liq.
Total...	745,180,000	1,224,190,000	627,708,000	946,585,000	11,708,400	1,570,000	42,420,000	
Average.	23,286,875	38,255,937	19,615,875	29,580,781	365,887	49,062	1,325,625	D
					percentage 1.5	percentage .1	percentage 3.4	

Quick Lunch Counters.—These places provide cheap lunches and milk, tea and coffee. Refrigerator facilities are usually absent. Thirty-two samples from as many places were examined. The average agar count in round numbers was twenty-three million bacteria to the c.c., the colon count 365,000 to the c.c. and the liquefier numbers 1,400,000 to the c.c.

Samples in Grade D were as follows:—

Total number of samples	32
In Grade D for total count	9
In Grade D for colon count	14
In Grade D for liquefier count	18

Dining Rooms.—The averages of eight samples in round numbers were as follows:—

Agar count	8,000,000 per c.c.
Colon count	80,000 per c.c.
Liquefier count	500,000 per c.c.

Samples in Grade D were as follows:—

Total number of samples	8
Grade D for total count	3
Grade D for colon count	6
Grade D for liquefier count	4

Cafes.—The averages of 14 samples were as follows:—

Agar count	2,000,000 per c.c.
Colon count	230,000 per c.c.
Liquefier count	800,000 per c.c.

Samples in Grade D were as follows:—

Total number of samples	14
Grade D for total count	1
Grade D for colon count	10
Grade D for liquefier count	10

DINING ROOMS (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
5	1,200,000	3,700,000	400,000	1,200,000	40,000	60,000	100,000	D	Colon.
23	17,600,000	56,900,000	14,800,000	24,200,000	160,000	.....	800,000	D	
25	3,200,000	3,700,000	2,800,000	2,800,000	.....	.....	100,000	C	Total.
119	5,960,000	5,160,000	5,060,000	4,330,000	3,000	.....	.....	D	"
447	1,925,000	5,865,000	1,700,000	3,065,000	158,300	15,000	50,000	D	Colon.
479	1,130,000	2,450,000	665,000	630,000	54,600	.....	65,000	D	"
609	1,980,000	2,050,000	780,000	380,000	57,000	.....	300,000	D	
684	30,665,000	10,330,000	29,865,000	6,830,000	185,000	.....	2,165,000	D	
Total...	63,660,000	90,155,000	56,070,000	43,435,000	657,900	75,000	3,580,000		
Average.	7,957,500	11,269,375	7,008,750	5,429,375	82,237	9,375	447,500	D	
					percentage 1.03	percentage .08	percentage 3.9		

CAFÉS (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
29	80,000	3,430,000	.....	1,200,000	50,000	.....	730,000	D	
52	760,000	730,000	200,000	200,000	.....	130,000	60,000	D	Liq.
54	200,000	930,000	30,000	560,000	.....	30,000	100,000	D	"
61	300,000	.....	115,000	.....	1,000	.....	.....	B	
81	1,680,000	26,165,000	1,530,000	23,050,000	35,300	30,000	1,350,000	D	
82	830,000	4,100,000	730,000	1,860,000	163,000	.....	30,000	D	Colon.
84	230,000	89,600,000	130,000	83,300,000	2,396,000	.....	1,630,000	D	
87	1,056,000	4,100,000	173,000	2,346,000	36,600	.....	553,000	D	
95	20,965,000	58,300,000	19,900,000	32,100,000	14,000	.....	2,480,000	D	
103	280,000	10,750,000	265,000	9,750,000	218,600	.....	365,000	D	
112	650,000	61,830,000	350,000	56,230,000	89,600	250,000	1,250,000	D	
114	115,000	1,375,000	15,000	65,000	17,000	.....	.....	D	Colon.
137	1,380,000	2,150,000	1,280,000	1,300,000	195,000	.....	1,150,000	D	
160	160,000	60,000	30,000	.....	1,000	.....	.....	B	Total.
Total...	28,686,000	263,520,000	24,748,000	211,961,000	3,217,100	440,000	9,698,000		
Average.	2,049,000	20,270,769	1,767,714	16,304,692	229,793	33,846	746,000	D	
					percentage 11.2	percentage .1	percentage 3.6		

Candy Stores, Ice Cream Parlors, Refreshments.—From stores selling candy, ice cream, etc., fifteen samples were obtained. The averages of these in round numbers were as follows:—

Agar count	4,000,000 per c.c.
Colon count	23,000 per c.c.
Liquefier count	250,000 per c.c.

Samples in Grade D were as follows:—

Total number of samples	15
Grade D for total count	3
Grade D for colon count	6
Grade D for liquefier count	9

General Stores.—There were only three samples from general stores, and little comment is necessary. One store gave the largest number of any sample collected—over four billions of bacteria to the c.c. All were in Grade D.

General Grocery Store.—Four samples were collected, three of which were in Grade D, and one in Grade C for high colon content.

Fruit Stores.—Of the four samples collected, three were in Grade C, and one in Grade D.

Better Class Dining Rooms.—Thirteen samples were obtained from dining rooms serving meals throughout the day, the majority of them not serving liquors.

The general averages in round numbers were as follows:—

Total count on agar	39,000,000 per c.c.
Colon count	56,000 per c.c.
Liquefier count	600,000 per c.c.

Samples in Grade D were as follows:—

Total number of samples	13
Grade D for total count	6
Grade D for colon count	8
Grade D for liquefier count	5

CANDY STORES, ICE CREAM PARLORS, REFRESHMENTS (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
56 xx	360,000	400,000	.....	160,000	6,600	100,000	30,000	D Liq.
58 xx	230,000	800,000	60,000	130,000	.....	100,000	160,000	D "
148 x	1,200,000	4,300,000	900,000	1,630,000	1,300	.....	30,000	C Total.
157 x	400,000	1,030,000	200,000	30,000	6,600	.....	.....	C Colon
417 xxx	6,950,000	18,000,000	6,465,000	13,665,000	117,600	15,000	650,000	D
428 xxx	11,530,000	13,280,000	11,000,000	12,315,000	14,300	200,000	365,000	D
437 xx	500,000	12,030,000	365,000	6,415,000	133,300	.....	1,300,000	D Colon.
449 xx	430,000	1,130,000	280,000	465,000	3,300	.....	115,000	D Liq.
468 x	280,000	750,000	230,000	280,000	.....	30,000	80,000	D "
510 x	730,000	3,300,000	615,000	900,000	6,300	65,000	230,000	D "
513 xxx	1,130,000	3,030,000	15,000	350,000	17,300	.....	30,000	D Colon.
529 x	2,415,000	5,500,000	700,000	850,000	23,600	.....	.....	D "
543 xx	30,100,000	14,330,000	8,600,000	2,330,000	18,300	.....	.....	D
542 xx	3,050,000	7,580,000	2,780,000	6,750,000	5,300	200,000	130,000	D Liq.
463 x	165,000	515,000	15,000	330,000	.....	30,000	50,000	C "
Total...	59,470,000	85,975,000	32,225,000	46,600,000	353,800	740,000	3,170,000	
Average.	3,964,666	5,731,666	2,148,333	3,106,666	23,586	49,333	211,333	D
					percentage .5	percentage .8	percentage 3.6	

x Candy Stores. xx Ice Cream Parlors. xxx Refreshments.

GENERAL STORES (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
6	4,900,000	7,000,000	460,000	.....	40,000	160,000	600,000	D
11	10,000,000	46,500,000	4,000,000	26,700,000	560,000	100,000	160,000	D
28	4,290,000,000	4,340,000,000	3,890,000	4,033,000,000	101,000,000	300,000	157,000,000	D
Total...	4,304,900,000	4,393,500,000	8,350,000	4,059,700,000	101,600,000	560,000	157,760,000	
Average.	1,434,966,666	1,464,500,000	2,783,333	1,353,233,333	33,866,666	186,666	52,586,666	D
					percentage 2.3	percentage .01	percentage 3.5	

GENERAL GROCERY STORES (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
4	1,800,000	4,500,000	900,000	4,000,000	60,000	30,000	200,000	D	
8	3,200,000	9,500,000	900,000	1,100,000	170,000	200,000	700,000	D	
26	2,000,000	6,000,000	400,000	1,500,000	70,000	30,000	.....	D	Colon.
102	465,000	180,000	315,000	180,000	7,300	.....	.....	C	"
Total...	7,465,000	20,180,000	2,515,000	6,780,000	307,300	260,000	900,000		
Average.	1,866,250	5,045,000	628,750	1,695,000	76,825	65,000	225,000	D	
					percentage 4.1	percentage 1.2	percentage 4.4		

FRUIT STORES (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
104	65,000	65,000	15,000	65,000	300	.....	50,000	C	Liq.
122	630,000	660,000	100,000	400,000	33,000	.....	.....	D	Colon.
127	4,260,000	3,100,000	3,430,000	2,300,000	.....	.....	.....	C	Total.
162	1,930,000	11,530,000	1,100,000	3,160,000	5,000	.....	.....	C	"
Total...	6,885,000	15,355,000	4,645,000	5,925,000	38,300	.....	50,000		
Average.	1,721,250	3,838,750	1,161,250	1,481,250	9,575	.....	12,500		
					percentage .5		percentage .3		

BETTER CLASS DINING ROOMS (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
97	9,950,000	380,000	9,315,000	130,000	24,000	.....	.....	D	
631	1,915,000	1,715,000	750,000	280,000	39,600	.....	100,000	D	Colon.
636	2,965,000	2,100,000	2,965,000	1,465,000	7,300	30,000	.....	C	
638	150,000	1,030,000	30,000	465,000	1,300	.....	100,000	C	
639	23,800,000	10,330,000	3,730,000	6,750,000	41,600	30,000	2,450,000	D	
681	250,000	1,200,000	115,000	50,000	1,300	.....	100,000	C	Liq.
690	30,000	100,000	15,000	15,000	.....	.....	.....	A	
691	198,000,000	92,115,000	197,450,000	90,000,000	106,600	.....	415,000	D	
694	265,000	100,000	200,000	30,000	300	.....	.....	B	Total.
699	4,030,000	11,165,000	2,830,000	10,665,000	24,300	15,000	30,000	D	Colon.
701	152,000,000	126,415,000	151,350,000	125,000,000	168,300	.....	215,000	D	
702	34,165,000	22,000,000	33,515,000	20,830,000	266,600	.....	2,580,000	D	
704	76,830,000	60,000,000	76,450,000	55,000,000	50,300	.....	1,900,000	D	
Total...	504,350,000	328,650,000	478,715,000	310,680,000	731,500	75,000	7,890,000		
Average.	38,796,154	25,280,769	36,824,230	23,898,461	56,269	5,769	606,923	D	
					percentage .1	percentage .02	percentage 2.4		

Residential Hotels.—Under this heading we include the largest and best hotels in the city.

