

# A BACTERIOLOGICAL STUDY OF THE MILK SUPPLY OF WASHINGTON, D. C.

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In September, 1910, a bacteriological examination of the milk supply of Washington was begun, which has been continued without interruption up to the present time. The object of this enquiry was to determine as near as was possible the condition of the milk as it reached the city, and also the condition it was delivered to the consumer; finally, after continuing these examinations for a sufficient time so as to include all the conditions met with during the year to see if it were possible to adduce from the data a betterment of the milk supply.

Now after a lapse of 14 months since starting this study we believe that we have accumulated sufficient information regarding it to state how and wherein the condition of the milk is bad as well as to show where it is good.

There has been no attempt to multiply the number of the daily examinations, but rather to confine ourselves to fewer samples studied so as to subject these to several laboratory methods in determining the bacterial content. The specimens of milk were obtained from various sources and places, the object being to take in all the conditions of the milk supply. These samples were either collected in special sterile containers under strict aseptic precautions, or brought to the laboratory in the original bottle, in both cases these were placed on ice and kept so in transit to the laboratory, where they were examined as soon as possible after their arrival.

## *Methods of Examination.*

As soon as the samples were delivered to the laboratory, a uniform sample was taken from each and the usual number of dilutions were made in normal saline solution, and then one c.c. of each were plated in duplicate on plus 15 ordinary agar; also three plates were made of the several dilutions on litmus-lactose agar; and inoculations made in fermentation tubes of peptone-lactose bile, for determining the fermentation and the streptococci and finally, dilutions of 1 to 1,000 and 1 to 10,000 were plated on Endo's fuchsin agar for the colon group.

We have found Endo's media indispensable for the detection and isolation of colon bacilli in milk, and without this it would have been difficult in many instances to have identified this group. Moreover, it was a great time saver. One set of plates on ordinary peptone agar, the litmus-lactose

plates, the fermentation tubes, were incubated for 24 hours and the colonies counted. The other set of plates on ordinary agar were kept at room temperature for 48 hours and then counted. The Endo plates were examined from 24 to 48 hours, and the fermentation tubes after 4 days.

We have found that if a small quantity of the Endo-agar be poured into the Petri dish and allowed to harden; then adding the dilution of the milk and the Endo-agar just in sufficient amount to mix well, spreading of the colonies between the plate and the media is prevented. This is sometimes troublesome, particularly when the colonies of colon are numerous.

The streptococci were estimated by the dilution method in the fermentation tubes and by a direct examination.

During the 14 months, that is to say from September 20, 1910, to the 1st of November, 1911, there have been 924 samples of milk and cream examined by the above described methods. All the records of the examination were kept on cards, and by these cards, a convenient card-index system is provided.

The milk and cream were collected as they were brought to the city or just as they were intended to the consumer. Only in a few instances was this plan departed from when samples were obtained from institutions of the milk just as it was being issued to the inmates.

The sources of the milk supply of Washington are so well described in a recent Bulletin issued by the Department of Agriculture, that it would be superfluous on our part to go into the details of describing it, further than to add some to it. Since this Bulletin was issued, there has been a considerable quantity of milk and cream shipped to Washington from Ohio, Pennsylvania, and New York, and from quite distant points in these States. Almost all this milk comes to Washington in car load lots; the cream in individual cans and a number of these are usually included in a shipment of less than a car load lot.

Those interested in the subject are referred to the Bulletin No. 138, Department of Agriculture, entitled, "The Milk Supply of Chicago and Washington."

For convenience of consideration and comparison, the examination of the milk and cream will be considered under the following heads: Raw Milk, Pasteurized Milk, and "Sanitary" Milk.

#### *Raw Milk.*

Seven hundred and fifty-eight (758) samples of raw milk and cream have been examined: as was to be expected, there was a variable bacterial content; it was full of surprises and paradoxes.

For a better understanding of the bacterial content we have arranged the results of the examination in the form of a table in which the milk is grouped according to the maximum number of bacteria found together with the number of times the colon and streptococci were present.

TABLE I.—RAW MILK.

