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Editorials

The opinions and ideas expressed in papers and editorials are those of the respective authors. The expressions of the Association are completely recorded in its transactions.

Skim Milk Under New Name

Our old friend "dried skim milk" is to have a new official name. In February the United States Senate by a vote of 46 to 4 officially changed the name of skim milk so that it now may be called any one of several names such as "dried milk solids," "defatted milk solids" or "non-fat milk solids." The House had already passed the bill.

Chief spokesman in the Senate for changing the name was Senator Clark (Dem. Mo.) who argued that the name skim milk was associated in the minds of many with food for hogs. He declared that the old name due to past associations imposed a stigma on a product that has been vastly improved by modern separator and dehydrator methods.

Senator Overton (Dem. La.) who opposed the bill said that "corn and potatoes are fed to hogs, too, but nobody refuses to eat them." He argued vehemently that you might as well call castor oil "the elixir of life" or change the name of spinach to something euphonious and disarming.

If changing the name of skim milk will remove any of the stigma attached to it and increase its use by humans in any way, then the action of the Congress of the United States is amply justified. It has been common knowledge among those familiar with the facts that a most valuable food was being wasted every year in the United States. According to the U. S. Department of Agriculture

> "Almost 50 billion pounds of skim milk are fed to animals or destroyed every year."
>
> "Only about 12 percent of all skim milk produced in the United States during the five year period 1930–1934 was used in the manufacture of dairy products."
>
> "Skim milk is a by-product of sweet cream and butter."
>
> "Skim milk is not sold on the market on account of the popular prejudice against it."

That the pig is getting the better of the deal when fed skim milk is evidenced by the fact that it requires 10 pounds of the food nutrients in skim milk to produce 1 pound of pork.

Abbott[1] points out that pound for pound the skim milk nutrients are equal if not superior to pork so that when skim milk is fed to pigs, we are losing 90 percent of its value. However, this is better than pouring it down the sewer as is sometimes done. He shows the great waste of human nutrients incident to the destruction of 50 billion pounds of skim milk every year by summarizing the following facts:

"It contains about 75 million pounds of milk fat which is sufficient to make about 93 million pounds of butter.

"It contains about 1½ billion pounds of milk proteins which are equal in food value to the edible beef proteins in 20 million beef steers.

"It contains about 300 million pounds of mineral food essentials equal to the edible mineral content of 15 million beef steers.

"It contains about 2 billion pounds of milk sugar equal in food value to as many pounds of cane sugar.

"It contains a specific for the prevention and cure of pellagra.

"It contains all the water soluble vitamins of 50 billion pounds of whole milk."

We know that millions of pounds of skim milk are being shipped to England and elsewhere throughout the world at the present time. We are most certain that to the starving millions in the world today the word "skim milk" connotes no unpleasant association with hog food. It is estimated that less than 35 percent of the people of the United States have a "satisfactory diet." The other 65 percent have their *hunger* satisfied but fail to eat the foods necessary for good *health* and *vigor*. Let us hope that changing the name of skim milk to dried milk solids, or any other of the names suggested, removes the stigma now attached to it by so many in this country. Instead of wasting 90 percent by feeding it to hogs or 100 percent by pouring it down the sewer, let us popularize dried milk solids to the extent that the 65 percent in American homes may have a more nearly satisfactory diet.

F. W. F.

What Is a Milk Sanitarian?

How often have we heard this question raised! We have never heard of any two descriptions that agree except perhaps that the term describes an occupation and not a profession.

The Constitution of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS declares as its Object:

"The object of this Association shall be to develop uniform and proper supervision and inspection of dairy farms, milk and milk products establishments, and milk and milk products; to encourage the improvement in quality of dairy products and the technological development of dairy equipment and supplies; and to disseminate useful information regarding dairy sanitation, technology, inspection, and administration."

In general, this description comprises *supervision* of milk production and handling, *improvement* in quality of product and technology of operations, and *education* concerning dairy sanitation, technology, inspection, and administration. Since many workers in this field are called upon by civic groups (as well as by

[1] Abbott. *Am. J. Pub. Health, 30,* 237 (1940).

their own health departments) to inform the public concerning the unique nutritive value of milk, an additional objective under education may be listed, namely, promotion of consumption of dairy products.

The milk sanitarian may get into this vocation by various routes—bacteriology, chemistry, engineering, medical or veterinary practice, or teaching—but he soon learns that he must utilize each of these formal divisions of learning. In addition, the successful milk sanitarian learns by experience how to handle the public, the news press, his superiors, his subordinates, and to make them like it. Almost without exception they are intelligent, conscientious, sincere, and honest. God bless them in their fine work, and help the public to appreciate them.

J. H. S.

An Organization of Food Sanitarians

MILK sanitation seminars have been held by the U.S.P.H.S. over the country for many years. An increasing number of state organizations of milk sanitarians, most of which are affiliated to one degree or another with the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS, are holding annual meetings, some of which are seminar-like in character. The success of this work in improving milk sanitation technology has led the U.S.P.H.S., within the past two years, to conduct restaurant sanitation seminars for the training of state and local milk and food sanitarians. One phase of this emphasizes improvement in official supervision of milk and food sanitation. This program has been receiving excellent acceptance. Food control and sanitation are growing by leaps and bounds.

The enthusiasm that is stimulated has led some groups to express the need for some means of conserving the benefits of such conferences, possibly even for following them up. Strong presentations have been made for setting up some kind of organization or association that will serve the interests of workers in this field.

There is some disinclination to setting up the new group as an affiliate of any of the state public health associations. It is felt that the formation of a new group of food (or restaurant) sanitarians would be swallowed up if it became a section of an established public health group. Certainly its freedom of action in certain fields would be curtailed, and it could not develop as it saw the need. Some favor a connection of some sort with the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS on the basis of the kindred interests of so many milk control officials in the general food sanitation field. It is pointed out (1) that there is a marked similarity of public health principles and procedures underlying the sanitation of both milk and food establishments, (2) that the practice is general of grouping both milk control and food establishment control under the same administrative unit in many state and municipal health departments, and (3) that there is much interest among many milk sanitarians in restaurant and other general food sanitation. It is held that the inclusion of both milk and food sanitation in the one larger organization would enable the responsible sanitarians to follow developments by attending only one annual meeting and following only one journal, would preclude duplicated efforts in various aspects of standardization and development, would strengthen the publication project, and would centralize and integrate what otherwise would be a scattered, more or less unrelated, and sometimes contradictory procedure in the handling of food sanitation problems.

It would seem quite likely that some such coordinated effort would protect us from (or certainly would reduce) the tendency for health officials to channel food control into the labyrinth of regulatory procedure which now weighs on the milk industry.

On the other hand, some responsible and experienced milk sanitarians feel that milk control is such a sizeable job that we cannot afford to dilute, so to speak, our milk organizational efforts by spreading out broadly into general foods. In addition, it is believed by some that our JOURNAL OF MILK TECHNOLOGY would not be likely to carry enough general food articles to hold the interest of the "food" people—and indeed, might weaken the interest of the milk people themselves in the JOURNAL.

These ideas seem to lead to three considerations which may be summed up as follows: (1) a separate organization for restaurant (or general food) sanitarians, (2) an affiliate status of food groups in an enlarged "International," and (3) a central sanitary institute which would serve to bind together all member sanitary organizations, each of which functions independently as it wishes concerning matters in its immediate field of interests but coordinately in the common interest of all.

Under the first consideration—a separate association of restaurant sanitarians—we think that the field is not yet sufficiently developed to maintain a continuously stimulating program. Quite possibly, other groups in the food field might want to organize. Already mention is made of the interests of bakers in sanitation requirements for their industry. It looks as if we shall have a number of food sanitation organizations springing up as the recognition of such need becomes more widely held.

The predominant interest of members of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS in general food sanitation problems as well as their mandatory official duty in both fields leads us to think that possibly the time has come for the "International" to broaden its scope and develop along natural lines. At first, it might authorize the formation of a section, free to develop autonomously within liberal limits. When its growth had been assured and the food sanitarians had gained stature, so to speak, in their section, then this broadened field would receive recognition by changing the name of the parent body to "International Association of Milk and Food Sanitarians" or just "International Association of Food Sanitarians," as some have pointed out.

A suggestion has been made that a parent body be set up known simply as "Sanitarians, Inc." or possibly as "The International Sanitary Institute." Under the latter, autonomous associations of sanitarians could function in collaboration with each other, without wasteful duplication, and mutually supporting.

What is your idea about these matters? Write us.

J. H. S.

NOTE: Since writing the above, the food sanitarians in the State of Massachusetts have organized. Some want it to include the whole New England field.—*Editor.*

Producing Milk With Low Bacterial Counts

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Fluid market milk always contains some bacteria, even when produced and handled under the most exacting conditions. Too large a number of bacteria in the milk is considered to be an indication that something is wrong with the methods of producing and handling the milk.

This relationship between poor methods and the bacterial population of the milk is recognized by the incorporation in the milk laws of some bacterial limits or standards. For example, the bacterial standard for certified milk is 10,000 bacteria per ml. The Grade A raw milk and Grade A pasteurized milk as defined in the United States Public Health Service Milk Ordinance is milk that does not have more than 50,000 and 30,000 bacteria per ml. respectively.

To control bacteria in milk and milk products has been and still is a troublesome problem in the dairy industry. A few years ago an opportunity presented itself to undertake a study to demonstrate to what extent bacteria could be controlled in milk under commercial conditions.

The milk plant in which the study was carried out was located in a small city of about 14,000 population. There were several other dairies in the city, making the competition keen. The

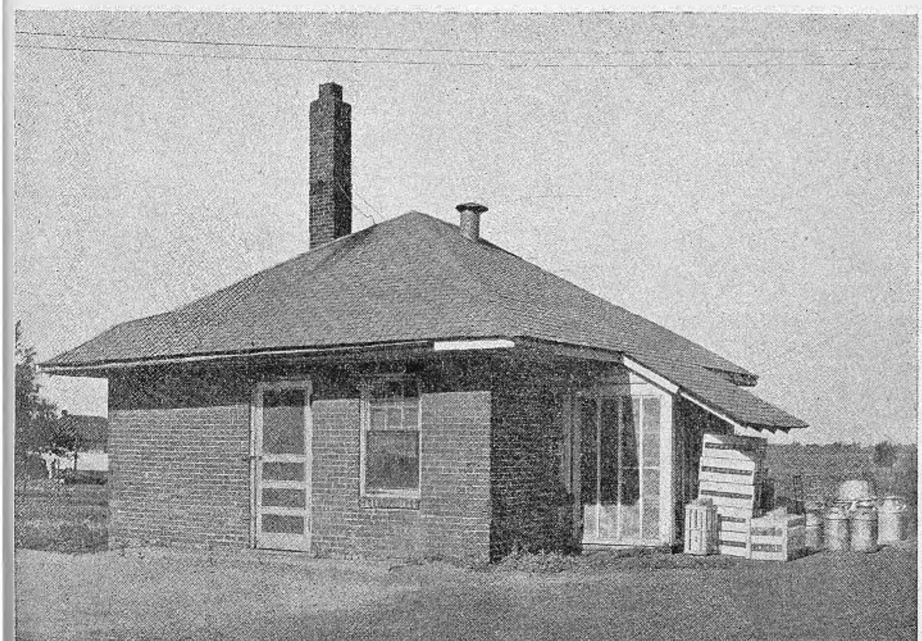

Figure 1

Exterior View of the Milk Plant.

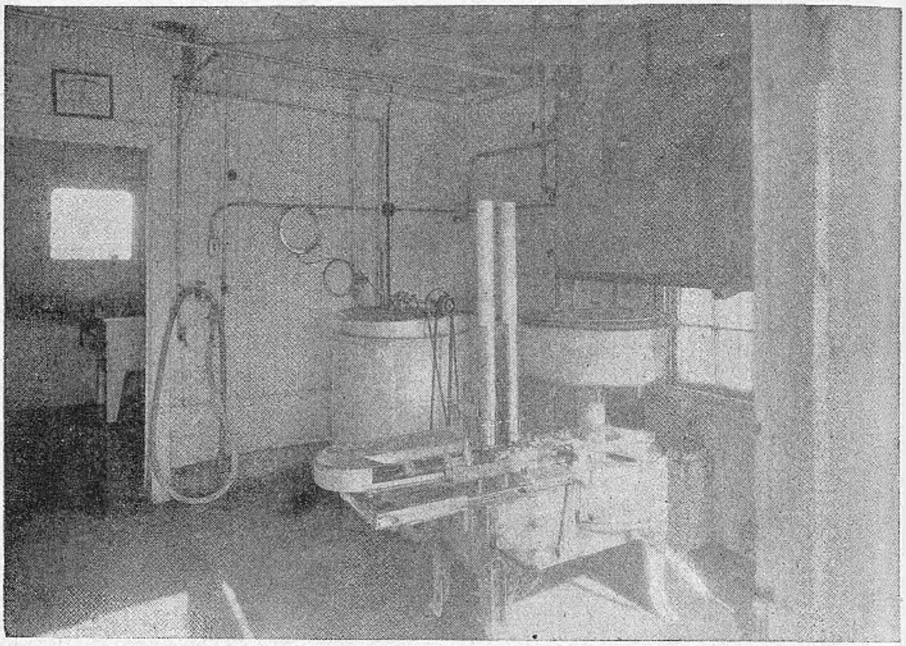

FIGURE 2
Pasteurizing, Cooling and Bottling Equipment.

dairy was rather small, bottling about 600 quarts of milk daily. The milk was sold on the local market at the same retail price as that of the other dairies, and the dairyman reported that he made good profits.

The building in which the milk was handled and pasteurized is shown in Figure 1. It was a one-story brick building about twenty feet square, and was located on the farm about 300 feet from the cow barn. The arrangement of the equipment inside the building is shown in Figures 2 and 3. Attention is called to the simplicity of the plant. At the prevailing prices at the time the study was undertaken, the cost of the building and the equipment was estimated by the owner to be about three thousand dollars. From the general appearance of the plant there was nothing outstanding about it; it appeared like many other small plants in a small city.

The plant was operated by one man. He took care of the boiler, dumped and weighed the raw milk, and washed and sterilized all the utensils and equipment. He pasteurized and bottled the milk, and was responsible for all the operations of the plant.

The milk cans and the milk bottles were washed by hand. The cans were sterilized by steam jet, and the bottles were sterilized by chlorine solution.

The samples for the bacteriological study were taken from the pasteurized bottled milk at the time the milk was being delivered to the consumers. The study covered a period of almost three years. For counting the bacteria, the standard agar plate method was used.

The results of the study are presented in Tables 1 and 2. Since it is not practical to present all the individual counts obtained during the entire period of study, the data are summarized. In Table 1 are presented

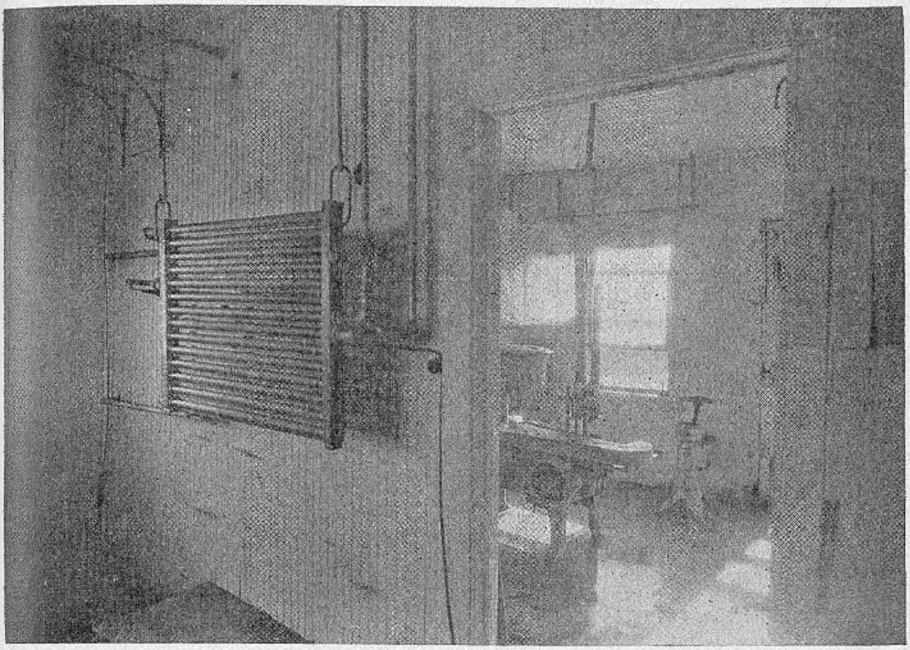

FIGURE 3

Receiving Room Showing a Coolor for Raw Milk.

counts of twenty consecutive samples of milk, to show how the bacterial counts fluctuated from day to day. These counts were representative and show the type of results obtained throughout the study.

TABLE 1

BACTERIAL COUNTS OF TWENTY CONSECUTIVE SAMPLES OF MILK

Sample number	*Counts per ml. of milk*	*Sample number*	*Counts per ml. of milk*
1	230	11	640
2	410	12	150
3	750	13	700
4	70	14	160,000
5	770	15	870
6	1,080	16	740
7	1,170	17	130
8	700	18	1,690
9	540	19	580
10	1,480	20	540

The bacterial counts of the milk were quite normal in one respect, namely, they varied from day to day. The highest count obtained during the three years of study was 160,000 per ml. and the lowest count obtained was 70. This high count was due to a new producer whose milk had a high count of thermoduric bacteria. After this producer's milk was excluded, the count of the pasteurized milk dropped to 870 bacteria per ml.

The bacterial counts of the milk during the three years of study were extremely low. As shown in Table 2, the logarithmic average counts for the three years were 930, 700 and 940 respectively.

TABLE 2

SUMMARY OF THE BACTERIAL COUNTS OF PASTEURIZED MILK

Year	*Percent of samples having less than 1,000 bacteria counts per ml.*	*Logarithmic averages per each year*
1	60	930
2	65	700
3	66	940

About 64 percent of the samples during the three years had counts of less than 1,000 per ml. During the first year only four samples gave counts above 10,000, during the second year the highest count was 4,320 and during the third year only one sample had a count above 10,000. During the three years, there were only forty counts above 1,000; the rest were below 1,000.