Eleven samples were obtained. The averages of these in round numbers are as follows:—

Agar count	19,000,000
Colon count	100,000
Liquefier count	700,000

Samples in Grade D were as follows:—

Total number of samples	11
Grade D for total count	4
Grade D for colon count	6
Grade D for liquefier count	5

Unclassified.—Six unclassified samples gave in round numbers the following averages:—

Total count	800,000 per c.c.
Colon count	15,000 per c.c.
Liquefier count	120,000 per c.c.

Samples in Grade D were as follows:—

Total number of samples	6
Grade D for total count	0
Grade D for colon count	2
Grade D for liquefier count	1

Ice Cream.—Six samples of ice cream were examined. The majority were fairly good as regards total bacterial content. Four of them, however, had a very high colon content, and one, a very large number of liquefying bacteria.

A quantity of ice cream is manufactured from the cream which is returned unsold from the delivery vans, and hence its bacterial content is apt to have increased considerably.

No endeavour was made to collect any large number of ice cream samples. Several concerns manufacture large quantities, and the description of some of these plants is given in another place (pages 36, 37).

Cream intended for the manufacture of ice cream should be pasteurized, on account of its usual high bacterial content. Further, pasteurized cream gives a better and smoother body to the manufactured product, which is much appreciated by the consumer.

RESIDENTIAL HOTELS (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
89	1,115,000	9,930,000	430,000	6,380,000	116,000	100,000	500,000	D	
100	2,115,000	12,400,000	2,000,000	10,850,000	312,000	.....	700,000	D	
125	1,930,000	530,000	1,560,000	360,000	.....	.....	.....	C	
250	300,000	230,000	250,000	100,000	.....	.....	.....	B	
680	26,665,000	33,330,000	26,300,000	26,830,000	5,600	.....	.....	D	Total.
682	1,400,000	415,000	765,000	15,000	3,300	.....	.....	C	Total.
685	35,165,000	10,165,000	34,430,000	6,330,000	52,300	.....	330,000	D	
686	530,000	800,000	380,000	415,000	3,300	.....	65,000	C	Liq.
687	32,665,000	11,450,000	32,365,000	5,750,000	433,300	.....	3,000,000	D	
688	104,665,000	19,330,000	103,965,000	15,830,000	190,000	.....	2,515,000	D	
703	715,000	1,865,000	250,000	30,000	28,600	15,000	50,000	D	Colon.
Total...	207,265,000	100,445,000	202,695,000	72,890,000	1,144,400	115,000	7,160,000		
Average.	18,842,272	9,131,363	18,426,818	6,626,363	104,036	10,454	650,909	D	
					percentage .5	percentage .1	percentage 7.1		

UNCLASSIFIED (SUMMER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
85	336,000	1,016,000	326,000	856,000	13,230	6,000	93,000	D	Colon.
88	1,500,000	11,130,000	650,000	10,200,000	64,000	.....	530,000	D	
90	2,560,000	2,530,000	2,430,000	2,100,000	300	.....	.....	C	Total.
503	615,000	365,000	165,000	80,000	9,300	.....	80,000	C	
598	15,000	150,000	15,000	.....	.....	.....	.....	A	
630	15,000	280,000	.....	15,000	3,300	30,000	.....	C	Liq.
Total...	5,041,000	15,471,000	3,586,000	13,251,000	90,130	36,000	703,000		
Average.	840,166	2,578,500	597,666	2,208,500	15,021	6,000	117,166	D	
					percentage 1.7	percentage .2	percentage 4.5		

CITY, (SUMMER) GRAND TOTAL AND AVERAGES.

——	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.	
						Sporulating.	Non-Sporulating.
Milkmen on street	407,000,000	672,694,300	328,365,000	353,900,000	6,442,700	665,000	77,268,000
Grocers	3,798,292,000	4,574,076,000	3,378,750,000	3,561,676,000	19,764,860	5,133,000	165,341,000
Bars	446,406,600	1,305,392,000	356,779,600	916,297,000	24,330,200	1,385,000	46,225,000
Restaurants	757,815,000	1,277,295,000	663,785,000	900,673,000	19,202,700	1,175,000	37,575,000
Quick Lunch Rooms	745,180,000	1,224,190,000	627,708,000	946,585,000	11,708,400	1,570,000	42,420,000
Dining Rooms	63,660,000	90,155,000	56,070,000	43,435,000	657,900	75,000	3,580,000
Cafes	28,686,000	263,520,000	24,748,000	211,961,000	3,217,100	440,000	9,698,000
Ice Cream Parlors, etc.	59,470,000	85,975,000	32,225,000	46,600,000	353,800	740,000	3,170,000
General Stores	4,304,900,000	4,393,500,000	8,350,000	4,059,700,000	101,600,000	560,000	157,760,000
General Grocery Stores	7,465,000	20,180,000	2,515,000	6,780,000	307,300	260,000	900,000
Fruit Stores	6,885,000	15,355,000	4,645,000	5,925,000	38,300	.....	50,000
Better class Dining Rooms	504,350,000	328,650,000	478,715,000	310,680,000	731,500	75,000	7,890,000
Residential Hotels	207,265,000	100,445,000	202,695,000	72,890,000	1,144,400	115,000	7,160,000
Unclassified	5,041,000	15,471,000	3,586,000	13,251,000	90,130	36,000	703,000
Grand Total	11,342,415,600	14,366,898,300	6,168,936,600	11,450,353,000	189,589,290	12,229,000	559,740,000
Average	20,290,546	25,747,129	11,035,664	20,520,346	334,372	21,916	1,003,118
					per cent. 1.6	per cent. .08	per cent. 3.8

NOTE.—It will be seen by referring to the tables of which the above is the synopsis, that the averages of the Grand Total in this table have been obtained from—Agar, 559 samples; Gelatine, 558 samples; Colon, 567 samples.

ICE CREAM (SUMMER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
197	30,000	1,030,000	30,000	.....	119,300	.....	200,000	
199	960,000	46,600,000	800,000	4,830,000	234,600	.....	1,400,000	
249	1,200,000	430,000	1,160,000	60,000	64,600	.....	100,000	
196	230,000	2,930,000	130,000	1,230,000	177,600	.....	460,000	
187	14,030,000	2,130,000	3,900,000	800,000	600	.....	260,000	
232	160,000	2,360,000	130,000	130,000	2,000	130,000	30,000	
Total...	16,610,000	55,480,000	6,150,000	7,050,000	598,700	130,000	2,450,000	
Average.	2,768,333	9,246,666	1,025,000	1,175,000	99,783	21,666	408,333	
					percentage 3.6	percentage .2	percentage 4.4	

RESULTS OF, AND NOTES ON, SAMPLES TAKEN WITHIN THE CITY OF MONTREAL DURING THE WINTER OF 1913-14

Large Milk Dealers.—The following samples are of milk as it arrives at the establishments of Montreal's large milk dealers.

The samples are from dealers "A," "B" and "C."

For particulars of establishments see "Summer."

Dealer "A," Winter.—The averages obtained from twenty-three samples of milk as delivered to this dealer were in round numbers:—

Agar count	190,000 per c.c.	Grade B
Colon count	55,000 per c.c.	Grade C
Liquefier count	17,000 per c.c.	Grade B

The number of samples in Grade D was:—

Agar count	0
Colon count	13
Liquefier count	1

Dealer "B," Winter.—The averages obtained from twenty-one samples of milk as delivered to this dealer were in round numbers:—

Agar count	79,000 per c.c.	Grade A
Colon count	30,000 per c.c.	Grade C
Liquefier count	8,000 per c.c.	Grade B

These are the best results obtained, but the colon content is unnecessarily high.

The number of samples in Grade D was:—

Agar count	0
Colon count	11
Liquefier count	1

DEALER "A" (WINTER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
325	26,000	73,000	.....	30,000	16,000	.....	3,000	D Colon.
327	460,000	1,666,000	386,000	1,603,000	.....	3,000	.....	B
329	16,000	96,000	.....	16,000	.....	.....	20,000	B Liq.
331	146,000	2,500,000	90,000	2,500,000	503,000	.....	175,000	D
333	56,000	180,000	33,000	73,000	3,000	.....	60,000	C Liq.
335	136,000	110,000	53,000	36,000	.....	.....	.....	B
337	40,000	840,000	.....	783,000	43,000	.....	20,000	D Colon.
339	220,000	5,000,000	193,000	5,260,000	20,000	16,000	3,000	D "
341	43,000	63,000	30,000	30,000	13,000	.....	.....	D "
342	110,000	150,000	83,000	86,000	6,000	.....	33,000	C "
355	dried	106,000	dried	56,000	46,000	.....	.....	D "
356	dried	23,000	dried	10,000	6,000	.....	10,000	C "
357	56,000	.....	.....		96,000			D "
402	1,543,000	17,250,000	1,000,000	17,250,000	180,000	.....	.....	D "
404	113,000	60,000	10,000	33,000	.....	3,000	.....	B
406	dried	63,000	dried	26,000	123,000	.....	.....	D Colon.
407	13,000	20,000	3,000	13,000	10,000	.....	.....	C "
411	dried	146,000	dried	110,000	26,000	.....	3,000	D "
412	310,000	600,000	230,000	400,000	73,000	3,000	10,000	D "
413	70,000	190,000	20,000	116,000	53,000	.....	6,000	D "
415	40,000	300,000	6,000	160,000	60,000	.....	.....	D "
416	dried	166,000	dried	100,000	6,000	.....	3,000	C "
419	20,000	180,000	6,000	80,000	3,000	3,000	.....	C "
Total...	3,418,000	29,782,000	2,143,000	28,771,000	1,286,000	28,000	346,000	
Average.	189,888	1,353,727	119,055	1,307,773	55,913	1,273	15,727	D Colon.
					percentage 29.4	percentage .09	percentage 1.1	

