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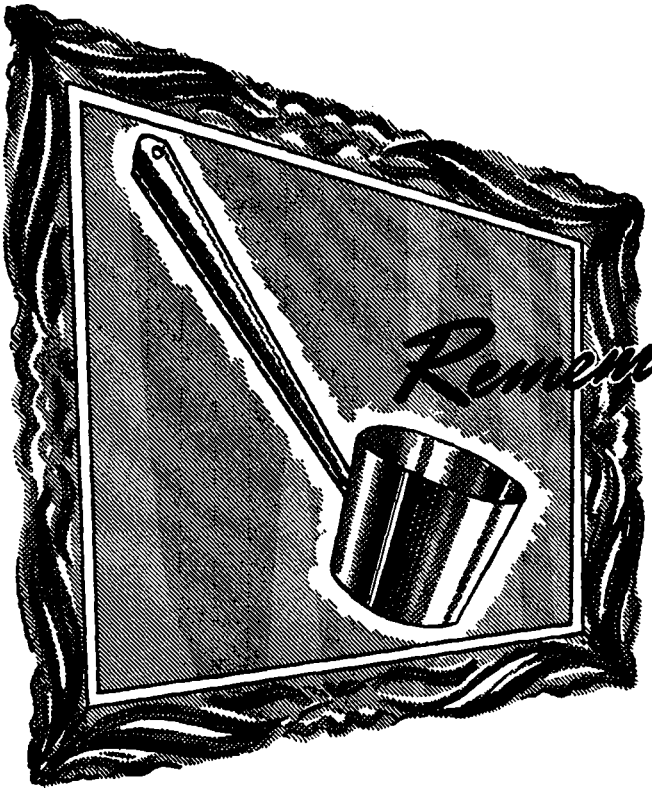

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JOURNAL OF MILK TECHNOLOGY

Official Publication of the

International Association of Milk Sanitarians
(Association Organized 1911)

and Other Dairy Products Organizations

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JOURNAL
of
MILK TECHNOLOGY

Volume 4 March-April, 1941 Number 2

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.

Milk — Rich or Enriched?

For the past twenty-five years or so, milk has enjoyed a unique place in the national dietary. Its nutritive quality has been widely recognized and exploited—properly so. No other branch of the food industry has had such gratuitous support of physicians, health departments, educators, school officials, and social workers. During this period, what has the dairy industry done with this situation?

It has built larger plants. It has publicized its sanitization. It has endeavored to improve its merchandizing. It has not done much to improve the nutritive quality of its basic product, milk—except to fortify it with one vitamin at a selling price ten to twenty-five times its cost, hence a merchandizing proposition, pure and simple. When it found that pasteurization of milk largely destroyed the vitamin C content, this fact was lightly tossed aside as unimportant: it was explained that there is plenty of vitamin C in citrus products—one industry using another as a shield for excusing its own shortcomings. Does this situation have any forebodings?

We might take a leaf from the notebook of the wheat flour industry. There was a time when bread was called "the staff of life." Competition for markets responded to (and also partly led) the public demand for white flour—until the industry woke up to realize that it had neglected nutritional essentials for an immediate "mess of pottage" (see Bible—Genesis 25:29-34). Now, belatedly, it has aroused itself in self-defense. It has organized a Department of Nutrition in the American Institute of Baking, and engaged from the milk industry the latter's most effective nutritional publicist, the man who made popular the phrase "Our Most Nearly Perfect Food"—namely, milk. Now government (British) and industry (British and American) are fostering a national program to fortify bread with several important nutritional essentials, particularly thiamine (vitamin B_1) nicotine acid (the pellagra-preventing vitamin, possibly B_6), and iron. In addition, calcium and riboflavin (vitamin B_2) are under favorable consideration. Such an "enriched" bread, backed by Government (British) authority, and publicized in this country by coordinated and skillfully developed publicity, may be expected to go far in helping to restore bread to its erstwhile place. This will be done without charge to the consumer.

Meanwhile, what of milk! The only great contribution of the milk industry, as such, to the improvement in the quality of milk is a defensive one, namely, improved sanitation—a *protection* against infectious disease. No wars are won on the defensive alone. If milk would merely retain its nutritive preeminence, it must be made better. If the dairy industry is desirous of only maintaining its position, it must produce a more nutritive product. Good insurance postulates that it keep ahead of competitors—the longer the lead, the stronger the insurance.

The problem looms larger yet. As L. W. Waters states, "The objective is to make a finished food product that is equal in nutritious value to the raw material from which it was made." One college after another is inaugurating courses in food technology—which means an increasingly higher level of quality production and applied research. The National Research Council is actively concerning itself with working out a program for improving the nutrition of the general population. The U. S. Army is even more directly concerned in developing a food technology that produces a higher level of nutritive quality in our foodstuffs, especially toward conserving or restoring to foods the vitamins and nutritive qualities lost during processing. Plans are being laid for applying these principles to numerous of our staple foods, to be taken up one by one. (And yet some persons hold that the *International Association of Milk Sanitarians* should not organically participate in these developments. See editorials in this Journal, November-December, and January-February issues.)

What should the milk industry do about the situation? First, recognize that there is a need for improving the nutritive quality of milk. Second, support constructive research where this objective is being prosecuted, e. g., the pasteurization studies (1) at Cornell. Third, develop further the technique, art, technology, dairy husbandry, agriculture, or what have you, of *feeding* nutritive quality into the milk. And fourth, make provisions for a Milk or Dairy Research Institute that will foster and promote these measures of commercial value, industrial expediency, and public necessity.

Enriched food is a good thing. Rich milk is better.

J. H. S.

(1) Preliminary Report on the Deaeration of Market Milk, by Paul F. Sharp, David B. Hand, and E. S. Guthrie, Cornell University. *J. Milk Technol.*, 3, 137, 228 (1940).

Philadelphia Dairy Technology Society

There is no doubt but what success engenders success. Several of our good Philadelphia friends were among those who helped establish the Metropolitan Dairy Technology Society (of New York) and it was inevitable but what the good work would take hold down there too. Stirred up by the enthusiasm and inspiration of Dr. O. F. Garrett, and supported by the best dairy technologists in the Philadelphia area, the new organization came into being with attendance at the March 1941 meeting of one hundred and fourteen. Straightway it designated the JOURNAL OF MILK TECHNOLOGY as its official organ and submitted a list of new subscribers. Their program has started with a splendid list of speakers.

We heartily welcome this new organization into the family of the JOURNAL OF MILK TECHNOLOGY. It would be just like this energetic and capable group to endeavor to interest the Baltimore fellows in a similar project. Philadelphia, we salute you.

J. H. S.

Methods for the Bacteriological Examination of Milk Bottle Caps, Hoods, and Closures *

J. R. Sanborn and Robert S. Breed

New York State Experiment Station, Geneva, N. Y.

A considerable amount of study has been made of the sanitary and bacteriological condition of glass and paper containers for milk, cream, and other dairy products. Conditions with respect to caps, hoods, and closures used in the packaging of these foods have, by comparison, received little attention. There is sometimes a tendency to ignore the fact that the cap or closure is really a part of the milk container and, as such, often comes in direct contact with food products. Some laboratories prefer, therefore, to test the complete package. When studied in this way, milk bottle rinses give the combined counts from containers and closures. With this procedure it is possible also to determine contamination from the capper.

Certain investigations of this subject are concerned chiefly with the protection which various types of closures afford bottled milk or cream. (1, 2, 3, 4). Similar problems in the case of other dairy products such as cheese and ice cream are also receiving consideration.

Quite apart from matters of sanitary protection, questions are frequently asked concerning the sanitary and bacteriological condition of the cap or closure itself. It is sometimes necessary, therefore, to test these products independently of the containers. Certain studies of this problem have already been carried out (5, 6), particularly by J. W. Rice who pioneered in the field. Feeling that more detailed investigations of suitable bacteriological methods for testing these products are needed, especially contact methods for the determination of surface contamination, further studies of the subject have been undertaken at this laboratory.

There are many types of caps and covers for milk bottles (7) including the common disc or plug caps; caps which cover to some extent the bottle lip or rim; hoods and closures made of paper, paperboard, metal, transparent sheeting, synthetic plastics, or films having cellulose, rubber, wax, or resinous bases, the majority of which not only cover the pouring lip but are sealed around the neck of the bottle.

Various methods have been developed for determining the bacteriological content of disc caps, hoods, and closures. These include the following procedures:

1. Disintegration tests for paper and paperboard products.
2. Rinse methods.
3. Contact culture methods for hoods and metal foil used as receptacles for nutrient media.
4. Milk bottle blank method.

Disintegration Tests. This method is useful for estimating bacterial counts in paper and paperboard used in the manufacture of these products. The test is also applicable to disc caps where it is desirable to know the bacteriological condition of the interior of the paperboard cap as well as the amount of surface contamination.

Determination of Surface Contamination.

a) Milk Bottle Blank Method. It is sometimes desirable to determine the bacteriological counts of cap and closure surfaces, particularly the surfaces which come in direct contact with perishable

* Approved by the Director of the New York State Agricultural Experiment Station for publication as Journal Paper No. 424, October 9, 1940.

foods such as milk and milk products. Various rinse and contact culture methods have been employed but one of the most satisfactory procedures involves the use of an unblown milk bottle blank** (Figure 1) having a normal cap seat and a concavity of about 25 ml. capacity.

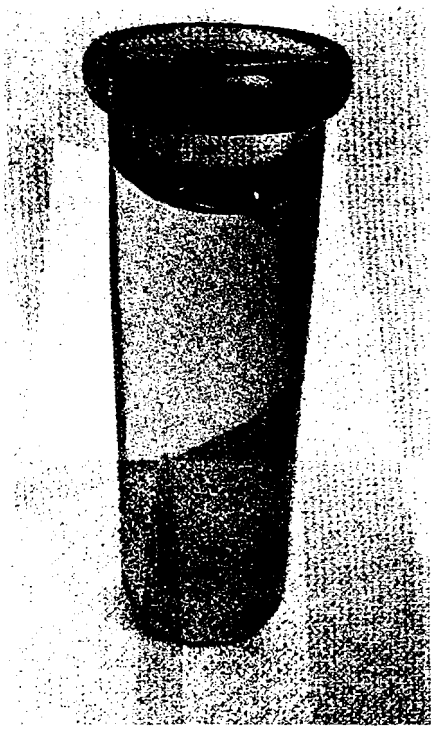

FIGURE 1
Unblown Milk Bottle Blank

Milk bottle blanks with kraft paper, metal foil, or other suitable covering sealed over the mouth, are sterilized in an autoclave. Approximately 10 ml. of melted, cooled standard agar*** are introduced into the concave cup, and the cap or closure to be tested is applied, using aseptic precautions, with sterile forceps. A sterile wooden plug of the type sometimes used for hand capping of milk bottles is useful in seating the cap firmly in position. The blank is inverted, shaken gently, and the agar allowed to harden. The blank should be incubated in an upright position, at 32° or 37° C. for 48 hours. At the end of this period, the cap or closure is removed and the colony count determined. To facilitate the removal of the agar layer from the cap or closure, the lip of the milk bottle blank may be gently heated by rotating over a Bunsen flame.

In making counts it is helpful to transfer the agar disc to a sterile Petri plate. When this is done, it is necessary to take into account the possibility of surface colonies adhering to the cap or closure.

As a supplementary procedure, a cap or closure may be rinsed with 5 ml. of sterile water placed in the concave cup. If this technic is followed, the entire amount of rinse water should be removed and distributed approximately equally between two Petri dishes. The standard agar is used for plating.

The milk bottle blank is also useful for the examination of caps and closures by broth sterility tests, for making coliform tests, and other tests with special media. Closures that require special methods for proper adjustment and sealing over the mouth of a milk bottle do not lend themselves readily to examination by this technic. However, unless these closures come in direct contact with milk or milk products, a method such as this would ordinarily not prove necessary.

b) Hoods and Closures used as Culture Dishes. Milk bottle hoods and closures may be placed, with aseptic precautions, in sterile Petri dishes and used as receptacles for agar media. For large skirted caps it may be necessary to use 150 mm. dishes. Closures may first be rinsed with 1 to 3 ml. of sterile water, plating the entire amount of water, or standard agar can be poured directly into the closure without rinsing. With the former method, standard agar may be introduced into the rinsed closure in order to determine the residual contamination.

** Unblown milk bottle blanks may be obtained from the manufacturers of glass milk bottles.

***Standard agar for milk work, used without the addition of milk.

TABLE 1

Bacteriological Analysis of Milk Bottle Caps and Paperboard Used in the Manufacture of these Products

Procedure: Disintegration methods. Results expressed in number of colonies per gram.
Medium: New Standard Agar.
Incubation: 37° C. for 48 hours.

	No. mills or plants	No. tests	Percentage of counts					Maximum counts
			Less than 10	Less than 100	Less than 250	Less than 500	More than 500	
Paperboard	8	397	31	81	87	95	5	20,400
Bottle Caps	5	1,174	45	97	99.6	99.6	0.4	1,080

With the latter method about 3 ml. of agar are used with each closure. These methods are applicable to metal hoods and closures as well as other types. Some investigators may wish to rinse the complete cap or closure. This can be done by transferring the closure, under aseptic conditions, to a sterile wide mouth Erlenmeyer flask and rinsing with 20 ml. of sterile water. After rinsing, 10 ml. of the water is removed and distributed approximately equally among three Petri dishes, followed by plating with standard agar.

In the testing of metal sheeting for the manufacture of hoods and closures, such as aluminum foil, two methods may be employed. Ten gram samples of foil cut into ½ inch strips in sterile Petri dishes are taken under aseptic conditions from rolls of metal at intervals of 20 to 30 feet. Before taking the samples, a margin of approximately ¼ inch is trimmed off the edges of rolls and discarded. Each 10 gram sample of aluminum foil is equivalent to approximately 3 feet. The samples are transferred to 50 ml. of sterile water in Erlenmeyer flasks of 250 ml. capacity and rinsed. Five or 10 ml. amounts of rinse water are removed and distributed among two or three Petri plates. Standard agar is used in plating. The rinses may also be used to inoculate sterile nutrient broth for sterility tests.

Metal foil may be tested by a contact culture method. Sections of foil are cut and transferred to large (150 mm.) Petri dishes. Using aseptic precautions, the sides of the sheet are raised, forming each section of foil into a rectangular dish, having an area at the base of approximately 36 sq. cm. The metal dish is made so as to fit properly in a large size Petri plate with the cover in place. Standard agar is introduced directly into the metal dish. Incubation is carried out at 32° or 37° C. for 48 hours.

EXPERIMENTAL RESULTS*

The counts obtained from analysis of bottle caps are slightly lower than those of the paperboard used in cap manufacture. This is probably largely due to the effect of paraffining the caps as they are made and possibly to a gradual decrease in count which paperboard of this grade sometimes shows on storage. These results indicate that conditions of cap manufacture at plants studied are not such as to contaminate these products during handling, fabrication, and packing. See Table 1.

Commercially pure aluminum foil used for milk bottle closures, tested according to methods described above, gives a surface count of less than 20 colonies on an area of approximately 36 sq. cm. In 116 tests of foil made at intervals of 25 feet from the start of a roll, 82 percent of the analyses yielded counts of less than 4 colonies; 31 percent of these tests showed no growth. The following table gives a summary of the bacteriological findings obtained from testing both metal and paperboard closures.