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Total
1,000 to 10,000.....	0	3	2	3	0	3	2	2	0	0	0	0	0	3	18.
<i>Colon and Strept.</i> .....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.
10,000 to 50,000.....	0	3	14	6	5	8	23	11	7	3	1	0	1	7	89.
<i>Colon and Strept.</i> .....	0	1	0	1	2	0	1	0	1	0	1	0	0	0	7.
50,000 to 100,000.....	1	5	5	2	5	4	11	8	3	1	0	1	1	4	51.
<i>Colon and Strept.</i> .....	0	2	0	1	2	1	4	0	0	0	0	1	0	0	11.
100,000 to 500,000.....	18	0	15	5	1	21	15	18	9	13	0	1	16	7	198.
<i>Colon and Strept.</i> .....	1	6	7	3	2	4	4	6	3	3	0	0	2	2	43.
500,00 to 1,000,000.....	4	10	3	6	4	5	6	3	2	8	4	4	6	6	71.
<i>Colon and Strept.</i> .....	3	3	2	2	2	2	3	0	5	2	2	2	5	5	38.
1,000,000 and over.....	23	17	20	8	26	11	19	19	28	41	37	57	37	17	360.
<i>Colon and Strept.</i> .....	16	20	14	9	19	10	12	13	24	32	28	49	31	13	289.

It will be seen by the above table that the colon group was present in the majority of the samples and in the following percentages:

September 66 per cent., October 42 per cent., November 40 per cent., December 39 per cent., January 61 per cent., February 30 per cent., March 30 per cent., April 31 per cent., May 66 per cent., June 65 per cent., July 75 per cent., August 80 per cent., September 67 per cent., October 44 per cent.

These two groups increase *pari passu* with the rest of the bacteria and as the number increases as it is seen to do during the rise of the temperature, the incidence of these groups become more and more frequent. Our experience leads us to conclude that the colon and streptococci content of a milk can be taken with reasonable certainty to indicate the amount of dirt and filth in milk. Only 35 per cent. of the milk and cream examined, had a bacterial content under 500,000, and the remainder, was above this; 20 per cent. between 500,000 and 1,000,000 and 45 per cent. over 1,000,000.

TABLE II.

Month	Average number of bacteria.	Average temperature of milk.	Average Temp.
September.....	5,435,000	63.7 F.	—
October.....	15,000,000	55.3	55.6
November.....	15,800,000	47.3	40.9
December.....	3,070,000	41	27.5
January.....	4,065,000	42	33.4
February.....	4,950,000	44	31
March.....	1,159,000	43.2	35.9
April.....	3,065,000	50.8	48
May.....	5,700,000	49.8	63.7
June.....	11,600,000	60.4	63.5
July.....	24,130,000	57.2	80.2
August.....	34,167,000	62.8	75.2
September.....	5,700,000	62.8	64.9
October.....	2,640,000	55	53.5

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The average number of bacteria of the samples for each month compared with the temperature of the milk at the time of collection together with the average daily temperature is shown in the Table II.

The data of this table taken together with that of Table I shows the influence of the temperature on the bacterial content. Just as soon as the warm weather begins, there is a gradual increase of the number of bacteria. The bad milk increases as the good milk becomes less frequent. Attention is invited to the temperature of the milk as compared with the daily temperature in the above, as well as shown on charts I and II. Here it will be seen that the temperature of the milk during the greater part of the year even in the coolest months, shows that it is a few degrees higher than the daily temperature. This is the case in nearly all the milk which reaches here via the railroad. This seldom if ever reaches Washington with a temperature below 40. F even for those which have a low bacterial content. It is evident from this fact alone, that it will account for a considerable proportion of the number, but it must be understood that we do not believe that this factor alone is responsible for the enormous numbers found, but that there must be other and as potent factors which are the cause of the most of the bad conditions present. We are strongly of the opinion that the main trouble lies in the careless handling of the milk even before it leaves the place of origin, for instance; the milk examined in October and November, 1910, showed a great number of bacteria present and the colon bacilli and streptococci were present in over 40 per cent. of these and in large numbers, yet the average daily temperature was not high. It was cool comparatively.