DEALER "B" (WINTER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
70	33,000	86,000	13,000	50,000	.....	.....	.....	A
101	130,000	753,000	16,000	123,000	13,000	3,000	26,000	D Colon.
187	250,000	65,000	65,000	65,000	70,000	30,000	.....	D "
260	36,000	60,000	3,000	36,000	.....	.....	.....	A
262	56,000	320,000	.....	53,000		.....	.....	A
264	43,000	166,000	3,000	80,000	3,000	.....	.....	B
266	16,000	70,000	6,000	56,000	6,000	.....	.....	C Colon.
270	100,000	153,000	36,000	90,000	53,000	.....	23,000	D "
272	36,000	10,000	3,000	.....	6,000	.....	.....	C "
274	80,000	383,000	66,000	383,000	146,000	.....	.....	D "
280	173,000	40,000	76,000	40,000	30,000	.....	.....	D "
282	36,000	66,000	10,000	30,000	6,000	.....	.....	C "
286	50,000	33,000	10,000	33,000	3,000	.....	.....	B "
290	20,000	20,000	3,000	20,000	3,000	.....	.....	B "
294	336,000	56,000	.....	80,000	13,000	.....	70,000	D "
306	36,000	33,000	.....	30,000	156,000	.....	proteus liq.	D
323	13,000	36,000	3,000	36,000	60,000	.....	.....	D Colon.
326	106,000	430,000	56,000	390,000	30,000	.....	.....	D "
359	36,000	56,000	3,000	40,000	20,000	.....	.....	D "
360	43,000	106,000	.....	63,000	10,000	.....	3,000	C "
367	43,000	136,000	.....	90,000	.....	.....	6,000	B
Total...	1,672,000	3,078,000	372,000	1,788,000	628,000	33,000	128,000	
Average.	79,619	146,571	17,714	85,143	29,905	1,571	6,400	D Colon.
					percentage 37.5	percentage 1.07	percentage 4.3	

DEALER "C" (WINTER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
369	6,930	1,166,000	6,000	966,000	.....	.....	20,000	B Liq.
370	676,000	liq. proteus	630,000	liq. proteus	176,000	.....	.....	D Colon.
371	dried	136,000	dried	76,000	80,000	.....	.....	D "
372	"	140,000	"	70,000	86,000	.....	.....	D "
373	"	33,000	"	20,000	3,000	.....	.....	B "
375	"	80,000	"	33,000	3,000	.....	.....	B "
377	"	100,000	"	85,000	96,000	3,000	.....	D "
379	"	86,000	"	23,000	33,000	.....	30,000	D "
381	333,000	220,000	250,000	150,000		3,000	.....	B "
382	dried	96,000	dried	55,000	23,000	.....	.....	D Colon.
383	330,000	1,033,000	273,000	613,000	436,000	.....	.....	D "
384	dried	280,000	dried	193,000	16,000	.....	.....	D "
385	"	liq. proteus	"	liquefied	96,000	.....	liq. proteus	D "
386	1,466,000	250,000	1,133,000	.....	1,553,000	.....	"	D "
388	636,000	liq. proteus	50,000	liq. proteus	100,000	.....	"	D "
389	203,000	613,000	160,000	463,000	506,000	.....	80,000	D "
390	3,000,000	1,890,000	2,466,000	1,026,000	246,000	26,000	70,000	D "
391	7,166,000	20,133,000	7,000,000	19,666,000	4,566,000	.....	23,000	D "
393	2,300,000	1,353,000	900,000	906,000	610,000	.....	16,000	D "
394	2,513,000	liquefied	2,460,000	liquefied	40,000	.....	liquefied	D "
397	6,633,000	8,735,000	6,533,000	8,575,000	583,000	.....	46,000	D "
400	23,000	3,000	.....	.....	6,000	.....	.....	C "
Total...	25,285,930	36,347,000	21,861,000	32,920,000	9,258,000	32,000	285,000	
Average.	1,945,071	2,019,278	1,681,615	1,828,888	440,857	1,777	15,833	D "
					percentage 22.6	percentage .08	percentage .7	

Large Dealers. GRAND TOTAL AND AVERAGES.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
A	3,418,000	29,782,000	2,143,000	28,771,000	1,286,000	28,000	346,000	
B	1,672,000	3,078,000	372,000	1,788,000	628,000	33,000	128,000	
C	25,285,930	36,347,000	21,861,000	32,920,000	9,258,000	32,000	285,000	
GRAND TOTAL	30,375,930	69,207,000	24,376,000	63,479,000	11,172,000	93,000	759,000	
AV.....	584,152	1,134,541	468,769	1,040,639	171,877	1,524	12,442	
					percentage 29.4	percentage .1	percentage 1.09	

NOTE—The averages in this table are obtained from 52 Agar, 61 Gelatine and 65 Colon samples respectively.

Dealer "C," Winter.—The averages obtained from eighteen samples of milk as delivered to this dealer were in round numbers:—

Agar count	2,000,000 per c.c.	Grade C
Colon count	440,000 per c.c.	Grade D
Liquefier count	17,000 per c.c.	

The number of samples in Grade D was:—

Agar count	2
Colon count	17
Liquefier count	0

Comparison of Summer and Winter Milk on Arrival at Montreal.

On page 40 is given the average of fifty samples of summer milk on its arrival in Montreal, and these figures are repeated here in order to compare them at a glance with the fifty-two samples of winter milk at Montreal.

	Summer.	Winter.
Agar count	1,100,000 per c.c.	600,000 per c.c.
Colon count	50,000 per c.c.	170,000 per c.c.
Liquefier count	140,000 per c.c.	14,000 per c.c.

Roughly, this indicates that the total bacterial content in summer is twice the winter content, the colon content in winter is more than three times the summer, and the liquefier count in summer is ten times the winter count.

In our judgment this indicates clearly that there is greater manurial infection in winter, due to dirty stables, dirty cattle, and dirty milking. Fortunately, in winter the temperature conditions are such that the colon content does not increase at such a rapid rate.

The liquefier content in winter is only one-tenth of the summer content. The liquefying organisms that are found in soil, and that cling to the hairy coat of the animal and are dislodged by the movements of milking are more numerous under summer conditions. The bacterial content of manure also changes and has a higher colon content in the winter than in the summer months, and the liquefier group, as intestinal bacteria, is larger in numbers under summer conditions.

Milkmen on Street (Winter).—Forty-eight samples of milk were obtained from milkmen on the street in the act of delivering milk, and gave the following averages in round numbers:—

Agar count	2,000,000	Grade C
Colon count	100,000	Grade D
Liquefier count	40,000	Grade C

Omitting one sample, these figures would be reduced by three-quarters—and give one higher grade.

The number of samples in Grade D was as follows:—

Agar count	2
Colon count	14
Liquefier count	8

SAMPLES TAKEN FROM MILKMEN IN THE ACT OF DELIVERING MILK BETWEEN 6 AND 10 A.M.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
41	165,000	465,000	50,000	380,000	3,000	.....	.....	B
132	615,000	165,000	100,000	50,000	30,000	.....	.....	D Colon.
196	100,000	400,000	.....	130,000	.....	30,000	.....	C Liq.
199	450,000	100,000	130,000	15,000	3,000	.....	.....	B
204	180,000	50,000	50,000	50,000	.....	.....	.....	B
206	180,000	650,000	30,000	280,000	110,000	.....	.....	D Colon.
269	300,000		80,000	.....	10,000	.....	.....	C "
273	50,000	700,000	.....	700,000	.....	.....	.....	A
276	315,000	215,000	150,000	115,000	20,000	.....	.....	D Colon.
277	250,000	400,000	30,000	165,000	23,000	.....	.....	D "
278	115,000	250,000	65,000	100,000	3,000	.....	.....	B
279	215,000	515,000	30,000	415,000	56,000	.....	.....	D Colon.
283	865,000	15,000	80,000	15,000	.....	.....	.....	B
284	1,130,000	1,615,000	1,030,000	1,600,000	10,000	.....	.....	C
285	65,000	65,000	30,000	50,000	.....	.....	.....	A
287	350,000	380,000	130,000	200,000	3,000	.....	30,000	C Liq.
288	130,000	315,000	.....	215,000	10,000	.....	.....	C "
289	265,000	1,600,000	150,000	1,165,000	36,000	.....	130,000	D
291	330,000	325,000	100,000	100,000	13,000	100,000	25,000	D Colon.
292	215,000	80,000	15,000	15,000	.....	.....	.....	B
293	30,000	50,000	.....	15,000	.....	.....	30,000	C Liq.
295	130,000	150,000	.....	65,000	5,000	.....	.....	B
296	215,000	115,000	15,000	.....	3,000	.....	80,000	C Liq.
297	30,000	115,000	30,000	100,000	.....	.....	.....	A
298	130,000	300,000	15,000	150,000	.....	.....	65,000	C Liq.
299	380,000	280,000	50,000	30,000	20,000	.....	100,000	D Colon.
300	1,465,000	1,915,000	1,250,000	1,525,000	.....	30,000	100,000	D Liq.
301	115,000	115,000	15,000	30,000	6,000	15,000	65,000	C
303	215,000	465,000	15,000	415,000	23,000	.....	.....	D Colon.
304		1,615,000		1,280,000		.....	215,000	D Liq.
305	230,000	330,000	30,000	265,000	13,000	.....	.....	D "
307	1,215,000	liq. by proteus	500,000	liq. by proteus	.....	liq. by proteus	liq. by proteus	D "
309	630,000	1,230,000	265,000	300,000	.....	125,000	375,000	D "
310	65,000	65,000	15,000	30,000	.....	.....	.....	A
311	150,000	15,000	15,000	.....	16,000	15,000	.....	D Colon.
312	65,000	215,000	50,000	200,000	6,000	.....	.....	C "
313	50,000	15,000	15,000	15,000	.....	.....	.....	A
314	130,000	165,000	80,000	100,000	10,000	.....	50,000	C
316	915,000	1,865,000	465,000	800,000	380,000	.....	65,000	D Colon.
318	80,000	600,000	65,000	550,000	26,000	.....	15,000	D "
319	180,000	330,000	15,000	.....	3,000	165,000	.....	D Liq.
324	80,000	50,000	15,000	50,000	3,000	.....	.....	B Colon.
328	100,000	550,000	.....	150,000	5,000	.....	.....	B "
330	100,000	230,000	.....	15,000	.....	15,000	.....	B "
332*	69,330,000		68,330,000		4,080,000			D
334	630,000	1,075,000	415,000	1,075,000	3,000	.....	.....	B Colon.
336	8,580,000	liq. by proteus	8,015,000	liq. by proteus	280,000	liquefied by	proteus	D
338	65,000	.....	30,000		.....	.....	.....	A
321	100,000	50,000	15,000	30,000	3,000	.....	.....	B Colon.
Total...	91,690,000	20,210,000	81,975,000	12,950,000	5,215,000	495,000	1,345,000	
Average.	1,910,208	459,318	1,707,812	294,318	108,646	11,250	30,568	D Colon.
					percentage 5.6	percentage 2.4		

* This sample especially bad. See notes.