These results show that bacterial contamination of hood and closure surfaces is normally slight. Findings obtained by rinsing and contact culture methods are generally comparable.

Coliform and broth sterility tests were

* The analyses given were made by Raphael A. Gillotte.

run in connection with these experiments. Results of over 100 analyses reveal a total absence of coliform organisms. Broth sterility tests, representing 150 analyses, generally confirm the results reported in Table 2.

These studies show that, according to the methods employed, the milk bottle caps, hoods, and closures examined are in good condition bacteriologically. Further improvements can be made in the general situation. There still remains some possibility of contamination through personal handling. Cap, hood, and closure manufacturers are, however, generally appreciative of the need for proper sanitary precautions in the fabrication, handling, and packing of these products. The most important of these plants have adopted uniform sanitary codes designed to protect adequately their products from contamination and to provide clean and sanitary conditions of manufacture.

BACTERIOLOGICAL COUNT STANDARDS

It has been suggested that a reasonable bacteriological standard for paper and paperboard used in the manufacture of caps, hoods, and closures shall not exceed 500 colonies per gram of disintegrated stock. There is justification for such a standard, based upon the studies that have been made on paperboard for milk containers.

The problem of setting a satisfactory standard for fabricated closures is not so simple a matter because of the many different sizes and the low surface counts secured. One way of expressing such a count is in terms of colonies per unit surface area. It might be stated, for example, that closure surfaces which come in contact with these foods shall not exceed 2 colonies per square centimeter. This figure is comparable to a standard of not more than 1 colony per ml. capacity as determined by rinse counts of glass and paper containers for milk.

Another way of expressing a count standard would be to state arbitrarily, based upon results such as those reported above, that counts shall be less than 10 or less than 25 colonies per cap or closure. Either count appears to be reasonable. There is some feeling, however, that it might be better at first to fix a more lenient standard until the problem has been given more study.

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TABLE 2

Bacteriological Analysis of Hoods and Closures by Surface Rinsing and Contact Culture Methods

Medium: New Standard Agar
Incubation: 37° C. for 48 hours

Method	No. closures tested	Percentages of closures showing no growth	Percentages of closures having count of			Maximum counts
			2 colonies or less	4 colonies or less	More than 4 colonies	
Rinse	260	25	81	94	6	502**
Contact	366	42	96	98	2	9

** A count of this magnitude was obtained in only a single case. Results such as these are unusual and unexplainable with present information. The maximum count secured in all of the other tests was 34 colonies per closure surface which is probably a fairer indication of the highest counts obtained by these methods.

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The Grading of Food Establishments. Kentucky Bulletin of the Dept. of Health, Vol. 12, No. 6, January 1940, pp. 126-128. *Pub Health Engin. Abs.* xx, Mi, 43.

There are 455 food establishments in Jefferson County, Kentucky, and the County Health Department began regrading these on January 1, 1939, using the U.S.P.H.S. tentative code. A preliminary survey was made and an intensive educational program was carried out by the inspectors and public health nurses. The grading system was explained to Parent-Teacher Associations and other civic groups. The results of this program have been very gratifying. In December 1938, 22% of the food establishments held Grade A certificates; in November 1939, 38.8% were Grade A establishments. The number of Grade B establishments decreased from 49% in December 1938 to 6% in November 1939. The most prevailing defects found in 1241 individual inspections were in walls and ceilings, toilet facilities, water supplies, lavatory facilities, cleaning and disinfection of equipment and in the disposal of garbage.

"The experience of Jefferson County Health Department may be matched by any county that makes and carries out an educational plan before and during the inspection work."

Edwin F. Franz.

Perfuming the Toilet Room. New Hampshire Health News, Vol. 18, No. 5, May 1940, pp. 14-15. *Pub. Health Engin. Abs.* xx, PHA, 11.

An interesting little article on the use of various "drip" methods for the disinfection of urinals and toilet bowls. The writer, in response to an opinion from the manufacturer, gives the department's viewpoint on the use of such commercial products and comes to the conclusion that they merely substitute one odor for another. A very handy letter to have around in order to answer such inquiries from other manufacturers.

R. C. Beckett.

Better Meals for Tomorrow *

Lewis W. Waters

Vice-President in Charge of Research,
General Foods Corporation, New York, N. Y.

Today there is a wider popular interest than ever before in all kinds of research. It makes the front pages of our newspapers. It is an important part of our national defense program. The National Association of Manufacturers is encouraging research among its company members, furnishing them with information on the formation and conduct of a research department. No longer is industry operated by rule-of-thumb, hunch, inspiration, chance. Mysterious and secret knowledge is disappearing. There is an increasing tendency to depend upon scientifically determined facts. Research is on the march as never before

The layman, reading in magazines and newspapers of the constant flood of new developments pouring forth from our laboratories, may receive the impression that little remains for research to accomplish. There have been amazing advances in every field of scientific knowledge, yet the surface has hardly been scratched. Research men know that every contribution to knowledge opens the way for new explorations, for still greater accomplishments.

The Research Advisory Service recently asked America's industrial leaders the question: "What new product, process, or material might industrial research develop that would be valuable to *your* business?"

Compilation of the answers gives some idea of the job research has ahead of it. There is a list of 598 specific problems to which a fully satisfactory solution has not yet been devised, and for which industry would like the answers today. Forty-four of these items have been selected by the National Inventors' Council as vital from the standpoint of national defense. Here is a real challenge to research! We have the brains and facilities to meet it?

There were 32 specific problems listed on foods, some of which, as well as many more, are already receiving the attention of our food laboratories. We cannot learn too much about food since it is the most important single commodity in the world. Fortunately, the whole food industry has been most hospitable to the scientific worker and, as a result, probably at least one-third of the items now present on our grocery shelves were unknown to our grandfathers.

Feeding human beings has become one of the greatest sciences. Two generations ago, the scientist thought the problem was simple. It seemed only necessary to discover the needs for proteins, carbohydrates, fats, and a few minerals; analyze the foods for these constituents, and then so blend the foods as to furnish an adequate supply of each. Eating was simply stoking a furnace. Food was merely fuel, and was evaluated in terms of calories, exactly like coal and wood.

The old science is still fundamental, but the new science of nutrition is continually adding to it new knowledge of a whole array of substances needed by the body.

Several factors have broadened food research, the old "cracker barrel" grocery gave way to new packaged foods—the milk bottle and carton replaced the dip-tank. By the use of individual contain-

* Paper read before the Joint Annual Meeting of the Metropolitan Certified Milk Producers and the Certified Milk Producers' Association of America, Inc., Hotel Roosevelt, New York, February 10, 1941.

ers, the manufacturer or producer identified his goods and protected their quality. The discovery, isolation, and sythesis of vitamins changed our entire concept of nutrition. Food companies merged into larger groups and conducted centralized research, thereby preventing duplication of effort and insuring maximum utilization of results. Our present investigators are better trained, better financed, and have better facilities than in the past.

The average per capita consumption of food, which remained fairly constant for over two decades at nearly a ton a year, in the last survey appeared to have declined. "Stream-lining" was being applied to the human body as well as to automobiles. Yet in spite of slenderizing campaigns, shorter working hours, and more recreational activities, the number of employees in about 50,000 food processing plants in this country is larger today than 10 years ago. The prices average about 25 percent lower. The quality of foods has been very definitely improved, and there is every indication that we shall have even better meals for tomorrow. Each food manufacturer has the problem of making his products so attractive they will be included in your diet. It is a highly competitive business, intensified by the daily shopping of some 20 million housewives.

In nations under war conditions the average person eats more than in times of peace. War-time rations jump to 4500 calories daily per man, and there are changes in demand among all classes of food. This is due to changes in occupation of the population, and general disruption of industry, transportation, and labor which follows the tremendous increase in the manufacture of war supplies.

In the present international crisis, the food supply of the world is a factor that may determine the outcome of the struggle now going on and the type of life which will follow after.

In the First World War, emphasis was placed on food conservation. In our present defense program, stress is laid on increasing the consumption of food and improving nutritional values because of the vital relationship between health and proper food. Modern wars are waged by all the people, and the health and morale of civilians is as important as that of the armies.

In spite of the increase in the knowledge of nutrition since the last war, there does not appear to be as much improvement in the proportion of army applicants who are physically unfit, many for conditions having nutritive basis, as was expected. It requires years of adequate feeding to strengthen a nation.

England at war is emphasizing the importance of the proper feeding of civilians and increasing the consumption of important foodstuffs. In addition to providing a ration which is adequate, if not liberal, in such items as milk and milk products, potatoes, cereals, and meat, the Ministry of Food is providing at comparatively cheap prices whole-grain cereals to increase the consumption of the essential vitamin B_1. Also all white flour is fortified with this vitamin which is one of the largest scale nutritional programs ever attempted.

In this country there is an increasing trend toward the restoration to foods of the vitamins and nutritive qualities lost in processing so that the finished product will equal in nutritious value the raw material from which it was made. This is already being applied to breakfast cereals and flour. Future food standards may stipulate minimum vitamin content; as, for example, winter milk products with vitamin A and D potency equal to summer milk.

Food research is being influenced by other familiar current trends—decreasing population growth, due to lower birth rate and restricted immigration, smaller families, smaller houses, less space per family, smaller stocks carried at home, more hand-to-mouth buying, greater tendency to move, decline in home owning, increase in apartment living, decline in farm population, but increase in suburban life around cities due to ease in commuting, and much less time devoted to the preparation of meals. The median age of our population has risen to nearly

30 years, life expectancy is increasing, and we are becoming a nation of older people.

To meet this situation, more and more of our foods are being packaged to assure freshness, full weight, convenience in handling, proper labeling, and brand and manufacturer identification. Almost every commodity can now be obtained in package form, in fact it is rumored that mothers' milk may be available soon in a tin can.

Containers are being improved: fabricated easier to open and reclose, offering better protection of contents, and in many cases made attractive enough to be placed on the table. There is an abundance of new carton and wrapping materials, such as transparent plastics from rubber, even glass in fabric form. Products which have required special containers or have short shelf-life because of tendency toward rancidity are being rendered stable by anti-oxidants, and are now suitable for automatic vending.

Ready-to-serve products are on the increase: coffee beverage ready to drink, packaged bread already sliced, ready made pie-crust and biscuits. Many products now require only the addition of milk before cooking. You can buy complete spaghetti dinners in a package, and even Crepe-Suzettes or hearts of palm in a tin can. Perhaps the better meals for tomorrow won't take more than 10 minutes to prepare.

During recent years, there has been a growing tendency to drink our foods, and you have seen the rise in fruit juices and more recently the vegetable juices—tomato, carrot, beet, and even spinach. Yet milk still remains the great national beverage.

Foods out of season are now available twelve months of the year, either rushed to your table by fast transportation, or quick-frozen quality foods with their vitamins intact, cleanly prepared immediately after they are harvested, and instantly ready for preparation for the table. More and more foods are being freed of waste before they ever reach the home kitchen.

Only 10 percent of the known foods are used to any extent today, and many delightful new products are being made available to us—Boysen berries, new melons, and different varieties of vegetables. The luxuries of yesterday are becoming the common necessities of today.

Drudgery in the kitchen and dining room is on the way out. Probably 60 million women-working-hours daily were saved last year due to the use of more convenient foods and better cooking devices. Probably more money and brains are going into the efficiency of the modern kitchen than into all the other rooms of the house put together. The kitchen has become a laboratory. Preparing meals has become a science, reducing the need for skill and insuring results. More schools are offering courses in home economics, and registration is increasing. Home cooking of better meals, made easy, appears to be growing in popularity.

Research is designing foods more intelligently to fit the needs of the individual, old or young. New advances are being made in infant feeding and the nourishment of 20 million school children. With less than two million babies born a year, the infant-food manufacturer is stretching his market with a line of "junior-foods" for the older child. The next step may be foods designed for the aged or middle-aged.

Attention is being given to special foods for the ailing, or the allergic. Food sensitization is a vast, almost unexplored field. It is known that some human beings are sensitive to some food, and the whole subject of allergies is receiving the serious attention of the food scientist.

And so we find research making our foods more colorful, more aromatic, more appetizing, more nutritious, of finer texture, better packaged, and of finer and finer quality.

Bright-colored foods are increasing, for we eat with our eyes. Along with fruit-flavored gelatin desserts, we now have colored coconut, tapioca, and even colored bread.

Our knowledge of flavor is still an art rather than a science, but methods of measuring and evaluating flavors are be-

ing developed so that they can be controlled and duplicated. Old flavors, such as butterscotch, have acquired new popularity. We know of sectional flavor preference in this country. The South does not like licorice flavor, Maine is strong for wintergreen, New Orleans is partial to chicory, Brooklyn wants a sharp mayonnaise, while Oakland prefers it bland. Our ice cream manufacturer uses 28 different flavors to satisfy the public. New flavors, once unknown, are being developed.

Research is contributing toward making our nation well-fed, yet probably half our people do not get enough of the proper food to enjoy full health and vigor. Too many families have poor diets, some have fair diets, too few have really good diets. A great need is for more milk and milk products, eggs, meat, and certain fruits and vegetables. It is estimated that nearly half the population of an eastern state has incipient scurvy every spring, known as spring fever, but usually treated with sulphur and molasses instead of vitamin C.

This condition exists in our nation not only because some people cannot afford proper food, but also because others have insufficient knowledge of dietetics. Research is continually reducing the cost of foods to the consumer, and the food industry is broadcasting accurate dietetic information in a multitude of ways.

We are only at the beginning of our knowledge of nutrition, but enough is known to give better health, greater vigor, more useful lives to more people, if the present knowledge could be generally applied.

Here is offered a suggested program for the food industry which will assure better meals for tomorrow:—

1. *Use the best materials* and work with suppliers to effect progress in quality of materials.

2. *Manufacture efficiently* conforming to all standards of purity, uniformity, and full weight, by a properly compensated personnel, working under modern sanitary conditions. Operations must be highly efficient to keep costs moderate.

3. *Process carefully* to preserve the maximum nourishing and nutritious qualities.

4. *Package properly* delivering the products to the consumer in perfect condition, in convenient and attractive form.

5. *Distribute widely* that they may be available everywhere.

6. *Advertise honestly* to inform the consumer of their true merits.

7. *Price wisely* giving consumers maximum value, but also a fair return to employees, stockholders, and dealers.

8. *Supply directions* that suggest economical, attractive, and appetizing ways to serve.

9. *Strive for convenience,* saving time and labor for the consumer.

10. *Maintain constant research* to find new and better methods, new and better products.

Report of Committee on "Chocolate Milk"

DEFINITIONS AND STANDARDS OF STATES

I. Fourteen states reported that they had no standard law or regulation covering the definition and standard of identity of chocolate milk, chocolate drinks, or chocolate flavored drinks:

Colorado	Oklahoma
Idaho	Oregon
Iowa	Rhode Island
Maryland	South Carolina
Nebraska	Utah
Nevada	Washington
North Dakota	Wyoming

The state of New Jersey has no standard, but their new state Food, Drug, and Cosmetic Act provides, as does the Federal Food, Drug, and Cosmetic Act, for the labeling of food products for which no standard has been promulgated, with the listing of ingredients by their common name.