These were extremely low counts for market milk. The results indicate what can be accomplished in the matter of bacterial control in milk.

From a practical standpoint, a question may be raised as to what factors were involved which enable this dairyman to put out milk with such low bacterial counts.

Perhaps the first factor was the availability and utilization of the bacteriological laboratory. The study emphasizes the value of bacteriological examination of milk. Without such examinations the operator of the plant is in the dark as to the efficiency of his methods to control bacteria in the milk. Bacterial counts of the milk might be considered as the "eyes" through which the plant operator can detect faulty practices.

There are a number of dairy plants in the state which maintain a laboratory and a technically trained personnel. Most of the plants, however, are not so equipped, and many of them are not large enough to afford financially such equipment. The dairy industry as a whole supports various organizations such as the National Dairy Council, Illinois Dairy Products Association, etc. It might be a good move if the small dairies of the state would establish and maintain a laboratory and technically trained personnel. Such a laboratory could perform a valuable service to the small plants.

Another factor and perhaps the most important one was the operator. He was a good dairyman. His goal was to deliver to his consumers milk with bacterial counts under one thousand per ml. He was greatly interested in the results of the bacteriological examinations and when the counts were above one thousand, he immediately proceeded to find the cause and to correct it.

Still another factor was the quality of raw milk used. The study was conducted during the years in which there was an abundant milk supply. The quality of the raw milk was determined by the platform inspection and examination of the milk and by the bacterial plate count. If any producer persisted in bringing milk below the standard adopted by the plant, he was dropped and another producer was taken on.

The city had a milk ordinance on the books but no appropriation was given for its enforcement. There was no inspector and no laboratory so that the ordinance was dead. There was, therefore, no inspection of the dairy farms and no requirements as to the buildings and equipment. The only requirement by the milk plant was that the milk when delivered must be clean and of low bacterial counts and must come from tuberculin-tested herds.

There are undoubtedly other dairy milk plants that put out pasteurized milk with bacterial counts under one thousand. In general, however, the bacterial count of pasteurized milk, as delivered to the customers, is much higher. The results of this experiment show what can be accomplished in the matter of bacterial control in milk under commercial conditions in small communities. It did not involve any financial outlay since no requirements of any kind were imposed on the producers. It was largely the matter of expertness on the part of the producers and the plant operator.

Reliability of Formulae in Determining Milk Solids-Not-Fat

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OTHER than the butter fat content, the most important constituents of whole milk are the solids-not-fat. In fact they are important enough to have induced several state legislative assemblies and a number of city governing bodies to define the maximum and minimum limitations of such solids in the milk sold legally to the consumer in their localities.

These solids, usually called solids-not-fat (S-N-F), are those solids soluble in water and include principally carbohydrates, proteins, and a variety of mineral salts. The percent of solids-not-fat in whole milk is readily disturbed by adulteration.

Most milk control laboratories arrive at their determination of solids-not-fat by some form of calculation. Such calculations are accepted practice and yield moderately accurate results if enough true known factors are available. Over the years we have encountered considerable variations in such results and it prompted us to conduct a small re-investigation of the calculated relationship of S-N-F with the various necessary factors obtained by accepted methods of analyses. The equations we used for investigation are those in wide use today.

Our plan of investigation was to determine, with proper controls, the specific gravity, butter fat, temperature, and total solids of nine samples of pasteurized whole milk. These samples were taken arbitrarily from a large group coming into the laboratory for routine analysis. The specific gravity and temperature were obtained with a certified hydrometer and thermometer, respectively. The butter fat percentage was obtained by the Babcock method which is an approved procedure in *Standard Methods for the Examination of Dairy Products,* 8th ed. Total solids were determined by dehydration in an air oven according to the above *Standard Methods.* Since neither this nor *Approved Methods of Analysis* (A.O.A.C.) give a procedure for arriving at solids-not-fat in milk, we determined these solids by subtracting the percentage of butter fat from the percentage of total solids.

The results of these determinations are given in Table 1. It will be noted that the actual normal percentage for S-N-F range from 9.48 to 10.55.

THE FORMULAE

The three formulae we selected for this work were, (1) The Hawley-Davis; (2) The Babcock; and (3) The Babcock No. 2. This latter is a formula in wide use and we have never seen it designated by an author-name. For convenience we designated it Babcock No. 2.

Hawley-Davis Formula. Hawlay[1] developed an expression for S-N-F which was slightly modified by Davis[2]. This modification was the one we used. Davis also designed a nomograph which facilitates the solution of this equation. Since it is difficult to read more than one decimal point on a nomograph it is not advisable to use it. The formula is given as follows:

$$\text{S-N-F} = 287.2 \left[\frac{D-1}{D}\right] + 0.328\ F$$

wherein—

D represents the specific gravity at 60° F.

F represents the percentage of butter fat.

Babcock Formula. This is the formula long in use in the milk industry. Its equation is as follows:

$$S\text{-}N\text{-}F=\left[\frac{100\,S-SF}{100-1.0753\,SF}\right]-1\,X(100-F)2.5$$

wherein—

S represents the specific gravity at 60° F.

F represents the percentage of butter fat.

1.0753 represents the factor of constant relationship between specific gravity, butter fat, and total solids.

Babcock No. 2 Formula. This formula is probably in universal use. Its equation is as follows:

$$S\text{-}N\text{-}F=.25\,L+.2\,F$$

L represents the lactometer reading at 60° F.

F represents the percentage of butter fat.

In calculating with these three formulae we used the specific gravities and the butter fat percentages given in Table 1. For the lactometer (Quevenne) readings we multiplied the above specific gravities by 1,000 and subtracted 1,000 when the sample was brought to 60° F. The results of these calculations are compared below in Table 2 with the actual percentages of S-N-F as shown in Table 1.

COMMENT

It will be readily seen that the Babcock and the Babcock No. 2 formulae give results that are substantially below those obtained by standard procedures even when controlled factors were available. Such wide variations might readily produce a report on a certain milk that could brand it as being below minimum legal requirements when such might not actually be the case. Apparently these two formulae are not permissible for use when employed as a legal grading procedure. The Hawley-Davis formula is within a reasonable range of agreement when compared with results obtained by standard procedures and providing that only close, approximate results are desired. This formula may be used in routine milk analyses with a fair degree of accuracy. It does seem, however, that when reliability in determinations of S-N-F are demanded, those obtained by controlled analytical methods are to be preferred.

SUMMARY

Nine samples of pasteurized whole milk were examined to obtain the actual percentages of solids-not-fat. This was accomplished by determining known factors such as butter fat, specific gravity, temperature, and total solids. The results so obtained were compared with those determined by formula calculations, employing the above predetermined factors. It was found that the Babcock and the Babcock No. 2 formulae were not suf-

TABLE 1

CONTROLLED DETERMINATIONS ON WHOLE MILK

Sample	*Specific gravity percent*	*Butter fat percent*	*Total solids percent*	*Solids-not-fat percent* *	*Temperature degrees F.*
1	1.032	3.5	13.05	9.55	65
2	1.032	3.4	13.55	10.15	62
3	1.031	3.7	12.86	9.16	61
4	1.031	3.6	13.11	10.51	62
5	1.033	3.5	13.07	9.57	62
6	1.032	3.7	13.75	10.05	63
7	1.032	3.6	13.34	9.74	62
8	1.033	3.7	13.75	10.05	63
9	1.032	3.7	13.18	9.48	64

* The percentage of solids-not-fat was obtained by subtracting the percentage of butter fat from the percentage of total solids.

ficiently accurate to use as a basis of legal grading of milk. The Hawley-Davis equation was found to be suitable when necessary to use a formula. It is recommended that whenever an accurate determination of the percentage of solids-not-fat is desired it is the safest plan to obtain it by subtracting the percent of butter fat from the percent of total solids where these are obtained by standard proceedures.

REFERENCES

1. Hawley, H. *Analyst,* 58, 272 (1933).
2. Davis, D. S. *Analyst* (1943). Exact reference not available.

TABLE 2

COMPARATIVE DETERMINATIONS OF SOLIDS-NOT-FAT

Comparison of three formulae with a standard method

Sample	*Standard Method* *	*Hawley-Davis*	*Babcock No. 1* †	*Babcock No. 2* ‡
1	9.55	10.05	8.44	8.88
2	10.15	10.01	8.69	8.76
3	9.16	9.83	8.44	8.54
4	10.51	10.50	8.43	8.55
5	9.57	10.34	8.97	9.03
6	10.05	10.12	8.67	8.87
7	9.74	10.08	8.87	8.79
8	10.05	10.40	8.42	9.11
9	9.48	10.11	8.66	8.89

* See Table No. 1.
† The specific gravity was adjusted to 60° F.
‡ The Quevenne readings in the formula were obtained by multiplying the specific gravity (60° F.) by 1,000 and subtracting 1,000.

Supplementary Home Sanitation of Shipping Cans

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In a world suffering from the ravages of war, farmers on this continent are called upon to produce more and better dairy products. Consequently, it is probable that never in the history of dairying has effective sanitation of milk and cream cans been so essential as it is today. Without an intensive campaign against microbial sabotage in these containers, the demand for increased production may result in just more to be wasted. As a result of the shortage of tin many cans are kept in use much longer than in normal times. These deteriorated cans present unusual problems in sanitation and the product might be improved if the producer supplemented the commercial sanitizing procedures with simple and inexpensive treatment at home.

It is probable that too much complacency has surrounded the can-cleaning phase of the dairy industry. Most dairy plant operators seem resigned to the belief that they are using efficient procedures with the equipment permitted by their finances. These methods vary anywhere from the desired automatic washers, turning out several cans a minute, to the open sink in which cans are washed manually in alkaline cleaning solutions as hot and strong as human hands can bear but always followed, as in the automatics, by at least a "shot" of steam, supposedly intended to inactivate any residual germ life.

The producers cannot be blamed for reasoning similarly on an economic basis, nor for assuming that they cannot improve upon the sanitation of cans treated in the commercial plant, particularly when they frequently are without adequate can washing facilities.

The fallacy of this complacency may be demonstrated by the simple "odor test" which Breed (1) recently claimed yet to be one of the most accurate means of grading milk. The application of this test to cans, supposedly returned to the farm ready for filling with fresh milk or cream, too frequently exposes gross inefficiency in the sanitation of such cans.

On the basis of residual bacteria in cans, Jamieson and Chan (2) established that 93.7 percent of 354 factory-sanitized cans, ready for return to the patrons, contained more than 40,000 bacteria per can. These cans would not meet the requirements for satisfactory cans set forth in the *Standard Methods for the Examination of Dairy Products* (11). This unfavorable condition would have been accentuated by the time the cans arrived on the farm for refilling. Parker and Shadwick (5), Scales (9), Schwarzkopf (10), Jamieson and Chan (3) demonstrated that improvement in can sanitation can be obtained by the use of organic acid detergents in preference to the alkaline type of cleansers.

Until such time as patrons are assured that cans returned to them meet the bacterial standard stated above it would appear advisable to encourage producers to improve the sanitary condition of the cans into which fresh products are to be put, particularly at this critical time. This article deals with a method designed to accomplish this improvement.

The Method

The method suggested is an adaptation of procedures used by different workers. Scales and Kemp (8) studied the germicidal power of a group of synthetic organic detergents under different conditions and suggested their use as final rinses for dairy utensils, drinking glasses, and even for sterilizing cows' udders prior to milking. Krog and Marshall (4) reported on the bactericidal action of Roccal on the flora associated with milk handling equipment. Parker (6) (7) presented a list of advantages of newly developed acid cleaners and also suggested a spray method of application as both efficient and economical.

Any of the commercially available synthetic organic detergents which rank high in germicidal action, stability, wetting and free-rinsing ability and also in freedom from corrosive effects, toxicity and excessive cost may be used. In this investigation a cheap and easily operated Harco Sprayer proved efficient for applying the agents, diluted in cold water, to cans which had been washed commercially. The sprayer is illustrated in Figure 1. It is made of non-corrosive plastic and duroglass and is suitable in design, action, and capacity to the needs of the average producer, one filling of the quart-size container being ample to sanitize eight 10-gallon cans. The hand-operated pump delivers a spray of optimum flare and volume which penetrates rapidly into all crevices of the can and lid.

The spraying should be completed at least 15 minutes before the cans are filled during which period the treated cans may be inverted for draining the excess sanitizing fluid.

Experimental Proof of the Method

Through the cooperation of the Department of Dairy Husbandry, which carries on a manufacturing business on a commercial basis, excellent material for testing the efficiency of the method was provided. Cans were washed manually in alkaline cleansing solutions, steamed and dried, and held about 15 hours before testing. Four sanitizing agents were used, a well established chlorine product as a control, the other three being newer organic types. A description of these agents follows:

I. A trade product; crystalline sodium hypochlorite. Concentration used: 1 ounce to 1 gallon of cold water. On the average the available chlorine content was found to be 183 p.p.m. in this solution.

II. A trade product; active ingredient 10 percent high molecular alkyl-dimethyl-benzyl-ammonium chlorides. Conc. 1 ounce to 1 gallon of water.

Figure 1
Harco Sprayer
Courtesy of
Germain's Germaco Products Div.,
Los Angeles, California.

III. A trade product; active ingredient 10 percent N (acyl colamino formyl-methyl) pyridinium chloride. Conc. 1 ounce to 1 gallon of water.

IV. A trade product; according to the manufacturers — a non-corrosive, non-toxic organic acid containing a microbial depressant. Conc. 1 ounce to 1 gallon of water.

Each agent was used in the supplementary sanitation of 10 to 15 cans per day for a period of at least a week, thus providing about 90 tests with each agent.

In order to obtain information on numbers of bacteria in cans before and

TABLE 1

REDUCTION OF BACTERIA BY THE SPRAY METHOD OF TREATING CANS

Sanitizing Agents	No. of Cans Tested	Before Treatment — Bacterial Counts			After Treatment — Bacterial Counts			Efficiency of Treatment — Percent Reduction of Bacteria		
		*Maxima**	*Minima**	*Average*	*Maxima**	*Minima**	*Average*	*Maxima**	*Minima**	*Average*
I	80	2,632,000	117,060	999,121	5,830	67	1,060	99.99	94.13	99.89
II	96	2,341,429	3,636	912,916	400	21	143	99.99	95.95	99.98
III	98	2,270,000	2,822	596,158	3,176	6	401	99.99	92.53	99.93
IV	90	2,775,000	14,150	967,914	14,223	38	1,258	99.99	98.42	99.87

* Maxima and minima are averages of several maxima and minima obtained in replicate trials.

after treatment, the sampling was by swabbing rather than by the free rinse technique. The swabs were prepared by wrapping 0.2 gm. of cotton around 2 applicator sticks. This gave a rigid swab which retained 1 ml. of sterile water after immersion and gentle squeezing against the neck of the flask.

Instead of swabbing a definite area of the interior of a can a progressive "line-system" was used. In the before-treatment tests, a swab was drawn across the bottom of the can, around the can wall at three predetermined levels, up the shoulder and out of the neck; then across the diameter of the lid and finally around its circumference.

After the first swabbing, each can and lid interior was sprayed with a sanitizing solution, care being taken to wet all surfaces. This required approximately four ounces per can at a maximum cost for the most expensive agent of less than one-fifth of a cent. After 15 minutes each can was dried over a warm air jet and re-swabbed for the after-treatment sampling. In this case care was exercised not to re-swab the same part of the can except where the lines crossed on the diameters of the can and lid.

Immediately after use, the swabs were immersed in screw capped vials containing 9 ml. of sterile skim milk, the applicators broken off below finger contact, and the contents shaken 10 times. This method proved effective in minimizing the carry-over effect of the germicidal and bacteriostatic sanitizing agents. Samples were refrigerated for about one hour, the pre-treatment samples being held not more than half an hour longer than those obtained after the cans were sanitized. They were plated quantitatively on Difco tryptone-glucose-extract-milk agar. Incubation was at 25° C. for 48 hours. Although not providing a total count of the bacteria in the cans this swab method of sampling furnished a basis for comparing the sanitary state of each can before and after treatment.

RESULTS AND DISCUSSION

For the sake of simplicity the efficiency of the method is shown by the percentage reduction in bacterial counts. For one trial with one agent 10 to 15 cans were used and the maximum, minimum and average counts were recorded, as well as the percentage reduction based on these figures. This was replicated several times for each agent. The averages of these trials for the various agents are presented in Table 1.

The data show clearly that these washed and supposedly clean cans would have added appreciably to the bacterial load in milk or cream and undoubtedly, would have been an important factor in determining the quality of the product that reached the consumer had they been used without the supplementary treatment. They demonstrate equally forcibly the efficiency of any of the agents used in reducing the bacterial content of cans to practical insignificance. While a detailed study of the types of colonies that developed on plates was not considered in this study it was readily apparent that pin-point colonies accounted for a much smaller proportion of the total count on plates prepared from the sanitized cans. Accordingly, such a simple procedure carried out by the producer shortly before cans are filled might be expected not only to mean fewer bacteria in the product delivered but also to remove thermoduric types that have been the cause of much worry to plant operators and milk control officials.

SUMMARY

A simple and inexpensive procedure for sanitizing milk and cream cans on the farm is outlined. It consists of spraying the cans shortly before use with one of the many commercial germicidal cleaners available on the market at reasonable cost.

In a study involving the application of the treatment to 364 commercially washed cans the method was found to

reduce the bacteria in cans to practical insignificance.

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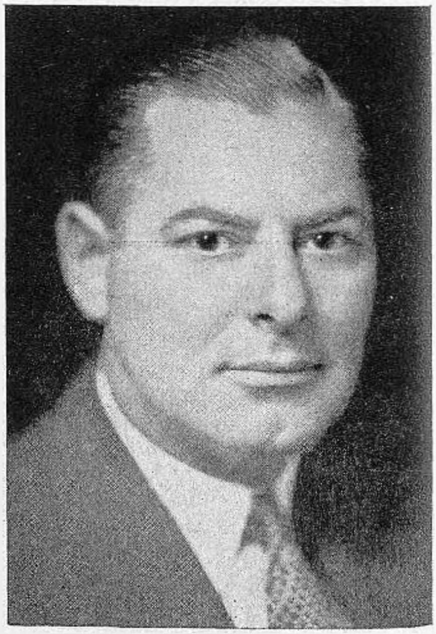
McGEE NEW PRESIDENT OF STANDARD CAP AND SEAL



Russell McGee, a partner in Harold E. Talbott & Company, has been elected president of Standard Cap and Seal Corporation, it has been announced by Harold E. Talbott, Chairman of the Board.