### *Milk reaching Washington by Railroad.*

For purposes of comparison, two of the principal milk routes to Washington have been selected which in general are very similar in the country through which these run. One is from Frederick, Md., 59 miles distant, and the other from Bluemont, Va., 79 miles distant. The milk on both these railroads is handled about in the same manner and the time of delivery is about the same. A study of the milk on both these routes at all parts of the year does not indicate that the reason for the high bacterial count is not due to any appreciable extent to the time the milk is in transit, as we find milk that is produced at Garret Park, Md., only 12 miles away, as bad if not worse than some coming from Frederick, Md., 59 miles away. This route from Frederick, Md., supplies a considerable portion of the milk. There are on record 552 permits granted to persons to ship milk over this route to Washington. Our examination of the milk from this route, shows that only 35 per cent. of the milk had a count as low as 50,000 per c.c. the remainder having a count much above this.

The Dairy scores of the producers and shippers would lead one to believe that a much better and cleaner milk would be produced, and, it was a

disappointment when the comparison was made. A few good milks are to be found all down the line, and frequently from dairies, where you would infer from the score, it would be poor. On the other hand, there are many of the dairies which have a good score where the bacterial content is high.

We have been told that the reason why such paradoxical results are obtained, is that the milk producers along this route are comparatively new to the business and are not too well conversant to what is required to produce and care for milk in the proper way. This may be true, but on account of the enormous numbers of both colon bacilli and streptococci present in the milk taken together with the other bacteria, we believe that dirty methods are responsible for this condition in the majority of cases. It is well to take into consideration another point which may also have a bearing on this, and that is, the dairymen on this route are mainly tenants on the farms and operate the dairy business as a side issue to their farming. In consequence, they do not have their places equipped as they should be, for producing a good milk. Perhaps this is true and should be given a proper weight, yet admitting all this the fact remains that the examination shows the milk to be dirty and filthy in many cases.

It is without doubt that almost all the bacterial content has its origin at the place of production and the time in transit plays but a minor part.

There is a far better showing made of the Virginia route. The result of the examination is almost the reverse of that of the Maryland route, in the matter of samples which had a count of less than 500,000 bacteria per c.c. was 65 percent. and those above this 35 per cent. was from 500,000 to over a million.

The dairy business along this route is better organized and has been longer in operation than that of the Maryland route. There is in general a better equipment and the dairies are better managed. Only 156 permits are in force for this section. This is also evidenced by the dairy scores, which are considerably higher. We find the same thing obtains along this route as mentioned on the other; that some of these dairies with a rather high score, produced some of the worst milk.

#### *The Local Supply.*

The local milk supply is drawn from the District and the surrounding country and is brought into the city by vehicle and by trolley. One hundred and thirty-one samples of such milk and cream which have been examined showed a bacterial content of 62 per cent. of these to be less than 500,000 per c.c. of the 38 per cent. the greater proportion of these, had over 1,000,000. Now if we should take the first nine months of the examination—which is the coolest part of the year—we find that 96 of the 131 had a count of 500,000 and below, and for the warm season—5 months—only 9 of the 35 were below the million mark.

The occurrence of colon and streptococci in the local milk is about as

often as we find it in those from a distance, and is about the same as are found in that of the Virginia route. The Maryland route exceeds this.

We do not see that the local supply is by reason of its proximity to the city any better than that from the Virginia route. The only thing which can be said in its favor—and this is of the greatest importance,—is that this milk is derived from tuberculin tested cows.

Occasionally, we have found samples of milk which had an enormous number of bacteria and no colon or streptococci. This is evidently an old milk once good or a good milk in an unclean container. This happens to the milk it matters not its source.

The temperature of the milk taken at the time of its collection shows that it is with but a few exceptions higher than the daily temperature, although the samples were collected at or about the same time as the daily temperature was taken. Also, that with the increase of the daily temperature, there was an increase in the number of the bacteria, there being the same increase in all the milk arriving here.