Eleven states have adopted by state regulation the definition of chocolate milk under a general definition as follows:

"Milk or Skimmed Milk Beverage—A milk beverage or a skimmed milk beverage is a food compound or confection consisting of milk or skimmed milk, as the case may be, to which has been added a syrup or flavor consisting of wholesome ingredients."

The states in which this is a standard for such products as chocolate milk, chocolate drink, or chocolate-flavored drink are:

Alabama	Montana
Arizona	New Mexico
Arkansas	North Carolina
Kansas	Texas
Massachusetts	West Virginia
Missouri	

In these states apparently milk or skimmed milk may be used and combined with a syrup or flavor so long as the product is of wholesome ingredients and no requirement is made as to the composition of the syrup or flavoring used.

The states of Michigan, Vermont, Virginia, and Territory of Hawaii provide that chocolate milk is a product made by combining in a sanitary manner an amount of whole milk and clean, sound chocolate syrup. No mention is made of the use of skimmed milk or the percentage of butterfat to be present in the product.

Virginia further provides that the butterfat and bacterial count must be the same as for milk.

The states of Florida and Louisiana provide that the product when made with whole or skimmed milk and a chocolate or cocoa syrup must not contain less than 2 percent of butterfat.

Georgia and Illinois provide that chocolate milk must contain at least 3 percent of butterfat after addition of a chocolate syrup.

Delaware, Kentucky, Mississippi, and Tennessee provide that chocolate milk must have at least 3¼ percent of butterfat or the label must indicate the percentage of milk fat to which the milk has been adjusted.

A number of the states have taken special cognizance of chocolate milk and chocolate milk drinks. Their definitions are different from those mentioned above as well as from one another, and perhaps should be mentioned in detail:

California—Pasteurized milk or pasteurized skimmed milk combined with chocolate syrup, with or without the addition of harmless coloring matter, may be used in the manufacture and sale of soft drinks under a trade name. Such a product shall be colored or contain ingredients that cause it to differ distinctly from milk in color and other characteristics.

Connecticut—Chocolate milk is a milk prepared by mixing chocolate with milk, either whole or skimmed, and subsequently must conform to the requirement for the labeling of milk. It is permissible to handle chocolate milk in a milk room. In the case of a chocolate milk prepared from milk in such a way that the butterfat content is below the legal standard,

this may still be labeled "Chocolate Milk," provided the percentage of butterfat is not below 2% and is clearly stated on the label in the following manner "Butterfat .....%."

Indiana—Under their new state Food, Drug, and Cosmetic Law, Indiana is among those states that have given attention to chocolate milk at the most recent date:

"Flavored Milk—Identity—Flavored milk is the clean, sound product made by adding chocolate, cocoa, or other flavoring (not artificial) to milk, with or without sugar, edible gelatin, or vegetable stabilizer. It contains not less than 3 per cent milk fat."

"Flavored Skimmed Milk—Identity. Flavored skimmed milk is the clean sound product (containing less than 3 percent of milk fat) made by adding chocolate, cocoa, or other flavoring (not artificial) to skimmed milk or to any mixture of skimmed milk or skimmed milk solids, with or without sugar, edible gelatin, or vegetable stabilizer."

"Regulation. Flavored skimmed milk shall be labeled to show that the product is made of skimmed milk or that it contains not less than a specified per cent of milk fat: Provided, that such labeling shall be printed conspicuously on the principal label in a size and color of type easily readable."

New Hampshire—The state of New Hampshire has made a very close study of chocolate milk and the type of product which is being sold within the state. Based on this study a definition as passed by the New Hampshire State Board of Health is as follows:

"All flavored milk drinks whether sold as 'chocolate milk' or under a special or coined name, shall, unless conspicuously labeled to indicate otherwise, consist of whole milk reduced in volume by not more than ten percent by the added flavoring agent, and shall contain not less than the minimum percentage of butter fat as provided by law (3.35%).

"Flavored milk drinks when based upon the use of partially skimmed milk shall, regardless of the name under which these may be sold, bear on the cap in conspicuous and legible type the words 'Made from Partly Skimmed Milk', or some equivalent language such as to be clearly informative to the consumer. In any case, such milk product shall contain not less than two per cent (2%) of butter fat. Any advertisement or display which may have the effect of causing it to appear that such partially skimmed product represents flavored whole milk is forbidden."

Ohio—The following definition has been promulgated within the last year by the state of Ohio: "Any bottled drink made from milk, cream, skim milk, or other similar dairy product, together with sugar or syrup, and chocolate or other flavoring matter, if it contains 3% or more of butter fat, shall be labeled as 'milk', together with the true name of such flavor, as for instance 'chocolate milk'.

"If any such product shall contain less than 3% of butter fat, but 2% or more of butter fat, then such product shall be labeled as 'dairy drink', together with the true name of the flavor of such product, as for instance, 'chocolate dairy drink.'

"If any such product shall contain less than 2% of butter fat, it shall be labeled as 'drink', together with the true name of the flavor of such product, as for instance, 'chocolate drink', and shall also be distinctly labeled in addition thereto, with the following statement, 'Made with skim milk."

New York and Minnesota—It would appear that Indiana, Minnesota, and New York are among the few states that have taken into consideration the fact that the product usually used as a flavoring material for chocolate milk is cocoa and not chocolate. New York provides that if cocoa is used as a flavoring material the product must be labeled "Chocolate Flavored Milk."

South Dakota—This state requires that a statement of all ingredients used must appear on the label of a product made of milk and milk products, chocolate, or cocoa.

Wisconsin—In this state cognizance has been taken of the fact that cocoa is used in most cases in place of chocolate, and that salt, sugar, and tapioca starch or other products acting as stabilizers are used in the manufacture of this product. It requires that the label of the product sold as "Chocolate Flavored Milk" must indicate that the product is composed of chocolate and cocoa syrup and that other ingredients used in the syrup must also be shown on the label.

State bacterial standards for chocolate milk appear to be based entirely on the bacterial standards of milk. The variation is from 30,000 colonies per ml. to 200,000 colonies per ml. depending upon the grade of milk used in the manufacture of the product. Many states do no work on bacterial control of milk products, and in those states the control of milk supply, including sanitary control of chocolate milk, is under the supervision of city or local health departments.

Only ten states reported the sale of a

sterilized chocolate drink handled by soft drink bottlers. This product is sold under some coined name or sold as "Chocolate Drink".

Reports were received from 48 states and the Territory of Hawaii.

There is at present no definition and standard of identity for chocolate milk, chocolate flavored milk, or chocolate flavored skimmed milk prescribed by regulation under the Federal Food, Drug, and Cosmetic Act. Under that law such a product being fabricated from two or more ingredients must bear on its label the common or usual name of each such ingredient except that spices, flavorings, and colorings may be designated as such without naming each. If an artificial flavoring or chemical preservative is used, the label must state that fact.

Undoubtedly there is a fair amount of interstate traffic in bottled "Chocolate Milk."

DEFINITIONS AND STANDARDS OF CITIES

II. Historically, it would appear that the Certain-Thyson Milk Company of Miami, Florida, began the manufacture and distribution of chocolate milk in bottles during the late fall of 1919. This company is of the opinion that they are first to manufacture and market chocolate milk successfully in large quantities.

In the study made of the control of chocolate milk and its definition and standard as promulgated under city ordinances, we find that most frequently cities refer to the state definitions, or the definition "A milk beverage or a skimmed milk beverage is a product consisting of milk or skimmed milk, as the case may be, to which has been added a syrup or flavoring consisting of chocolate ingredients".

Of the 52 cities in 31 states, 23 did not have any standards by municipal ordinance or were using the state definition. Most of the cities having a standard, require the product be labeled with the bottler's name and the name of the product. In 32 cities the grade of the milk used in manufacture is required on the label. The sanitary regulations for the production of milk apply in all cases to the production and sale of the chocolate milk. The standards for bacterial count of chocolate milk range from 30,000 colonies per ml. to 150,000 colonies per ml.

Baltimore, Maryland, goes so far as to limit the amount of cocoa or chocolate and sugar which may be added to chocolate milk sold in that city.

One city, Savannah, Georgia, has prohibited the sale of chocolate milk or chocolate drinks containing milk by special ordinance since 1928.

New York City, Fall River, Massachusetts, and Newport, Rhode Island, have special regulations in regard to the manufacture of chocolate milk, prohibiting the use of milk equipment for the processing or bottling of chocolate milk.

Jacksonville, Florida, reported in detail the bacterial count of chocolate milk samples as examined during 1939 and 1940. The bacterial counts of these samples range from 1,000 colonies per ml. to 1,000,000 colonies per ml. for 1939, and from 600 colonies per ml. to 800,000 colonies per ml. for 1940 with the majority in both years of well under 50,000 colonies.

Only 8 of the 52 cities reported the sale within their city of a sterilized chocolate drink put out by a beverage plant. In each case these products were usually sold under a coined name or as a chocolate beverage. The list of cities queried included only those over 100,000 population.

COMPOSITION OF SYRUPS OR POWDERS

III. From the information received from the majority of cities and states, it would appear that "Chocolate" syrup used in the manufacture of "Chocolate Drink" or "Chocolate Milk" has been largely taken for granted by the formers of definitions and standards. In order to secure information as to exactly the composition of the products sold to milk plants for their use in manufacturing this product, inquiry was made of 30 manufacturers of syrups for use in flavoring chocolate milk. These manufacturers reported on 38 different products and it is believed that

their reports cover the majority of syrups or powders offered for sale to dairy plants. Of these 38 syrups or powders, the manufacturers themselves report that only 9 contain any chocolate or chocolate liquor. In not a single preparation did chocolate or chocolate liquor itself compose the entire flavoring ingredient. In all of them cocoa constituted the greatest proportion of the flavoring material. The percentage of cocoa in the syrups varied from 3 percent to 24 percent, the average running around 10 percent. Only 3 of the manufacturers reported using starch in their syrups. Twenty-eight of these products contained thickeners or emulsifiers in the form of Irish moss (carrageen), sodium alginate, karaya gum, or locust bean; in one case lecithin was used in addition to Irish moss. The sweetening agent in most of the syrups or preparations was cane sugar, though there were a number of products made of a combination of sucrose, dextrose, invert syrup, and in a few cases malt syrup, maltose, and levulose.

One product offered for use by bottlers of carbonated beverages was made of cocoa with gelatin. The sugar was added by the bottler in accordance with instructions. The final product, made of skimmed milk, contained 12 percent to 14 percent of sugar and 1 percent of cocoa.

Of the 38 preparations, 20, in the instructions for use, recommended what is known as the "hot method" of addition of the syrup or powder; that is, the product was to be added to the hot milk. Directions on three preparations recommended the cold mix method, and the remaining 15 products could be used either in the hot or cold mix method.

Fourteen of the preparations were for use in whole milk only. The others were to be used with whole milk or skimmed milk or the combination with approximately 2 percent of butterfat. In the finished beverages prepared in accordance with instructions from the manufacturers, the percentage of sugar ranged from 4 percent to 9 percent with the average of between 5 percent and 6 percent. The percentage of cocoa in the finished beverage prepared in accordance with instructions from the manufacturers ranged from 0.4 percent to 1.5 percent with the majority around 0.8 percent to 0.9 percent.

Ingredients of the syrups and powders included sucrose, water, cocoa, chocolate liquor, dextrose, invert syrup, malt extract, malt syrup, brewer's yeast, levulose, salt, vegetable gum, tapioca, lecithin, vanilla, vanillin, artificial flavor, "Re-enforced vanilla," "vanillose", coumarin, tartaric acid, baking soda, mineral salt, and sodium benzoate. The vegetable gum used, in accordance with the labels under which the products are sold and in accordance with statements made by the manufacturers, appears to consist mainly of carrageen or Irish moss.

The products are sold under various names as follows: "Chocolate Syrup", "Chocolate Flavored Syrup", "Syrup—Genuine Chocolate Flavor", "Powder for Chocolate Flavored Drinks", "Dairy Drink Syrup", "Chocolate Flavored Drink Base", and "Dairy Syrup, Chocolate Flavor". A number of the products were labeled with statement of ingredients in accordance with the Federal Food, Drug, and Cosmetic Act.

It would appear that the average product sold for making a chocolate drink consists of Dutch processed cocoa (9-10 percent), water, cane sugar, invert syrup, with vanillin, and Irish moss. This product is added in the proportion of 1 to 10 or 1 to 13 to milk either whole or adjusted to 2 percent butterfat.

PLANT PRACTICES

IV. Reports were obtained from 98 plants which are selling a "Chocolate Milk". Of these, 18 plants reported individually to the committee. Information about the other 80 plants was obtained through national corporations. Of the 18 plants reporting direct, only 3 were making their own chocolate flavored syrup; the others were using a manufactured product. Seven of the 18 plants were of the opinion that they were using a chocolate preparation and were not

aware that the preparation they were using was made entirely from cocoa. All of the 98 plants were pasteurizing the chocolate milk after the addition of the syrup or powder. The temperatures of pasteurization ranged from 142° F. for 30 minutes to 185° F. for 10 minutes, and included 165° F. for 30 minutes as well as 160° F. for 10 minutes.

Bacterial counts appeared, as reported by these manufacturers, to range well under 50,000 colonies per ml. In those plants replying, the percentage of sugar in the final product ranged from 4½ percent to 6½ percent, while they stated that the percentage of cocoa in the drink ranged from 1¼ percent to 2.2 percent. The fat in the various products ranged from 1 percent to 3.8 percent. Those products having less than 3 percent butterfat were in nearly all cases labeled as a "Chocolate Dairy Drink," instead of a "Chocolate Milk".

A number of products were labeled with trade names, indicating the chocolate content and undoubtedly were put up in milk bottles. A number of milk bottle caps submitted showed ingredients listed directly on the cap, indicating that the product was made of "Chocolate Flavored, Sweetened, Partially De-Fatted Milk with Added Tapioca and Salt" or "Made from Skimmed milk, 2 percent Milk Fat, Sugar, Cocoa, Vegetable Stabilizer, Salt and Artificial Flavor."

It is unfortunate that in the short time available to the committee, data was not obtained from dairies selling raw chocolate milk. Experience of members of the committee would indicate that chocolate milk sold by dairymen is usually made by the cold method and the product is sold as a raw milk product under city ordinances.

RECOMMENDATIONS

Serious consideration should be given by states and municipalities to the need of more realistic definition of the product known as "Chocolate Milk" or "Chocolate Dairy Drink". In the first place, few products so labeled contain any chocolate, and in the second place, few of them are made with whole milk.

The products as now sold are in the majority of cases a skimmed milk to which has been added a syrup made of water, cocoa, sugar, salt, Irish moss, and vanillin, an artificial flavor. The usual statement in state and city definitions "A syrup consisting of wholesome ingredients" or a "Chocolate syrup" is hardly sufficient to cover this product.

The dairyman or milk plant operator is advised by label of the composition of the product he adds to his milk or skimmed milk as chocolate flavored syrup. In a few cases, the milk bottle caps he uses informs the consumer, if he reads. It is true that many consumers would be uninterested and uninformed by the listing but they are still entitled to such information, or to a definition, state or municipal, which really tells them the composition of the product.