Mr. Talbott said that Standard Cap and Seal Corporation has acquired the General Felt Company of Brooklyn, maker of laminated, coated and processed paper. Both companies are large suppliers to the food-products and dairy industries. Robert Newbold, founder and president of General Felt Company, will become a vice-president and a director of Standard Cap and Seal Corporation in charge of the General Felt Division.

A Sterile Cutting Device for Swab Vial Outfits Utilizing Wood Applicators

THEODORE C. BUCK, JR., AND EMANUEL KAPLAN

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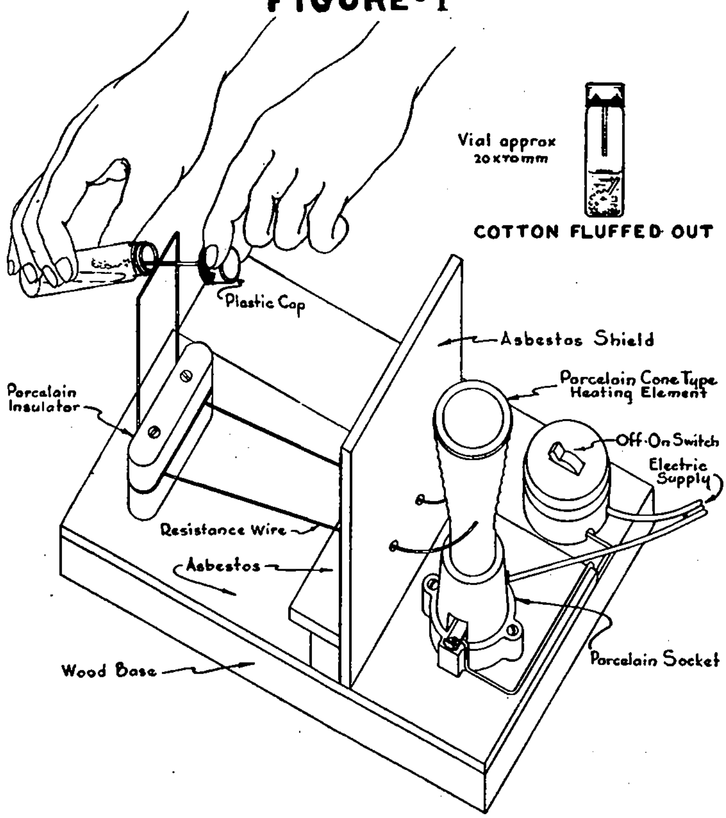
IN recent years, swab methods for collecting samples have gained prominence in the bacteriologic examination of utensils in eating and drinking establishments (1) and dairies (2). Recently, one of us (3) described a simple and practical swab vial outfit which has been adopted in the tentative procedure for the bacteriological examination of food utensils by the Subcom-

FIGURE - I



HOT WIRE CUTTER

mittee on Food Utensil Sanitation of the Committee on Research and Standards of the American Public Health Association (4).

The principal criticism of the outfit referred to above related to the difficulty in aseptically cutting the wooden applicator so as readily to disentangle the cotton. The retention of bacteria upon the swab, despite agitation, would be expected (5) unless the cotton were disentangled. We have recently found that this objection can be overcome by a simple technique involving the use of an inexpensive home-made hot wire device commonly employed as a glass cutter. Similar devices are described in a number of laboratory supply-house catalogues. The procedure is illustrated in Figure 1.

The swab is partly removed from the vial and is then rotated along the hot wire at a point about one centimeter from the end of the cotton. The swab stick is completely severed in several seconds and falls into the vial. The screw cap is tightly replaced. Following about 25 vigorous "thumpings" the cotton is well fluffed out. The swab stick "stump" remaining attached to the inner surface of the screw cap materially aids in "fluffing" the cotton.

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ANNUAL MEETING, NOVEMBER 2 and 4, 1944

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Mastitis Infections and Their Relation to the Milk Supply*

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THE previous speaker has very ably reviewed the various laboratory tests that have been developed for detecting mastitis infections. All of these are, in essence, tests that reveal some abnormality of the usual milk secretion. In the course of Professor Frayer's remarks, he has stated that we ought not to regard mastitis as a simple disease. The term mastitis signifies an inflammation of the udder and this inflammation may be produced by any one of several different microorganisms. Because those of us who present discussions of the mastitis problem to audiences such as this one, usually speak of mastitis as if it was a simple and uncomplicated disease, I should like to emphasize the complexity of the problem. It is readily possible to deceive ourselves into thinking that the situation is simple when, as a matter of fact, this disease presents one of the most complicated problems that dairymen and veterinarians face today.

As yet, no really adequate control or elimination program has been developed for mastitis. One reason for this failure is because of a failure to recognize the difficult nature of the mastitis problem. There are, in fact, at least seven or eight different types of infections included under this term. They might very properly be described as seven or eight different diseases, each one a different problem and nearly all of them serious from the standpoint of the dairyman.

Because there are no common names for the various types of bacteria that produce the different types of inflammation in cows' udders, it is necessary to use the technical names for these bacteria. Professor Allen has kindly consented to write these names on the blackboard for me as they are mentioned (See Table 1). The organism that will be mentioned first is so predominantly the cause of inflammations of bovine udders that it is commonly mentioned as the only cause of this trouble. This is the organism known properly as *Streptococcus agalactiae* Lehmann and Neumann. The name refers to the fact that the inflammation may dry infected quarters. Another name frequently used for the same bacterium is *Streptococcus mastitidis* Migula. Many prefer to use the second name because it is easier to remember as it refers to mastitis, the disease which this streptococcus produces. This organism is found in the udders of very nearly all of our milch cows. Frequently it remains latent and causes no inflammation. Sooner or later, however, it may start an active infection that results in a bad or "gargety" quarter.

While streptococci exactly like this streptococcus that causes mastitis in cattle are occasionally found in human infections, it has never been definitely proved that the bovine mastitis streptococcus as it occurs in milk causes infections in human beings.

There are other varieties of bovine mastitis streptococci that have received names, and perhaps they should be mentioned. There are, for example, *Streptococcus uberis* and *Streptococcus dysgalactiae*. These differ but slightly from *Streptococcus agalactiae*. This

* Presented at Twenty-Second Annual Meeting of the Vermont Dairy Plant Operators and Managers' Association, Burlington, November 3–4, 1943.

TABLE 1

MICROORGANISMS THAT PRODUCE INFLAMMATIONS OF THE BOVINE UDDER (MASTITIS)

Scientific Name	*Prevalence in Cattle*	*Transmissibility to Man*	*Selected References*
Streptococcus agalactiae Syn. *S. mastitidis*, etc. Possible variants of above=*S. uberis*, *S. dysgalactiae* and others.	Latent to active infection present in 50 to 95% of bovine udders. Little known of distribution in other mammals.	Identical organisms have been described from certain human infections, but the relationship between the human and bovine infection, if any, is still obscure. Abnormal milk rarely causes stomach and intestinal upsets in man.	Hansen, Tech. Bull. 232, N. Y. State Exp. Sta., 1935. Sherman, Bact. Reviews, *1*, 1937, 26–30. Ferguson, Cornell Vet., *28*, 1938, 211. Murphy, Cornell Vet., *30*, 1940, 261.
Streptococcus pyogenes, Syn. *Streptococcus hemolyticus*, *Streptococcus epidemicus*, *Streptococcus scarlatinae*, *Streptococcus erysipelatis*, etc.	Rare, and normally derived directly from some human source.	Readily gives rise to epidemics of septic sore throat, scarlet fever, erysipelas, etc., when infected milk is used in raw state.	Brooks, Jour. Milk Tech., *6*, 1943, 152. Tiedeman, Health News, New York State Dept. Health, *14*, 1937, 46 and 79.
Staphylococcus aureus and *Staphylococcus albus*. Also called *Micrococcus aureus* and *M. albus*.	Very common in the udder as well as on the skin of cattle. On occasion cause inflammations and formation of pus in the udder.	The actively pathogenic strains sometimes produce a toxin that causes stomach and intestinal upsets in man.	Little and Foley, Jour. Amer. Vet. Med. Assoc., *87*, 1935, 637. Hardenberg and Schlottbauer, Jour. Inf. Dis., *40*, 1927, 667.
Aerobacter aerogenes, *Escherichia coli* and other coliform bacteria.	Usually found when a search is made but udder infections are not really common.	Probably never the direct cause of human diseases.	Moore & Ward, Cornell Agr. Exp. Sta., Bull. 158, 1899. Yale & Eglinton, Proc. Internat. Assoc. Dairy and Milk Inspectors, 24th Ann. Rept., 1935, 116. Murphy & Hanson, Cornell Vet., *33*, 1943, 65.
Gangrenous or acute mastitis usually attributed to a mixed infection of the above bacteria or possibly to a virus.	Not common, but usually fatal to cattle.	Dependent on type of organism involved.	Ferguson, Cornell Vet., *30*, 1940, 299. Kelser and Schoening, Manual Veter. Bact., Baltimore, 1943, 563. Sabin, Bact. Reviews, *5*, 1941, 16.
Mycobacterium tuberculosis, Syn. *Bacillus tuberculosis*.	Practically eradicated in the U. S. A.	Transmissible to human beings.	Kelser & Schoening, *loc. cit.*, 367. *Hagan*, Infectious Diseases of Domestic Animals, Ithaca, 1943, 229.
Actinomyces bovis and *Actinobacillus lignieresi*.	Found in cattle with lumpy jaw. Also infect other bovine organs including the udder.	Little known regarding transmissibility to man.	Kelser & Schoening, *loc. cit.*, 395. Hagan, *loc. cit.*, 321.
Brucella abortus, *Brucella suis* and *Brucella melitensis*.	The bovine organism is widespread, the porcine variety is found most commonly in hog raising areas while the caprine variety is found in North America only in Mexico and southwestern U. S. A.	Bovine variety least infectious for human beings. Caprine variety most infectious of the three. Cause of undulant fever or brucellosis.	Brucellosis in man and Animals. Huddleson, 1939, 337 pp. Castaneda, Tovar and Velez, Jour. Inf. Dis., *70*, 1942, 97.
Corynebacterium pyogenes Syn. *Bacterium pyogenes*.	Common cause of pus formation in cattle and not infrequently found in the udder.	Not generally found in human beings.	Ward, Jour. Bact., *2*, 1917, 619. Hagan, *loc. cit.*, 103.

difference is shown chiefly by their ability to ferment certain compounds that are not fermented by the odinary bovine mastitis streptococcus. In recent years *Streptococcus uberis* has been identified as occurring in cases of mastitis.

There is also another type of *Streptococcus* which causes mastitis. Fortunately this occurs only very rarely. I say "fortunately" because it is the common human type of streptococcus which when it occurs in milk causes septic sore throat and scarlet fever epidemics. This streptococcus is known to bacteriologists by a great variety of names as it causes a variety of human ills, such as blood poisoning, septic sore throat, scarlet fever, erysipelas, puerperal or childbed fever, etc. These may be of a very serious nature. This human type of streptococcus is frequently spoken of as a hemolytic streptococcus as it has the power of dissolving red blood corpuscles in a broad zone about each colony when blood is added to the culture plates inoculated with this streptococcus. It is quite distinct from the streptococcus that causes typical bovine mastitis and is properly known as *Streptococcus pyogenes* Rosenbach, or the pus-forming streptococcus. It causes inflammations in udders which resemble the inflammation set up by *Streptococus agalactiae*.

It enters the udder, however, through an infection derived from some human source such as a felon on the milker's hand, a case of scarlet fever, sore throat or the like. The organism apparently makes its way into the cow's udder through an injury such as that caused by forcing a milking tube into the teat, a cut from barbed wire, an injury or something of the sort.

The development of this human type streptococcus in the cow's udder may not cause the milk to be sufficiently abnormal at the beginning of the infection to cause the dairyman to discard it. When milk containing this human type streptococcus is mixed with a milk supply, it is sure to cause trouble if the milk is used raw. The usual result is a septic sore throat epidemic. Some cases of sore throat may be accompanied by a skin rash, and under these conditions the human disease is regarded as scarlet fever, or if the infection is localized in the face and neck region, it is called erysipelas.

The New York State Department of Health has followed these infections of cattle with the human streptococcus (*Streptococcus pyogenes*) very closely. In New York State, as elsewhere, such epidemics are found in regions where raw milk is used. In New York State this usually means that the outbreak occurs in a village or small city. Judging from the success our health authorities have had during the past years in finding animals infected with this streptococcus, the number of animals becoming infected each year in New York State cannot be more than ten to perhaps fifteen or more. The epidemics that result from using this infected milk in the unheated condition are so evident that it is not probable that many cows with this infection are overlooked in the areas where raw milk is used.

Where the milk from one of these infected cows is mixed with other milk that is to be pasteurized, the milk is ordinarily used without causing disease as pasteurization kills *Streptococcus pyogenes*. In spite of the rarity of this type of infection, it is very important that we know and understand it. The industry suffers serious loss when epidemics are traced to the milk supply.

Because some of the bacteria that belong to the group known as streptococci cause human or animal diseases, it is very common to find that people believe that all streptococci are dangerous and undesirable bacteria. For this reason, I should like to digress a moment to point out that another bacterium belonging to this same group is known as *Streptococcus lactis* Lister and is the bacterium that sours milk normally. It and other species of closely related streptococci are used for butter starters, cheese starters and the like. These lactic acid streptococci not only are not harmful but are very desirable bacteria because sour milk drinks are generally regarded as particularly healthful. Cheddar cheese is ripened partially by streptococci of this same lactic acid type. The choice flavor that is associated with well ripened cheddar cheese does not develop unless lactic acid streptococci are present to ripen the cheese. It is important to distinguish between these beneficial types of streptococci and those that cause disease.

However, let us return to our discussion of the microorganisms that cause mastitis. As stated at the beginning, there are other kinds of bacteria than streptococci that cause inflammations in the bovine udder. *Staphylococcus aureus* Rosenbach, another spherical type of bacterium that occurs in masses rather than in chains is widely distributed on the skin of warm blooded animals, *i.e.,* it is found on both the human and the cow's skin. This coccus produces a golden yellow pus but it also occurs in a white variety known as *Staphylococcus albus* Rosenbach. Staphylococci are found not only on the skin of cattle but also in the udder tissue and in the milk as it is drawn from the udder. Under normal conditions staphylococci cause no difficulty either in the udder or to the users of the milk. They occur even in the best raw certified milk. However, under some conditions these staphylococci develop infections, *i.e.,* cause inflammations both on the human skin and in the cow's udder. They are, for example, the normal cause of human boils and occasionally they become active in the udder and cause inflammations, *i.e.,* mastitis. The worst of it is that these staphylococci under such conditions frequently produce a toxin or poison that may cause stomach and intestinal upsets. While staphylococci are found in the milk of many cows, they usually do not set up an inflammation, *i.e.,* a mastitis. When these bacteria become active, however, they may cause a serious infection throughout a herd. Some feel that the staphylococci are the commonest cause of mastitis other than *Streptococcus agalactiae*. In recent years food poisoning outbreaks have been traced more and more frequently to these udder infections with staphylococci.

A recent case of staphylococcus food poisoning from milk that came to my attention in the region about Geneva occurred in a dairyman's family where a can of milk rejected by a New York City inspector was allowed to stand uncooled for 24 hours, the cream removed and made into ice cream. The children of the family ate the ice cream at five o'clock in the afternoon and the father ate some of it a little later. All had stomach and intestinal upsets at ten to twelve o'clock that evening, the usual period needed for the development of such upsets. Examination showed the ice cream to contain a toxin producing strain of staphylococcus.

Another type of udder infection is caused by coliform bacteria, organisms that are not normally regarded as pathogenic. These bacteria, however, do cause inflammations in the human body (cystitis) and they also cause infections of cows' udders. The organism most frequently found in these infections is *Aerobacter aerogenes* Beijerinck, and organism that is used with others as an indicator of recontamination of pasteurized milk. These occur in feces of warm blooded animals and as stated above occasionally cause infections.

In order to discover how frequently infections with coliform bacteria occur in the area about Geneva, our Dr. Yale and Mr. Eglinton made a survey some years ago. Milk from 70 or more herds was tested twice a month in a routine way in order to identify supplies that regularly contained excessive numbers of coliform bacteria. In eight herds where excessive numbers were found, Dr. Yale went to the individual farms and made a study to determine the source of the coliform bacteria including a study of the milk as drawn from the udders. In this way, in two years he found two infected animals in herds maintaining approximately 800 milking animals.

Occasionally it has been reported that entire herds become infected with coliform organisms. Drs. Moore and Ward discovered such a case forty or more years ago (Cornell Bull. No. 158). The effect of these infections on the milk secretion is quite different from that of the effect of the common streptococcus infection on the milk secretion. In one of the two animals that Dr. Yale discovered, the milk was quite normal in appearance when he first found that it contained large numbers of the coliform bacteria. Within a day or two the milk became clear and a golden yellow. Afterwards the infection appeared to heal and the milk became normal again. In the second cow, the teat had been stepped upon and the milk cistern was cut open. In this case the milk continued to remain normal in appearance, but samples drawn from this teat during the weeks and months that followed the injury contained a certain number of coliform organisms. These did not cause a serious disturbance in the milk secretion as the organisms apparently did not set up an infection in the udder itself.

Another type of mastitis that occurs rarely is acute and sometimes gangrenous mastitis. This is a serious and usually fatal disease in infected cattle. Recently we had an opportunity to study a case of this type of mastitis. This occurred in our herd at the Experiment Station. As is common in such cases a mixed infection was present, the bacteria found being *Staphylococcus aureus* and *Streptococcus agalactiae*. Inasmuch as the latter organism is so frequently present, it is usually thought that its presence is more or less accidental and that it has little to do with causing the death of the animal. As acute or gangrenous mastitis has as yet been studied so inadequately, bacteriologists frequently suspect that some as yet unrecognized microorganism or virus is also concerned in this infection. It is well known that gangrenous mastitis of sheep and goats is caused by a virus-like organism (*Borrelomyces agalactiae* Turner) and future studies may indeed show that the same or a related virus is associated with *Staphylococcus aureus* in causing these gangrenous types of mastitis in cattle.