GROCERY STORES (WINTER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
1	5,365,000	6,830,000	4,830,000	6,000,000	1,300	30,000	.....	D	Total.
2	3,080,000	9,380,000	580,000	7,100,000	37,600	.....	50,000	D	Colon.
3	665,000	1,500,000	200,000	1,365,000	24,600	.....	80,000	D	"
4	5,300,000	2,280,000	2,050,000	1,015,000	.....	16,000	.....	D	Total.
5	4,415,000	10,250,000	265,000	9,550,000	4,600	16,000	30,000	C	"
6	9,430,000	11,165,000	7,950,000	1,765,000	9,000	.....	1,215,000	D	
7	4,715,000	10,330,000	1,700,000	250,000	22,300	.....	130,000	D	
8	350,000	1,465,000	80,000	1,265,000	11,600	.....	.....	D	Colon.
9	1,900,000	8,330,000	1,180,000	7,515,000	3,000	.....	16,000	C	Total.
10	10,380,000	11,165,000	480,000	480,000	96,000	.....	165,000	D	
11	9,165,000	22,830,000	1,065,000	430,000	29,300	.....	400,000	D	
12	7,475,000	7,750,000	125,000	2,500,000	41,000	.....	25,000	D	
13	815,000	730,000	665,000	665,000	300	.....	.....	B	Total.
14	480,000	1,480,000	400,000	1,165,000	10,000	15,000	50,000	C	Colon.
15	450,000	450,000	130,000	.....	143,000	.....	100,000	D	"
16	400,000	465,000	300,000	180,000	33,000	.....	.....	D	"
17	57,500,000	43,500,000	8,580,000	3,250,000	233,000	.....	750,000	D	
18	265,000	130,000	180,000	80,000	20,000	15,000	.....	D	Colon.
19	3,950,000	2,400,000	900,000	850,000	80,000	.....	.....	D	"
20	350,000	865,000	315,000	715,000	40,000	15,000	50,000	D	"
21	2,115,000	9,665,000	680,000	1,165,000	123,000	15,000	.....	D	"
22	9,580,000	53,600,000	8,915,000	53,330,000	1,066,000	30,000	.....	D	"
23	180,000	130,000	30,000	.....	10,000	.....	.....	C	"
25	3,065,000	3,130,000	2,600,000	2,900,000	26,000	65,000	.....	D	"
27	865,000	330,000	580,000	250,000	26,000	.....	15,000	D	"
29	1,165,000	1,950,000	230,000	350,000	30,000	.....	215,000	D	"
31	34,665,000	14,750,000	18,665,000	6,700,000	4,666,000	.....	1,650,000	D	
32	680,000	565,000	230,000	30,000	.....	.....	.....	B	
33	415,000	1,100,000	365,000	880,000	40,000	15,000	15,000	D	Colon.
34	430,000	530,000	215,000	500,000	16,000	.....	15,000	D	"
35	2,280,000	280,000	615,000	130,000	.....	.....	.....	C	
36	600,000	3,480,000	465,000	2,765,000	156,000	.....	80,000	D	Colon.
37	430,000	315,000	180,000	215,000	.....	.....	.....	B	
38	8,500,000	6,415,000	6,530,000	900,000	376,000	50,000	450,000	D	
39	3,150,000	8,250,000	2,080,000	1,530,000	820,000	.....	380,000	D	
40	450,000	1,250,000	315,000	1,180,000	140,000	.....	.....	D	Colon.
42	700,000	2,380,000	580,000	2,250,000	326,000	.....	15,000	D	"
43	4,815,000	4,030,000	4,350,000	3,900,000	16,000	15,000	.....	D	"
44	1,050,000	1,230,000	350,000	200,000	16,000	.....	250,000	D	"
46	515,000	3,130,000	465,000	2,950,000	.....	.....	.....	B	
47	850,000	5,750,000	765,000	380,000	213,000	.....	65,000	D	Colon.
48	5,500,000	7,665,000	3,150,000	2,380,000	1,983,000	15,000	150,000	D	
49	980,000	6,330,000	880,000	480,000	866,000	.....	30,000	D	
51	3,880,000	4,830,000	2,900,000	1,250,000	1,000,000	30,000	150,000	D	
54	1,315,000	1,530,000	1,080,000	1,080,000	53,000	.....	15,000	D	Colon.
57	6,565,000	97,000,000	6,280,000	91,665,000	4,366,000	30,000	30,000	D	
61	2,480,000	7,000,000	2,165,000	5,700,000	420,000	15,000	50,000	D	Colon.
68	1,365,000	1,730,000	1,050,000	415,000	390,000	.....	115,000	D	
69	3,200,000	6,580,000	2,880,000	6,465,000	96,000	50,000	.....	D	Colon.
72	1,280,000	3,165,000	1,165,000	1,315,000	1,333,000	15,000	80,000	D	"
74	630,000	2,015,000	365,000	1,350,000	373,000	15,000	50,000	D	"
75	8,480,000	22,415,000	7,700,000	20,700,000	330,000	15,000	215,000	D	
76	4,830,000	6,200,000	3,715,000	2,165,000	73,000	.....	50,000	D	Colon.
77	150,000	1,230,000	50,000	650,000	120,000	15,000	15,000	D	"
78	1,300,000	10,465,000	965,000	6,280,000	613,000	.....	200,000	D	
79	280,000	650,000	30,000	600,000	.....	.....	.....	B	
80	3,715,000	4,180,000	2,580,000	2,630,000	523,000	.....	180,000	D	
84	7,800,000	16,365,000	5,280,000	14,550,000	.....	50,000	730,000	D	
86	2,030,000	3,515,000	1,730,000	2,915,000	.....	.....	15,000	C	
87	80,000	450,000	50,000	265,000	6,000	.....	15,000	C	Colon.
88	465,000	650,000	215,000	115,000	6,000	.....	.....	C	
89	65,000	100,000	.....	.....	13,000	.....	15,000	D	Colon.
90	10,680,000	18,700,000	10,080,000	9,800,000	1,526,000	15,000	815,000	D	
91	415,000	900,000	150,000	450,000	13,000	15,000	15,000	D	Colon.
92	650,000	1,065,000	300,000	465,000	10,000	30,000	.....	C	
93	3,230,000	33,000,000	1,600,000	28,730,000	3,000	.....	.....	C	Total.
94	365,000	1,450,000	115,000	450,000	66,000	30,000	80,000	D	
98	2,980,000	965,000	2,650,000	750,000	26,000	.....	.....	D	
99	1,800,000	9,600,000	1,050,000	8,830,000	356,000	.....	30,000	D	Colon.

GROCERY STORES (WINTER)—Continued.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
100	65,000	530,000	.....	450,000	3,000	.....	.....	B	Colon.
102	265,000	380,000	50,000	330,000	.....	.....	.....	B	
103	530,000	1,965,000	130,000	1,165,000	16,000	30,000	115,000	D	
104	115,000	80,000	15,000	30,000	3,000	.....	.....	B	
105	1,030,000	1,700,000	50,000	1,465,000	3,000	.....	.....	C	Total.
107	130,000	265,000	15,000	200,000	23,000	.....	.....	D	Colon.
108	50,000	30,000	15,000	15,000	6,000	.....	.....	C	"
109	11,050,000	35,750,000	9,050,000	23,250,000	1,166,000	15,000	700,000	D	
111	880,000	780,000	750,000	150,000	350,000	.....	50,000	D	Colon.
112	415,000	700,000	100,000	65,000	43,000	.....	100,000	D	"
114	2,180,000	5,015,000	715,000	1,680,000	.....	.....	250,000	D	Liq.
117	174,600	75,600	56,300	8,000	149,000	.....	28,600	D	Colon.
118	3,800,000	5,565,000	3,415,000	2,750,000	180,000	15,000	415,000	D	
120	1,780,000	4,165,000	1,530,000	2,400,000	66,000	.....	530,000	D	
123	115,000	350,000	50,000	115,000	3,000	.....	15,000	B	
127	350,000	350,000	200,000	215,000	30,000	.....	.....	D	Colon.
128	30,000	330,000	30,000	150,000	.....	.....	.....	A	
129	430,000	430,000	230,000	250,000	10,000	.....	15,000	C	Colon.
130	11,050,000	45,215,000	10,100,000	43,830,000	73,000	.....	330,000	D	
131	265,000	680,000	130,000	530,000	30,000	15,000	15,000	D	Colon.
133	2,150,000	30,065,000	630,000	15,315,000	1,196,000	.....	730,000	D	
134	3,650,000	2,280,000	3,265,000	1,980,000	17,000	.....	150,000	D	
135	430,000	4,500,000	115,000	1,230,000	313,000	.....	280,000	D	
136	450,000	2,200,000	130,000	1,830,000	170,000	.....	.....	D	Colon.
137	280,000	480,000	65,000	130,000	30,000	.....	15,000	D	"
138	200,000	580,000	50,000	230,000	120,000	.....	100,000	D	"
139	350,000	815,000	130,000	430,000	156,000	.....	.....	D	"
140	4,200,000	5,865,000	3,400,000	3,815,000	243,000	.....	150,000	D	"
141	35,250,000	31,665,000	34,030,000	30,500,000	170,000	15,000	615,000	D	
142	850,000	1,830,000	680,000	1,815,000	66,000	.....	.....	D	Colon.
143	2,225,000	1,350,000	1,325,000	800,000	13,000	30,000	.....	D	"
144	1,065,000	5,415,000	165,000	4,580,000	63,000	15,000	80,000	D	
149	580,000	1,050,000	130,000	880,000	16,000	.....	15,000	D	Colon.
150	130,000	365,000	15,000	115,000	90,000	.....	50,000	D	"
151	35,000,000	157,200,000	34,115,000	156,665,000	363,000	15,000	215,000	D	
152	400,000	1,225,000	265,000	425,000	406,000	25,000	25,000	D	Colon.
153	1,500,000	6,080,000	630,000	800,000	130,000	.....	30,000	D	"
155	65,000	565,000	.....	165,000	160,000	.....	.....	D	"
156	165,000	200,000	15,000	100,000	.....	.....	50,000	C	Liq.
157	4,680,000	34,015,000	1,200,000	865,000	30,000	.....	5,630,000	D	
161	150,000	830,000	50,000	315,000	.....	.....	15,000	B	
163	480,000	400,000	350,000	130,000	3,000	.....	.....	B	
165	330,000	715,000	115,000	265,000	6,000	65,000	.....	C	
166	1,950,000	10,000,000	1,300,000	7,830,000	260,000	.....	1,415,000	D	
168	330,000	1,165,000	115,000	415,000	43,000	.....	80,000	D	
169	115,000	350,000	.....	80,000	.....	.....	.....	B	
170	665,000	2,550,000	550,000	1,915,000	113,000	30,000	265,000	D	
171	965,000		800,000		36,000			D	Colon.
172	2,230,000	10,665,000	1,880,000	7,765,000	193,000	.....	1,750,000	D	
173	600,000	1,625,000	300,000	1,350,000	40,000	.....	.....	D	Colon.
179	30,000	1,180,000	15,000	430,000	3,000	.....	.....	B	
184	365,000	Liq. by proteus	80,000	Liq. by proteus	150,000	Liq. by proteus	proteus Liq.	D	
185	200,000	815,000	15,000	300,000	80,000	.....	15,000	D	Colon.
188	5,000,000	16,500,000	4,565,000	8,665,000	106,000	.....	30,000	D	"
189	8,230,000	24,580,000	680,000	14,500,000	17,350,000	.....	2,730,000	D	
191	330,000	730,000	50,000	130,000	53,000	.....	15,000	D	Colon.
195	815,000	930,000	330,000	400,000	6,000	.....	230,000	D	Liq.
198	2,630,000	8,250,000	2,030,000	7,780,000	563,000	.....	200,000	D	
200	365,000	1,530,000	.....	180,000	196,000	.....	465,000	D	
202	100,000	530,000	15,000	515,000	40,000	.....	.....	D	Colon.
214	9,530,000	13,350,000	9,115,000	12,730,000	950,000	15,000	130,000	D	
221	80,000	130,000	.....	80,000	.....	.....	.....	A	
224	57,265,000	49,165,000	56,065,000	45,000,000	6,893,000	80,000	515,000	D	
225	430,000	350,000	65,000	215,000	3,000	.....	15,000	B	
226	500,000	1,550,000	215,000	1,080,000	3,000	.....	.....	B	
232	715,000	565,000	80,000	80,000	13,000	15,000	80,000	D	Colon.
236	1,565,000		1,115,000		1,306,000			D	
238	1,050,000	1,080,000	80,000	365,000	13,000	15,000	15,000	D	Colon.
240	230,000	780,000	.....	75,000	6,000	.....	225,000	D	