In the opinion of the committee, the question of percentage of sugar or cocoa in the product has been decided by consumer preference and need not be limited in a definition.

The product or products as sold to the consumer may be divided into:

(1) Chocolate-flavored milk, made of whole milk to which has been added a syrup or powder made of sugar (and/or dextrose, maltose, invert sugar), water, cocoa, and/or chocolate, with or without the following ingredients: (1) A stabilizing agent such as sodium alginate, Irish moss, lecithin, or starch (tapioca or corn), (2) sodium bicarbonate, (3) tartaric acid, (4) salt, (5) flavoring (vanilla), (6) artificial flavoring (vanillin or coumarin, (7) a chemical preservative, sodium benzoate, (8) vitamin concentrates of various sorts.

(2) Chocolate-flavored skimmed milk made of milk from which a sufficient portion of milk fat has been removed to reduce its milk fat percentage to less than 3 or 3.25 percent and to which has been added a syrup or powder made of the ingredients listed in (1).

(3) Chocolate-flavored reconstituted or recombined milk is a product resulting from recombining of milk fat, dried

skimmed milk, skimmed milk, evaporated milk or dried whole milk with water and which complies with the standards for milk fat and milk-solids-not-fat for milk, to which has been added a syrup or powder made of ingredients listed in (1).

(4) Chocolate-flavored reconstituted or recombined skimmed milk is a product resulting from recombining of dried skimmed milk, evaporated skimmed milk with water and to which has been added a syrup or powder made of ingredients listed in (1).

The butterfat content of chocolate flavored milks should be determined by the state or local standard for whole milk, reduced only by the addition of the syrup or powder.

The bacterial standard of chocolate-flavored milk products should be determined by the bacterial standards for *milk*.

The milk or skimmed milk used may be pasteurized before mixing or the chocolate-flavored milk or skimmed milk may be pasteurized after mixing by heating to and holding at a temperature of *at least* 143° F., for 30 minutes.

The sanitary requirements for equipment and handling of chocolate-flavored milk or skimmed milk should be the same as for milk.

It would seem that if raw whole milk is legal for sale in a community, the sale of raw chocolate flavored milk could not be banned so long as the bacterial count of the chocolate-flavored milk complied with the standard set for raw milk.

Recent literature and papers in trade journals were reviewed and particular reference should be made to the Association Quarterly of the Dairy Industries Supply Association for February 1940, which contained an exhaustive report on chocolate milk from the industry standpoint. The international Association of Milk Dealers and the National Dairy Council have both collected data for a report on "Chocolate Milk" during the past six months. The results of these reports were not made available to the committee.

The following comments and objections by individual committee members are reported:

1. One committee member believes that recommendations should be made that the milk should be pasteurized after all ingredients have been added.
2. Two members of the committee believe that it was unnecessary to change the name of the product from "Chocolate Milk" or "Chocolate Dairy Drink" to "Chocolate Flavored Milk" or "Chocolate Flavored Dairy Drink".
3. In the opinion of one member a product made of whole milk and a syrup flavored with cocoa should be labeled "Chocolate Milk" because of the fact that this product so composed has been sold as "Chocolate Milk" for the last 20 years and that the consumer has been accustomed to accepting it as "Chocolate Milk".

The Chairman wishes to express especial appreciation to Mr. Horatio N. Parker, of the Committee, for his invaluable asistance with references and information.

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The Past and Future of Dairying *

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History, they say, repeats itself, and the economist adds that business moves in cycles of more or less the same pattern. Consequently, in presenting a subject dealing with the future of dairying it seems appropriate to delve into the past with the hope that its experiences may be of some value in making plans for the future.

For the past ten to twenty years there has been a tremendous amount of research work carried on in all phases of the dairy industry. Much of this work has been stimulated by the problems at hand. Scientific studies dealing with chemical, bacteriological, and engineering problems related to dairy products have given us valuable information. However, the greatest problems confronting the dairy industry today are economic and sociological. We must study our problem then from these angles and endeavor to evolve solutions which will meet exigencies that are becoming more and more apparent.

BEGINNINGS OF DAIRYING IN ILLINOIS

May we go back to some of the early history of dairying in Illinois to see if we can find any clue to our current problems.

About 1813 - 1818 (at the close of the War of 1812) the settlers again began to come into Illinois. This was due to two reasons: one was that the government gave the soldiers land grants in lieu of pay; and the second, that the farmers of the east were moving westward seeking fertile lands. In the early part of the 19th century, the agriculture of New York was primarily that of grain farming; but with constant cropping the farmers soon realized that it was necessary to bring livestock into the picture in order to maintain the fertility of the soil. Some farmers did this but other pushed westward to Ohio, Indiana, Michigan, Wisconsin, and Illinois, seeking new lands and new opportunities. These pioneers settled along the Fox River and although they did bring some cattle with them, they were primarily cereal farmers. In a statement made in 1831 by a certain Mr. J. M. Peck, he says, "Cows in general do not produce the same amount of milk nor so rich a quality here (referring to the Middle West) as in New England." Wheat, corn, and hogs were the crops which could be sold for ready cash and quickly repaid the early pioneer for his efforts. Soon, however, in Illinois as had been true in the East, the constant cropping with grain had a telling effect upon yield and as time passed the crops became lighter with each succeeding year until it became apparent that raising of grain did not pay, and many were of the opinion that the land in northern Illinois would never again repay the farmer for his efforts.

In this same situation the New York farmer had turned to dairying which they promoted with the firm belief that the western states would never compete with them in this industry. But in about 1845 to 50 some of the more progressive farmers of northern Illinois realized their predicament with regard to the fertility of the soil and they too turned to dairying. Herds were enlarged beyond the size needed for the family supply of dairy products. Buttermaking became one of the household duties and each

* Address given at meeting of Chicago Dairy Technology Society, Chicago, December 11, 1940.

family produced enough for its own use and a surplus which was exchanged at the store for what was then known as "store pay". There were no market quotations, and since the producers were completely at the mercy of their buyers, the prices were low.

ORIGIN OF CHICAGO MILK SHED

About this time Chicago was realizing a phenomenal growth from a mere handful of fur traders in 1830 it became a city of 800,000 by the year 1850. Not the least of the problems arising from this rapid growth was that of the city's milk supply. Early in the year 1852 newspapers began to expose the conditions under which much of the milk used in the city was being produced. The inhabitants were shocked to learn that most of the cows were being fed from distillers' and brewers' wastes and were being housed under very insanitary conditions. The solution to both of these problems was found in the idea conceived by Mr. Phineas H. Smith of Elgin —shipping milk from the rural districts into the city of Chicago. On February 12, 1852, he shipped his first can of milk to the old City Hotel in Chicago. This was the beginning of the Chicago milk shed. Mr. Smith was the first to attempt exclusive dairy farming in Illinois.

Supplying Chicago with fresh fluid milk proved to be a profitable enterprise, and Mr. Smith soon increased the size of his herd. His neighbors became interested and in a short time there were carloads rather than single cans of milk going into Chicago.

It is interesting to note that in the year 1857, a young man by the name of Sidney Wanzer started his own independent business of delivering milk which was the birth of the present Sidney Wanzer Company in Chicago.

ORIGIN OF ILLINOIS CHEESE INDUSTRY

Dairy production expanded rapidly for about eight years and within ten years the supply exceeded the demand. Farmers looked for an outlet and some turned to the home manufacture of butter and cheese. However, it seemd hopeless to many because it was difficult to market Illinois dairy products in Eastern markets due to their reputation for poor quality. However, some did begin making cheese in their homes. Utensils were few and methods crude but they found a market for their cheese and butter in Elgin and adjoining towns and occasionally took a load to Chicago. The following is taken from an address by Mr. I. H. Wanzer, one of the pioneer dairymen of northern Illinois:

> "We remember our first experiment in making cheese. We had, on a June morning in 1860, taken our milk to Elgin but, finding the previous day's milk had been returned with notice that they were so flooded with milk that they could not use any more of ours for some time to come, we took the previous day's milk into the wagon with that just brought and started for home. Calling at the grocery of James Knott, purchasing a large wash tub, and a little farther on to the meat market of George Roberts, and bought a calf's rennet, and upon our arrival home under the directions of Mother Herrick made our first cheese, putting it to press under a temporarily constructed press and to curing in one of the rooms of the house. We soon partitioned off a part of the woodshed and obtained a larger wooden tub, with a smaller tin tub to go inside of the wooden one, heating our milk and whey by warming water on the stove and turning it between the two tubs. Thus we worked for three seasons, curing our cheese in a part of our house."

Thus was born the commercial cheese industry of Illinois.

Later, in 1863, Mr. Herick built a small cheese factory 16 by 40 feet and purchased a cheese vat and screw presses from H. A. Rowe in Hudson, Ohio, which was the first cheese factory in Illinois.

Again quoting from Mr. Wanzer:

> "Thus we labored on releasing the overburdened milk market, taking our cheese loose in wagons principally to Chicago, in warm weather going all the way by night. We remember reaching South Water Street one morning in the summer of '63. Meeting Mike Daris, who got upon our wagon, lifting the sheet that kept the dust off our cheese, offering us 21 cents per pound for the load, we closed a bargain at 22 cents, and in less than one hour had unloaded and received our pay, $462.00, reaching home in time to do our milking that night."

The cheese industry had its commercial beginning in Mr. Wanzer's kitchen in 1860, and the first specialized cheese factory was built in 1863. By 1865 there were 17 cheese factories in Illinois and this number had increased to 46 by 1870.

CONDENSED AND EVAPORATED MILK

It was about the middle of the 19th century that Mr. Gail Borden of White Plains, New York, began experimenting with the process of condensing milk, and in 1857 Mr. Borden put upon the market for city use "Plain condensed milk." By 1861 he had introduced his article rather extensively and had established several factories, each capable of producing 5,000 one-pound cans per day. In 1865 the Illinois Milk Condensing Company was organized in Elgin. This played a very important part in dairying because it gave an additional market to milk and, furthermore, it changed a perishable into a non-perishable product that could be shipped great distances, thus encouraging greater expansion of milk production in Illinois.

BUTTER PRODUCTION

The manufacture of butter in the farm homes was developed in Illinois about the middle of the century. By 1870 producers in and around Elgin became interested in the commercial manufacture of butter, and according to Mr. Earl Garver, Dr. Joseph Tefft of Elgin was sent East to examine buildings and equipment used in the commercial manufacture of butter. The Elgin Butter Factory was built in 1870, and late in the season it began operations. Mr. Wanzer was engaged to superintend the manufacture of butter and skimmed milk cheese. It was in this plant that Mr. Wanzer, with the help of some of the stockholders' wives, made the first creamery butter west of the Great Lakes. During the second season —1871—this factory made about 80,000 pounds of butter. Thus began the commercial creamery industry in the Elgin district, utilizing butterfat; the by-product, skim milk, was made into skimmed milk cheese. The creamery and cheese industries increased rapidly throughout the Elgin district and other parts of the state so that by 1883 there were about 400 creameries and cheese factories in Illinois.

It was also about this time that someone conceived the idea of making filled cheese by substituting lard for butterfat. This continued until the Federal law interfered, but during this time filled cheese did much to destroy the reputation of Midwestern cheese in Eastern markets of this country and also in foreign markets.

COMPARISON WITH PRESENT CONDITIONS

I have given you the foregoing because it perhaps antedates the life history of anyone here. Now may I contrast what I have said with the conditions as we find them today.

You will note that approximately 100 years ago many farmers in New York went westward to find more fertile soil for the production of grain and that the grain farmers of the Midwest soon produced grain in such quantities that it made cereal farming in New York unprofitable and these farmers turned to dairying. Then within a period of 10 or 15 years the grain farmers of the Midwest found that to maintain the fertility of their soil they, too, had to turn to dairying and at first their activities along this line were curtailed by lack of local markets and the quality of their products. It was difficult to break into the more profitable Eastern markets but the rapid development of urban centers and the interest in sanitation in milk production eventually created a market for the fluid milk produced in "the country". With this stimulus the supply of milk soon exceeded the demand and the dairyman of the Midwest sought new markets and new methods of utilizing their milk.

Now where are we today? To be sure, we are very advanced in our methods of breeding and feeding cattle, in the production, processing, and distribution of sanitary milk, and in the manufacture and distribution of other dairy products. We have very large urban areas and our modern methods of transportation have extended our markets tremendously; nevertheless, we have fundamental problems that are quite akin to those of 100 years

ago. At that time the farmers realized that they were depleting the fertility of their soils. Never in the history of this country has there been so much emphasis placed upon conservation of our productive soils as at present. To be sure, for 50 years some of the state experiment stations have advocated a system of permanent agriculture, but much of their teachings has fallen on deaf ears. Now the Federal Government, working through the state experiment stations and various soil committees extending down into every county, is promoting a program on land use planning on a gigantic scale. Their program includes the control of the depletion of fertile soils by erosion, as well as depleting soils by removing fertility in the form of crops. In a program of this kind, involving the control of soil-depleting crops, expansion of soil-building crops, use of grass waterways to control soil erosion, and the production of wholesome food for the farm family, dairying is taking a very significant position. The dairy cow is the most efficient converter of grasses, legumes, and other crops into animal products, milk, and meat, and in addition, returns a by-product to the land which will improve its fertility. Consequently, dairying in Illinois is on the increase.

COMPETITIVE DEVELOPMENT OF DAIRYING IN OTHER SECTIONS

In the land-use planning program for some of our other states, especially those in the South, curtailment in the production of certain crops, especially cotton, has resulted in an increase in those crops which encourage dairying. This is extremely significant because these new areas have become competitors for Illinois and Midwest dairymen the same as the competition which developed between the Midwest farmers and the New York farmers 60 to 80 years ago. The increased production of milk, cream, evaporated milk, ice cream mix, powdered milk, cheese, and butter by states that twenty-five years ago practiced very little dairying is changing the marketing situation of this country considerably. It is interesting to note that for some years the corn belt states have been supplying a considerable portion of the sweet cream used in Boston, New York, and other Eastern cities, in addition to much of their butter and other dairy products. For illustration, the months of November and December have always been months of low production for the New England farmers and over a 10-year period (1930-39) Western plants have supplied an average of 57 percent of the cream used by the city of Boston during the month of November. The increase in dairying, coupled with certain economic trade barriers, is changing that situation tremendously and the Western cream shippers are rapidly losing their Eastern markets. The basic changes which are taking place in agriculture in Eastern states, together with certain stimulating effects of marketing programs, have promoted the production of milk in those states to the extent that they have no need for much of the cream formerly supplied by the Midwest.

TRADE BARRIERS

One cannot mention the trend in dairying without giving some consideration to a new factor entering into the picture—economic trade barriers. An economic trade barrier is any law, rule, or ordinance, or the act of any individual or group which will prevent or inhibit the free flow of economic goods. I speak of trade barriers as a new factor whereas they are really as old as business. In fact, so far as this country is concerned, they date back to the federation of the 13 states of the Union. When the Constitution of the United States was formulated the authors planned to regulate trade barriers and, therefore, included articles which would regulate commerce with foreign nations, among the several states, and with the Indian tribes. Article 1, Section 10 of the Constitution of the United States provides that: "No state shall, without the consent of Congress, lay any duties on exports or imports except what may be absolutely necessary for its inspection laws."