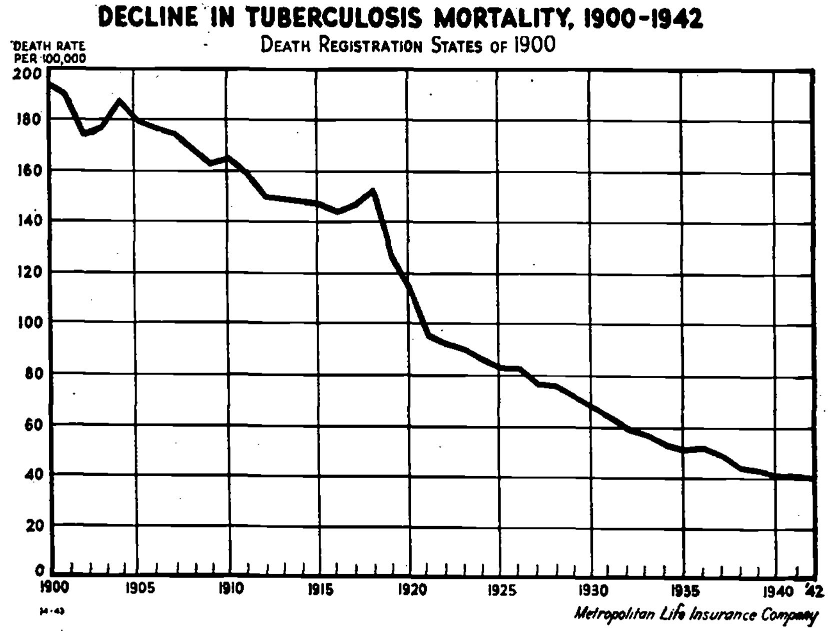
In recent days tuberculous mastitis is rarely mentioned because bovine tuberculosis is so largely eradicated from U. S. A. herds. It should not be forgotten, however, that the U. S. A. is the only country in which bovine tuberculosis has been so completely eliminated. Our soldier boys in foreign countries are sure to have unpasteurized milk offered to them from tuberculous herds.

I can never forget an experience that I had in the Po Valley in Northern Italy some twenty years ago. I went out to a farm where the milk was being manufactured into the hard, half-skim type of cheese so popular with Italians (and indeed with all who have had a good sample of it) for grating into soups and for use on macaroni and spaghetti. The man who took me to the farm happened to be a veterinarian and so I took the opportunity to ask him whether there was much bovine tuberculosis in the herds in the Po Valley. He replied, "Yes, the infection is really very bad" and added that he thought the percentage of infection was as high as 50 to 60 percent. I asked whether the infected animals were being eliminated from the herds, and he replied that the animals were milked as long as they could stand, and showed me some very emaciated animals, one of which had a swollen udder. I asked whether she was affected with mastitis, and he replied "Yes, tuberculous mastitis."

That evening I was entertained at the home of the Italian family that owned this herd, a family that had specialized in handling Parmesan cheese for centuries. At dinner, they offered me a special dish of the region. When the dish was served it proved to be a soup plate full of something that looked like light cream into which we broke some sweet cake. Later, I learned that it was cream, and that the cream had come from the farm where I had seen the cow with the inflamed tuberculous udder.

Those who have worked with microscopic examinations of milk and cream know that the bacteria in any given sample rise with the cream so that gravity cream always has a large concentration of bacteria in it. Knowing these things, I shall certainly refuse this special dish even at the risk of offending my hostess if I ever happen to be entertained under similar circumstances again. Do you wonder that public health men expect that more than 50 percent of the children of the European countries that have suffered most from this war will be found to be infected with tuberculosis when the war is over? We may also expect an increase in human tuberculosis in the U. S. A. such as took place after the last war (see chart) when our boys return. The interesting feature of this chart from the standpoint of this discussion today, however, is the continuous and more rapid decline in human deaths that has accompanied the increase in the amount of pasteurized milk used since 1918 and the eradication since that date of our tuberculous cattle including those with tuberculous mastitis. Although many things have played a part in producing this lessening of the death rate from tuberculosis, it is probable that reduction in the use of infected milk supplies has been a potent factor.

The majority of dairymen know something about lumpy jaw or actinomycosis. This is a disease caused by *Actinomyces bovis* Harz. This organism causes a distortion of the bone of the jaw and is something like the organism that causes bovine tuberculosis,



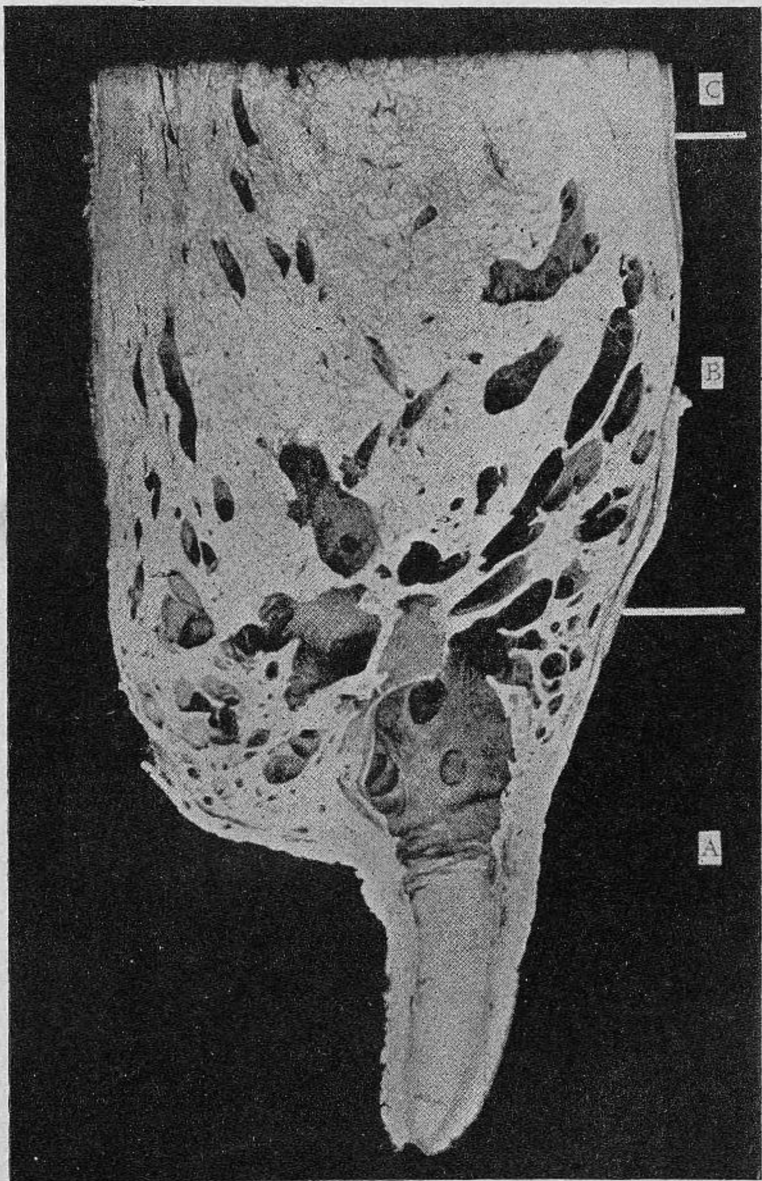


Figure 1

Section through the teat and one-quarter of the udder of a cow. (A) Region of teat and milk cistern. (B) Region of the larger collecting ducts. (C) Main secretory portion. (From museum specimen prepared by Dr. G. S. Hopkins, Cornell University Agr. Exp. Sta. Bul. No. 158.)

but is readily distinguishable from it. It is frequently associated with another bacterium, *Actinobacillus lignieresi* Brumpt. Both of these microorganisms have been reported to cause generalized infections of various organs of the cow's body including the udder. Recent studies indicate that the latter organism is the one found most commonly in the udder. So far as known, these infections are never or very rarely transmitted to man. Actinomycotic mastitis occurs but rarely in comparison to other types of mastitis.

Another pathogenic organism that may infect bovine udders is *Brucella abortus* Meyer and Shaw, the organism that causes Bang's disease. The milk usually does not become abnormal in appearance when the bacterium is present so perhaps some may feel that it ought not to be classed as a mastitis organism. The porcine variety of this species (*Brucella suis* Huddleson) and the caprine variety (*Brucella melitensis* Meyer and Shaw) also occur in cattle but less commonly than in pigs and goats, their more natural hosts. Likewise, both the pig and especially the goat strains are found in cattle but rarely if at all, in New England.

Another bacterium that does cause a mastitis, probably more frequently than most of us realize, is *Corynebacterium pyogenes* Brown and Orcutt. Because this organism is even more difficult to grow on first isolation from milk than the various species of *Brucella* and also because it is the common pus forming bacterium found in cattle, some students believe that this organism is second in importance only to *Streptococcus agalactiae* as a cause of bovine mastitis. Information regarding its distribution in our dairy herds is meager and found only in technical veterinary and bacteriological publications. One of our young men at Geneva, Dr. Brooks, has been making a study of bacteria of this type and will soon publish a report discussing their relationships to other closely related bacteria, one of which is the cause of diphtheria and is much better known.*

This makes a long list of bacteria responsible for inflammations of the bovine udder, and in a sense all cause mastitis. However, from the practical standpoint, there is reason in ignoring all but the commonest type of mastitis in any eradication program set up at the present time. The type of mastitis caused by *Streptococcus agalactiae* occurs so commonly and causes so much trouble that its eradication would be of enormous value to dairymen; but it should not be forgotten that there are other types of mastitis and that some of them, from the standpoint of human health, are much more dangerous than is the mastitis caused by the bovine streptococcus.

In order to explain the effect that these infections have on the normal milk secretion, it is necessary to recall the process of normal milk secretion. The cow's udder is really composed of four independent glands. The milk leaves the upper or secreting portion of the glands by ducts which join each other until they finally open directly into the milk cistern, the cavity found within the hollow teat. (See Figure 1).

If very thin slices of the secreting portion of the gland are stained so as to make structures show plainly, the appearance under high magnification is much as is seen in Figure 2.

The secreting sacs are called alveoli. Where they are cut as in this section, they show as rings in which the walls are composed of the secretory or gland cells. Alveoli that are distended with milk show with thinner walls than alveoli in the resting condition. The

* Since writing the above, my attention has been called to the fact that another pus-forming organism (*Pseudomonas aeruginosa* syn. *Pseudomonas pyocyaneus*) is occasionally found as a cause of udder infections. Cone reports [*Jour. Agr. Research 58*, 141 (1939)] an infection of this type in a Beltsville herd and mentions other cases reported in the literature. The blue pus organism was one of the first of the polar flagellate bacteria to be described and named. The name was given because it produces a bluish or bluish-green pus. It is found in various human infections as well as in the bovine udder and has been reported as the cause of a plant disease [Elrod and Braun, *Jour. Bact. 44*, 633 (1942)].

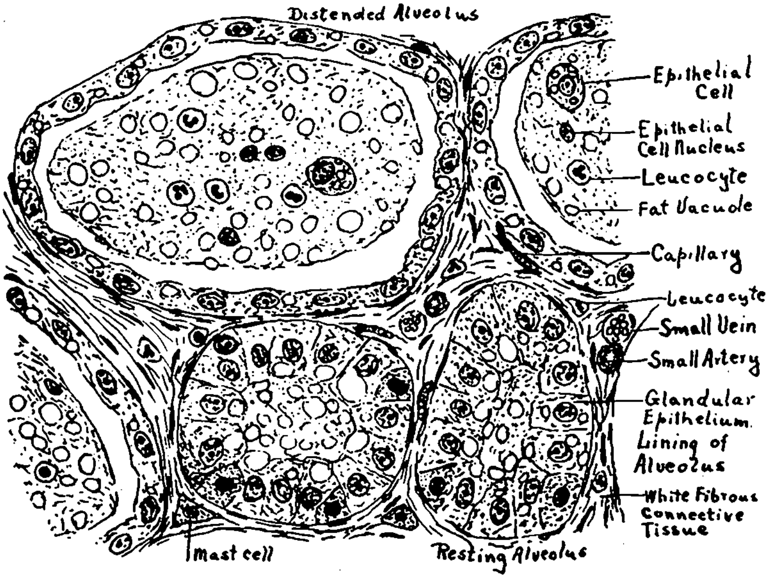


FIGURE 2

Cross section of the secretory portion of the udder, showing two resting alveoli, one distended alveolus, and portions of two others. White fibrous connective tissue with lymphatics and blood vessels shown in the spaces between the alveoli.

structure of the individual gland cell is much like that of gland cells in other similar secreting glands. These cells in the resting alveoli are polyhedral in shape with diameters nearly equal. The secreting cells in the distended alveoli are flat and more like pavement blocks.

Fixing fluids used in preparing the gland tissue for cutting thin sections for microscopic examination coagulate the milk in the distended alveoli. In the stained slides, this curdled milk shows as a more or less granular mass with circular spaces or vacuoles which indicate the original position of milk fat drops, the latter having been dissolved out of the curdled milk by the treatment used in preparing the slide. The remaining granular mass is composed of casein and albumens. The milk sugar (lactose) is soluble and does not appear in the microscopic section.

In a complete section of one quarter of the udder, there would be many thousands of these alveoli, each with its lining of gland cells. Between the oval to circular sections of the alveoli, the triangular spaces are filled with white fibrous connective tissue. This tissue not only serves as a connecting tissue, but also has other important functions. It carries the nerves and blood vessels and has an intimate relationship to the very important lymphatic system. Reserve food materials may be stored in this connective tissue as body fat. It is essentially fibrous in nature, the ordinary fibers being very tough and inelastic. The flattened nuclei of connective tissue cells may be seen among the bundles of fibers. Special cells in this tissue which contain granules that are readily stainable in certain aniline dyes, *e.g.*, orange G, are known as mast cells. Their function is not understood.

The open spaces between the bundles of fibers are filled with lymph, a liquid that is essentially blood without red blood corpuscles. Some leucocytes (white blood corpuscles) are present in the lymph and appear in this connective tissue. In some of the triangular spaces blood vessels may be seen. These are usually in pairs, one a small artery and the other a small vein. Where cut in cross section, the artery shows with the thicker wall and contains no blood. The vein shows with thinner walls and contains blood which shows primarily as red blood corpuscles with an occasional white blood corpuscle. Blood capillaries can also be demonstrated with proper stains. These are embedded in the connective tissue just back of the gland cells that line the alveoli.

In the process of milk secretion, blood serum oozes through the walls of the capillaries; and sometimes white blood corpuscles, which are amoeboid in nature, make their way through these same walls. The lymph so formed oozes into and through the gland cells, being transformed into milk during its passage through the gland cells. No microscopic evidence can be found of the chemical changes that go on in these cells, except that fat drops form in the protoplasm of the outer end of the gland cells. These dissolve as explained above in the process of making preparations ready for examination with a microscope. Thus their existence is shown by the holes or vacuoles which may be seen in the gland cells of the resting alveoli (See Figure 2), The generally accepted theory of the release of the fat drops into the milk in the cavity of the alveolus is that they move to the surface and break out of the cell.

It is quite well established that the milk sugar (lactose) is made in the gland cells from the glucose present in the blood and lymph. The casein, albumens, and other substances in the milk are made from constituent parts of the blood and lymph in a way that is not entirely worked out as yet.

The formation of the nitrogenous constituents of the milk may be passed over as they do not concern us at this time. The history of the gland cells and the leucocytes is to be followed more closely. During the transformation of the lymph into milk, amoeboid leucocytes migrate through the tissues and may pass between the gland cells into the milk in the open spaces within the alveoli. As shown, these characteristic cells are found even in normal udders, both in the fibrous connective tissue and in the milk in the cavity within the alveolus. It is more difficult to find a leucocyte in the act of passing between the gland cells, a fact that suggests that the act of migration from one place to the other is carried out rather promptly.

Leucocytes as found in the blood are cells of a very characteristic type unlike any other cells in the body. They show as lymphocytes and as transitional, polymorphonuclear, and polynuclear leucocytes all of which types may be found in milk. Moreover, they enclose certain characteristic granules, some leucocytes being so-called eosinophiles, others neutrophiles, etc. These names are used because of the reactions that the granules in the cytoplasm show to certain aniline dyes. When appropriate blood stains are used on freshly drawn milk, all of these special types of cells may be found in the milk.

In addition to the nucleated leucocytes some of which are normally found in milk, it is usually possible to find, in well prepared sections of udder tissues, bare nuclei of cells in the coagulated milk within the alveoli. There is not much question but that these should be regarded as the nuclei of gland cells that have been torn out of the gland cells with the discharge of the fat drops. The process of milk secretion is a very active process, and it is easy to see how such conditions might arise. The number of these epithelial cell nuclei in the milk is usually very much less than the number of leucocytes.

At other times, particularly during the colostral period, entire gland cells or even groups of gland cells may become loosened from the wall of the alveolus and be discharged with the milk. These fat-laden gland cells are so-called colostral corpuscles.

In other words, during active secretion, gland cells and nuclei of gland cells are used up and are discharged with the milk. These epithelial cells and nuclei are worn out tissue and apparently have no other significance. Similar waste epithelial cells are found in other body secretions, as for example, the saliva. New gland cells are produced from regenerative epithelial cells wedged in between the more active cells (See lining cells of the resting alveoli in Figure 2).

In microscopic preparations of milk as drawn from the udder, these epithelial cells and nuclei can still be recognized by the characteristics mentioned. Likewise, the leucocytes can be recognized in all of their varied forms—lymphocytes, transitional, polymorphonuclears, polynuclears, neutrophiles, eosinophiles—if fresh milk is stained with proper blood stains.