GROCERY STORES (WINTER).—Continued.

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
242	165,000	300,000	.....	65,000	.....	.....	15,000	B	
244	2,250,000	4,915,000	365,000	3,315,000	356,000	.....	215,000	D	
246	115,000	730,000	.....	300,000	3,000	.....	30,000	C	Liq.
247	130,000	1,365,000	80,000	315,000	143,000	.....	600,000	D	
249	1,330,000	1,165,000	750,000	1,000,000	1,080,000	.....	500,000	D	
251	215,000	380,000	150,000	350,000	.....	15,000	.....	B	
252	165,000	615,000	.....	380,000	20,000	.....	.....	D	Colon.
253	300,000	400,000	15,000	250,000	63,000	.....	30,000	D	"
254	600,000	1,980,000	130,000	1,175,000	2,106,000	.....	700,000	D	
255	800,000	1,615,000	150,000	1,500,000	3,000	.....	15,000	B	
256	600,000	2,900,000	80,000	1,630,000	10,000	.....	100,000	C	
258	930,000	Liq. by proteus	.....	Liq. by proteus	.....	Liq. by proteus	.....	D	Liq.
261	480,000	230,000	80,000	65,000	3,000	15,000	.....	B	
263	750,000	1,830,000	165,000	215,000	816,000	.....	415,000	D	
265	380,000	1,230,000	30,000	280,000	10,000	165,000	300,000	D	Liq.
302	730,000	4,365,000	650,000	2,965,000		15,000	30,000	C	Liq.
344	1,900,000	6,280,000	1,600,000	5,665,000	90,000	.....	115,000	D	
347	dried	4,350,000	dried	4,000,000	46,000	50,000	50,000	D	Colon.
348	800,000	1,115,000	380,000	965,000	30,000	.....	.....	D	"
349	1,475,000	280,000	.....	150,000	86,000	.....	16,600	D	"
350	6,515,000	8,330,000	8,365,000	7,580,000	620,000	.....	100,000	D	
358	800,000	456,000	680,000	1,765,000	670,000	.....	80,000	D	Colon.
362	325,000	930,000	125,000	880,000	203,000	.....	.....	D	
363	dried	165,000	dried	30,000	4,300	.....	.....	B	
364	"	465,000	"	165,000	20,000	.....	30,000	D	Colon.
366	"	300,000	"	275,000	6,000	.....	.....	C	"
427	66,000	110,000	43,000	66,000	.....	6,000	.....	B	Liq.
428	150,000	236,000	76,000	190,000		.....	16,000	B	
429	123,000	60,000	83,000	13,000	16,000	.....	.....	D	Colon.
Total...	529,123,600	1,134,782,600	342,313,300	790,947,000	64,207,900	1,298,000	31,501,600		
Average.	3,246,157	6,961,856	2,100,081	4,852,435	391,511	7,963	193,261	D	"
					per cent. 12.06	percentage .1	percentage 2.7		

Groceries (*Winter*).—One hundred and sixty-seven samples were obtained from grocery stores. The general averages of these samples in round numbers were:—

Total count	3,000,000 per c.c.	Grade C
Colon count	400,000 per c.c.	Grade D
Liquefier count	200,000 per c.c.	Grade D

The number of samples that fell in Grade D was:—

Total number of samples	167
For total count	22
For colon count	116
Liquefier count	48

Restaurants and Chinese Restaurants (*Winter*).—The number of samples obtained from restaurants and Chinese restaurants was 29. The averages of these in round numbers were as follows:—

Total count	25,000,000 per c.c.	Grade D
Colon count	2,000,000 per c.c.	Grade D
Liquefier count	250,000 per c.c.	Grade D

The number of samples in Grade D was as follows:—

Agar count	4
Colon count	19
Liquefier count	14

Lunch Rooms (*Winter*).—Twenty-three samples were obtained from lunch rooms. The averages of these gave the following figures in round numbers:—

Total count	1,300,000 per c.c.	Grade C
Colon count	300,000 per c.c.	Grade D
Liquefier count	100,000 per c.c.	Grade D

The number of samples in Grade D was as follows:—

Agar count	2
Colon count	16
Liquefier count	6

Dining Rooms (*Winter*).—Seven samples from dining rooms gave the following averages in round numbers:—

Total count	2,500,000 per c.c.	Grade C
Colon count	5,000,000 per c.c.	Grade D
Liquefier count	50,000 per c.c.	Grade C

The large colon average is accounted for by the one exceptionally bad sample.

The number of samples in Grade D was as follows:—

Total count	2
Colon count	6
Liquefier count	2

RESTAURANTS AND CHINESE RESTAURANTS.—(WINTER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
65	2,530,000	7,350,000	1,250,000	5,950,000	56,000	.....	165,000	D	
67	115,000	1,115,000	15,000	400,000	536,000	15,000	130,000	D	
82	120,950,000	155,000,000	120,000,000	15,000,000	23,446,000	265,000	415,000	D	
106	800,000	650,000	250,000	300,000	50,000	.....	425,000	D	
113	50,000	215,000	.....	65,000	.....	.....	.....	A	
115	180,000	500,000	50,000	180,000	3,000	.....	30,000	C	Liq.
121	280,000	230,000	50,000	65,000	.....	.....	.....	B	
148*	4,280,000	13,500,000	1,165,000	10,800,000	400,000	.....	1,300,000	D	
154	1,580,000	2,915,000	1,500,000	2,215,000	.....	.....	80,000	C	
160	3,125,000	3,230,000	2,625,000	1,515,000	120,000	.....	365,000	D	
167*	5,265,000	20,000,000	4,630,000	18,330,000	370,000	.....	50,000	D	
174	1,300,000	3,130,000	1,080,000	2,265,000		30,000	130,000	D	
175	200,000	1,580,000	15,000	665,000	6,000	.....	.....	C	Colon.
180	80,000	65,000	.....	30,000	3,000	.....	.....	B	"
183	680,000	1,565,000	480,000	1,450,000	43,000	.....	15,000	D	"
190	280,000	615,000	65,000	180,000	256,000	.....	15,000	D	"
194	800,000	1,865,000	165,000	115,000	56,000	.....	130,000	D	
197*	800,000	565,000	65,000	465,000	3,000	.....	.....	B	Colon.
205	67,130,000	41,330,000	66,330,000	34,500,000	22,306,000	100,000	315,000	D	
212	65,000	215,000	.....	115,000	20,000	.....	.....	D	
213*	580,000	580,000	165,000	315,000	156,000	15,000	.....	D	Colon.
222*	2,115,000	2,215,000	1,130,000	1,115,000	56,000	30,000	100,000	D	
239	2,380,000	20,000,000	2,000,000	18,000,000	4,566,000	.....	50,000	D	Colon.
257	450,000,000	100,000,000	400,000,000	137,500,000	.....	.....	1,825,000	D	
352	dried	4,000,000	dried	1,525,000	290,000	.....	575,000	D	Liq.
361	dried	2,080,000	dried	1,715,000	3,200,000	.....	15,000	D	Colon.
365	115,000	380,000	50,000	165,000	13,000	.....	.....	D	"
431	106,000	540,000	66,000	176,000	133,000	.....	136,000	D	
178	5,815,000	15,415,000	5,200,000	11,830,000		.....	430,000	D	
Total...	670,901,000	400,845,000	608,346,000	266,946,000	56,088,000	455,000	6,696,000		
Average.	24,848,185	13,822,241	22,531,333	9,205,034	2,077,333	15,689	230,896	D	
					percentage 8.3	percentage .1	percentage 1.6		

*Chinese.