So, economic trade barriers are not new but under the new scheme of government which has been promoted in recent years, and because of the activity of pressure groups, trade barriers have multiplied in number, in kind, and complexity. Altogether too few of us engaged in the dairy industry fully realize the far-reaching effects of trade barriers that are now in existence. Many of the health regulations promulgated by states, counties, and municipalities have been adopted and promoted for the protection and benefit of the public's health. I believe that this aspect of these laws and ordinances had the whole-hearted support of the dairy industry. However, many of these helpful pieces of legislation are being misused by those who would control the volume of supply available for a market and thus create artificial prices. All of these trade barriers which tend to prevent the free flow of milk of equal quality, tend artificially to raise the price of milk to the consumer with the result that the consumption of milk by urban people, especially those in the lower income brackets, is greately curtailed. Thus there is a loss of a market for the producer and distributor and there is a loss in health by those potential consumers. Malnutrition due to a lack of an adequate consumption of milk by many children is a definite community hazard.

CHANGING AGE LEVELS

There is another situation that is coming into the picture. There has been a definite decrease in the birth rate during recent years. For example, from 1925 to 1936 our national birth rate dropped from 21.5 to 16.7 births per thousand of population, a startling decrease. Consequently, as a people we are becoming older. We must not overlook the fact that children have been our greatest consumers of fluid milk. Therefore, if we are to maintain our per capita consumption of dairy products, we must encourage adults to consume more milk and we must also promote dairy products which are to the liking of adult consumers because with the curtailment of a potential market and a definite increase in the production of milk and dairy products, we are confronted with a situation which can become serious.

THE FUTURE OF DAIRYING

There will always be technical problems to be solved; but our main problem today is to maintain for the dairy industry its important place in the scheme of American living. The answers to this problem will be complicated and multiple.

There is a definite relationship between food nutrients per acre and economic milk production. Consequently, those areas which are most efficient in the production of dairy feeds, especially roughages, are going to develop as leading production centers in the dairy industry. This must be coupled with a better breeding and feeding program for dairy cattle; and most important of all will be the marketing. In the year 1822 an Englishman making an exploratory trip through the new state of Illinois to see what its possibilities were for the dairy man stopped over night at a farm near Lawrenceville. In the morning he found his host greasing his wagon with "good fresh butter." Upon questioning the man explained that he might as well since it was hardly worth his while to carry it the ten miles to Lawrenceville since there he would only receive 5 cents a pound for his product and that in trade.

Whether or not the most efficient marketing will prevail will depend upon the curtailment of trade barriers, since today our transportation system is highly developed and has greatly reduced the distance between farm and market.

And finally, to keep up the per capita consumption of dairy products we must adapt our products to the desires and demands of our consumers and supply them at the minimum cost commensurate with service and quality.

Phosphatase Production in Dairy Products by Microorganisms *

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The value of the phosphatase test in detecting inadequate pasteurization of market milk naturally suggests its use with other dairy products. With certain of these products, for example butter and cheese, the situation is quite different than with market milk because in normal commercial and consumer channels they may be held for extended periods at temperatures which do not prevent the growth of organisms. This raises the question of whether positive phosphatase tests necessarily indicate inadequate pasteurization of the milk or cream used for the products or whether phosphatase can be formed in the products.

Various investigators have noted the production of phosphatase by microorganisms. In the work herein reported a variety of organisms was considered but most of the attention was directed to species known to grow in butter. The organisms were first tested for phosphatase production in sterile milk, and then selected cultures were tested in butter.

LABORATORY PROCEDURE

A modified Scharer short test was used and the results considered positive only when they were very definite. With the cultures that were positive in milk, tests also were run with heated cultures and again in a buffer substrate containing no disodium phenyl phosphate in an attempt to exclude growth products which would react with the indicator; these trials were regularly negative. For the most part no serious attempt was made to evaluate the activity of the phosphatase, as indicated by the phenol liberated, because this was greatly influenced by the amount of inoculation, time and temperature of growth, and other factors. Phosphatase production was tested only at the normal pH of the buffer substrate employed, rather than at various pH values, as was the case in certain studies that have been reported. A culture definitely was considered phosphatase negative only after a 7-day culture grown at a reasonably satisfactory temperature failed to give a test. Many of the species studied grew very well at 21° C. but with some of them 37° C. was employed. With butter, the tests were run on serum recovered by melting and centrifuging the butter.

BACTERIAL PRODUCTION OF PHOSPHATASE

Of the species studied, the most active phosphatase production in milk occurred with those belonging to the genus *Pseudomonas*. *Ps. putrefaciens* is an excellent example. Each of 52 cultures, no two of which came from the same source, gave strong reactions in 24 hours, although there was some variation in the reactions, presumably because this species does not readily initiate growth in milk or on agar. Up to a certain point, the phosphatase increased as the culture aged. The production of phosphatase is now used at the Iowa Agricultural Experiment Station in the tentative identification of *Ps. putrefaciens;* that is, cultures which give the typical reaction in litmus milk are next tested for phosphatase production.

Ps. nigrifaciens also rapidly produced phosphatase. *Ps. mephitica* was less active but still conspicuously positive. *Ps. cyanogenes* was even less active. The other species of *Pseudomonas*, which in-

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cluded *Ps. aeruginosa, Ps. fluorescens, Ps. synxantha, Ps. fragi, Ps. graveolens, Ps. mucidolens* and some others, were negative.

In the *Escherichia-Aerobacter* group, certain cultures of *Aerobacter* gave a positive reaction while the *Escherichia* cultures were negative. A single culture of *Flavobacterium fecale* was strongly positive. Some of the cultures of *Alcaligenes* were positive and some negative, the positive cultures being unidentified species from sewage and negative cultures being *Alc. lipolyticus* and *Alc. viscosus.*

Each of five cultures of *Oospora lactis* gave a positive reaction, although the reactions were not as strong as with some of the bacterial species.

Only negative results were obtained with organisms of the genus *Streptococcus,* which included *S. lactis, S. citrovorus, S. paracitrovorus, S. citrophilus, S. diacetilactis* and *S. liquefaciens.* and with organisms of the genus *Lactobacillus,* which included *L. acidophilus, L. bulgaricus* and *L. casei.* Twelve cultures of the genus *Propionibacterium* gave negative results. Nine cultures of the genus *Bacillus* from stock collections, each representing a different species, also gave only negative results. Of seven cultures of the genus *Clostridium,* one gave a slight reaction. *Proteus ichthyosmius, Proteus vulgaris, Serratia indica, Serratia marcescens* and *Staphylococcus cremoris-viscosi* were negative. *Torula sphaerica, Torula cremoris, Mycotorula lipolytica* and various species of the genus *Sporobolomyces* also were negative.

Various cultures of bacteria isolated from butter on different occasions, but not identifiable on the basis of published descriptions, gave positive phosphatase reactions, some of them being strong.

The active production of phosphatase by certain species of organisms has a significance from the standpoint of phosphatase in dairy products that are held for extended periods at temperatures above the freezing point because most of these cultures can grow at relatively low temperatures. This is particularly true of some of the *Pseudomonas* species which are known to grow in butter.

The results on phosphatase production by organisms also are of interest from the standpoint of identification of species, a point that has been suggested by various investigators. Certainly, tests that are not too time-consuming and which have a real significance from the standpoint of the identity of organisms are needed. While many cultures of the various species must be investigated before adequate information can be formulated, interesting points along this general line are developing. Since different genera apparently include both phosphatase negative and phosphatase positive organisms, it appears that the test can be of value only within a genus.

Various cultures that produced phosphatase in sterile milk also produced it in other liquid media in which the particular species developed satisfactorily, while cultures that were phosphatase negative in sterile milk also were negative in other suitable liquid media. No detailed study was made of the numbers of organisms required in the media to give a positive phosphatase test.

PRODUCTION OF PHOSPHATASE IN BUTTER

In testing the phosphatase production of selected species in butter, the following procedure was used. Sweet cream was pasteurized at about 77° C. for 30 minutes. After cooling to about 17° C., portions of the cream were put into sterile jars, inoculated with the test organisms, and held over night at about 6° C. The cream was churned in the jars with a laboratory churn and the butter washed with sterile water and worked with sterile equipment. The butter, some of which was salted and some unsalted, was held at 21° C. This is a common temperature for keeping quality tests on butter. Although the changes at 21° C. sometimes are different from those at the temperatures to which butter is exposed in commercial channels, there is a general similarity and the changes occur more quickly; 7 days at 21° C. are roughly equivalent to a considerably longer period at 5° or

10° C., at least for many of the species that grow in butter.

The organisms which actively produced phosphatase in milk also rapidly produced it in unsalted butter. These included *Ps. putrefaciens, Ps. nigrifaciens, Ps. mephitica* and *Fl. fecale.* Certain cultures that were less active in milk, such as *O. lactis* and an *Aerobacter* strain, also gave definite reactions in unsalted butter. Some of the unidentified cultures gave conspicuous reactions in the butter.

In general, when the butter was salted, the production of phosphatase was less rapid and less extensive than with the corresponding unsalted butter but was still very definite with various organisms.

Portions of some lots of the experimental butter were held at temperatures considerably below 21° C. and tested for phosphatase at various intervals. Phosphatase production occurred in these portions, although it was less rapid than at 21° C., as would be expected from the temperature relationships of the organisms.

PHOSPHATASE DEVELOPMENT ON HOLDING

Various investigators have reported that butter which was originally phosphatase negative may become positive on holding. In studying this point, 28 samples of salted butter and 74 of unsalted butter were used, the latter being churned from highly ripened cream in order to get the desired flavor. The butter was made in a number of plants that varied greatly in the general methods of operation. Seven of the salted samples and 16 of the unsalted samples changed from negative to positive or from slightly positive to more strongly positive. Serums from these samples were streaked on the agar used for milk analysis and representative colonies picked into milk. After purification the cultures were tested for phosphatase production in milk. Three of the salted samples and nine of the unsalted samples readily yielded organisms that produced phosphatase.

The failure to isolate phosphatase positive organisms from all the samples streaked may have been due to the difficulty with which certain species develop on plates, although growing readily in butter. An example of such an organism is *Ps. putrefaciens;* ordinarily it can be isolated from butter in which it is present only with special procedures.

In general, the phosphatase positive organisms isolated from butter produced little or no acid in milk and were proteolytic. No attempt was made to identify them but studies along this line are under way. Several of the cultures were added to pasteurized cream and the cream churned, as already outlined. The resulting butter became phosphatase positive on holding.

CHEESE

Although trials were not carried out, in general it appears that there is less danger of phosphatase producing organisms causing positive phosphatase reactions in cheese than in butter. The most active phosphatase producing organisms encountered are relatively sensitive to acid and would have less opportunity for significant growth in cheese than in butter because of the rapid acid production during the manufacture and ripening of cheese. In a limited number of experimental cheddar cheese made from pasteurized milk, the phosphatase tests were still negative after ripening for several months.

SUMMARY STATEMENT

Various organisms produced phosphatase in sterile milk. Of the species studied, some of those belonging to the genus *Pseudomonas* were the most important in this respect. These and other phosphatase-producing organisms also produced phosphatase in both unsalted and salted butter, although the production was less rapid in the salted product. This general relationship suggests that phosphatase production by organisms in butter during the relatively long, normal holding period should be considered in applying the test to butter. An important point in this connection is the ability of various *Pseudomonas* organisms to grow at relatively low temperatures. In general, it appears there is less danger of phosphatase production causing positive tests in cheese than in butter.

Dr. Hardenbergh in New Position

John G. Hardenbergh, a long-time active member of the International Association of Milk Sanitarians, has been selected to be the executive secretary of the American Veterinary Medical Association, with headquarters in Chicago, Ill. His new duties include some editorial work on the two publications of the Association, namely, the monthly Journal of the American Veterinary Medical Association and the new American Journal of Veterinary Research, started only last October but already with a subscription list of nearly two thousand names.

Jack Hardenbergh has behind him a notable record of accomplishment. Since his graduation from the School of Veterinary Medicine, University of Pennsylvania, in 1916, he has been affiliated with the Gilliland Laboratories, the Veterinary Corps of the U. S. Army (1918-1920), the New Jersey Bureau of Animal Industry, the Mayo Foundation for Medical Education and Research, and the Walker-Gordon Laboratory at Plainsboro, N. J. In 1936, he was elected to the presidency of the International Association of Milk Sanitarians. During his incumbency, executive ability, vision, and courage were strikingly displayed in his support of Mr. William B. Palmer in launching the Journal of Milk Technology.

DR. J. G. HARDENBERGH

J. H. S.

The Fruits of Industry

The many friends of Dr. H. A. Harding, one of the old-timers in the I. A. M. S., will be interested in the following extracts from a personal letter written by him in December to one of the officers of the Association. Said Dr. Harding:

"Am now well started in my 70th year and if I am to have any special fun and do any special writing it is time that it was under way.

"Have about 100 acres here on the shore of a bay out of Lake Michigan, where the bass fishing is unusually good. One cottage is fitted up as an office or study and a couple more for the various members of the family. Have 14 grandchildren, and all of them were in camp some time during the summer.

"Am planning to build a small modern cottage so that I can live here all the year if desirable. Had intended to spend the winter in Florida in my trailer but am still here making arrangements to get pine timber cut for the house. Will hardly get away South, as I have some business to attend to and desire to get back here by the first of April.

"The above heading (Bailey's Harbor, R. D., North Bay, Wis.) is my permanent address, but the Journal of Milk Technology had better come to the Detroit office, as I will be in Detroit for some months this winter. All first-class mail will be forwarded by the postmaster here.

"We have had a couple of zero days here this winter but the remaining weather has been delightful. It was thawing practically all day today.

"If your travels bring you out this way, hope that you will look me up."

Dr. Harding, evidently, is one of the wise and fortunate minority who find it possible to enjoy the fruits of their years of labor before the "grinders cease because they are few" and "while the evil days come not, nor the years draw nigh" of which they must say that they "have no pleasure in them."

P. B. B.

Report of the Committee on Education and Training

The desire for the establishment of a reservoir of trained personnel from which to draw replacements for individuals lost by death, retirement, or dismissal, or for expansion of a staff, is probably innate in every administrator and executive. The existence of such a reservoir would so materially simplify replacements and extensions. Milk control administrators and executives are also victims of this passion for simplification.

For a generation or two, first those known as "reformers" and then all conscientious public officials have been appealing for trained personnel in public employment. The establishment of civil service systems of public employment resulted from this demand when it was realized that satisfaction of the demand would also freeze their appointees into their positions. In recent years public health authorities have emphasized the essential need for the employment of adequately trained personnel, the American Public Health Association has proposed minimal standards of educational qualifications for professional public health department personnel, and a number of educational institutions have established both regular and specialized courses for the education of such personnel.

Milk sanitarians have not been innocent of nor exempt from this clamor for trained personnel. That this demand is sincere is exemplified by the numerous institutes, short courses, seminars, etc., held each year for the training of milk control personnel. All milk control personnel is not employed in a public capacity, because the need for the quality control of milk supplies, and the demands of manufacturing and packaging processes, are receiving increasing attention from commercial milk and milk products distributing concerns.