Infections which cause truly pathological conditions bring excessive numbers of leucocytes and other cellular debris into the milk. It is the presence of large numbers of leucocytes under these abnormal conditions that give these cells a sanitary significance. The most common type of pathological condition is the streptococcus infection of mastitis. Where the udder becomes infected with streptococci, they occur in the milk within the alveoli (See Figure 3). The streptococci grow in the milk within the alveoli, and in their growth undoubtedly ferment the lactose as they do in milk cultures in the laboratory. This fermentation produces acid. It is therefore surprising to find that the milk as drawn from the infected quarter has a more alkaline reaction than normal milk. The bacteria certainly produce acid, and yet the milk from streptococus-infected quarters as drawn has a pH of 7.0 to 7.2 while normal milk has a pH of 6.5 to 6.7.

The explanation of this condition seems to be (Technical Bulletin No. 80 of the Geneva Station) that the infection causes the gland cells to lose their vitality so that they no longer transform the blood serum into milk. The blood serum then enters the interior of the alveolus without being changed into milk. This serous ex-

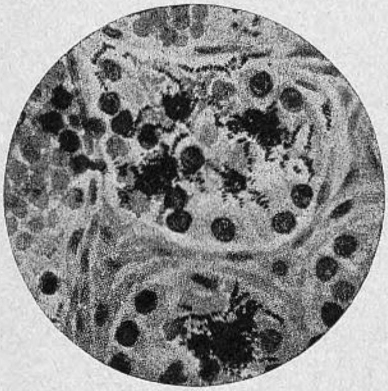


FIGURE 3

Drawing of a microscopic section of the udder of a sheep with acute streptococcic mastitis. Alveoli containing streptococci. Glandular epithelium disorganized. (From Ernst, Milchhygiene für Tierartze.) 1000×.

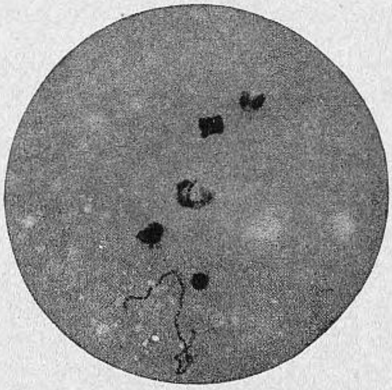


FIGURE 4

Microscopic appearance of milk from a cow suffering with streptococcic mastitis. Phagocyte with engulfed streptococcus in center of picture. 600×.

udate, as it would be called by pathologists has the pH of blood serum and is more akaline than normal milk. If it enters the milk ducts in sufficient quantity it over-neutralizes the acid formed by the bacteria and gives the milk as drawn the alkaline reaction of mastitis milk (pH 7.0 to 7.2). Possibly this is one way in which the healing processes of the body tissues combat this bacterial infection. Certainly the growth of the streptococci is not favored by the increased alkalinity.

Excessive numbers of leucocytes also enter directly into the milk with this serous exudate causing an increase in the leucocyte count. Some of the leucocytes act as phagocytes, that is they engulf and digest the bacteria (streptococci). When such phagocytes are found by microscopic examination of the milk (See Figure 4), it is practical proof that the milk contains at least some milk from an infected udder. If this cellular material and the serous exudate become predominate, then the milk secretion becomes clotted and later clear and serous. At this stage the secretion is usually free from bacteria.

Under certain special conditions, as first pointed out, I believe, by Dr. Little, the bacteria may be present in such great numbers that they produce enough acid from the milk sugar present to give the milk an acid reaction. When this happens, brom thymol blue in milk turns yellow, not the more frequently bluish green of mastitis milk. This situation appears to arise when milk containing numerous streptococci remains for some time in the milk cistern.

The conditions described above are those found when the infection is produced by *Streptococcus agalactiae*. It is known that similar changes take place in the udder tissues and in the milk when the infection is caused by the human type of streptococcus (*Streptococcus pyogenes*). This is indicated by some figures published by Mr. Tiedeman (*Health News,* 14, 1937, 46 and 79) of the New York State Department of Health and reproduced here by permission (Figures 5 and 6).

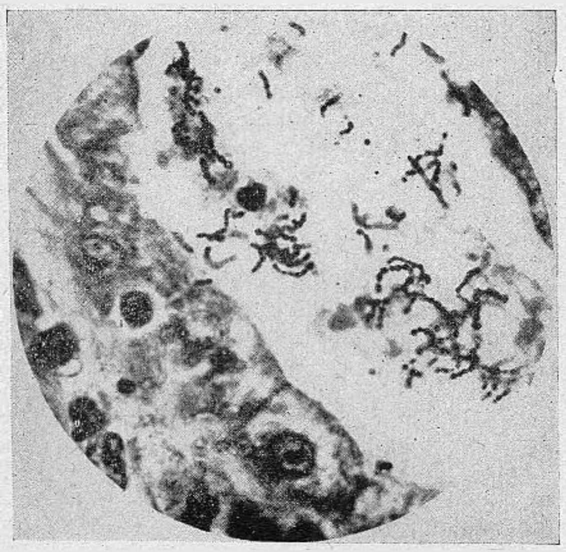


FIGURE 5

Microphotograph of a section of the udder of a cow responsible for 2 milk-borne outbreaks of scarlet fever, 6 months apart. 1000×. Taken by Dr. Schleifstein, New York State Department of Health Laboratory.

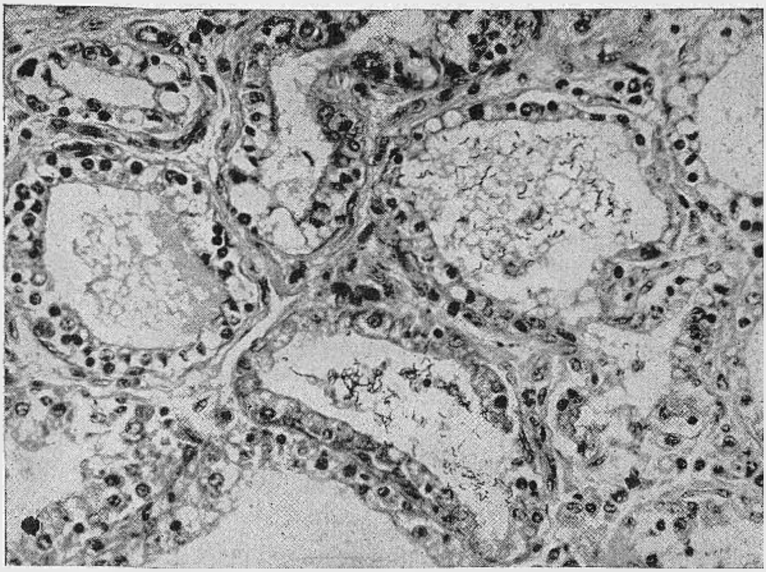


Figure 6

Microphotograph of a section of the udder of a cow responsible for 2 milk-borne outbreaks of scarlet fever, 6 months apart. 400×. Taken by Dr. Schleifstein, New York State Department of Health Laboratory.

Figures 5 and 6, courtesy of New York State Department of Health.

The story of this cow as published by Mr. Tiedemann is unique and interesting and proves that an infection with the human type of streptococcus may persist from one lactation period over into a second lactation period.

According to the revised circular (Circ. 672, June, 1943) put out recently by W. T. Miller of the U. S. Dept. of Agriculture, it is usually possible to distinguish between abnormal milk from streptococcus-infected udders and that from staphylococcus-infected udders by means of the Hotis test. However, little is known in regard to the changes that take place in the udder tissues, as a result of infections with mastitis bacteria other than mastitis streptococci.

Studies are needed in this field as a better knowledge of these infections might enable Dr. Little or other workers in this field to develop the practical methods of control that are so badly needed.

This survey has been so hurried that it has not been possible to discuss the clinical picture presented by each of the different types of mastitis; but perhaps you will keep in mind the fact that the situation is complicated and will not expect the Vermont State authorities to clear it up quickly.

Conservation of Milk Plant Equipment*

C. W. Weber

State Department of Health, Albany, N. Y.

Every plant operator would like to see his equipment stay in good condition indefinitely. Every one of us would like to stay young indefinitely. Wishful thinking won't help but the application of our present knowledge will help to get our wish. Our goal in public health work is first to prevent illness and second to cure as quickly as possible. Application of known facts and hard work has almost doubled the life span of man during the past century. Careful handling and early repair can double the life of dairy equipment.

In normal times the average life of most milk plant equipment is from 10 to 15 years. Under present conditions with limited repair parts available, and with reduced plant personnel, many inexperienced, the average life of much equipment may be expected to be considerably less than average. Based on these facts it is estimated that ten percent of the present equipment will become useless each year and will be located in more than ten percent of the plants. Without replacements, the amount of repair parts and service will rise proportionately and progressively.

If we are to continue to have an adequate supply of safe milk it is obvious that the life of the present milk handling equipment must be prolonged. In so doing the war effort will be helped in three ways. Critical materials will be saved for war munitions. The manpower needed to produce, fabricate, transport and install new equipment will be saved for use in direct war effort. Equipment kept in good operating condition will yield safe products which are needed by both the men manning the guns and the men producing the guns.

Before we can take intelligent action to prolong the life of milk handling equipment, we must know the basic factors which are instrumental in shortening the life of this equipment. The life of equipment is destroyed either by physical force or chemical action. The two physical diseases of equipment are friction and shock. The chemical disease of equipment is corrosion or disintegration.

Friction

The physical disease, friction, like most diseases may, in some cases, be prevented and in others controlled. In our small plants, it is not an uncommon practice to wash sanitary milk piping on the floor. The ends of the pipe or fitting, rubbing on this concrete grind stone, is soon worn away so that tight joints cannot be made. Either the pipe has to be replaced or the farmers' war effort in producing more milk, goes to waste down the sewer. Sanitary pipe brushes with metal bristle or an uncovered wire handle, soon wear the tinning from any copper piping or scratch the surface of steel. I have seen new tinned surface coolers almost ruined in several days by being scrubbed with brushes the bristles of which were so stiff that they actually scarified the surface. These open wounds are the foci of infection for the chemical disease, corrosion, to start oxidation of the copper.

Friction wear of bearing surfaces cannot be entirely prevented, but the degree of wear can be reduced to a minimum by proper lubrication. Lubrication probably exerts a greater in-

* Presented at Twenty-Second Annual Meeting of the Vermont Dairy Plant Operators and Managers' Association, Burlington, November 3–4, 1943.

fluence than any other maintenance operation, on the life of machinery but is the one most commonly neglected in small plants. First, no individual is assigned this responsibility. Second, there is a wide variety of equipment in a milk plant, ranging from electric motors, gear heads, compressors, separators, to conveyors. Many bearing surfaces are required to be lubricated daily, while others need servicing only semi-annually. Each requires a specific lubricant.

One thing hard to understand is how a bright progressive plant operator will spend $1,000 or more for a new piece of dairy equipment, then never grease it until some part "squeals" or "freezes up" entirely. Yet he spends about the same amount for an automobile which he has greased every 1,000 miles and the oil changed every 2,000 miles. I believe we should apply this lesson learned from the automobile service to our dairy equipment. Each plant should have a lubrication chart showing where and when to grease, the kind and amount of grease to use, and last but not least, whether or not service was actually performed as specified.

SHOCK

Most dairy equipment is built sturdily but it will not withstand the mechanical shocks of shelling or bombing. Every time a plant employee throws a sanitary valve or pump impellor into a wash tank of fittings he is in reality bombing for the enemy by destroying our vital materials. There is an item on our pasteurizing plant inspection reports which asks, "Are the containers and equipment in good condition?" This item is checked "no" as often if not more often than any other. Let us look at some of the notations following this violation:

Milk cans dented, joints cracked.
Dump tank, upper edge bent, guard rail missing.
Can washer support arms broken.
Pasteurizer covers cracked.
Thermometer bulb broken—used for step.
Bottle cover, bent downward.
Bottler air tubes bent.
Surface cooler cover bent and cracked at lower corners.
Surface cooler jabbed with ice pick.
Sanitary valves marred.

Many more can be added to the list.

In each instance, the damage was due to neglect or carelessness. The prevention of the damage to this equipment should be obvious. Apply the old adage slightly modified, "be kind to equipment." Try to diagnose the cause of the damage. Use a rubber mallet to loosen can covers. Use a rubber covered guard rail when dumping cans of milk into a tank or pasteurizer, provide a table or platform with a mat top for disassembling, washing and storing small pipe fittings. Wash the valves separately from other parts. Use a wrench and not a metal hammer on sanitary pipe nuts. Wash thermometers and other gauges separately and store in a protected place. Don't run motors when washing up. Keep the nuts tight on the hangers supporting the cooler covers. Handle glass bottles carefully to reduce breakage loss. Glass may not be on the priority list, but it takes man power and metals to make the machines to make the bottles, and it takes more man power, fuel, transportation facilities, wood and tires to get new bottles to the milk plant.

This disease, shock, may manifest itself in more insidious ways than those I have just mentioned. Sudden temperature changes shorten or destroy the life of most equipment and containers. Steam applied directly to a cold, tinned copper cooler often breaks the soldered joints due to the difference in expansion between the upper and lower tubes. Many glass bottles are broken, especially in small washers, due to heat shock. Rubber gaskets on plate regenerators, pumps, gaskets, and rubber bottle filler valves are often damaged when over-heated while in contact with metal, or when disassembled while hot.

CORROSION

The Webster definition of corrosion is "the gradual wearing away by disintegration." All equipment in a milk plant, whether it be the metal in a stainless steel pasteurizer, the rubber steam hose, the brine tank, the fabric-belt drive, or the neoprene gasket in a milk pump, undergo some corrosion, some to a greater degree than others. Milk cans are practically vulnerable. Prolonging the life of milk cans will increase the supply of critical metals needed for war purposes. Cans after being thoroughly washed should be thoroughly dried. Rust undoubtedly leads the mortality rate list of milk cans.

Corrosion of stainless steel or tin may not be visible and therefore not as evident as the corrosion of tinned steel in cans, but it is taking place almost continually. Thoroughly drying all milk handling equipment after washing greatly reduces the rate of corrosion. The separator bowl and small parts should be dried in a steam chest. Store pipes so that they drain completely. Either heat or wipe dry the surfaces of the pasteurizer, cooler and bottler. If chlorine is used as a sterilizing agent, don't permit it to remain in contact with metal equipment for long periods of time. Sterilize with chlorine just before use rather than after washing.

The outer surfaces of most milk handling equipment are painted to prevent corrosion. Friction and moisture soon destroys the paint and the moisture then accelerates the oxidation of the metal. In order to prevent rusting, the equipment should be kept well painted. Painting a rusted surface is like locking the garage door after the tires are stolen.

Water has an important place in a milk plant but when it gets out of its proper place, it becomes a saboteur. The life span of much of our equipment is shortened because of the high humidity and condensation caused by the extreme changes in temperature within our plants. Proper ventilation and heating of these plants would go a long way to extend the life of both equipment and plant interiors.

Corrosion is not always manifest in the form of rusting. The material in a steam hose is needed for war purposes. A leaky valve which permits steam to escape through the hose continually will shorten its life faster than all the normal use. Keep the valve in good repair and tightly closed when not in use and keep the hose on a good curved support, not on the floor where it comes in contact with milk wastes, the fat or acid of which deteriorates the rubber.

Water in electric motors may short the electric currents, and may get into the bearings and reduce the effectiveness of the lubricant. Moisture will condense in the oil chambers of compressors resulting in ineffectual lubrication and rusting of the metal parts especially when idle. Oils and greases prevent corrosion of metal parts but cause rapid deterioration of rubber and insulation parts. Excessive greasing of machines may cause the lubricant to run out or be thrown out onto belts and thereby shorten their usefulness.

Washing compounds when used to excess are often deleterious. Excessive alkalinity in the wash water of a can washer will cause spangling of the tin followed by rusting of the iron. When washing equipment by hand, prepare the wash solution in a pail before placing in the equipment. When the powder is added to water in the equipment, some will probably settle out causing a high concentration at the bottom which is destructive to the surface. Always measure or weigh the wash powders so that the proper concentration of solution is obtained for best results.

Milk sanitarians have always insisted that all milk handling equipment be thoroughly cleaned after each use primarily to prevent contamination of any product subsequently handled in this equipment. Now they have another reason for insisting on keeping all equipment clean. Dirt is misplaced matter. Milk in a bottler is considered clean as the last bottle is being filled, but the milk remaining after filling the last bottle is dirt. Similarly wash powders or water may be considered dirt when left on equipment after cleaning. Grease on a bearing is clean but the same grease on a rubber hose or belt is dirt. Milk substances, wash solution grease or water when left on equipment cause corrosion. Thorough cleaning of all surfaces of equipment will add years to its life. Keep the outer surface as well as the milk contact surfaces in a clean condition.

General

All milk codes specify that buildings shall be well constructed, well lighted and ventilated, and kept clean. One of the main reasons for having a building or roof over the equipment is to prevent it from the natural but destructive elements of the weather. Plants cannot be rebuilt at this time but it pays to keep them in good repair. A leaky roof may damage much equipment. A broken window, if not replaced, may permit rain or snow to fall on equipment or cold air may freeze and burst water lines. Keep windows clean and replace broken light bulbs so you can see to operate and clean equipment.

As you know, large numbers of dairy industry employees have entered the military services, or munition production plants thereby leaving the dairy industry very short handed. The men remaining in the milk industry have a big and important job to perform and I am sure that they will do it to the best of their ability. When available new but untrained help is being drafted into our milk plants. Unless they are rapidly and well trained, they can do much damage to our dairy equipment and lower the quality of the finished products.

If there ever was a time when our milk plants should be well operated it is right now. Milk sanitarians have the opportunity to assist and advise the plant employees in proper methods of operation; and it is their patriotic duty to insist that they do so.

The manufacturers of dairy equipment are certainly doing their part by furnishing free written instructions in simple language on how best to operate their equipment to obtain the most service and life out of it. They have offered their assistance to the equipment owners to examine and service all equipment. The plant owners would be helping themselves and the war effort by taking advantage of the manufacturer's offer by having all equipment examined and serviced periodically.