There is evidence that attempts have been made in quite a proportion of the shippers from nearby places to cool their milk. Ice is used by some, others depend on the well or spring water. Much is to be desired before these efforts will be effective in preventing the rise in the number of bacteria, because as it stands now the amount of cooling the milk is too imperfectly applied to amount to much.

It is a foregone conclusion that when a milk is kept at a temperature at or above 50° F. for any length of time there will be a great increase of bacteria even in a short space of time, and more so when the milk has been improperly handled at the time of milking.

We find that when we attempt to apply our count of a certain milk to the temperature there is sometimes such great discrepancies that at first we thought that our methods might be at fault; but after having this repeated several times we were compelled to accept them. But only when we apply these observations to a large number we see the relation between the temperature and the bacterial content. We have of course been able to solve some of the puzzles by finding the variations were due to dirt, or worse.

The local milk supply is susceptible of great improvement before we can say that it is both sanitary and clean. Yet in both these respects, it compares favorably with the milk coming over the aforementioned Virginia route. Possibly, if we would have analyzed the results of the examination of the milk coming into Washington via the other railroad routes we would have had the same data as we have used in the comparison of these two. On the whole, however, the results would not be changed materially, as we have found in comparing a few of the examinations made of milk derived from these other sources, with that of the local supply. Now if it is pos-

sible to produce a better milk during the 9 months of the year and with the majority of the samples with 500,000 and less and of the 62 per cent. of the output containing only 13 per cent. colon and streptococci, we feel assured that this can be increased far above the point that now is done. And in view of the fact that a considerable amount of milk is produced by those same dairies during the summer months demonstrates that good milk can be produced by them even during the warmest weather.

*Pasteurized Milk and Cream:*

At the time of the beginning of this study there were five plants for pasteurizing in operation; one has been installed only recently. Five of these plants are located in Washington, the other at Frederick, Md. These plants supply all the pasteurized milk used here and nearly all the cream. One hundred and fifty-four (154) examinations were made of this product, the results of these are tabulated in the same way as for the raw milk.

TABLE III.—PASTEURIZED MILK.

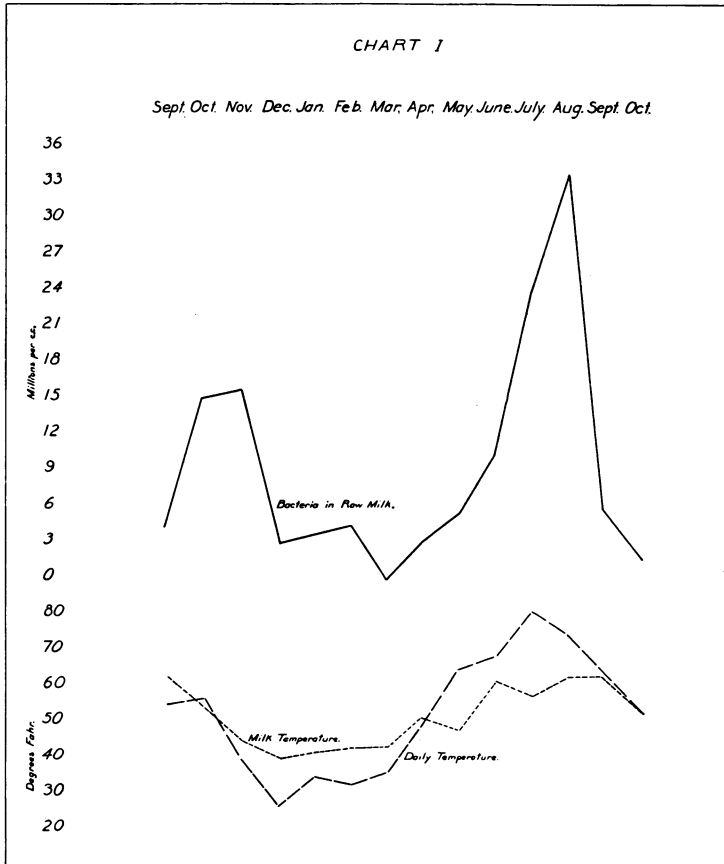
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May	Jun.	July	Aug.	Sept.	Oct.	Total
1,000 to 10,000.....	2	6	1	1	0	2	0	5	1	0	0	0	0	4	22.
<i>Colon and Strept.</i> .....	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.
10,000 to 50,000.....	2	0	1	1	1	3	0	5	3	0	0	0	1	1	18.
<i>Colon and Strept.</i> .....	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.
50,000 to 100,000.....	1	1	0	0	0	1	0	0	1	1	0	0	0	1	6.
<i>Colon and Strept.</i> .....	1	2	0	0	0	1	0	0	0	0	0	0	0	0	4.
100,000 to 500,000.....	0	8	2	2	6	2	3	4	4	2	0	0	2	6	41.
<i>Colon and Strept.</i> .....	0	1	0	2	2	0	0	0	0	1	0	0	1	2	9.
500,000 to 1,000,000....	0	3	2	1	2	1	0	0	0	1	1	0	3	3	17.
<i>Colon and Strept.</i> .....	0	3	1	3	2	0	1	0	0	2	1		1	2	16.
1,000,000 and on.....	0	5	3	3	5	0	2			5	7	0	1	6	40.
<i>Colon and Strept.</i> .....	0	4	1	2	4	0	0	2	2	5	7	0	1	6	34.