The foregoing is a rather succinct—possibly incomplete—statement of the need and problem for which the Committee on Education and Training of this Association is called upon to propose a solution and means of fulfillment.

Most of the older members of this Association have obtained their training—and, incidentally, their present professional status—in "the hard way." They, in a large majority of instances, were educated to be physicians, veterinarians, sanitary engineers, chemists, bacteriologists, dairy husbandrymen, or technologists—and even attorneys; yet circumstances, propinquity, or desire led them into milk sanitation. From then on, they had to learn their new "profession" by their own efforts. In many cases that learning has extended over a long period, during which the profession of milk quality control has developed and evolved.

Now that milk quality control—or milk sanitation—is a fairly widely recognized profession, and milk control is a function of most units of government—from the federal, through the states, to counties, cities, and even townships and villages—the demand for milk sanitarians is greater than the supply, and those responsible for the demand and for the filling of it are appealing to the educational institutions of the nation for a supply—they cannot wait for their successors to learn by experience.

Your committee has studied this situation rather pragmatically, and has no panacea to propose.

There are at least four types of milk sanitarians, including: *directors* of milk control programs in health departments and in commercial organizations; *inspectors* and *fieldmen* who devote their full time to that endeavor; *sanitation officers* and general *inspectors*, a greater or lesser part of whose time is devoted to milk control; as well as *health officers*, *veterinarians*, *bacteriologists*, and *chem-*

ists, whose duties require a knowledge of the principles and practices of milk sanitation. Although milk sanitation is regarded by the members of this organization as a "profession," it is really a specialty of any one of several of the more established professions.

Generally speaking, the vast majority of milk sanitarians are employed by units of government. There is, consequently, a limit to the number of milk sanitarians employable in that connection, particularly to the number of directors of milk control divisions, bureaus, or sections of health departments. It would, therefore, be rather hazardous for an educational institution to establish a full academic course in milk sanitation. A young man would hardly be expected to enter upon a four-year preparation for a profession, which, if he does not obtain a position over political and civil service obstacles, he cannot practice as an individual in the open market. Even though a graduate of a medical or engineering school prefers a career in public health, if he fails to obtain a position in that field he can practice medicine or make a connection with an engineering firm. The opportunities available to the recently graduated milk sanitarian would be far more limited.

It appears to follow, then, that the education of milk sanitarians—those who seek that professional status—can most practically consist of the grafting of specialized training on the curricula of courses in medicine, veterinary medicine, sanitary engineering, public health, dairy husbandry, and possibly others.

Much as we might prefer the situation to be otherwise, most milk sanitarians have grown into their positions, and new additions to the ranks are entering as inspectors and fieldmen. An increasing proportion of these hold degrees; but a high proportion do not. We may as well admit and recognize the fact that the proportion of inducted inspectors who do not hold degrees will remain high for some years—at least until remuneration for these positions becomes more attractive to university graduates. Such personnel requires specialized training, available in semester or short courses, institutes, seminars, etc. Instruction of this nature may be termed "in-service education."

Instruction of a similar nature is the only practical means for improving the serviceability of the type of personnel which devotes only a part of its activity to milk control.

Your committee would not ignore nor minimize the part which the reading of periodicals plays in the inspiration of personnel to more thorough work, in the awakening of them to new trends, and in the development of an understanding of new materials, processes, and equipment used by the industry—all of which falls in the category of education.

It has not been the purpose of your committee to compile a roster of institutions where education of the types referred to may be had. Inclusion of such a roster would specifically date this report. It is, instead, the object of the committee to point out certain facts which appear to have been unrecognized or ignored in discussions of the education of milk sanitarians.

Although milk sanitation is becoming more nearly unified year by year, it is still true that each state and locality must conduct its milk control activities in a manner fitted and suited to that locality. Milk ordinances may be practically identical, but basic local statutes vary. The most completely educated milk sanitarian is unlikely to be fully equipped to assume immediate direction of a milk control bureau or division until he has been in a locality long enough to learn local statutes, conditions, and other factors. This truism applies with equal force to new personnel inducted into a milk sanitation organization. It will ever be necessary to depend upon organization-maintained educational facilities to polish and put the finishing touches on personnel. Indeed, some administrators prefer to employ intelligent, industrious, and aggressive salesmen, teachers, and others, without an inkling of the principles of milk sanitation, and to educate and train

them *de novo,* thus avoiding the introduction into their organizations of views and philosophies in conflict with policies already in effect.

CONCLUSION

Your committee ventures the opinion that no institution now offers a course of education including all the subjects in which it has been suggested that a milk sanitarian should be fully competent. The reason has been suggested. The tendency is, rather, for schools of veterinary medicine, sanitary engineering, public health, dairy husbandry, and dairy technology, to provide courses in the more specialized phases of milk sanitation, thus integrating existing facilities for the equipment of a limited profession.

The possibility that educational institutions will function so effectively that public health organizations may discontinue their educational efforts, as exemplified by short courses, seminars, institutes, etc., is not envisioned as one of the near future. The value of such educational efforts, as refresher courses and in the instruction of new personnel, is sufficient justification for their continuance. In this connection it is recommended that the Association designate some member to consult with the proper authorities in Washington with respect to the securing of funds provided by the George-Deen Act, for the training of milk sanitarians in a manner similar to that now utilized by Water and Sewage Associations.

Lastly, your committee desires to emphasize the educational value of membership in the *International Association of Milk Sanitarians,* or any of its affiliates, and of attendance at its annual meetings, and of the regular perusal of the JOURNAL OF MILK TECHNOLOGY, and other periodicals devoted to milk and milk sanitation. All milk control organizations are urged to encourage their personnel in this direction.

H. E. MILLER, *Chairman.*

Report of Committee on Dairy Farm Methods

For the past few years it has been the policy of your Committee to select one or two subjects for discussion instead of submitting a general report. This year your Committee has selected SEDIMENT IN MILK as its topic. The reason for this choice is the great diversity of opinion among health officials and milk sanitarians as to its importance from the standpoint of public health.

We all agree that theoretically milk should be free from foreign matter. The question arises—"Is it possible to produce a supply of market milk entirely free from sediment?" If, as many of us feel, it is practically impossible to do so, then some definite procedure should be adopted and followed for the determination of what constitutes satisfactory and unsatisfactory milk.

If the best sanitary practices are employed in its production, there should be very little evidence of sediment in milk. However, it should be observed that even with the rigid methods which prevail in the production of certified milk, it is desirable and necessary to filter the milk at the place of production.

In most instances, slight sediment in milk does not seem to have a direct bearing upon its bacterial content. Then again, even though there is a small amount of foreign material in milk when delivered to the receiving station, it is seldom that sediment is found in the finished product when sold to the consumer, because of our modern methods of processing milk.

Obviously, from the aesthetic point of view, dirt in milk is highly undesirable, and in many cases it unfavorably affects milk consumption. At one time the American Public Health Association included in their *Standard Methods of Milk Analysis* a definite procedure for determining the amount and significance of sediment in milk. This brought about a certain degree of uniformity in analytical procedure among health officials and the industry in judging milk quality based on the presence of dirt.

In those days, methods of taking sediments differed greatly from those which prevail at present. Generally a pint sample of milk was taken from a full 40 quart can after it had been thoroughly stirred and the sample in question then permitted to flow by gravity through the filter pad. Today we use a 40 quart can of unagitated milk as the unit, and collect our sample from the bottom of the container by using a suction type collector.

When comparing the results of the two methods, it is interesting to note the great improvement that has taken place in milk sanitation during the past twenty-five years. At present most of our milk supplies show a smaller amount of visible sediment on the discs with the agitated 40 quart unit than with the unagitated one pint unit method. The conclusion is therefore warranted that our milk of today contains much less dirt than our supply of a score of years ago.

As previously stated, most sediment tests are now taken by using the suction type collector. This type tends to draw the sediment and approximately one pint of milk directly from the supply in the bottom of the can. By this means, the maximum amount of sediment in the 40 quart can is disclosed. Admittedly the amount of sediment removed from a 40 quart can of milk by a suction collector is not an accurate index of the cleanliness of milk in a quart bottle or container offered for sale. The test however has been a factor in cleaning our supply. In most cases when a dairyman is shown his sediment disc containing an excessive amount of dirt, the psychological effect generally prompts improved methods and the delivery of cleaner milk.

Samples of milk for sediment testing are generally taken from a can of morning's milk. The reason for this is that the warm milk will pass through the cotton disc more rapidly. Tests have revealed that not all cans of morning's milk from the same producer contain equal quantities of sediment. The first can of milk strained is liable to contain a smaller amount of sediment than the second can, and so on depending upon the volume of milk passing through the filter. As the straining process becomes slower the dairyman is liable to resort to bumping, which tends to force some of the sediment through the filtering material. This results in the second can showing additional sediment. Morning's milk usually contains more sediment than night's milk. This is undoubtedly due to greater care in the preparation of the cows and stable before the night's milking.

We all realize that dirty sediment tests are an index of careless production methods. Although most of the dirt can be removed from milk containing an excessive amount of sediment, the normal fresh, clean flavor that is so desirable may be adversely affected by its presence.

Your Committee would like to offer the following practices to assist in the production of clean milk:

Stable

1. Keep cow beds and floors clean and free from dust and dirt.
2. Keep walls and ceiling clean and as free from dust as possible.
3. Provide a plentiful supply of clean bedding, free from dust.
4. Clean shallow gutters at least twice daily using plenty of absorbent.

Cow Yard

1. Keep cow yard well drained and free from holes.

Milking

1. Keep cows clean. Keep hair on flanks and udders short at all times. This will necessitate more than one clipping during the stabling season.
2. Thoroughly wash with clean water udders and flanks of all milking cows.

Straining

1. Use a good strainer that holds a single-service flannel square or cotton disc firmly in place. Make sure that filtering material is properly placed in strainer, so as to prevent any by-passing of milk.
2. Never bump or jar the strainer if milk filters slowly.
3. Never strain more than two cans of milk through one filter. Better to use a separate filter for each can.
4. When changing filtering material, the strainer should never be held over a clean empty can or a full can of milk.
5. Never set strainer down on a dirty surface while changing filtering material.
6. Always rinse strainer with clean cold water when filtering material is changed.
7. Never strain milk in a dirty atmosphere. Always use milk house or straining room.
8. Good practice suggests a separate strainer for each two cans of milk.

Cans

1. Keep cans covered with clean canvas to and from plant.
2. Never carry feed or other material on top of cans while in transit.
3. Keep truck clean and free from dirt and dust.
4. Never walk on tops of cans while on truck.
5. Always store cans in a clean atmosphere.
6. Never park cans along dusty roads unless they are protected.
7. Care should be taken in removing cans from truck. They should be placed in an upright position with covers on.
8. All cans and utensils should be examined and found clean before coming in contact with milk.

Your Committee believes that some control officials are too rigid in their interpretation of the sediment test results and

in their subsequent enforcement of those interpretations. The customary routine at milk receiving stations in the country is to reject milk containing excessive sediment, particularly after one or more warnings have been issued to the producers. Obviously some of this milk which has been cleaned in the interim, has found its way back into the milk receipts on the following morning, thereby adversely affecting the flavor and general quality of the milk supply. It is unfortunate and at times embarrassing that there is a lack of uniformity among health officials and milk sanitarians in determining what constitutes satisfactory and unsatisfactory milk, as revealed by sediment test results.

Your Committee also feels that a standard or gauge should be in general use whereby health officials, sanitarians, and the industry would be enabled to interpret sediment test results in a uniform manner. Due to the fact that widely different interpretations do prevail, your Committee recommends the following:

1. That a resolution be adopted by this Association and presented to the American Public Health Association, in order that there may be evolved the most satisfactory methods for collecting samples of milk for the purpose of determining its sediment content.
2. That a resolution be drawn up by this Association and presented to the American Public Health Association, for the purpose of developing a standard photographic gauge to be placed in general use for the determination of what constitutes satisfactory versus unsatisfactory milk as indicated by the sediment test.
3. That a committee be appointed by this Association to cooperate with a committee of the American Public Health Association, for the purpose of developing such a photographic gauge.

Your Committee feels that this question is so important that action should be taken during the current convention.

F. D. HOLFORD, *Chairman.*

The Disposal of Dairy Wastes *

H. A. Trebler

Sealtest Research Laboratories, Baltimore, Maryland

In recent years progress has been made in understanding the waste-saving and waste-disposal problems of the dairy industry. Most workers in the field now agree that:

(1) Practically all the well-known methods of sewage disposal can be readily adapted to dairy waste.

(2) Dairy waste disposal is relatively expensive because most of the plants are small and the waste is strong. It therefore becomes of utmost importance to cut wastes in the plants as far as practicable and as far as the sanitarians will permit.

(3) The strong by-products such as buttermilk and whey should not be treated in waste-disposal units and should not be dumped into streams or sewers unless very large amounts of dilution water are available.

(4) Cooling waters and storm waters should in general not go to disposal plants except when and where they are needed for dilution.

(5) Wastes from toilets should go directly to a septic tank and not pass through screening units, etc., used for dairy waste. The effluent from these tanks, however, may join the dairy waste for further disposal if so desired.

(6) Small amounts of milk waste are beneficial and not at all detrimental to healthy stream conditions if at all times the total daily oxygen demand of the waste discharge from a plant is kept well within the available oxidizing and reaerating ability of the stream.

Most of these facts have been known for many years, but it has taken a long time for the dairy industry to heed this good advice. In the meantime, a rather undesirable reputation has been established which it will take some time to live down. Furthermore, a great deal of money has been spent on unnecessary damage suits and on improperly operated and inadequate waste-disposal units.

ELIMINATION OF WASTE IN THE PLANTS

An important contribution has been made by the equipment manufacturers. For instance, the foamless separators have cut out much waste. Large entrainment separators on vacuum pans are also quite essential, especially for making superheated condensed skim milk. New can washers are being built with long drip savers and frequently with a small preliminary water jet. But can washers can still be greatly improved. Dump equipment is being improved but careless dumping personnel continue to cause spillage on the floor in spite of relatively well-designed equipment. In general the new streamlined design of milk equipment has been of great help by facilitating complete drainage and easy rinsing of the equipment. Unfortunately, leaky sanitary valves, pumps, and fittings are still with us, but at least some plants use drip pans and collect all drips for animal feeds. The increasing use of paper gaskets has also been of help in reducing leaks.

Further progress can be made if continuous automatic samplers are installed in the sewage lines, taking samples in proportion to the flow every day. The volume of a daily composite sample and its turbidity makes it possible to determine the daily milk waste for a given plant. A premium system for reducing waste could be inaugurated, depending, of course, on the number and type of operations done in the plant each day.

* Presented at Annual Meeting of the Pennsylvania Association of Dairy Sanitarians, Harrisburg, Pa., 1940.

A photo-electric turbidity-volume recorder could also be installed without much difficulty, but this would naturally be somewhat more expensive than a simple homemade automatic sampler.

One of the greatest difficulties is that some health officials seem to think it is bad policy to permit collection of rinsings and drips because they are afraid that these waste products might find their way back into the regular milk supply. Most health departments now permit saving of drips and rinsings if specially marked cans are used to handle the material but there is still considerable disagreement as regards the proper utilization of these wastes.