Summary

The life of milk handling equipment is shortened by friction, mechanical shock and corrosion. Each of the causes of the aging of equipment can be prevented or controlled. Application of present knowledge and common sense in using and servicing milk handling equipment will prolong its usefulness, thereby:

Save the plant owner replacement costs
Save critical materials for the war effort
Save manpower in constructing new equipment
And result in better quality finished products.

ANNUAL MEETING, NOVEMBER 2 and 4, 1944

LaSalle Hotel Chicago, Ill.

The Small Town Milk Control Unit*

C. A. Hooven

Marshalltown, Iowa

The control of milk sanitation in our smaller communities has always been a problem. Unlike our larger municipalities, the small town does not have the need for full time milk control. Neither does it have the financial resources to maintain it. Yet, a safe, wholesome milk supply is just as urgent for the small town as for its larger neighbor.

Because the solution to this problem has been difficult, the population in many of our smaller towns has suffered. A few years ago, the United States Public Health Service, in tabulating the reports of milk-borne outbreaks of disease in the United States, observed that most of these outbreaks occurred in our smaller communities. According to the 1942 reports, from all the state and city health departments, 83 percent of such outbreaks were in towns with a population under 10,000, and 95 percent were in towns under 25,000.

Many arrangements of one kind or another have been tried in an attempt to control the situation. In some instances, the local health officer, a practicing physician, has been assigned the task of enforcing the milk ordinance. He is usually paid the sum of $15 per month or $200 per year to perform all duties of health officer, including that of milk inspector. His practice is his primary interest and, likewise, his bread and butter. Naturally, he cannot sacrifice his practice by making enemies of the dairymen and their friends.

To a large extent, the same thing is true of the local veterinarian. Other arrangements have included the part-time employment of the city clerk, city marshall, school nurse, or some commercial employee, such as a grocery clerk, service station attendant, or a salesman, on the theory that anybody can tell if things are clean. With but rare exception, all such arrangements have failed.

The reasons for this are obvious. His first interest lies with his principal income and chosen profession. He doesn't know much about the intricate problems involved. Since the pay received is small, he neither likes it nor learns about it.

A more workable plan seems to be that of the small town unit. Several small towns, situated geographically convenient, associate themselves together, employing a full-time milk sanitarian. Each contributes financial support to the unit according to its population. This amount approximates the cost of one quart of milk per person per year. By this association, each community is able to have one inspection of all producers and distributors and one laboratory examination of milk from all producers and distributors once each month or six weeks as routine, with additional calls and samples where needed. The records and files are kept for each community and occasional reports made at meetings of the town council and board of health.

By pooling the resources of the various communities, the unit is enabled to employ someone experienced in milk, milk sanitation, and laboratory control.

The headquarters and laboratory should be centrally located. For economy in travel and time, the associated communities should preferably be

* Presented at the annual conference, Iowa Association of Milk Sanitarians, February, 1944.

within a fifty mile radius of the laboratory. The unit with which I am associated has no locality more than thirty-five miles from the laboratory.

Under this plan, one person can, I believe, give this service to a combined population of from 25,000 to 30,000 people depending on his agility. By employing a technician under the supervision of the milk sanitarian, it would be possible to enlarge this to 40,000 to 50,000 people or beyond.

The unit with which I am associated is composed of six communities including Marshalltown, population, 19,500; Grinnell, population, 5,500; Newton, population, 10,000; Tama, Toledo, population, 5,000, and Traer, population, 1,500, or a total population of slightly over 41,000.

There are in Marshalltown a total of eight pasteurizing plants with thirty-seven producing farms, and five raw milk distributors bottling and distributing their own products, or a total of thirteen plants.

In Grinnell there are two pasteurizing plants, and one plant which distributes both raw and pasteurized milk which is produced from their own herd, two raw milk distributors, and thirteen producing farms.

Newton has three pasteurizing plants, with thirty-three producing farms, one raw milk distributor that buys the products from two other farms, and one raw distributor who produces none of his own milk, but depends entirely on buying his whole output.

Tama and Toledo have one pasteurizing plant with thirteen producers, and four raw distributors bottling and distributing their own supply.

And finally, there is the little city of Traer with a population of just under 1,500 people with one pasteurizing plant and five producers. The U. S. Public Health Service Ordinance is in effect and provides that only Grade A pasteurized milk may be sold.

In these six communities there are a total of sixteen pasteurizing plants involving the products from one hundred farms and fourteen raw milk plants distributing the products from sixteen producing farms.

At the present time I have a "C" gasoline ration book that permits me to travel about 900 miles per month. When the time comes that gasoline and rubber are no longer so vital and important to our national welfare, return calls that should be made will not be postponed until the next scheduled trip as is necessary at present.

In the past year, we have made about 1,500 agar plates and approximately the same number of miscroscopic examinations. We have been using the plate counts as a guide to the quality of the milk, and the microscopic examination more as an aid in determining the types present in the samples plated.

We make it a routine practice to "phosphatase" all samples of pasteurized milk and "butterfat" all bottled milk each time we make tests.

The State Department of Health has rendered us invaluable help in getting the unit organized and functioning. Several such units are operating in the State of Iowa, and it seems to be the solution to the small town milk control problem. It can be and should be made an asset to the industry and consumers alike, and it is the concensus of opinion among health officials as well as men in the dairy industry that any forward looking community would do well, whenever it becomes possible, to associate itself with a unit of this kind if it cannot carry on its own program.

Selling the Milk Sanitation Program to the Public*

Lewis Blevins

Department of Public Health, Pratt, Kansas

Someone has said that there never has been a progressive step taken but what some individual or group of individuals has had to fight every step of the way. It is unfortunate that it should be necessary to fight all the way to *sell* a milk program but all of us interested in milk sanitation realize that it is true, and we realize, furthermore, that it is one of the most difficult phases of a sanitarian's work. I want to pass on to you the experience I had in selling the milk sanitation program in my own community. Few, if any, of the methods which were used were original with me.

No one can lay down a detailed plan which would be applicable in every community. A plan that would work—a plan that has worked—in my community might not work in yours. However, there are a number of salient points which I believe are necessary to any successful program.

Let me begin by giving the order in which those concerned with a sanitation program should be sold.

First: sell yourself as a sanitarian.
Second: sell the governing body of your community.
Third: sell the newspapers.
Fourth: sell the public.

Sanitarian

The sanitarian is placed first because he is the most important cog in the machine. It may seem strange to even so much as suggest that the sanitarian needs to be sold. He would not need to be sold were it not that a large percentage of persons work for pay checks alone. And this includes an occasional sanitarian, even in Kansas. For instance, there is on record the story of one milk sanitarian in a town which had adopted the standard milk ordinance. After the producers had gone on grade and the program seemed off to a good start, the sanitarian began accepting Grade D milk for personal use in payment of a bill which the dairyman owed him. Because of the conduct of the sanitarian, the dairymen and the public lost confidence in the program and in a very short time most of the producers were selling Grade D. Not one sold Grade A.

Perhaps the first indication that a sanitarian has sold himself is his familiarizing himself with the ordinance. And by "familiarize" I mean practically memorize. He will be asked many questions as to the meaning of, or the necessity for this or that clause. He must know and understand the ordinance himself and be able to answer the questions with the authority which comes from knowledge. Through this alone he will earn a great deal of respect both for the program and for his office. The sanitarian must sell himself to the point where he does not think of a day's work being accomplished by merely following a routine from eight in the morning until five at night. If he cannot do this, he had better forget being a sanitarian and take up the study of medicine, law, engineering, or some other easy and comfortable work.

Governing Body

Step number two: selling the governing body. Of course we will have to assume that a milk ordinance has been passed and that a sanitarian has been secured and placed in charge. Perhaps it seems logical to assume

* Read at meeting of Kansas Milk Sanitarians

that the governing body is already sold; otherwise, it would not have passed the ordinance. But such reasoning is fallacious. One reason why we have so many ineffective laws on our statute books is because they were passed by officials who did not believe in them; officials who passed them because pressure in some manner had been applied, and who consider the laws so lightly that no effort is made to make proper provision for enforcement.

To be a little more specific, I will give you the general pattern of what happens when a milk ordinance is passed. Generally, the city fathers pass the ordinance at the instigation of some small group of citizens backed by the State Board of Health. Having passed the ordinance, they go their way happy and contented, feeling that they performed a deed which will benefit the entire community and which the community will appreciate. In a day or two they are jarred out of their complacency; they are bombarded with criticism. The dairymen of course are the most vocal of the critics. They think they are being persecuted; they believe the program was instigated by the large companies in order to force them out of business. And to the discontent of the dairymen must be added the complaints from the usual group of taxpayers found in every community who are "agin" every progressive move that is made.

And so the lawmakers begin to unsell themselves, doubt creeps into their minds. Perhaps they did not do the right thing after all. Perhaps the law does work a hardship on this or that dairyman who has always been a good citizen and who is always at the polls "Johnny-on-the-spot" on election day. They begin to consider modification of the rules. And here is the point where the sanitarian must do some mighty effective selling if he is to save the program. He must induce his officials on dairy inspections to visit dairies where the officials can see for themselves the dirty, unsanitary conditions of some of the places from which milk is sold.

For the purpose of comparison, they should be shown also the ones which show better care. The sanitarian must show the officials the results of his tests of unclean milk and of diseased cows. If he can show them milk samples containing blood he has practically assured his sale. And if he is prepared to show them that unclean milk has been responsible for sickness or death in the community, he has consummated his sale.

NEWSPAPERS

Step number three is selling the newspapers. It is necessary that the program have a mouthpiece. If you are dealing with good newspapermen, you are lucky. A good newspaperman feels that it is his responsibility to give his newspaper's support to any worth while project, and so the sanitarian will likely find him very receptive and open to conviction. The sanitarian's job is to convince him. The method should be much the same as that used with the governing body. In addition, the sanitarian should make available to the editor statistics pertaining to milk sanitation and also the bulletins which are issued by the State Board of Health. The printed word is the editor's own medium of expression to such an extent that pamphlets and other printed data are much more effective with him than with the average person.

When you ask the editor for publicity on some phase of the program and he asks for data on which to base his stories, be sure to give him truths. Do not try to hoodwink him into printing something which, although it might do the program a lot of good, is not based on fact. It might work a time or two but once the editor catches on, your program may be sunk temporarily as far as he is concerned. Another small matter but very important, is this: spend a few dollars of the department's budget for advertising. The editor cannot live on manna from heaven, and the few dollars he will receive will be small pay for the services he can render.

Incidentally, there is one matter I want to emphasize. In conducting a campaign for the adoption of a milk program, there is sometimes a tendency to dwell too much on the point that the milk supply is unsafe and that consumers may be stricken with some dreadful disease at any moment. Quite likely this is the truth. But the effect of this line of attack is to discourage milk consumption. When this is done, the dairyman is antagonized and, in truth, has cause to feel resentful. The degree to which he will lend voluntary cooperation is greatly lessened. It is true that after the ordinance has been passed and the green light has been given to the sanitarian, the producer will be forced to comply regardless of his opinion. Nevertheless, the sanitarian will find that a measure of cheerful assent to the program on the part of the dairyman will prove beneficial in his campaign.

PUBLIC

The stage now is set for the big job of winning the approval and support of the public. I doubt if any milk program in its embryonic stage has ever produced any great show of enthusiasm from the public. I base this opinion on vote tabulations in those communities in which the adoption of the program was left to the will of the voters. Such figures as have been accessible to me show that in no instance has the issue been responsible for the turning out of an overwhelming vote. And in those instances where the vote was favorable, it was so only by a small majority.

The public at large should first be approached through various organizations. After the seed of the program is planted in the organizations and has taken root, let it be cultivated by stories in the newspapers. The organizations through which the sanitarian should seek to work are the home-nursing classes, the parent-teachers associations, the women's clubs, the service clubs such as Rotary, Lions, Kiwanis, and the schools. And perhaps there are others that I have overlooked. The sanitarian should be prepared to give talks to such groups. He should make arrangements for representatives from the State Board of Health to appear on their programs. He can obtain film strips on the subject and he should arrange to have these shown.

Of the groups I have named I found the best results were obtained through the home-nursing classes. The reason, of course, is evident. The classes are composed of wives and mothers, and they are very receptive to anything that will help safeguard the lives of their families. The classes are ordinarily taught by nurses, and the nurse is well aware of the importance of clean milk. So the set-up is ideal. Particularly today are the home-nursing classes of great importance. This is because so many doctors and nurses have been called away from their home communities to assist in the war effort. The mothers realize that it is up to themselves to assume a great share of the responsibility for the health of their families and so there is likely much more interest in the classes now than there would be in normal times.

An insight to the attitude of the public as a whole toward the matter of milk can be given through an experience I had working with the schools. One of the first groups of students I dealt with was a class from a Junior College. I took them on a field trip. First, we visited a milk producer who had not as yet met the demands of the ordinance. His barn and the surroundings were as dirty as they had always been. Next we visited a dairy which had met the requirements. The students were amazed. Most of them had never seen a cow-barn with a concrete floor. There were a great many comments on the thoroughness of measures which were used to insure cleanliness. To them, as to a high percentage of the public, a dairy was a place where a milker waded through six inches of cow manure to get to the cows. Those students were surprised at the clean cow-lot they saw. They were astounded at the dirty one!

The sanitarian should cooperate fully with the State Board of Health, the Board of Agriculture, and other governmental agencies, in their battle to improve the quality of milk. I do not mean merely in the sanitarian's own district. If the sanitarian knows that such agencies are attempting to put over the program in some nearby community. He should take advantage of any contacts he may have in that community to help create interest. He will not be paid very many fifty-dollar bonuses for this extra effort but he will get a lot of satisfaction when the campaign bears fruit.

When you sell someone the sanitation program, you don't wrap it up in a piece of pretty paper, let him take it home for keeps, and then proceed to forget all about the matter yourself. It is not that easy. Selling him in the first place is just a small part of the job—you must *keep* him sold.

Extracts From the Report of the Chief of the Bureau of Dairy Industry, U. S. Agricultural Research Administration, 1943

Faster Curing Cheese

Manufacturers of Cheddar cheese may soon be able to make cheese that will ripen in about half the time now required. Speeding up the rate of ripening would give the young cheese used for lend-lease shipment much more flavor by the time it arrives overseas, and it would also save time and labor in curing aged cheese for domestic consumers. Ordinarily, Cheddar cheese requires at least 6 months to develop a pronounced or characteristic flavor.

Although the investigation is not yet completed, the results to date show that the rate and extent of ripening are affected greatly by the curing temperature. Apparently the ripening process can be carried out successfuly and more quickly at 60° F., or slightly less, than at 50° or lower, provided the milk is of good quality and is pasteurized. Also, certain species of lactobacilli, when used as auxiliary starters, were found to be more effective than others in producing a desirable flavor, body, and texture, and some strains accomplished these results in much less time than others. The combination of special starters and a curing temperature of 60° promises to be a practical way of reducing the ripening period from about 6 months to 3 months.

Dehydrated Cheese

The urgent need to conserve shipping space and tonnage in transporting vital wartime foods stimulated interest in the dehydration of cheese, with the result that a method was devised in the Bureau's laboratories which permits the dehydration of natural, full-fat cheese without preliminary processing. The laboratory work has been completed on a test scale, and plans are now being made to test the method on a semicommercial basis.

The dehydrated product contains about 2.5 percent moisture, 50 percent fat, and 37 percent protein. Compared with the original cheese, the saving in weight is about 35 percent and the saving in shipping space, when the dehydrated flakes are compressed into rectangular blocks, is from 40 to 46 percent. It can be handled and used without waste, and it can be transported or stored without refrigeration if some ventilation is provided. Judged on the basis of a combination of all essential factors studied to date, including dryness, physical properties, flavor, and keeping qualities, the product is considered satisfactory and apparently meets lend-lease requirements.

Dried Milk

Studies during the year showed that packaging dried whole milk in nitrogen, with the final oxygen content of the container reduced to 2 or 3 percent, greatly prolongs its keeping quality. Reducing the oxygen content sufficiently to improve the keeping quality still further is difficult. The degree of removal is dependent principally on the amount of vacuum used and the length of time it is applied. The conditions of evacuation necessary for efficient removal of the oxygen-containing gases were studied and established, and the exact relationship between oxygen concentration and keeping quality is being determined.

From 30 to 40 percent reduction in space is obtained by compression, and 20 percent by jolting the container during filling.

Evaporated Milk

Studies during the year showed that the stability of concentrated milk to heat during sterilization can be greatly increased if the milk is forewarmed at a relatively high temperature for a short period of time before it is concentrated. It is possible with this type of forewarming treatment to manufacture evaporated milks with 31 to 32 percent solids content, or even greater concentrations, without the danger of coagulation.

Other difficulties, however, such as changes in color and body, and the separation of fat during unfavorable storage conditions, which are typical of the standard evaporated product, are intensified in evaporated milks of higher solids content. When evaporated milk of 31 percent solids content can be made commercially practical in these respects, its use will result in a saving of nearly 20 percent in container materials and shipping space.

Ice-cream Studies

Tests in the Bureau had shown that the sweetness of ice cream is dependent upon the concentration of the sugar in the water of the ice cream and that at least 1 part sugar to 5 parts water is necessary for satisfactory sweetness. With these facts as a basis for further studies this year, it was found that ice cream with from 20 to 30 percent less sugar than is normally used can be made sufficiently sweet, if less water is used in the mix and more air is whipped into the product. The food value per unit volume is not affected.

The so-called "corn-sweeteners" have been available to the ice cream maker to augment the reduced cane sugar supply. A study of these sweeteners showed that they are more effectively sweet in ice cream than had been realized. In fact dextrose, when used in conjunction with cane sugar, is more effectively sweet than the cane sugar it replaces.

Butter Oil

Butter oil, which is pure milk fat obtained by melting freshly churned butter and centrifuging to remove water and curd, will remain in good condition under the most adverse conditions of handling and storage, if it is prepared from cream of excellent quality and packaged under conditions that eliminate practically all the oxygen. Studies conducted during the year established the degree to which the dissolved and free oxygen must be removed and also the conditions under which satisfactory removal can be accomplished.

The butter oil can be used in liquid form as a spread or in cooking, or it may be mixed with skim-milk powder and made into a satisfactory butter if cold water is available to solidify the mixture.