LUNCH ROOMS (WINTER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
26	300,000	2,980,000	100,000	2,930,000	.....	.....	.....	B	Total.
45	550,000	3,800,000	250,000	765,000	100,000	30,000	80,000	D	
52	1,415,000	4,250,000	1,130,000	1,450,000	403,000	30,000	65,000	D	Colon.
55	115,000	250,000	50,000	200,000	.....	.....	25,000	C	Liq.
64	6,615,000	9,980,000	2,115,000	9,180,000	4,840,000	50,000	230,000	D	
73	8,000,000	53,330,000	5,980,000	41,330,000	770,000	465,000	565,000	D	
81	665,000	3,550,000	500,000	2,600,000	73,000	.....	.....	D	Colon.
83	100,000	800,000	.....	700,000	.....	.....	.....	A	
85	4,815,000	7,850,000	4,265,000	7,180,000	66,000	80,000	15,000	D	Colon.
95	750,000	2,265,000	350,000	280,000	46,000	.....	165,000	D	
146	915,000	1,980,000	665,000	480,000	.....	50,000	130,000	D	Liq.
158	80,000	50,000	.....	.....	3,000	.....	.....	B	"
162	530,000	2,230,000	30,000	1,665,000	30,000	30,000	65,000	D	Colon.
192	730,000	1,065,000	365,000	565,000	56,000	15,000	30,000	D	"
193	530,000	365,000	280,000	.....	23,000	.....	.....	D	"
201	115,000	915,000	30,000	50,000	26,000	.....	80,000	D	"
207	265,000	515,000	50,000	280,000	3,000	.....	30,000	C	Liq.
211	265,000	380,000	65,000	200,000	13,000	.....	30,000	D	Colon.
217	1,280,000	1,730,000	980,000	1,250,000	86,000	.....	.....	D	"
248	115,000	215,000	.....	130,000	.....	15,000	.....	B	
250	100,000	1,200,000	15,000	900,000	76,000	.....	.....	D	Colon.
259	1,150,000	665,000	380,000	200,000	40,000	15,000	130,000	D	
267	615,000		50,000		43,000			D	Colon.
Total...	30,015,000	100,365,000	17,650,000	72,335,000	6,697,000	780,000	1,640,000		
Average.	1,305,000	4,562,045	767,391	3,287,954	291,174	35,454	74,545	D	Colon
					percentage 22.3	percentage .7	percentage 1.6		& Liq.

Cafes (Winter).—Six samples from cafes were collected. The general averages of these samples, in round numbers, were:—

Total count	4,000,000 per c.c.	Grade C
Colon count	750,000 per c.c.	Grade D
Liquefier count	150,000 per c.c.	Grade D

The number of samples in Grade D was for:—

Total count	1
Colon count	3
Liquefier count	2

Ice Cream Shops (Winter).—Eight samples of milk from these shops gave very high figures, with the following averages in round numbers:—

Total count	1,800,000 per c.c.	Grade C
Colon count	110,000 per c.c.	Grade D
Liquefier count	140,000 per c.c.	Grade D

The number of samples in Grade D was as follows:—

Total count	1
Colon count	5
Liquefier count	1

DINING ROOMS (WINTER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
50	1,480,000	4,930,000	480,000	2,630,000	8,066,000	50,000	65,000	D Colon.
63	215,000	1,280,000	100,000	730,000	13,000	15,000	50,000	D "
164	765,000	1,350,000	565,000	700,000	3,000	.....	15,000	B
208	6,265,000	15,415,000	5,680,000	9,950,000	283,000	.....	15,000	D Total.
227	315,000	1,730,000	280,000	1,250,000	230,000	.....	30,000	B Colon.
423	dried	completely liq.	dried	liquefied	22,500,000	completely	liquefied	D "
177	6,815,000	53,330,000	3,730,000	49,665,000	5,206,000	30,000	80,000	D Total.
Total...	15,855,000	78,035,000	10,835,000	64,925,000	36,301,000	95,000	255,000	
Average.	2,642,500	13,005,833	1,805,833	10,820,833	5,185,855	15,833	42,500	
					per cent. 196.2	percentage .1	percentage .3	

CAFES (WINTER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
58	850,000	1,065,000	465,000	1,000,000	226,000	.....	.....	D Colon.
216	215,000	315,000	115,000	130,000	.....	.....	100,000	C Liq.
218	880,000	2,500,000	400,000	750,000	3,000	.....	315,000	D "
223	265,000	1,915,000	115,000	730,000	303,000	30,000	65,000	D Colon.
228	21,065,000	27,165,000	20,215,000	25,880,000	4,036,000	15,000	350,000	D
230	100,000	265,000	30,000	130,000	3,000	.....	30,000	C Liq.
Total...	23,375,000	33,225,000	21,340,000	28,620,000	4,571,000	45,000	860,000	
Average.	3,895,833	5,537,500	3,556,666	4,770,000	761,833	7,500	143,333	D
					percentage 19.5	percentage .1	percentage 2.5	

ICE CREAM PARLORS (WINTER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
53	2,665,000	3,730,000	465,000	.....	73,000	.....	65,000	D Colon.
110	465,000	730,000	315,000	150,000	56,000	15,000	15,000	D "
122	200,000	580,000	165,000	450,000	.....	.....	.....	B Total.
124	275,000	415,000	100,000	265,000	56,000	.....	.....	D Colon.
126	130,000	450,000	65,000	330,000	.....	.....	.....	B
176	8,665,000	12,000,000	2,900,000	4,765,000	16,000	230,000	.....	D
181	2,065,000	1,930,000	1,200,000	780,000	693,000	65,000	730,000	D
243	200,000	165,000	15,000	30,000	3,000	.....	50,000	C Liq.
Total...	14,665,000	20,000,000	5,225,000	6,770,000	897,000	310,000	860,000	
Average.	1,833,125	2,500,000	653,125	846,250	112,125	38,750	107,500	D
					percentage 6.1	percentage 1.5	percentage 4.3	

Better-class Dining Rooms (Winter).—Seven samples from better-class dining rooms gave the following averages in round numbers:—

Total count	4,500,000 per c.c.	Grade C
Colon count	600,000 per c.c.	Grade D
Liquefier count	275,000 per c.c.	Grade D

The number of samples in Grade D was as follows:—

Total count	2
Colon count	5
Liquefier count	5

Residential Hotels (Winter).—Seven samples from these hotels gave averages as follows:—

Total count	680,000 per c.c.	Grade B
Colon count	78,000 per c.c.	Grade D
Liquefier count	27,000 per c.c.	Grade C

The samples in Grade D were as follows:—

Total count	0
Colon count	6
Liquefier count	1

Unclassified (Winter).—Nine samples of unclassified milk gave the following averages:—

Agar count	500,000	Grade B
Colon count	75,000	Grade D
Liquefier count	40,000	Grade C

The number of samples in Grade D were as follows:—

Agar count	0
Colon count	5
Liquefier count	2

BETTER-CLASS DINING ROOMS (WINTER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
24	2,015,000	5,330,000	515,000	315,000	36,000	.....	650,000	D	
28	1,765,000	3,530,000	715,000	2,580,000		50,000	30,000	C	
30	15,750,000	40,000,000	14,115,000	33,330,000	83,000	.....	150,000	D	Colon.
203	2,050,000	6,000,000	765,000	2,025,000	786,000	.....	600,000	D	"
209	2,615,000	5,665,000	2,400,000	4,980,000	596,000	15,000	100,000	D	"
219	7,430,000	20,665,000	5,950,000	19,330,000	2,113,000	.....	350,000	D	
220	215,000	465,000	130,000	315,000	.....	.....	.....	D	
Total...	31,840,000	81,655,000	24,590,000	62,875,000	3,614,000	65,000	1,880,000		
Average.	4,548,888	11,665,000	3,512,855	8,982,142	602,333	9,285	268,571	D	
					percentage 13.2	percentage .07	percentage 2.3		

RESIDENTIAL HOTELS (WINTER)

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.	
						Sporulating.	Non-sporulating.		
56	350,000	580,000	300,000	400,000	163,000	.....	15,000	D	Colon.
60	215,000	1,250,000	150,000	980,000	80,000	15,000	.....	D	"
62	1,330,000	4,465,000	750,000	3,665,000	43,000	.....	50,000	D	"
417	dried	180,000	dried	106,000	33,000	.....	3,000	D	"
420	dried	30,000	dried	30,000	20,000	.....	.....	D	"
422		133,000		200,000		10,000	26,000	C	Liqs.
425	825,000	733,000	.....	755,000	133,000	.....	70,000	D	Colon.
Total...	2,720,000	7,371,000	1,200,000	6,136,000	472,000	25,000	164,000		
Average.	680,000	1,053,000	400,000	876,571	78,666	3,571	23,428	D	Colon.
					percentage 11.5	percentage .3	percentage 2.2		

UNCLASSIFIED (WINTER).

No.	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.		Grade.
						Sporulating.	Non-sporulating.	
59	2,830,000	5,250,000	2,065,000	215,000	140,000	15,000	180,000	D Colon.
97	130,000	100,000	15,000	.....	3,000	.....	.....	B
215	230,000	680,000	100,000	400,000	126,000	.....	30,000	D Colon.
231	480,000	2,800,000	100,000	680,000	153,000	.....	165,000	D
237	150,000	250,000	50,000	115,000	.....	.....	.....	B Total.
245	30,000	200,000	15,000	100,000	.....	.....	.....	A
430	40,000	126,000	3,000	113,000	6,000	.....	3,000	C Colon.
432	335,000	793,000	66,000	473,000	170,000	.....	.....	D "
392	dried	100,000	dried	63,000	73,000	.....	.....	D "
Total...	4,225,000	10,299,000	2,414,000	2,159,000	671,000	15,000	378,000	
Average.	528,125	1,144,333	301,750	239,888	74,555	1,666	42,000	
					percentage 14.1	percentage .1	percentage 3.6	

CITY (WINTER) GRAND TOTAL AND AVERAGES.

——	Agar.	Gelatine.	Acid on Agar.	Acid on Gelatine.	Colon.	Liquefiers.	
						Sporulating.	Non-sporulating.
Milkmen on Streets	91,690,000	20,210,000	81,975,000	12,950,000	5,215,000	495,000	1,345,000
Grocers.....	529,123,600	1,134,782,600	342,313,300	790,947,000	64,207,900	1,298,000	31,501,600
Restaurants	670,901,000	400,845,000	608,346,000	266,946,000	56,088,000	455,000	6,696,000
Quick Lunch Rooms.....	30,015,000	100,365,000	17,650,000	72,335,000	6,697,000	780,000	1,640,000
Dining Rooms	15,855,000	78,035,000	10,835,000	64,925,000	36,301,000	95,000	255,000
Cafes	23,375,000	33,225,000	21,340,000	28,620,000	4,571,000	45,000	860,000
Ice Cream Parlors	14,665,000	20,000,000	5,225,000	6,770,000	897,000	310,000	860,000
Better class Dining Rooms	31,840,000	81,665,000	24,590,000	62,875,000	3,614,000	65,000	1,880,000
Residential Hotels	2,720,000	7,371,000	1,200,000	6,136,000	472,000	25,000	164,000
Unclassified	4,225,000	10,299,000	2,414,000	2,159,000	671,000	15,000	378,000
Grand Total	1,414,409,600	1,886,797,600	1,115,888,300	1,314,663,000	178,733,900	3,583,000	45,579,600
Average	4,714,698	6,268,430	3,719,627	4,367,651	587,940	11,903	151,427
					per cent. 12.4	per cent .18	per cent. 2.4

NOTE.—It will be seen by referring to the preceding tables, of which the above is a synopsis, that the averages in this table are obtained from 300 Agar, 301 Gelatine, 304 Colon samples respectively.