Of course there are practical limits to waste saving, especially in plants where more complicated manufacturing is undertaken. In creameries and in cheese factories making washed types of cheese there will always be diluted wash waters to dispose of even if the strong buttermilk and whey are carefully collected and utilized. Also, when vacuum pans and drying rolls are used, there will be waste on the floor even if the "burnt-on" scrapings are collected and burned as they should be. These scrapings, if left on the floor, give strong waste as they gradually dissolve and are carried down the sewers.

A town or city disposal plant can usually handle such wash waters without trouble, and very frequently a stream of sufficient volume is available; but if this is not the case, then it becomes essential to know what procedure to follow to determine the treatment best suited for a given set of conditions. Frequently a partial treatment will be adequate, and sometimes it is only necessary to treat during certain seasons of low-stream flow. Fortunately low-stream flow does not usually coincide with our greatest milk production.

FLOW MEASUREMENTS AND SAMPLING

If an automatic sampler and flow-measurement device is not available, samples and flow-measurements should be taken at least every 15 minutes during the full time of the plant operation. Furthermore, this should be done each day for at least one full week since in most plants there are great variations in waste from day to day. The simplest way of making flow measurements is to time the filling of a five- or ten-gallon container. It is also easy to construct a still box with a measuring weir. Of course, if an automatic sampler is installed, a weir box is essential. The old-style tipping box with a counter can also be used to good advantage and can be made to sample automatically without difficulty.

Each day's composite sample should be sent, well iced, to a laboratory and analyzed for biological oxygen demand. From the dairy-waste volume and its biological oxygen demand, the daily pounds of oxygen demand can be estimated. This is the most important factor in determining the degree of treatment required for a particular plant and the cost of such treatment. Also this is the most important factor for determining whether or not a stream is capable of handling the waste by self-purification. No definite figures can be given since streams vary both in rate of flow and re-aerating capacity. However, experienced sanitary engineers can make fairly accurate estimates if they know the pollution value of the waste and the characteristics of the stream at various seasons of the year.

PRELIMINARY OR PARTIAL WASTE TREATMENT

Some preliminary treatment will usually be required to eliminate coarse suspended matter and to distribute the load either to streams or disposal plants. Frequently it may be possible to improve conditions sufficiently by preliminary treatment so that no further treatment is required. Various methods are available.

Screens and Fat Traps

Coarse suspended matter should be taken out of the waste as soon as possible. It is therefore advantageous to have many and large floor drains with perforated screens on top and large perforated screen buckets underneath. These buckets

should be cleaned daily and the collected solids burned. A small amount of chloride of lime should be sprayed in and around each sewer outlet after the daily cleaning. The screen buckets are particularly important in cheese plants where it is difficult to avoid some spillage of curd particles on the floor.

The next best thing to screen buckets in the floor drains is a large screen-bucket or a screening tank in the main sewer outlet. In larger plants it is convenient to use brass screens of the slotted type next to a septic tank so that the screenings can be backwashed into the septic tank once a day, while the screened liquid may by-pass the septic tank directly to other waste-disposal units. In most cases, however, it is just as easy to collect screenings in a perforated metal bucket and burn them under the boilers. If the waste carries large amounts of fat, it is advantageous to build the screen tank rather long and to place a skimming baffle just ahead of the screens in order to keep fat and floating matter away from them. The tank should be skimmed once a day and skimmings disposed of with the screenings.

The depth of a combined screen tank and fat trap should be at least two feet under the normal liquid level. For good fat separation the surface area of the tank should be about two square feet per one hundred gallons maximum hourly flow, the tank being about twice as long as it is wide. The tanks and screens should be cleaned and sprayed with dry chloride of lime once a day. It is impossible to specify the size and mesh of the screens required since conditions vary from plant to plant; but in general it may be found convenient to use one screen with slotted openings of one-eighth inch by two inches and another screen with slots one-sixteenth inch by one and one-half inches.

When compressed air is available it may be better to separate fat and floating matter by aeration. As the aerated liquid cools down, the fat clumps together with other solid material and can be removed from the tank with a long-handled screen basket. The aeration tends to keep the waste fresh and free from odors. Some chloride of lime should be sprayed around the edges of the tank daily. A primary aeration tank also can be used as an equalizing tank or pump sump for a disposal unit or for equalizing the discharge to a stream or to a city sewer.

Septic Tanks

Most investigators agree that a septic tank is unsatisfactory for treatment of dairy waste. However, if the tank is properly built and correctly used, it is undoubtedly the simplest and cheapest waste-disposal unit available. The curious thing is that the very earliest investigators in the field apparently gave correct dimensions and methods of operation for septic tanks for dairy waste, but it is relatively seldom that one finds a tank which has sufficient capacity and which is being operated correctly.

The tanks should have a volume of at least twice the daily waste volume or two hundred fifty gallons per pound oxygen demand, whichever is the larger of the two. Furthermore, the pH should be kept neutral. This can be accomplished best by keeping them warm (preferably around 90° F.) and by introducing the waste through several inlets or otherwise distributing the waste as soon as it enters the tank. The heating of the tank will not be expensive in most milk plants since the boiler blowoff and other waste heat are usually available; furthermore, there is usually enough hot water used in the plant to keep the waste at a relatively high temperature. Boiler blowoff should be particularly beneficial since it gives both heat and alkalinity.

It is essential that septic tanks be started right by filling them with water, some lime, and some ripe septic sludge from a disposal plant, possibly about one pound of lime and one gallon of sludge per one thousand gallon tank capacity. Horse manure has been found to be helpful in getting the right fermentation started. Under these conditions, it does not appear to be very difficult to keep the tank from going sour. A relatively large volume of methane and carbon dioxide gas is formed

under these conditions but very little hydrogen sulphide. On the larger tanks the gas should be collected and sent through a flame trap to the grates under the boiler.

If the septic tank is operated without seeding with sludge, it will soon go sour. This will help to precipitate protein, but the protein digestion is slowed down to such an extent that there will be very little BOD reduction in the tank. In addition to this, the tank has a tendency to fill up too fast and to create bad odors. Also, a heavy layer of scum is formed on top, although this can be kept down to some extent if a fat trap is used ahead of the tank.

Chemical Precipitation

It is highly probable that a stream of reasonable reaeration ability can handle waste with 0.01 to 0.02 percent lactose or lactic acid (100 to 200 ppm.). If so, a chemical precipitation process could be used to great advantage in many cases. Lactic acid itself appears to be toxic to fish life in soft water, but in most natural streams the water has enough hardness to neutralize the acid (1). At least, it is possible by chemical precipitation to produce a clear effluent free from odors with considerable reduction in biological oxygen demand. This would be a satisfactory solution in many cases, especially where it is simply a matter of reducing the load on a stream during certain seasons of the year. If chemical precipitation is followed by chlorination, still better conditions can be produced in small streams and in city disposal plants. Chlorination can be used to delay the decomposition of the milk sugar until the waste reaches a point where more dilution is available.

Various chemicals have been suggested for treatment of milk waste. A combination of copper sulfate and lime does a complete job of precipitating proteins, but it is expensive. Ferrous sulfate and lime will also do a good job but leaves an effluent highly deficient in oxygen. Ferric sulfate is better in this respect and also gives a sludge which is easier to handle. However, the pH range of these compounds is rather narrow so that frequently quite large amounts of lime are required in order to get the best results. Aluminum sulfate has the advantage of being easy to handle and of having a rather wide pH range. This seems like the cheapest and best chemical at the present time and there should be a number of places where it could be used to advantage. From 200 to 400 ppm. of aluminum sulfate are usually required to get satisfactory precipitation.

For large plants it may be more economical to use continuous precipitation. It is more economical to use vertical cylindrical settlers made of steel than horizontal flow concrete tanks placed in the ground. Wooden tanks are not very satisfactory unless they can be kept filled with liquid all the time. The retention required in vertical flow tanks is much shorter than that required in horizontal flow tanks. Possibly four hours' retention should be provided on the basis of maximum hourly flow. In some cases it may be economical to have a flow-equalizing tank ahead of the settler in order to reduce the size of the latter. Of course this will be economical only if very heavy surges are expected. Since very few plants operate both day and night, the ideal method may be to pump the waste into a tall steel tank, feed chemicals in proportion to the flow, then allow this to set for a while after the cleaning operations have been finished in the plant at night, and then during the night let clear liquid run out the top by the use of a flexible hose attached to a float. In the morning the sludge can then be let down to a lagoon or large septic tank and the tank hosed out and sprayed with a small amount of dry chloride of lime in order to keep it in good condition.

COMPLETE TREATMENT

The various treatments described above will not do a complete job. A number of complete treatments are now available to the industry at a reasonable cost but they should, of course, not be installed except where absolutely needed.

The available types of treatments fall into two main classifications, namely, processes using trickle filters, and processes using activated sludge. In addition to these there are a number of combination processes involving the use of chemicals in combination with one or both of the above. All of the processes have this in common, namely, they require some means of:

1. Preliminary treatment with screens or fat traps.
2. Storage and equalizing with a pump.
3. Aeration in tanks or on tricklers.
4. Settling.
5. Sludge disposal (which is usually not included in the price quoted for the unit because it can frequently be done with old lagoons or septic tanks already available.)

TRICKLER FILTER

As originally designed, very large crushed rock units were required, but development work in the last several years has made it possible to reduce the size of the unit to such an extent that they are competitive with other methods of treatment as regards construction costs. In our own work (2) we have been able to get very satisfactory results by the use of tin-can tricklers. Tricklers are rather difficult to keep free from odors at all times. Also there is always the danger of flies even when the rapid-and-continuous-flow type is used.

Rapid-flow trickle filters followed by precipitation with aluminum sulfate give excellent results, and this may be the ideal solution for many plants. The chemical precipitation step might have to be used only in the summer time. Chemical precipitation preceding a rapid-flow trickle filter also gives good results. However, in using chemical precipitation ahead of a biological process, there is always the possibility of an accidental excess of chemicals interfering with the subsequent biological process.

ACTIVATED SLUDGE

It has been claimed that it is difficult to operate an activated sludge plant for dairy waste because it requires much more attention than the corresponding trickle filter plant. Both plants really require considerable attention when used in connection with certain types of dairy waste. One thing is certain—it has been shown both here and abroad that it is possible to treat dairy waste by activated sludge in a very satisfactory manner. The straight activated sludge process, however, does appear somewhat expensive both to install and to operate, since a long time aeration and considerable lime are required in order to get the best results.

COMBINATION PROCESSES

Some of the recently developed combination processes appear to offer good promise since they are cheaper to build and appear less delicate to operate than the simpler processes mentioned above.

The Guggenheim process uses a small amount of ferric sulfate and a small amount of lime followed by four hours' aeration. The sludge is then settled out; part of it is returned to mix with the incoming waste as in an activated sludge process, and part of it goes as waste to a lagoon or septic tank or to sand beds. All that this really amounts to is to shorten the aeration time of an activated sludge process by the use of a small amount of chemicals. The process is giving good results in two cheese plants. There is no royalty to be paid for the use of the process but a reasonable license fee is included in the construction cost of the unit.

The most recent combination process, and possibly the most interesting one, is built by the Lancaster Iron Works. This firm conceived the idea of making a small disposal plant consisting essentially of two eight feet diameter steel tanks which, except for foundation, can be put on trucks and set up in less than a day's time. The treatment consists of an activated sludge step and a chemical precipitation step using aluminum sulfate. The operation is simple, and first costs and operating costs are low. Therefore, it looks as though this may be a very

satisfactory solution for plants where a perfect purification is required.

Both the Guggenheim and Lancaster plants are capable of taking care of overloads for a short time, but this does not necessarily mean that we can afford to work with smaller plants as a continuous proposition. Trickle filters also will take occasional large overloads, but they must be given time to recover. Most waste disposal firms and consultants make complete surveys of the plants before they design any units, and they also give advice on waste-saving precautions in order to keep the size and the cost of the units within reason.

CONCLUSION

In conclusion it may be said that the essential thing is to cut down the waste in the plants to the absolute minimum, since every pound of milk solids which has to be treated in a disposal plant is going to cost a great deal of money both in installation cost and treatment cost. After wastes have been cut to the practical and economical limit, conditions should be investigated carefully to determine if a partial treatment, possibly for only part of the year, would be satisfactory. There are any number of streams which have plenty of water during three-quarters of the year and, consequently, treatment may be required for only three or four months each year at the most. If complete treatment is necessary, it is strongly recommended that one of the well established firms which are now specializing in dairy waste disposal be consulted. This would be far more satisfactory than trying to experiment with all kinds of homemade units which most likely will not do the job after they have been installed.

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The Phosphatase Test in Canada

In August, 1940, at the request of Dr. T. H. Butterworth, Chairman of the Committee on Applied Laboratory Methods of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS, a letter was addressed to each of the Provincial Health Departments in Canada requesting information concerning the use of the phosphatase test. Replies received from seven of the nine provinces are summarized briefly on the accompanying table.

As might be expected, there is considerable variation in the extent to which the phosphatase test is being used. Ontario, where compulsory pasteurization was introduced in October, 1938, makes the greatest use of the test, closely followed by Quebec. Where, as in the Prairie Provinces, cities are smaller and the rural population is proportionately larger, the test is not employed to the same extent. However, there is a general recognition of the value of the phosphatase test, and its use will doubtless increase considerably in the near future.

C. K. JOHNS.

Tabulation of Use of Phosphatase Test in Canada

Question	Alberta	British Columbia	Manitoba	Nova Scotia	Ontario	Quebec	Saskatchewan
1. To what extent is test being used in routine control of pasteurizing methods by health departments in your province?	Being used to some extent in Calgary and Edmonton.	Not yet used as routine test.	Not yet as routine test, but used on a limited scale in Winnipeg and Brandon.	Rapidly coming to be used as a routine test in Provincial Laboratories, also for field work.	Routine tests on all samples from pasteurizing plants, the same as plate count and other examinations.	Provincial Laboratory runs all samples taken for controlling efficiency of pasteurization. Montreal City Lab. runs special samples.	One city uses as a more or less regular routine test, others occasionally.
2. Is it being used as a basis for court action?	No.	No.	No.	No.	Yes. Basis of court action. Compulsory pasteurization has been in effect since October 1938.	Yes, when undepasteurization suspected.	No.
3. If so, what success has it met with when presented as evidence in court?	—	—	—	—	Yes. Validity of test never questioned.	Used successfully to support claim that raw milk was supplied instead of pasteurized.	—
4. To what extent is it being used by commercial concerns in checking their operations?	None running as routine test.	Not as routine.	Several interested but none running as routine test.	One or two considering its adoption.	Doubtful if used to appreciable extent.	Not as routine.	Some interested but none using routine tests yet.
5. Which of the various modifications of the test are being used, and which are most popular?	Kay-Graham-Neave, Scharer.	—	Scharer short test found satisfactory.	Scharer.	Scharer used as preliminary test. Before court action, checked by Kay-Graham.	Prov. Lab. - Gilcreas modification. Montreal Lab. - Scharer.	Scharer
6. Any information concerning the phosphatase test not included under the first five headings.	Exceedingly useful as control measure.	—	Test of great value in locating unsatisfactory conditions in plants. Hope to make greater use of it in future.	More impressed with Scharer than Gilcreas method.	Scharer test much quicker. Of particular value as check on operations of different plants.	Believe Scharer test insufficiently sensitive. O. K. for field test. More useful with chocolate milk since other methods always give positive results with well pasteurized chocolate milk.	—

Report of Committee on Sanitary Control of Ice Cream

Progress in the field of ice cream and frozen desserts has been steady during the past year. There is ample evidence to indicate that more states and cities are increasing their regulations pertaining to frozen desserts. Canada through its federal government at Ottawa has passed some noteworthy legislation affecting the packaging and selling of ice cream.