Riboflavin from Whey

Inadequate supplies of riboflavin concentrates so far have prevented the enrichment of bread with this vitamin—the vitamin most lacking in the average diet. Methods devised in the Bureau and elsewhere indicate that substantial quantities of riboflavin in suitable concentration for enriching bread can be obtained from cheese whey.

Liquid whey contains approximately 1.37 micrograms of riboflavin per gram and dried whey contains 22 micrograms per gram, but a concentration of about 250 micrograms per gram is needed so that 1 pound of the product will be adequate to enrich 100 pounds of flour.

The Bureau's research work has shown that, in the manufacture of milk sugar from whey, some of the riboflavin will adsorb on some of the milk sugar, if suitable conditions of temperature and concentration of sugar and riboflavin are provided. By this method it is now possible to manufacture milk sugar containing 300 micrograms of riboflavin per gram of sugar, at approximately the cost of making milk sugar. This enriched milk sugar has been tested in bread with satisfactory results, and pilot-plant tests indicate that the method of production is practicable for large-scale operations.

Other workers have developed a commercial process for increasing the riboflavin content of liquid whey, by bacterial action, and drying the enriched whey, which then contains 1,200 micrograms of riboflavin per gram. From commercial samples of enriched dried whey, the Bureau has produced milk sugar containing as much as 2,500 micrograms of riboflavin per gram of sugar. The riboflavin-enriched milk sugar is free of the salts that give dried whey an unpleasant taste and it also dissolves readily. Research will be continued with a view to improving the methods and adapting the results to industrial operations.

LACTIC ACID LACQUER

Further improvement was made during the year in the Bureau's method of making resin lacquer from lactic acid and castor oil, to replace tin as a protective coating material in the food industry. The time required to bake the lacquer was reduced from 40 minutes at 400° F. to 20 minutes at the same temperature, by incorporating suitable driers. The durability and elasticity of the lacquer were also improved.

Trial coatings of the lacquer on evaporated milk cans proved to be resistant to the usual processing treatment. On 10-gallon milk cans of "Bonderized" iron, the lacquer was adequately durable except in the neck of the can where abrasion caused wearing off. This lacquer proved more desirable for milk cans than coatings of the phenolic or vinylite types. Lacquer samples were prepared for tests by the War Department and industrial concerns, and in general the tests proved that the lacquer is satisfactory for coating metal containers on which tin is customarily used.

Because of the shortage of castor oil, other oils were tried as a component of the resin. Hydroxylated linseed oil gave a greater yield of resin but a somewhat less resistant coating.

Cooperation with a number of industrial firms in the preparation and use of the lacquer resulted in its commercial production by one firm, and the prospects are that others will soon be starting operations.

FACTORS AFFECTING PRODUCER-DISTRIBUTOR COSTS

For some years there has been much discussion as to whether it is more profitable for dairymen under certain conditions to retail the milk they produce on their own farms or to sell it to others for processing or distribution. The Bureau has now obtained data on the costs of distribution, capital investments, and general data on operating methods for about 24 producer-distributors.

In general, the data show there were wide variations both in capital investment and in the operating costs. There was a certain level at which dairies could afford to operate quite well while others in the same vicinity, because of unwise investment of capital or lack of proper system, operated uneconomically. To show the differences that existed it may be pointed out that, for the raw-milk distributors studied, the total capital per quart of milk equivalent sold daily ranged from $4.89 to $18.16, and for the pasteurized-milk distributors the range was from $11.95 to $20.01.

Correlation coefficients were computed to determine the relation of various factors to the cost of distribution. These studies indicate that volume in itself is not necessarily a determining factor in the cost of distribution for small producer-distributors. Some of the smaller distributors had costs lower than the larger distributors, both because of their low investment in equipment and because they covered only a small territory in delivery to the consumers.

In most cases the men in the plant were on a part-time basis, spending much of the day on other farm work, so that quarts handled per hour of labor and unit costs in plant did not depend to any great extent on the volume of milk handled. Plant labor efficiency did, however, affect the total cost of distribution by reducing the unit cost of plant handling, labor being the principal item of plant cost.

While an increase in volume of daily sales increased the quantity delivered per man-hour, the total cost of distribution was only slightly affected by labor efficiency in delivery. Labor was an important item in delivery but was not so controlling an item in affecting total costs as was the case with plant labor. The cost of operating the delivery truck was a more important factor in causing variation in cost of distribution.

The most important factor affecting the cost of distribution was the compactness of the delivery routes. By serving customers in a limited territory the small distributor is able to operate his delivery truck at low cost, especially for such items as gas, tires, and repairs. While most small producer-distributors usually start out by delivering only in a small territory, many of them gradually spread out and cover the whole town.

SOME UNKNOWN NUTRITIONAL FACTORS IN MILK

Research in the Bureau of Dairy Industry during the last few years has provided convincing evidence that milk contains some growth-promoting substance that has not yet been identified. Since, in planning nutritional programs, a shortage of milk in some form may sometimes make it necessary to rely more on other foods, it is important not only to know the nature of the unidentified substance in milk but also the extent to which it may exist in other foods.

In the preliminary research, laboratory animals were fed a basal ration supplemented with milk in some form, for comparison with supplements of the various nutritive essentials that were then known to science. As new nutritive factors were discovered they were tested in turn, but in every comparison the animals made more normal growth and reached sexual development earlier when milk was a part of the ration. This was evidence that milk supplied some nutritional factor which the scientists were unable to duplicate from their long list of known nutritive essentials. It has not yet been possible to test the factor B_c, recently reported to be essential in the nutrition of the chick and to have been isolated in crystalline form; but barring the possibility that this may be the one involved, milk apparently contains a growth-promoting factor that has not yet been identified.

The same growth-promoting effect of milk has now been obtained by supplementing the basal ration with commercial casein, commercial casein extracted with ether, whole milk from barn-fed and pasture-fed cows, commercial dried skim milk, cheese (cottage, Cheddar, and Swiss), beef muscle, lettuce, or the extract of liver that is used in the treatment of pernicious anemia. The growth obtained with these supplements was from 75 to 100 percent faster than growth on the basal ration. The growth effect was apparent in the weights of the ovaries, uterus, adrenals, seminal vescicles, prostate gland, epididymis, thymus, and the organism in general, and in length of body.

Tests to determine other possible sources of the unidentified factor showed that hays (U. S. No. 1 alfalfa, U. S. No. 3 alfalfa, U. S. No. 1 timothy, and U. S. No. 3 timothy) contain some of the factor, since rats on these hays grew 25 to 50 percent faster than litter mates on a basal ration deficient in the factor. The growth factor occurs only in very small amounts, if at all, in soybean oil meal, linseed oil meal, wheat bran, and yellow corn. It is practically absent from white flour, enriched white flour, and whole wheat flour.

All efforts to produce a definite, characteristic lesion in rats fed a basal ration deficient in the growth-promoting factor have failed. Groups of rats kept on this diet for 35 to 37 weeks have shown only a retarded growth. The failure to develop other deficiency symptoms may be the result of small amounts of this factor in the basal diet or the rats may have obtained it from some other source. To test this, a part of the dextrin in the basal ration was replaced by other carbohydrates—recrystallized lactose or sucrose. The lactose depressed growth, but the reason is not yet apparent. It may be that lactose contains less of the growth-promoting factor than the dextrin it replaces or it may be—as some have suggested—that these carbohydrates affect differently the bacterial activity in the intestinal tract. Regardless of their mode of action, however, the evidence seems to indicate that the difference in the effect of these carbohydrates on growth is brought about almost exclusively by a change in the amount of the growth factor available to the rats. On this assumption the rats are now being kept on the lactose-containing basal diet to see if they develop any characteristic symptoms that may be useful in detecting the deficiency of this still unidentified growth-promoting factor in humans.

SULFA DRUGS AND MASTITIS

Mastitis is a widespread disease of dairy cattle, which usually causes a severe reduction in milk production or makes the milk unfit for use. Conservative estimates by the Bureau of Dairy Industry, based on various surveys of the prevalence of the disease and its effects, indicate that dairymen in 1942 lost at least 3 percent of their potential milk production as a result of mastitis, or 3½ billion pounds, which was approximately the additional quantity needed to meet the national milk-production goal.

Many attempts have been made to control mastitis, with varying degrees of success, but little if any improvement has been made in eliminating the disease from the dairy industry as a whole. Recently, however, investigators elsewhere announced some success in eliminating streptococcic infections from dairy cow udders by using injections of sulfanilamide in oil. This work prompted the Bureau to try the treatment, with certain modifications, in the dairy herd at Beltsville, to determine its effectiveness in eliminating the various types of organisms associated with the disease.

Milk from 170 cows in the Beltsville herd was examined bacteriologically and 56, or 32.9 percent, of the cows were found to be harboring various organisms capable of causing mastitis. Treatment of the 56 cows consisted of infusing the infected quarters of the udders with a mineral oil suspension of sulfanilamide and sulfadiazine, the amount of the suspension varying from case to case. Following treatment, milk samples were again taken from each quarter for bacteriological examination; and at least two such samples had to be negative for mastitis organisms before the quarter was considered "cured." Results for 7 cows are still incomplete; but of the other 49 cows, 39, or nearly 80 percent, apparently have been cleared of infection.

Most of the treatments heretofore recommended for eliminating mastitis organisms have been effective against only one, *Streptococcus agalactiae*. Of the 108 treated quarters, 80 were infected with streptococci and 87.5 percent were cleared; 8 had staphylococci and 87.5 percent were cleared; 2 had a combination of streptococci and staphylococci, and 100 percent were cleared; 12 had *Pseudomonas aeruginosa* and 83.3 percent were cleared; and 6 had coliform infections and 83.3 percent were cleared. It is apparent that these different types of infection have responded to treatment at very nearly the same rate.

The treatments have been administered without causing any appreciable physiological reaction or change in the udder, or any significant reduction in milk production either during treatment or immediately thereafter. The study will be continued with the use of still other drugs and combinations to determine whether mastitis infections can be entirely eliminated from a herd and whether the herd once free of infection can be kept free.

IMPROVED QUALITY OF DAIRY PRODUCTS

The increased demand for dairy products that require whole milk for their manufacture, such as evaporated milk, cheese, and whole-milk powder, resulted in many milk producers shifting from the delivery of cream to the delivery of whole milk. More care and better equipment are required to produce whole milk of acceptable quality, particularly in cooling the milk. Past research in sanitary milk production and proper handling to deliver good-quality milk enabled extension workers to assist large groups of farmers in their efforts to meet the requirements of a new market.

When the Government asked for a huge increase in the production of American Cheddar cheese, the output of low-grade cheese increased proportionately because most factories have always made a large percentage of cheese below the No. 1 grade. The dairy industry was soon confronted with a troublesome surplus of low-grade cheese, since only the higher grades that will withstand long storage and shipment were bought by the Government. Low-grade cheese, even in normal times, is an economic liability because it does not develop the desirable flavor of good-quality aged cheese and must be processed or held at costly low refrigeration temperatures to prevent complete loss.

The Bureau's research had shown that almost any cheese factory could improve the average quality of its output simply by grading all the milk for quality, and that the further step of pasteurizing the milk would enable the cheesemakes to control the manufacturing processes more exactly. To help stem the disastrous flood of low-grade production, the Bureau intensified its educational demonstrations among producers. Specialists, some with mobile trailer laboratories, went from factory to factory working directly with cheesemakers. Factories that are using the Bureau's methods in Minnesota, Wisconsin, Illinois, Michigan, Ohio, Indiana, Missouri, Oregon, Washington, and Tennessee are now making mostly No. 1 cheese. In the Minnesota factories, where a Bureau specialist worked continuously during the last year and where records are sufficiently complete for an estimate of the improvement, the production of U. S. No. 1 cheese increased from approximately 35 percent to more than 80 percent.

BUTTER-PROCESSING PLANTS

Considerable butter is still made on farms for sale through local stores and other trade channels. Much of the farm-made butter is not satisfactory for direct consumption, but some of that made in seven Southeastern States is being salvaged for human food by processing it in factories qualified and licensed for the purpose. These factories must operate in accordance with regulatory laws enacted by Congress to insure a safe and wholesome food for human consumption.

Through the Secretary of Agriculture, the Bureau of Dairy Industry is authorized to maintain sanitary inspection of the factories and to examine all materials used for the manufacture of process butter and to approve all marks, brands, and labels to prevent misrepresentation of the product. In addition to performing these regulatory activities, the Bureau assists the operators in developing better methods of procuring the raw materials and in improving the product generally.

At present only 5 qualified factories

are operating—2 in Alabama, 2 in Georgia, and 1 in Maryland. In addition to affording 60,000 farmers a market outlet for home-made butter, the operation of these factories adds approximately 4,500,000 pounds of essential fat to the country's yearly supply of food. The quality of process butter has been improved to such an extent in recent years that approximately 90 percent of the production is now "printed" and sold as table butter.

Legal Aspects

Milk Regulations—Validity *

(West Virginia Supreme Court of Appeals; *State* v. *Bunner et al.,* 27 S.E.2d 823; decided November 23, 1943.) The milk regulations of the public health council of West Virginia, among other things, made it unlawful for any person not possessing a permit from the health officer to sell any milk and provided that only a person who complied with the requirements of the regulations was entitled to receive and retain a permit. The defendants were charged with having sold a pint of milk from their store without having a permit from the health officer. A county criminal court sustained the defendants' demurrer to the indictment and the State, after being refused a writ of error by the circuit court of the county, appealed to the Supreme Court of Appeals of West Virginia.

One of the objections raised by the defendants was that the State statute under which the regulations were adopted was unconstitutional because it attempted to vest in the public health council an unwarranted power to legislate by prescribing public health regulations. By the statutes the council was required to promulgate regulations and was authorized to establish and amend regulations under the public health laws. A violation of the regulations so promulgated, when the regulations were reasonable and not inconsistent with law, was a misdemeanor. It was also provided in the statutes that the council "shall adopt regulations to provide clean and safe milk and fresh milk products." The appellate court took the view that standards and limitations with respect to the regulations or "legislation" which the council was empowered to adopt were contained in the statutes. Such standards were found by the court in those provisions which required regulations to be reasonable and consistent with law and which mentioned clean and safe milk. The defendants' contention that the statute was invalid because it improperly delegated legislative power was rejected by the court.

With respect to the regulations the defendants argued that the requirement of a permit was void because the legislative act did not expressly confer upon the public health council power to require a permit. The court pointed out that a permit requirement was a very simple, effective, and mild method of control and that in the instant case no fee was charged and no difficulty or delay was involved. "When issued, a permit can be nothing more than a formal certification by the health officer that the milk proposed to be sold by a named vendor has been produced under conditions prescribed by the health council." The court was of the opinion that the regulation in that respect was valid.

The defendants also took the position that the regulation conferred upon the health officer arbitrary power to grant or refuse a permit because it did not state upon what conditions an applicant was entitled to a permit and did not in terms require the granting of a permit to all who were duly qualified. However, the appellate court did not so construe the regulation. It was expressly provided that only a person who complied with the requirements was entitled to a permit, and, according to the court, this clearly stipulated that one who had not complied should not receive a permit and equally stated that one who had complied should be so entitled. It was immaterial that the regulation did not prescribe any exact method of making application. It did provide that the permit should be from the health officer, thus designating the person to whom application should be made.

The statutes provided that every general regulation adopted by the public health council "shall state the day on which it takes effect" and the defendants urged the invalidity of the regulations because they failed to show on their face the time when they should go into effect. The only provision in the regulations purporting to show their effective date was one which stated that "this regulation shall be in full force and effect immediately upon its adoption and its publication, as provided by law." The State argued that, although no date in words and figures was mentioned, the allusion in the regulations to the date of adoption was a sufficient reference to the health council's minutes, a public record, where the exact day could be found, and that this sufficiently complied with the statutory requirement. "Possibly," said the court, "this would be true if

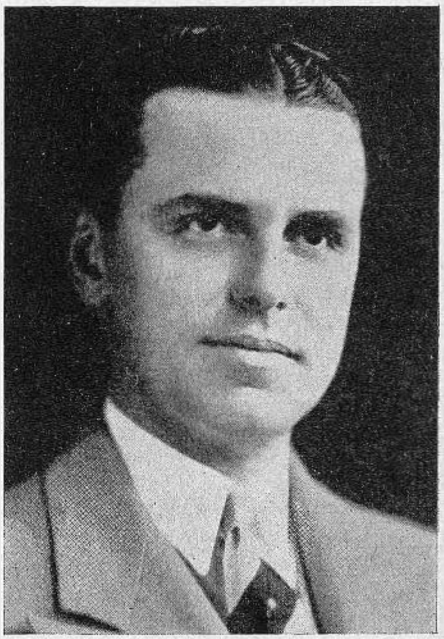
* *Pub. Health Repts.,* March 3, 1944.

the date of adoption alone fixed the time when the regulations should become effective; but the regulations do not so say. The provision is that the regulations shall be in effect, not simply upon their adoption but upon their adoption and publication as provided by law. The crucial date, therefore, is not that of the adoption but that of the completion of the publication of the regulations and there is no attempt therein to state when the publication shall be complete. Hence, there is a complete failure to comply with this statutory requirement." According to the court the statutory provision was clearly mandatory.

Further, the indictment was held defective because it failed to allege that the regulations came into effect on or before the date of their alleged violation by the defendants. While the indictment did allege the adoption of the regulations on November 6, 1939, the only reference to their publication was that they were duly published by distribution and circulation in the manner determined by the council. The indictment thus failed to show when the regulations were published.

The judgments of the county criminal and circuit courts in favor of the defendants were affirmed.

M. E. PARKER AS SANITATION CONSULTANT



After more than twenty years as a dairy technologist and production executive, M. E. Parker severed his connection with Beatrice Creamery Co. as of March 1 to investigate the possibilities of a food industries service organization in sanitary practices and quality control.

As a background for such an enterprise he has the experience of two years as a Research Associate in Dairy Technology with Dr. S. C. Prescott following his course in Industrial Biology at Massachusetts Institute of Technology; two years as Laboratory Director for Walker-Gordon Laboratory Co. at Plainsboro, N. J.; two years as Laboratory Director for Philadelphia Dairy Products Co., Philadelphia, Pa.; eight years as Dairy Technologist for Sealtest, Inc., subsidiary of National Dairy Products Corp. at Baltimore, Md., and Danville, Ill.; and eight years as Chief of Quality Control Laboratory and Manager of Production for Beatrice Creamery Co., Chicago, Ill.