Comparison of Averages of Summer and Winter Milk

In round numbers the averages of all city samples under summer and winter conditions are for:—

	Summer.	Winter.
Agar count	20,000,000 per c.c.	5,000,000 per c.c.
Colon count	350,000 per c.c.	500,000 per c.c.
Liquefier count ..	1,000,000 per c.c.	150,000 per c.c.

These averages which were obtained from the analyses of nearly a thousand samples of milk, give practically the same results as mentioned in the comparison made of summer and winter milk on its arrival in the city, and the remarks made under this heading apply also to these totals.

The most deplorable fact is that the averages of these samples show that Montreal milk in both summer and winter is of very poor hygienic quality. It is Grade D milk, milk which should not be permitted for sale, and which would be unhesitatingly condemned by any city with even a low standard. Such milk could not be sold in Chicago, Boston or Rochester.

City, Summer and Winter.—Under summer conditions, and excluding those samples collected at wholesalers on arrival, 577 samples were analyzed; of these

12 were in class A
43 were in class B
121 were in class C
401 were in class D

Of the 312 samples analyzed during the winter

11 were in class A
47 were in class B
41 were in class C
213 were in class D

What is the reason for this very high proportion of Grade D milk?

The answer to this question is to review the whole system of the handling of milk, but inasmuch as many points have been discussed we shall note here a few of the more outstanding defects.

Summary

Rural Samples.—Under summer conditions 285 samples of milk were analysed. Of these 27 were in Grade A, 104 in Grade B, 96 in Grade C, and 58 in Grade D.

More than seven times as many samples missed being graded one class higher on account of an excessive number of liquefying bacteria than for both total agar and colon counts combined.

Since liquefying bacteria represent the dirt that comes from the animal, and dust and dirty stables, such contamination is largely avoidable. With a little extra cleanliness, of animals and stable, this filth will not gain entrance to the milk. The use of the small filtering apparatus, by means of which a pint of milk is filtered through a disc of cotton wool about an inch in diameter, reveals the presence of a great deal of visible dirt, and gives ocular demonstration of the grosser contamination. But we must remember that this is only the visible dirt; the bacteria which affect the keeping property, which give rise to bad flavours, and which in some cases produce disease, are washed off these particles of filth, and, finding in milk a perfect diet, increase rapidly.

Too much emphasis cannot be laid upon the fact that the farmer is given no extra remuneration for the care he may exercise to produce pure milk.

Although practically all farm produce is paid for according to quality, we find that milk is an exception. Wheat and other grains, fruit, and vegetables are all graded; the manufactured products of the farm, such as meat, eggs, butter, cheese, etc., are all graded, and extra prices given for the best quality; but not so milk. The farmer who knows the importance of cleanliness in all operations connected with the production of milk obtains no extra price for his good product, and he argues that it is no use expending time, trouble and money in securing a sanitary milk.

Another factor, which, however, cannot be discussed at any length here, but which none the less is a factor of extreme importance, is the relatively small price that the farmer obtains for milk. Compared with the price of other foodstuffs, the rise in the price of milk has been slow; but there are many reasons for increase of cost, such as increased length of transportation, due to the size of cities and the pushing farther away of dairy farms; the increase of middlemen, with their expensive buildings and equipment; and the wasteful system of distribution whereby many dealers cover the same ground to perform the same service.

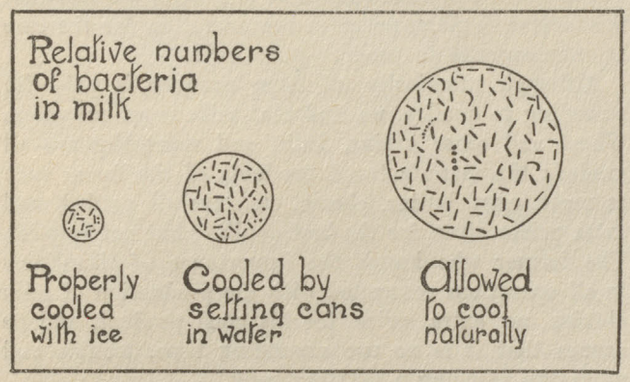
From the farmers' standpoint, the increased cost of labour and cattle feeds has not had its corresponding increase in the price of milk; the former has increased 50 per cent. in the last twenty years, and the latter not more than 40 per cent. In the decade ending 1899, hay was worth $7.62 a ton; to-day it is worth $12.00-$15.00, and so on with the other foodstuffs. These two items, labour and cattle feeds, represent 80 to 85 per cent. of the total farm cost of milk production.

The Animal Husbandry Department of Macdonald College, after a careful analysis of the cost of milk production of a large herd supplying milk to the College, allowing for cost of upkeep, etc., and taking into account the value of an annual calf per cow, has concluded that a price of twenty cents a gallon for milk will only pay when the milk production per cow is 8,000 lbs. per head per annum. Hence, as the average farm cow of Quebec gives only about four to five thousand pounds of milk

per year, the "average" farmer is actually losing money when he sells milk to the dealer for $2.00 a hundred pounds.

The consumer is buying milk at a low price compared with other foods, and if he desires a clean, sanitary milk he must expect to pay more for the additional labour which such production entails. Milk should be sold by quality, and cleanliness must be made remunerative.

Farmers do not cool their milk sufficiently. This is of the utmost hygienic importance. This simple diagram will show why it is important to keep the milk cool.



Many municipalities will reject milk which is sent by train if the milk exceeds a temperature of 50 deg. F., and many foreign dairy companies require the farmers to store ice in proportion to their output. The storing of ice is an easy matter in our country, and there are many coolers on the market which are effective, and give good results for the amount of ice used.

Lastly, all rural milk should be in Grade A or B. If in a lower grade it indicates that there is gross negligence in the production and handling.

Transportation.—Three-fourths or more of the milk supply of the city is transported in railway cars. These cars become very warm during the hot weather if the doors are left open, as is frequently the case; the milk rises in temperature and correspondingly the bacterial population increases (see fig.).

Just how great this increase is may be illustrated by the fact that during transportation from farm to city *the milk loses one grade.* That is to say, if it starts as Grade A milk, it arrives at the dealers as Grade B; Grade B milk arrives as Grade C, and so on.

All railways have a large number of refrigerator cars; hardly a freight passes in the summer but has refrigerator cars for meats, fruits, etc. Milk, a more perishable commodity than those just mentioned, is placed in what are open cars, exposed to heat and dust. Perhaps it would be difficult to secure refrigerator cars for small supplies, but on many trains there are whole cars carrying milk, and, in one instance, a milk train. Surely the railway companies could afford to ice a few cars, and thus contribute something to the healthfulness of the milk supply.

Milk transported into Boston is placed in iced cars; even in Europe, where ice is scarce and consequently dearer, many municipalities require that the milk shall be used during transport. A great deal of the milk supply of European cities is moved at night, when the temperature is usually lower.

Certainly, the railway companies should be requested to provide refrigerator or iced cars for the transport of milk. If the farmers would bring this to the attention of the railway companies, or state their case before the Railway Commission, this much-needed reform could be carried out, and a sound link would thus be forged between the farmer and the milk dealer.

Dealers.—The majority of dealers do not understand the principles underlying the care of milk; some do take cognisance of the visible particles, but the greater number know nothing of the vast bacterial population with which they have to deal. A course of instruction for dealers is necessary, which would give the underlying principles of the subject.

Every druggist, before he can dispense medicine, has to undergo a provincial examination, which ascertains if he is competent or not to prepare a prescription. The public is thus safeguarded. It is just as important to the health of the community to exact a similar requirement from a dealer who wishes to supply the public with a food which may possibly be the cause of conveying disease; in other words, the dealer must be educated for his job. We were astonished time and again by the dealers' ignorance of the most elementary facts in the care of milk. Before issuing a municipal milk license, the food-inspection officials should be given the authority to ascertain if the individual is sufficiently educated along dairy lines.

Pasteurization of milk in many establishments is not effectively carried out. In some cases the equipment is faulty, in others the temperature is too low, and in others, again, the duration of time is too short. Hence there is much improper pasteurization which is apt to give a sense of false security to both dealer and consumer. It must be emphasized, that for human consumption milk must be heated to 145 deg. F. for twenty minutes, and at the end of this period of time cooled as rapidly as possible.

Unless pasteurization is carefully controlled, frequently inspected, and the standard mentioned rigidly enforced, the consumer is not benefited.

Re-infection after pasteurization, from flies, from improper washing of bottling machines, from cooling machines, etc., was noticed. Only by attending to each single detail in the handling of milk can the best results be obtained, and the majority of dealers do not seem to understand the importance of these minutiæ.

Retailers who keep milk for the convenience of occasional customers, and especially the proprietors of groceries, are extremely careless. We have seen utensils that would be a disgrace to a piggery used to measure milk that was for infant feeding.

The lack of proper refrigerators, and the use of them for all kinds of produce, meat, fish, vegetables, etc., was quite common. All stores selling milk should have adequate facilities for keeping it cool, and no one should be allowed to sell milk unless his store is properly equipped.

Treatment of Cans and Bottles.—In the production of an hygienic milk supply, the treatment of all receptacles destined for the storage, transportation and distribution of the milk is of such vital importance that it is necessary to draw special attention to this phase.

Milk utensils, unless treated in a proper manner, are a constant source of infection and re-infection; many investigators have shown that in the spread of undesirable bacteria no agency is more responsible than unclean, carelessly-washed utensils.

The farmer, the wholesale dealer, and the retailer are each and all at fault as regards the ineffectiveness of the treatment of the utensils used by them.

But factories, creameries and depots are the worst offenders. It seemed to us that throughout the main drawback was the failure on the part of those engaged in the production and sale of milk to appreciate, firstly, that all milk or cream allowed to remain in cans and vessels is specific food for bacteria; secondly, that live steam or boiling water is essential in the final cleansing operations.

On the farms we found few instances where a supply of live steam was available for cleansing purposes. This was not unexpected, for unless steam power be used for other farm operations, the question of the expense involved in providing steam for the dairy alone is an item which has to be considered.

Boiling water, however, can always be provided, and if such is not available, a farmer has failed to secure the first essential for cleaning operations; further, he should under these circumstances be prohibited from selling milk.

After the vessels and can had been washed we frequently saw them inverted in a yard or open space to which dust from barnyards and poultry runs had easy access. This cannot be too strongly deprecated, for the highly undesirable organisms present in such dust may be carried by wind and thus infect the cans before they receive the milk.

In some cases cans, etc., would be left for some considerable time after having contained milk before they were washed; this is a bad practice, because the remains of the milk adhere to the surface of the metal, and unless special precautions are taken subsequent cleaning is much more difficult and less effective.