It will be seen that the number of bacteria increases, and as it does the colon and streptococci also increase in about the same ratio, notwithstanding it is "pasteurized." It is not difficult to explain why such a discrepancy should exist when we take into consideration just what has been done. It is a well known fact that the colon group and the streptococci are killed at rather a low temperature, and it was for this purpose that the process of pasteurization was applied to milk. For it is also a well established fact that other micro-organisms of these groups are killed at the same temperature. But when this is not performed can it be truthfully said that this particular milk is in truth what it is labeled? There is also another feature

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to be considered about this, and that is the milk might have been so dirty or so near the souring point that it was "beyond redemption" if such a term is permissive. Such milk or cream cannot be pasteurized by subjecting it to the time of heating as is found sufficient for a fresh milk with but a fair number of bacteria.

We are afraid this has not always been the object had in view by the

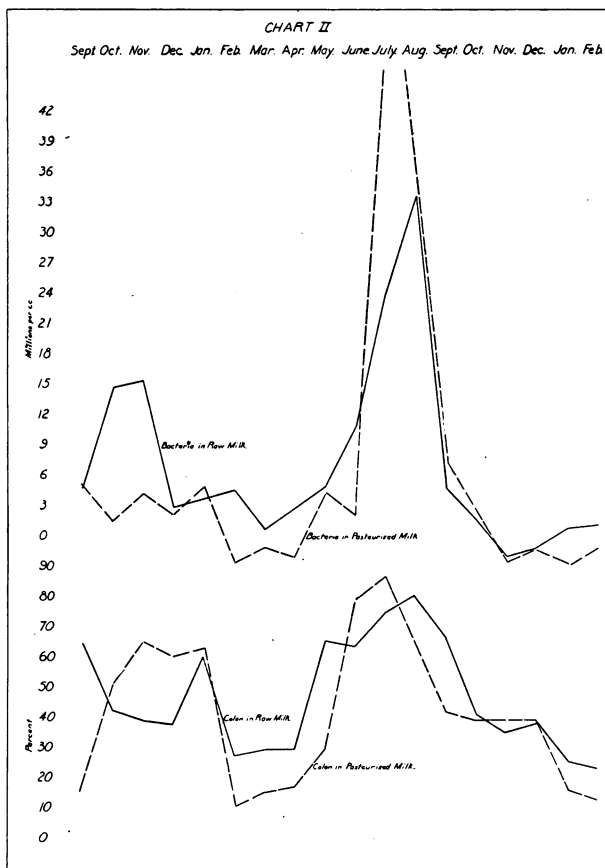


operations of these plants, but rather these are used for commercial purposes more frequently than for its true purpose of removing the possible dangers from the milk. There seems to be a current belief held by those engaged in the dairy business that pasteurization is the cure-all for bad milk. By subjecting any kind of milk to the process it may make it wholesome—certainly saleable. This latter view is the one most prevalent and is the reason why such is employed by at least three of these if, one is to draw any inference from the examinations of the output from these plants.