During these years Mr. Parker has specialized on and emphasized the importance of sanitary practices and improvements in housekeeping, equipment sanitation and quality control practices.

He is a member of the Committee on Sanitary Procedure of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS and for twelve years has been a member of the Research Committee of the American Butter Institute; five years as Chairman.

His present activities include membership on the Advisory Board of the Military Planning Division of the Office of the Quartermaster General, War Department, Washington, D. C.; Fellow and Life Member of the American Public Health Association; Charter Member and Member of Council of Institute of Food Technologists since its formation and Past Chairman of Chicago Section of the Institute.

New Books and Other Publications

The Chemical Formulary, edited by H. Bennett. Published by The Chemical Publishing Company, Inc., Brooklyn, N. Y. 1943. Vol. VI. 636 pages. $6.00.

This useful compilation of practical formulae for a wide variety of industrial and household needs is enhanced over previous issues by the inclusion of a new chapter on substitutes for scarce materials. An enlarged directory of sources of chemicals and supplies has been added to aid in locating new as well as old materials and products. Also, some special elementary formulae of direct and indirect military interest have been included.

Emulsion Technology, Theoretical and Applied, compiled and edited by H. Bennett. Published by The Chemical Publishing Company, Inc., Brooklyn, N. Y. 1943. 290 pages. $5.00.

This book is an addition to and a revision of the earlier published symposium on emulsions compiled by the leather trades chemists. There is new material on colloid mills and homogenizers, water emulsion paints and coatings, and observations on some food emulsions. An extensive list of 244 references to the emulsion patent literature and a chapter on the design of various types of machines give it practical value to the industrialist.

Drying and Dehydration of Foods, by H. W. von Loesecke. Published by Reinhold Publishing Corporation, 330 West Forty-second Street, New York, N. Y. 1943. 64 illustrations and figures. 302 pages. $4.25.

The author presents a condensed, well illustrated view of the procedure and practices in general use by the food drying industry. It is not an operating manual, nor is it so intended, and the discussion is necessarily sketchy. Following chapters on types of dehydrators, fruits, vegetables, eggs and dairy products, and meats, it carries a chapter each on plant sanitation, costs of dehydration, the nutritive value of dried foods, then packaging and storage, analysis and reconstitution, a short glossary, and a list of six and one-half pages of patents pertaining to the dehydration of foods.

Home Food Preservation: Salting, Canning, Drying, Freezing, by F. W. Fabian. Published by The Avi Publishing Co., Inc., New York 3, N. Y. 1943. 20 figures. 138 pages. $1.50.

This book is packed full of good practical instructions for the preservation of a wide variety of meats, fruits, and vegetables. It is written for the intelligent person who wants to preserve foods under household conditions. It is non-technical but withal gives reasons, interestingly and clearly expressed, for selecting the proper varieties of food, their preparation, their treatment during the processing, their storage, and their treatment for consumption.

An Introduction to Foods and Nutrition, by Henry C. Sherman and Caroline Sherman Langford. Published by The Macmillan Company, New York, N. Y. 1943. 14 figures. 292 pages. $2.00.

Like the other books by these authors, the instant one is a clear, authoritative, and readable exposition of the subject of foods and nutrition. It differs from the authors' *Essentials of Nutrition* in that the student is introduced "at once to foods and nutrition: 'Foods for the nutrition course; nutrition for the foods course' ". The subject matter is presented so condensed that there is very little opportunity for the teacher to be selective in the material that is to be used. This has an advantage for certain types of courses, particularly those concerned with the immediate nutritive needs in terms of the accepted "yardstick" based on the Recommended Dietary Allowances published by the National Research Council. Special emphasis is given to the required quantities of the ten nutritionally essential factors which cannot safely be left to dietetic chance. Brief exercises and recommended readings accompany almost every chapter; and comprehensive tables of food values and a glossary of nutritional terms enchance its value. "Thus this volume seeks to serve anyone interested in foods and nutrition, whether or not with a background of previous study of science".

ANNUAL MEETING, NOVEMBER 2 and 4, 1944

LaSalle Hotel Chicago, Ill.

JOURNAL OF MILK TECHNOLOGY

Official Publication of the

International Association of Milk Sanitarians

(Association Organized 1911)

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Chairman, F. D. Fields, Berkeley County Health Dept.
Secretary-Treasurer, J. B. Baker, Department of Health, Charleston, W. Va.

Association News

Iowa Association of Milk Sanitarians

The Iowa Association of Milk Sanitarians held its annual meeting at Iowa State College, Ames, Iowa, February 17–18.

Attendance and interest were unusually good.

Several joint sessions were held with the dairy industry meeting at the College for the Dairy Short Course.

The program covered such subjects as production problems, mastitis, equipment, plant operations, milk shortages, laboratory, help problems, and the program of small-town milk control units.

At the business session, the membership voted to continue holding one-day sectional meetings to discuss local administrative problems.

A legislative committee was appointed to study and recommend to the state legislature the passage of needed legislation.

Officers elected for 1944 were: E. R. Armil, Davenport, President; E. G. Blassick, Fort Dodge, Vice-President; J. R. Jennings, Des Moines, Secretary-Treasurer.

J. R. JENNINGS,
Secretary-Treasurer.

Michigan Association of Dairy and Milk Inspectors

During the month of March, Milk Sanitarians in Michigan had the unusual opportunity to attend one of two full week in-service training courses in milk sanitation offered by the University School of Public Health and Michigan State College, Division of Agriculture and Veterinary Science. The former was held during the week of March 6th, and the latter during the week of March 13th. Both were limited to 60 and 50 students respectively. Both courses were highly successful.

H. S. Adams, First Vice-President, entered the service of the United States Public Health Service as a Reserve Officer with the rank of Captain. Captain Adams is now located with the Minnesota State Health Department in Minneapolis as Food Sanitarian. Adams is the third ranking officer of the Michigan Association to be sworn into the Service in as many years.

HAROLD J. BARNUM,
Secretary-Treasurer.

New York State Association of Milk Sanitarians

Mr. Paul Brooks, Milk Sanitarian for the Middletown District of the New York State Department of Health, recently enlisted in the army. He has been assigned to the Veterinary Corps.

Mr. Paul Fenton has entered the employ of the New York State Department of Health as Milk Inspector. He has been assigned to out of state inspection, with headquarters at Vergennes, Vermont. Mr. Fenton formerly was in the employ of the Middletown Milk and Cream Company as a Quality Control man.

The Executive Committee of the New York State Association of Milk Sanitarians had a recent meeting in Albany and determined that an annual meeting of the Association is to be held this year. The meeting is scheduled to be held at the Hotel Syracuse in Syracuse, New York, on September 20, 21 and 22, 1944.

W. D. TIEDEMAN,
Secretary-Treasurer.

Philadelphia Dairy Technology Society

The Philadelphia Dairy Technology Society meeting, held March 14, 1944, was attended by 64 members.

Because of difficulty to get speakers from distant points, due to travel conditions, etc., the Philadelphia group has depended upon its membership for program material this season.

This past meeting featured a question and answer program in which practically every member took part. The members were asked to submit unsigned questions to the Program Committee at least a week in advance of the announced meeting date. More than seventy questions were received. The questions were then classified and turned over to various members of the Board of Experts consisting of Messrs. Kelly, Fusselbaugh, Baldwin, Matt, Austin, Moyer, Welsh, Hittle and Roberts, for study and preparation of answers. The "experts" really "went to town" on their various assignments and the meeting developed into one of those sessions where everyone was interested, everyone learned something, and no one wanted to go home.

So successful was this meeting that there was no question but that we continue this type of meeting until all questions are answered.

W. S. HOLMES,
Secretary-Treasurer.

Mr. Alexander R. Tolland (former President of this Association) is now and has been for some time in the Long Island Hospital, Long Island, Boston Harbor, Boston, Mass. He is confined to his bed most of the time. "Al" would like to hear from his old friends.

ANNUAL MEETING, NOVEMBER 2 and 4, 1944

LaSalle Hotel Chicago, Ill.

New Members

ACTIVE

Hobbs, Lewis Franklin, Sanitary Inspector, Bureau of Food and Drugs, State Health Department, Salisbury, Md.

Meyer, Dr. E. F., Grand Rapids Health Department, City Hall, Grand Rapids, Mich.

Nelson, Dr. F. E., Dairy Bacteriologist, Iowa State College, Ames, Iowa.

Smach, Dr. Henry H., Bacteriologist, Suburban Laboratories, Inc., 2137 S. Lombard Ave., Cicero 50, Ill.

Turney, Grey J., Sanitarian, Lansing, Department of Health, City Hall, Lansing, Mich.

ASSOCIATE

Althaus, J. J., Vice-President. Hill Top Milk Co., Hannibal, Mo.

Anderson, C. W., Lab. Director, Rockford Health Dept., 2223 Grand Ave., Rockford, Ill.

Anderson, Kenneth, White House Milk Co., West Bend, Wis.

Bacon, Dr. Leslie R., Supervisor, Research Division, Wyandotte Chemical Corp., Wyandotte, Mich.

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Barnes, Harry L., The DeLaval Separator Co., 114 James St., Westwood, N. J.

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ANNUAL MEETING, NOVEMBER 2 and 4, 1944

LaSalle Hotel Chicago, Ill.

Correspondence

Columbus, Ohio, March 18, 1996.

The Editor,
International Journal of Dairy Technology,
Chicago, Illinois.

Dear Sir:

I am taking the liberty of sending you, under separate cover, a number of letters which I acquired incidentally to the purchase of a bundle of enclosures and stamps (I am a stamp collector and dealer) of the Farley period of the Franklin Roosevelt era. Ordinarily I turn over the contents, if any, of enclosures to the waste paper collector; but these letters cast such an interesting historical sidelight upon the problems of public health administrators in the early part of the century—a fact which writers of public health history have rarely, if ever, presented to our view—that they may be of interest to your readers.

Should you care to publish these letters, in whole or in part, you are at liberty to do so. In that case, it might be advisable to explain that they constitute one-half of the correspondence between an ex-dairyman (who was no doubt an "economic individualist" of whom historians speak) and a younger relative. Unfortunately, from an interested reader's point of view, the full effect of these letters upon the recipient, and upon the quality of the services of the dairy inspectors with whom he came in contact, can not now be determined or evaluated.

At any rate, I send these letters to you, for such use as you may see fit to make of them, as my small and humble contribution to the history of a most worthy profession.

Should you ever be in the market for old or rare stamps, I shall be pleased to serve you.

Respectfully yours,
Morgan R. Beckwith.

FIRST LETTER

Sunny Acres, Oregon, June 14, 1937.

Dear Nephew:

Your Aunt Matilda and I were very much interested in the account of the settlement of your father's estate, which Matilda received from your sister, Jane. But I was particularly pleased to learn that you inherited the old-home place, and that you have decided to re-condition, re-stock, and operate the farm and dairy.

You could have made no better choice of a herdsman and dairy operator than George Taylor, whom I recall as a young man, and whose knowledge of cattle was, even then, broad and sound.

My main object in writing you, however, is to warn you against the delusion that a set of nicely proportioned and painted structures, and the latest wrinkles in milking and dairy equipment (which I am sure you will install) are the sole requirements for a dairy farm, and that the possession of them automatically entitles you to sell milk in any market, no matter how restricted. You will recall that after your father and mother moved to the city, I milked the herd and marketed the milk for several years, until I became disgusted and moved out here to ride herd on an orchard of fruit trees. During my years as a milk producer I learned—the hard way—a number of things, a knowledge of which might help you over some rough spots. So, whether you like it or not, I have decided to enroll you in my free personal correspondence course on "How to Outwit Dairy Inspectors," of which this is the first lesson.

In order to gain the maximum benefit from this and the letters which I shall write you from time to time, you must understand that I do not impugn your morals nor question your good intentions. I know your breed pretty well as the result of nearly forty years of wedded life with your father's sister—your Aunt Matilda; and I appreciate the fact that it is your intent to produce milk of good quality—fit to place on your family table, and to serve to your guests. But do not kid yourself, son! That does not necessarily imply that your physical equipment, or your methods, or the ultimate quality of your milk, or even your personal attitude, will at all times completely satisfy the dairy inspector or inspectors, and their supervisors and superiors, who will inevitably visit your place from time to time. And, unless you satisfy the inspectors you will not get the top price for your milk, and be a successful milk producer; that is, one to serve as a example to posterity.

In further explanation of my meaning, it is safe to state that you will occasionally, even with new equipment, experience minor breakdowns in routine, resulting from worn parts in machinery or equipment, unforeseen exhaustion of supplies, unexpected turn-over in labor causing the employment of untrained help, and by emergency demands for your entire operational personnel in other farm activities; so that your dairy operations will necessarily temporarily vary from the routine. The visit of an inspector at such a time can play havoc with a favorable reputation, and with your temper—or control of it.

Consequently, one of your first steps as a milk producer should be to become acquainted with the producers on all sides of your place, who consign milk to the market to which you consign yours. I suspect you will find that they maintain an informal, but nevertheless effective, information system whereby information concerning the imminent presence of the dairy inspector is passed along, so that the necessary precautions can be taken. If your neighbors are not so organized, you should take measures to start a reporting system.

It can hardly be expected that such a reporting system will work perfectly, for there will always be surprise visits, and victims of the first stop of the inspector. But, the direction from which he came will no doubt be known—or can be learned—and producers along the route he naturally must follow can then be warned by telephone that he is coming that way. Inspectors are often inclined to follow a pattern. They start down a road, and inspect each dairy farm as they reach it; or they clean up a section or township, or all the producers of a receiving station before they move on to the next area. As soon as an inspector's habits and procedure become known, it is a simple matter to anticipate his next move, and the producers in whole areas can be warned, sometimes days in advance, of his visits. His presence at the receiving station, or at the truck loading platform, is often a tip-off on imminent inspections in that area, and the drivers of collecting trucks can spread the alarm.

I have noticed that, for reasons which are not always clear, dairy inspectors sometimes suddenly change their emphasis from one phase of inspection to another. For some months, on a number of visits, the inspector may be very particular about the condition of the barn floor, for example; and the only way to send him away happy is to have it immaculately clean, or heavily limed, as the case may be. On the very next visit he may hardly notice a badly soiled floor, but be ultra critical about the structural condition of the milking utensils, even urging that the producer throw away a bucket with a hair-crack in the solder of the seam. It is in such shifts of interest and emphasis that an information system can be most helpful to producers, because it will enable them to prepare for the inspector's visit.

You will no doubt read the foregoing with the mental reservation that no dairy inspector can be so dumb as to signal his plays—so to speak—so obviously. Let me assure you that I do not imply that such obvious actions are the counterpart of a low order of mentality. They are, rather, the result of inflexible instructions from arm-chair superiors, or of a desire to cover the maximum territory with the minimum of driving and elapsed time, or of inexperience and a failure to evaluate the innate capacity of farmers to observe character, and to adjust themselves accordingly. As you gain more experience with them, you will observe that a large proportion of dairy inspectors are city-bred. This may explain many of their curious actions. On the other hand, some inspectors are good! I mean, efficient. It is difficult to anticipate their emphasis, and dangerous to depend upon warning of their presence. If such a one is your lot, these letters will probably prove to be a waste of my time—and yours. But they are so rare that the chances are all in your favor. You see, really good inspectors do not remain inspectors for long periods—for reasons which are not hard to find.

I trust I have not bored you, nor offended your sense of propriety. Remember that you are engaged in a business undertaking in which you can not afford to take risks with your reputation. If you were speeding along a highway at a rate in excess of the legal limit, and saw a highway patrolman waiting for you to enter a speed trap, you would not hesitate, for an instant, to lift your foot from the accelerator—and even to use your breaks—to slow down to legitimate speed, in order to keep out of trouble. So, don't be a prude, and spurn my advice.

It is the hope of your Aunt and me that you are finding the renovation of the old home a pleasant undertaking, and that you and your family are enjoying good health. I shall write you again in a short while.

Affectionately yours,
UNCLE BOB.

"Doctor Jones" Says—*

Somebody I was talking to a while back—I said I was thinking of suggesting a course on safe food-handling for ladies' aid societies and ladies' auxiliaries and so on: to get rid of these outbreaks of food poisoning and what not from church suppers and such affairs. "My gosh! Don't do that," this fellow says, "or you'll stir up a hornet's nest." These women, he said, were not only experienced housekeepers but they were volunteers, giving their time for nothing. They'd take it as a criticism and, anyway, they wouldn't stand for being told how to do things. So I decided I'd better think it over a little more. But, stirring up a hornet's nest: at least you get things moving.

Here just lately I read about a situation: a women's group served a lunch for some affair or other. They served sandwiches: minced ham or something like that. A lot of the people that ate 'em—within a few hours they came down with the molly-grables and a little later a few of 'em developed scarlet fever. It turned out, on investigation, that one of the women that fixed the meat for the sandwiches—she was just starting to come down with scarlet fever. After the meat was ground up they let it stand overnight at room temperature. A toxin formed from the germs and that was what caused the bowel trouble. The ones that came down with scarlet fever, they'd gotten the germs themselves. And, of course, it was embarrassing for all of 'em.

I saw some figures here awhile ago: showed there were something like nine outbreaks of gastroenteritis in upstate New York in one year, all from church and lodge suppers and that sort of thing. And it's always a slip in the food-handling technique that's responsible for 'em. Oftener'n not somebody with boils or furuncles on their hands, they handle chicken and so on after it's cooked and then they leave it over night at room temperature. And these staphylococcus bugs: that's just the ideal condition for 'em to grow and develop their toxin.

Of course, all this business about the effect of bacteria on food—formation of toxins and so on, it's familiar to the doctors but the women—it's comparatively new stuff to them. But even volunteers, if they're going to serve food to the public—well, women are sort of unpredictable but I imagine, if it was approached right, they'd want to know about it. Sometimes it's possible to get rid of hornets' nests without stirring 'em up.

Paul B. Brooks, M.D.

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* *Health News*, New York State Department of Health, Albany, Nov. 22, 1943.