The grayish material, often seen by us, lining the inside of the utensils, bore out this fact, and, moreover, showed that in such cases milk had been "cooked on" by hot water before it had been thoroughly washed out by means of cold or tepid water.

We would briefly point out that on the farm all utensils, milking pails, strainers, cooling apparatus and cans should, as early as possible, be washed out thoroughly with tepid water to which may be added a little washing soda. Cloths should on no consideration whatever be used, stiff bristled brushes supplying all that is necessary.

Extreme care must be taken to insure all crevices being well cleaned, as these are lodging places for bacteria. It is to be hoped that seamless cans will be more generally adopted, as cleaning operations are thereby much facilitated. We were glad to find that, on the advice of the Montreal milk inspectors, a number of farmers had already provided themselves with utensils of this nature.

The utensils, having been thoroughly washed as above, should be well rinsed with pure water, in order to clear away all milkiness and any remains of the washing soda —"the presence of the latter favouring the growth of organisms responsible for 'ropy milk.'"

The final treatment is thorough steaming with live steam or scalding with boiling water for several minutes. The utensils should not be dried with cloths, but should then be inverted in an airy clean place free from dust.

Depots, factories or creameries which serve as collecting centres for milk, prior to its shipment to the city, follow in almost all cases a practice calculated to nullify the greatest care on the part of the farmer.

After accepting the milk, those depots where separating is carried on return a quantity of the separated milk to the farmers; this is taken away in the same cans in which the whole milk is conveyed.

Almost invariably the separated milk is pumped from the separator into a tank above, from which it passes through pipes into the cans on the farmer's wagon.

This separated milk is untreated, and as stated elsewhere (page 19) the tank is usually in a filthy state. Hence, any organisms causing disease—notably tuberculosis—or undesirable flavours or taints in milk are automatically spread by means of the tank and the mixed separated milk through a whole countryside.

The practice thus described entails much extra labour in cleansing operations at the farm, and means that practically any farmer who supplies milk to a depot must of necessity clean and sterilize his cans, on the assumption that they may have become contaminated with disease-producing or other deleterious organisms.

As long as this state of affairs is permitted to exist, the dirty contaminated tank at the depot and a single careless farmer may together subject all the other patrons to the gravest risks.

Investigations into the spread of tuberculosis in the State of Wisconsin, U.S.A., afford ample proof of this statement. These investigations clearly showed that one of the most potent means of transmitting tuberculosis to swine and calves was the unpasteurized by-product—separated milk or whey—returned to farms from the factories.

The proprietors of creameries, factories and depots should be compelled by law to effectively pasteurize all separated milk before it is returned to the farmer; and further, the tanks in which the milk is stored should be maintained in a cleanly and reputable condition.

The cleansing of milk cans by some of the wholesale dealers leaves much to be desired. In one of these establishments the procedure is noted on page 37 Dealer "F"; happily the methods there adopted are improved upon by the other large dealers.

Usually the cans are washed in tanks containing tepid water and washing soda; brushes are used, these being sometimes operated mechanically. After rinsing in clean water the cans are inverted over a steam jet. This is effective if continued for a sufficient length of time, but often the time given is too short. The steaming should be done for at least three minutes.

The cleansing is then assumed to be complete; but in one establishment we found an arrangement for blowing hot air into the inverted cans prior to their removal from the room.

This insures complete drying, thus precluding any residual washings getting back to the farm. As the arrangement is comparatively inexpensive we would recommend its installation in establishments concerned in the distribution of milk.

In Montreal, as in other cities, an increasing demand is being made for milk distributed in bottles. Many people have come to the conclusion that bottled milk is somewhat of the nature of a panacea, and that if milk dealers would adopt this method of distribution the consummation of a satisfactory milk supply is in sight. Theoretically, this would sound feasible, but in actual practice the mere fact that milk is in bottles instead of in cans means nothing. The distribution of milk in bottles is preferable to the more common method of distributing cans only (*a*) when the handling of the milk and its treatment prior to the bottling has been satisfactory; (*b*) when the system of bottling and the cleansing of the bottling apparatus are satisfactory, and (*c*) when the bottles have been properly cleaned and sterilized.

Unless the consumer has reason to feel satisfied as to these main paints, the purchasing of milk in bottles is not to be particularly recommended.

We are strongly in favour of the use of bottles or some equally convenient receptacle for milk distribution; and in a well-organized city milk supply such a system must eventually be adopted; but we wish to point out the fallacy of presuming that milk obtainable in bottles is necessarily cleaner and more hygienic than milk purchased from cans.

With the treatment of the milk we deal in other sections of this Report; here it is the cleansing operations with which we are concerned.

When the bottles are filled by hand, as is the case with Dealer "F" among the large dealers, and practically the usual procedure among the smaller retailers who sell bottled milk, there is, of course, no automatic bottling apparatus to be considered.

However, where bottling is done to any large extent a bottling machine is used; the mechanism of these machines is such that it is not easy to insure bacteriological cleanliness. We would point out to the users of these machines that the greatest care needs to be taken in cleaning and sterilizing them; otherwise milk which has been well treated is open to contamination again during the bottling process.

In the system of bottle washing as adopted by certain of the leading milk dealers in Montreal, the bottles are inverted in crates and automatically on a continuous chain are carried through the various processes incidental to cleansing. Successively they are subjected to jets of water containing soda, to clean rinsing water, to hot water, and steam. Subsequently, any bottles which appear unclean are taken out and cleaned separately.

The details as to procedure vary, of course, in specific establishments, but the general principle is the same.

The system must be considered as moderately satisfactory, but we consider that the length of time in which the bottles are subjected to the steaming part of the process is frequently inadequate. We are fully aware that the time allowed is not seldom looked at from the standpoint of economy of time and business necessity; but having in mind the vital importance which the cleansing processes bear to the bottled milk trade, we consider that all other reasons must be made subservient to the main essential—efficiency of cleansing. All bottles should be subjected to boiling water or steam for at least three minutes.

Finally, we would point out what we consider to be a paramount reason for special care in bottle washing. The bottles, when filled with milk, are delivered to all kinds of customers, in all types of houses or stores, from the best to the worst, and from the cleanest to the

dirtiest. The hygienic conditions prevailing must, in some cases, be highly questionable; the bottles are subsequently collected by the milk distributor and are, of course, returned to his establishment direct from the house or store in which they have for a longer or shorter time been kept.

Thus the bottle, as no other milk utensil, is exposed to conditions and possibly risks of which the milk dealer knows nothing. Most emphatically, therefore, before these bottles are again used for the purposes of milk distribution they should be cleansed and sterilized in a manner which allows of no possible doubt as to their bacteriological cleanliness.

The crates, also, in which the bottles are conveyed should be subjected to cleansing operations of more frequent occurrence and of a more effective nature than is commonly the case.

Recommendations

In view of our present knowledge of the milk supply of Montreal, we earnestly recommend to those in authority and to the milk-consuming public, that the legal statutes of the province, and the regulations and by-laws of the city of Montreal relative to the sale and distribution of milk be so amended as to include the following points:—

1. The grading of city market milk.

2. Payment for milk according to this grading or scoring.

3. Confiscation of milk as poor in quality as that which we have designated Grade "D."

4. The conferring of such power upon the Chief Food Inspector and his staff as to enable him to—

(*a*) Inspect and maintain at a certain standard all farms shipping milk to Montreal.

(*b*) To issue licenses subject to recall, for the production, handling, sale and delivery of milk consumed in the city to those who satisfy the requirements (and to refuse licenses to others).

(*c*) To fine offenders for violation of regulations.

(*d*) To insist upon the provision of proper equipment in all shops, stores and other places were milk is retailed.

5. The technical examination of men in charge of works where bottling, pasteurization, clarification, cooling, etc., are carried out.

6. The enforcing of pasteurization, i.e., heating milk to a temperature of 145 deg. F. for twenty minutes, followed by subsequent cooling.

7. Frequent visits and tests by the city milk inspectors to enforce proper pasteurization.

8. Systematic publication in the press by the Chief Food Inspector of analyses made of city milk; giving also the names of the vendors from whom samples are taken.

9. The instituting of an educational campaign among consumers; emphasizing the value of milk as a food, the necessity for, and advantages of a pure milk supply, and the duties of the consumer.

10. The general improvements on milk-producing farms, so as to be in keeping with the particulars of our scoring system on page 9.

11. The use of refrigerator or iced cars for transportation.

References

Blackader, A. D., "The More Important Causes Underlying the Heavy Infantile Death Rate in Large Cities and the Benefits to be Derived from the Establishments of Milk Depots." *Public Health Journal*, July, 1912, Toronto.

For a general review of the bacterial contest of American and European cities, see Harrison, F. C., "The Bacterial Contamination of Milk and Its Control." Transactions of the Canadian Institute, 1902-1903, p. 467. Toronto, 1903.

Kilbourne, Charles H., "Pasteurization of Milk," Health Department, City of New York, August, 1912.

Savage, William G., "Milk and the Public Health." Macmillan & Co., 1912.

Harrison, F. C., and Vanderleck, J., "Aesculin Bile Salt Media for the Isolation of B. Coli and B. Typhosus. Central. f. Bakt." I Abt. Originale, Bd. 51. Heft. 5, s. 706, 1909.

Rosenau, N. J., "The Milk Question." Boston and New York: Houghton, Mifflin Co., 1912.

"Standard Methods for the Bacterial Examination of Milk in the Laboratory Section of the American Public Health Association." *American Journal Hyg.*, Vol. VII., No. 3, August, 1910.

Eager, J. N., "Morbidity and Mortality Statistics as Influenced by Milk." Bulletin 56. Hygienic Laboratory, Washington, D.C.

Lederle and Raynor, "The Milk Supply of New York City and Its Control by the Department of Health." The Health Dept., City of New York, September, 1912.

"Report of the Commission on Milk Standards Appointed by the New York Milk Committee" (2nd edition), No. 78. Government Printing Office, Washington, 1912.

"Report of the Milk Inspector for the Year 1912-1913." Health Department, City of Boston, U.S.A.

Ward, A. R., "Pure Milk and the Public Health." Ithaca, N.Y.: Taylor & Carpenter, 1909.

Houston, A. C., "Bacteriological Examination of Milk." London County Council, London, 1905.

Com, H. W., Esten, W. M., and Stocking, W. A., "Classification of Dairy Bacteria." Report, Storrs Expt. Station, 1906.

Stocking, W. A., "Bacteriological Studies of a Milking Machine." U. S. Dept. of Agriculture, B.A.I., Bull. 92.

Erf, O., "Milking Machines." Kansas Expt. Station, Bull. 140.

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