The other three are doing fairly consistent work at all times and even during the warmest weather.

Now all these plants are good and efficient work can be done with them provided they are operated with the proper object in view, that is to kill off the bacteria, and to provide the public with a safe milk. But as evidenced by our examinations, this is secondary to the main purpose of their



use. It is nothing more or less than a simple commercial project to sell milk.

The output of some of these are at times worse than if they would purvey a dirty raw milk.

It is impossible to reconcile the fact that a so-called pasteurized milk containing as many as 38,000,000 bacteria per c.c. and 210,000 of these colon bacilli and 100,000 streptococci is anything more than a dirty bad milk. It is unfortunate that such instances are not rare.

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TABLE IV.  
FEBRUARY, 1911—RAW MILK.

Number	Temperature at time of Collection	Bacteria per c.c. 25° C., 48 hrs.	Colon Group per c.c.	Daily Temperature	Streptococci per c.c.
1.....	39.2.	550,000.	1,000.	32°.	++100.
2.....	42.8.	33,000.	0.	32.	0.
3.....	46.4.	18,700,000.	115,000.	32.	100,000.
4.....	41.9.	132,000.	0.	38.	0.
5.....	42.8.	1,350,000.	0.	38.	0.
6.....	46.4.	210,000.	0.	38.	1,000.
7.....	41.	148,000.	0.	28.	+100.
8.....	51.8.	130,000.	0.	28.	0.
9.....	42.8.	29,000.	0.	34.	0.
10.....	42.8.	111,000.	0.	34.	0.
11.....	43.7.	370,000.	0.	22.	0.
12.....	41.	240,000.	2,000.	22.	1,000.
13.....	39.2.	510,000.	0.	22.	100.
14.....	39.2.	306,000.	0.	30.	100.
15.....	44.6.	5,400,000.	102,000.	30.	10,000.
16.....	39.2.	190,000.	5,000.	32.	1,000.
17.....	42.8.	176,000.	0.	32.	100.
18.....	42.8.	45,000.	0.	32.	0.
19.....	41.	56,000.	0.	30.	0.
20.....	41.	223,000.	6,000.	30.	1,000.
21.....	42.8.	34,000.	0.	22.	0.
22.....	41.	310,000.	1,000.	22.	100.
23.....	42.8.	8,900,000.	15,000.	34.	++1,000.
24.....	44.6.	352,000.	0.	34.	100.
25.....	48.2.	111,000.	1,000.	34.	+100.
26.....	46.4.	93,000.	0.	34.	100.
27.....	42.8.	1,050,000.	9,000.	36.	1,000.
28.....	42.8.	10,200,000.	5,000.	36.	1,000.
29.....	42.8.	133,000.	0.	30.	0.
30.....	48.2.	690,000.	0.	30.	0.
31.....	41.	121,000,000.	690,000.	30.	10,000.
32.....	42.8.	310,000.	0.	30.	0.
33.....	42.8.	530,000.	0.	30.	0.
34.....	46.4.	18,000.	0.	38.	0.
35.....	46.4.	121,000.	0.	38.	100.
36.....	44.6.	210,000.	0.	38.	0.
37.....	48.2.	3,500,000.	9,000.	54.	0.
38.....	50.	410,000.	1,000.	54.	1,000.
39.....	41.	181,000.	0.	32.	++1,000.
40.....	44.6.	82,000.	0.	32.	0.
41.....	46.4.	106,000.	0.	32.	0.
42.....	40.1.	850,000.	0.	24.	0.
43.....	32.	360,000.	0.	24.	+100.
44.....	39.2.	5,600,000.	8,000.	24.	10,000.
45.....	41.	120,000.	1,000.	28.	0.
46.....	44.6.	6,000.	0.	28.	0.
47.....	44.6.	13,000.	0.	28.	0.
48.....	42.8.	7,600,000.	0.	32.	0.
49.....	44.6.	160,000.	0.	32.	0.
50.....	44.6.	23,000.	0.	32.	0.

There are shipments of milk and cream from distant points sent to Washington which are claimed to have been pasteurized. On arrival these are in great part repasteurized before being distributed. Now all this milk on arrival here has a large bacterial content plus the number of the dead bacteria which were killed in the first process. As all the enzymes of the milk are surely destroyed by this double pasteurization and as the dead and the living bacteria now comprise a considerable part would it not be more in keeping with common sense to boil this kind of milk?

If pasteurization means anything it certainly should not only remove a greater part of the bacterial content and most certainly the colon group, or it fails in its purpose. If this is not done what assurance do we have that this process is any protection against the diseases which may be conveyed by milk, viz; typhoid, diphtheria, bacillary dysentery and tuberculosis.

It stands to reason that when an old milk or a dirty fresh milk is to be pasteurized it should be done in such a manner as to render the product safe, and it should be under the supervision of some one who is not only acquainted with what is required to be done, but how to do it.

From our experiences during the past year, we are of the opinion that there has been but little interest shown by the owners of these pasteurizing plants in the matter of ascertaining the efficiency of their work. None of these have ever requested that an examination be made either for determining whether the process was effective, or for checking up their own bacteriological tests. Two of these plants have a bacteriological examination made by their own bacteriologists, and it must be said that so far as our tests go the process is effective in nearly all the instances which we have examined their output. It is to be regretted that this is not the case with the others; and just so long as the gullible public will buy an old stale filthy decomposed milk under the guise of a label stating that it is a pasteurized milk, just so long will it be purveyed.

#### *Hospital and Institution Milk.*

The milk supplied to the several hospitals and institutions is both raw and pasteurized. The bulk of it is raw; only one or two hospitals are supplied with pasteurized. The bacterial content of this milk is about the same as market milk,—the lunch room milk being excepted,—91 samples obtained from these institutions have been examined, the average count per c.c. for the raw milk was 6,252,000 and 48 of these contained both colon and streptococci. The pasteurized milk was not what it should be, the average count per c.c. was 754,000 and 33 per cent. of these both contained colon and streptococci.

Some of the pasteurized milk was good, and contained neither colon or streptococci, and the whole count was low.

The bulk of the milk as is served to the hospitals and institutions is not what it should be and is not in our opinion a proper food for the sick or for

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TABLE V.  
AUGUST, 1911—RAW MILK.

Number	Temperature at time of Collection	Bacteria per c.c. 25° C., 48 hrs.	Colon Group per c.c.	Daily Temperature	Streptococci per c.c.
1.....	48.2.	19,000,000.	2,000.	90°.	10,000.
2.....	48.2.	42,000,000.	Innumerable	90.	100,000.
3.....	53.6.	149,000,000.	74,000.	92.	100,000.
4.....	55.4.	4,000,000.	4,000.	92.	1,000.
5.....	46.4.	3,000,000.	12,000.	94.	10,000.
6.....	53.6.	17,000,000.	4,200,000.	94.	10,000.
7.....	50.	4,000,000.	7,000.	86.	100,000.
8.....	48.6.	40,350,000.	1,400,000.	86.	100,000.
9.....	55.4.	181,000,000.	65,000.	84.	100.
10.....	50.	8,500,000.	91,000.	86.	100,000.
11.....	51.8.	1,650,000.	2,000.	86.	10,000.
12.....	48.2.	39,000,000.	0.	92.	1,000.
13.....	55.4.	35,600,000.	142,000.	92.	1,000.
14.....	62.	8,230,000.	0.	94.	10,000.
15.....	66.	Innumerable.	2,940,000.	94.	100,000.
16.....	78.	1,190,000.	0.	90.	10,000.
17.....	62.	2,880,000.	2,000.	90.	1,000.
18.....	62.6.	3,570,000.	1,000.	74.	100.
19.....	64.4.	4,600,000.	0.	74.	100.
20.....	68.	3,400,000.	9,000.	74.	100.
21.....	66.2.	396,000,000.	0.	76.	100.
22.....	66.2.	9,500,000.	188,000.	76.	100,000.
23.....	68.	5,400,000.	26,000.	76.	10,000.
24.....	64.4.	1,410,000.	2,000.	66.	100.
25.....	64.4.	8,500,000.	290,000.	66.	100,000.
26.....	69.8.	3,800,000.	6,000.	66.	10,000.
27.....	68.	1,500,000.	2,000.	66.	10,000.
28.....	66.2.	950,000.	0.	66.	0.
29.....	62.6.	940,000.	25,000.	66.	10,000.
30.....	64.4.	10,600,000.	2,000.	64.	100.
31.....	62.6.	261,000,000.	358,000.	64.	100,000.
32.....	64.4.	13,100,000.	0.	64.	0.
33.....	60.8.	7,100,000.	0.	66.	0.
34.....	60.8.	2,950,000.	0.	66.	100.
35.....	64.4.	6,100,000.	1,000.	66.	100.
36.....	71.6.	59,900,000.	310,000.	68.	10,000.
37.....	62.6.	14,100,000.	168,000.	68.	100,000.
38.....	64.4.	60,400,000.	390,000.	68.	100,000.
39.....	59.	950,000.	0.	72.	10,000.
40.....	68.	30,100,000.	5,000.	72.	10,000.
41.....	68.	13,100,000.	21,000.	72.	10,000.
42.....	66.2.	5,200,000.	31,000.	68.	10,000.
43.....	66.2.	20,100,000.	410,000.	68.	100,000.
44.....	64.4.	110,000,000.	320,000.	68.	100,000.
45.....	64.4.	25,200,000.	352,000.	76.	100,000.
46.....	80.6.	24,000,000.	65,000.	76.	10,000.
47.....	68.	1,850,000.	0.	76.	0.
48.....	73.4.	68,100,000.	110,000.	80.	100,000.
49.....	66.2.	10,200,000.	285,000.	80.	10,000.
50.....	68.	8,100,000.	52,000.	80.	10,000.

children. Yet notwithstanding its poor quality, it is no better or no worse than the milk that is consumed by the sick of the city outside the hospitals or of the thousands of children.

Only three hospitals have requested the Health Department to make an examination of the milk supplied them. All the others either treated the matter with indifference or even with resentment. Further comment is unnecessary.

#### *Special Milk.*

One firm here supplies what it calls a "Sanitary Milk." This milk is of good quality and is properly handled from the time of its production until its issue. The highest bacterial count was 30,000 per c.c. and none contained colon.

#### *Lunch Room Milk.*

The milk served in lunch rooms is about as poor a quality as can be had. The average number of bacteria per c.c. of all samples was 20,330,000 and all but six were rich in colon and streptococci.

There were three grades of this bad milk; that from the original bottle contained 11,000,000; that drawn from a tank through a faucet 13,000,000 and that taken out of the can by a dipper 39,000,000.

This is without question the cheapest milk that can be obtained and still maintain the principal physical characteristics of milk. It would be a waste of time to give it further notice, or even dignify it with the title of milk. Swill would be a term more appropriate.

#### *Notices.*

It has been the custom to notify a dairyman when the examination of his milk contained a large bacterial content, a part of which is colon bacilli and streptococci, for him to appear on a certain date for a hearing on this particular milk. We have taken at random 24 of the notices sent out and compared the examination made subsequent to the hearing to see if the warning given or the promises made on his behalf had any effect on the improvement of the milk. There was an improvement noted in one case, in the rest none.

We do not consider that it is within the province of this paper to do any more than to state the results of our findings. These we think permit but one interpretation, one which is self evident; that the milk supply of Washington is far, very far from what it should be.

As to the remedy; we will not at this time make any recommendations.

With regard to freeing tuberculosis from the dairy herds; we would state that we are now engaged in a laboratory study of this and hope in the near future to make this the subject of another paper.

November 1, 1911.