The new proposed Standard Methods for Analyzing Frozen Desserts which is being promulgated by the American Public Health Association is going to be of immense benefit in the control of these products. It will place frozen desserts on a par with milk and should aid greatly in their control.

Following the custom of previous years, the chairman has asked all members of the committee to contribute to the report. Since every section of the United States and Canada is represented, the report gives an excellent idea of the problems as well as the progress that is being made in this field.

Ralph E. Irwin, Director, Bureau of Milk Sanitation, Pennsylvania State Department of Health, makes several good points relative to ice cream sanitation. He states:

"In many states the standards for cleanliness relating to milk and ice cream vary greatly. Until 1935 we had sanitary requirements for dairy farms producing milk for milk treatment plants but no sanitary requirements for farms producing milk for preparation of ice cream. Therefore, when we found the dairy farm too dirty to sell milk for bottling purposes, we allowed the sale of milk for making ice cream. Today the sanitary requirements for making ice cream and for the preparation of bottled milk are the same. Certainly our Association should promote the use of clean milk not only for bottling purposes but also for the preparation of ice cream, cheese, butter, etc.

"The continuous freezer now coming into general use is a forward step in that this freezer is operated under cover and under pressure and there may be no exposure from the holding tank to the filling machine. The mechanical packaging of ice cream is likewise a forward step as this gives additional protection from the plant to the consumer.

"Attention is called to the protection needed for small installations. The so-called counter freezer is usually installed under sanitary conditions as to location and operation. Certainly the public at large should be informed as to the protection needed for the preparation of ice cream so that the individual purchasing a small ice cream outfit understands that the preparation of ice cream is under supervision so far as cleanliness and safety are concerned. I mention publicity because we find that in Pennsylvania the purchaser is usually led to sign a contract for the so-called counter freezer because he is assured that the freezer may be installed in a show window or beside the cash register and that the sanitary requirements which must be met by his competitor are not required for the installation he is to make."

Every year it becomes more evident that counter freezer installations must meet the same sanitary requirements as manufacturing plants. We can not have two requirements—one for the small and one for the large producer. Disease is no respector of size. Disease epidemics bear ample testimony of this fact. Every milk inspector who does not recognize this is assuming a grave and an unnecessary responsibility. G. J. Turney, Sanitary and Food Inspector, Lansing, Michigan, makes some pertinent suggestions regarding regulations for counter freezer installations.

"*Room*—The counter freezer shall be enclosed in a room on all four sides and top with at least four feet from the working end of the freezer and two feet on all other sides. However, an eighteen-inch opening for serving may be installed on one side of the freezing room when positive filtered ventilation is used.

"*Floors*—All floors in freezing room shall be constructed of concrete or other equally impervious and easily cleaned material and shall be smooth and properly drained.

"*Walls and ceiling* of the room shall have a smooth, washable and light colored surface.

"*Light and ventilation*—The room shall be well lighted and ventilated. Every part of the room shall have a minimum of at least ten foot candles of light per square foot. The ventilation shall be sufficient to prevent odors and water condensation.

"*Hand washing facilities* shall be provided in the freezing room consisting of a wash bowl

properly connected to a drain, an adequate supply of hot and cold running water, soap and single service towels, easily accessible to the employees.

"Facilities for cleaning equipment—There shall be separate wash tanks or vats for properly cleaning of the freezer parts, cans, forms, piping and other equipment. Wash tanks or vats shall be large enough to completely submerge such equipment. There shall be equipment available for supplying and using an abundance of hot water at a minimum temperature of 180° F. or live steam under pressure for cleaning and sterilizing purposes.

"Care of equipment—Immediately after each usage or when the operation for the day is finished, all equipment, pipe lines, containers, and other utensils used in the manufacture of frozen desserts shall be first rinsed with warm water and then washed in water at 115° F. containing a suitable dairy cleaner (not soap) and finally rinsed to remove all washing solution, after which they should be stored so as to allow proper drainage.

"Sterilization of counter freezers may be accomplished after cleaning by use of hot water at 180° F. for two minutes, treating with flowing steam until the condensed steam dripping from the freezer reaches a temperature of 190° F. or by 100 p. p. m. of available chlorine.

"Immediately prior to starting the freezing operation, the freezer and all parts coming in contact with the frozen dessert, shall be treated with a chlorine rinse containing 50 p. p. m. or other equivalent bacterial treatment approved by the health department. No cloth of any kind shall be used to wipe the interior of the freezer or parts coming in contact with the frozen dessert after the bactericidal treatment.

"Care of raw and finished products—All mix shall be pasteurized and only a sufficient amount placed in each container for one freezing. The mix shall not be held longer than seven days under proper refrigeration. All finished products shall conform in all respects to the legal requirements of the board of health and shall be properly refrigerated at all times."

W. C. Cameron, Chief Inspector of Dairy Products, Department of Agriculture, Ottawa, Canada, gives us a very clear picture of the recent advances made in Canada regarding standardization and weight of package and bulk ice cream. This is a problem that is under consideration in many places in the states. Canada's forward step should encourage those who have this matter under consideration. Mr. Cameron's report follows:

PACKAGED ICE CREAM

"Standardization of Size"

"On May 1, 1940, under the Dairy Industry Act and Regulations it became compulsory for all packages containing ice cream and sherbet to be of a full net volume of one-quarter pint, one-half pint, one pint, one quart or multiples of a quart (imperial measure). Small packages, novelties, etc., that is, packages of a net content of less than 5 fluid ounces, are not standardized, but the net contents must be shown, and may be expressed in terms of fluid ounces.

"The necessary legislation for this standardization was passed on June 15, 1939, so that the trade was given ample opportunity to dispose of stock of irregular-sized packages. This regulation has now been operative for five months, or one season. Indications to date are that it is proving to be an important factor in maintaining stability within the industry and confidence among consumers.

"Volume of Packages

"The control of overrun in the manufacture of ice cream in Canada is controlled by legislation requiring that each gallon of ice cream shall contain at least 1.9 pounds of food solids. In checking the amount of food solids per gallon, it is necessary to weigh representative packages and cans of ice cream. Therefore, it is of extreme importance that the actual volume of ice cream in a package be known. That is to say, a pint package must be capable of holding, and must actually contain, twenty fluid ounces of ice cream (imperial pint), if calculations of food solids per gallon are to be accurate. During the past season, with the cooperation of the Weights and Measures Inspection Service, Department of Trade and Commerce, Ottawa, a large number of ice cream cartons have been measured and checked for actual volume, and the actual quantity of ice cream being offered for sale in such cartons has been checked on many occasions in all parts of the Dominion. As might be expected, discrepancies were found, but were corrected as quickly as possible, and it can now be stated that the pint brick cartons now in use are capable of holding one pint of ice cream, and that such cartons are properly filled by the trade.

BULK ICE CREAM

"Determination of Weights

"Members of our inspection staff still encounter some difficulty in respect to partly filled cans of ice cream in the retail trade. Small 'counter freezer' operators do not as a rule carry heavy stocks of ice cream, and oftentimes several partly filled cans of various flavours are on hand, making it very difficult to determine an accurate weight per gallon. This problem was raised last year, and has not been solved by us as yet.

SHERBETS

"There appeared on the market a product called sherbet, which was a very cheap article manufactured from skim milk, stabilizer, and

sugar. The definition for sherbet as it appeared in the regulations under the Dairy Industry Act did not contain a clause prescribing the minimum acid content, and the result was that the above-mentioned product was being substituted for ice cream in dispensing milk shakes, sodas, malted milks, etc. The sale of this product was increasing and threatened to become a serious abuse in the industry. When the regulations were amended in June, 1939, the definition for sherbert was corrected by including the usual statement setting forth the minimum acid content (0.35 percent of acid as determined by titrating with standard alkaline solution and expressed as lactic acid). By requiring all sherbets to have an acid content of not less than 0.35 percent, the trade has discontinued using sherbets in sodas, milk shakes, etc., because sherbets are now true to type and quite distinct from ice cream."

Dr. Andrew J. Krog, Health Officer, Plainfield, N. J., has made a number of timely suggestions in the field of frozen desserts. It is interesting that committee members located in different parts of the country should make the same observations and suggest the same remedy to correct them. This was especially true this year regarding several items. Dr. Krog's report follows:

"1. *Emptying of Batch Freezers:* The adoption of continuous freezers (in most ice cream plants of large capacity) has focused the attention of dairy sanitarians on the problem of withdrawing ice cream from batch freezers for package-filling machines. The old practice of drawing ice cream out of batch freezers into cans, after which the ice cream is dumped into packaging machines has been eliminated by continuous freezers—ice cream is pumped directly into the packages, or pumped directly into packaging machines. The development of devices whereby ice cream may be pumped from batch freezers to packaging machines without the intermediate can-handling eliminates the problems of the sanitation of these intermediate cans. The action of the New York City Health Department in demanding such pumping devices for batch freezers is considered a step in the right direction. It is suggested that this Committee advocate similar steps for the uniform treatment of ice cream from batch freezers.

"2. *Packaging Machines:* The trend of distributing ice cream in factory-packaged containers is a definite step toward eliminating the contamination difficulties encountered at ice cream fountains—if the plant packaging equipment is kept at a proper level of sanitation. It has been the finding of some of the control agencies in this area that sometimes plant-packaging devices are not kept in proper sanitary condition. The attention of this Committee is directed to the cleaning operations which must be given to popsicle molds, fancy-form molds, brick molds, Dixie and Vortex type cup-filling machines, and pint and half-pint filling machines. The suggestion is made that definite rules for the cleaning and sterilization of such items be drawn by the Committee. It has been our experience that attempts to enforce a coliform specification on plants (which maintain proper physical equipment) are rendered void by the elementary lack of sterilizing these various packaging devices. The suggestion is further made that a routine check-up of these machines be included in line-tests at ice cream plants.

"3. *Counter Freezer Installations*: The difficulty which has been experienced in this area with counter freezing units is that although one operator may have been taught the proper method of caring for and handling the device, the sanitation of the device is frequently left to the care of uninstructed individuals. The suggestion is offered the Committee that definite rules be adopted for the sanitation of these units, and that copies of these rules be posted in premises employing such devices, so that all who have contact with the machine can not claim the excuse of not being familiar with the sanitary requirements imposed.

"Counter freezer installations generally buy a completely processed mix. This mix may have met all current sanitary specifications originally; but the care given the mix at the point of final use varies so much with the seasonal demand (mix may be held for only twenty-four hours on hot days, up to a week or more during a cold spell), that the product when finally frozen bears little resemblance to the original mix. It is believed that if definite specifications are made out and enforced, for the handling of continuous freezers, a definite time interval beyond which mix is no longer considered suitable for use should also be invoked. The mix containers should bear the original tags from the mix manufacturing plant as long as they remain in the use of the counter freezer operator.

"4. *Sanitary Specifications:*

"(a) AGAR PLATE COUNTS ON TRYPTONE GLUCOSE AGAR: The levels of maximal counts permitted in this area are in large part much higher than those obtained from efficient plants, even though tryptone-glucose-agar has been found to raise the counts beyond those yielded with the old standard formula medium. The average counts obtained on ice creams from plants in this area during the past twelve months is below 15,000 colonies per gram (on plant packaged items). It is believed that the maximal permissible counts which are now between 100,000 and 500,000 colonies per gram could well be lowered to a level, say of 25,000. It must

be admitted that the samples taken from fountains frequently exceed a 25,000 maximum specification. This is merely another indication that our control of fountains has not yet reached the point that we want to achieve ultimately.

"(b) DIRECT MICROSCOPIC STANDARDS: The nature of the individual components of ice cream mix have, of course, a large bearing on the direct microscopic information which will be obtained on the examination of the finished ice cream. It is to be expected that the product made from skim-milk powder and butter oil will have a much lower count than one made from whole fresh milk, whole fresh cream and whole fresh fluid condensed product. It is still to be expected, however, that the products used when fresh fluid products are employed will meet the specifications for those same ingredients when encountered in the fluid market. It is needless to point out that the mix made from concentrates alone—if it does possess a high microscopic count, points definitely to improper handling within the plant—if the count has been obtained on a plant-packaged item.

"(c) COLIFORM CONTROL: This representative of the Committee is pleased to report progress made in the levels of coliform organisms encountered in ice creams marketed in this area. The use of this technique has been able to locate sources of trouble in various plants and to calibrate the degree of success in overcoming these troubles. This statement can not be made, however, for the whole field of frozen desserts. We have found high coliform concentrations in ices and in novelties (from mixes completely devoid of dairy products) from some manufacturing plants. We have adopted the use of the coliform technique on frozen desserts other than ice creams. (The point referred to under sanitation, above, may well be reconsidered at this time). We have further found that blood agar plates may be used, to advantage, in the examination of ices and other frozen desserts (made without dairy ingredients).

"5. *Contamination after Pasteurization:* The role of fruits, nuts, colors and flavors in contaminating perfect mixes at the freezer, was reviewed thoroughly in last year's committee report. Recent examination of various brands of these materials (prepared for ice cream use) has disclosed that possibly the recommendations of this committee have not been brought to the attention of a sufficient number of ice cream plant operators. If the industry is cautioned to buy these products on sanitary specifications, the manufacturers will learn to supply them. It is suggested that this committee attempt to direct more publicity to the value of carefully selecting those materials which are added to the mix at the freezer."

New problems continually arise in milk control work. One which arose in Birmingham, Alabama, and its solution is presented by L. C. Bulmer, Director of the Bureau of Food and Dairy Inspection of that city. He states,

"The Department of Health of the City of Birmingham, Alabama, in 1940, required popsicles and similar ice cream novelties to be distributed and sold in a completely sealed package or wrapper in order to make tampering with the same immediately obvious to the consumer. Such products are frequently held by peddlers for indefinite periods of time before sale and many instances of tampering, such as licking, have been reported.

"A practical means of sealing such packages or wrappers presents a problem which has not yet been entirely solved. The following steps toward progress have been made:

"1. The use of a hand-operated stapling machine which inserted brads or staples in the bag or container on each side of the stick. This proved unsatisfactory in that the staples tore out on handling and occasionally a child's thumb was punctured in removing the staple. Too, there was the hazard of staples getting into the product.

"2. The method of sealing the container by use of a specially prepared adhesive tape. This did not prove practical as storage caused the tape to lose its adhesive properties.

"3. In the process of being studied are two other means of sealing. Both make use of a container which encloses the popsickle stick. One is a container which has a glue lip across its inner edge and is sealed by the application of heat. The other is the use of a paper punching machine which makes a series of interlocking punches all the way across the end of the bag. At present, both lend promise toward a satisfactory solution of the problem.

"To afford a satisfactory sealed container, the following factors are involved:

"From the public health point of view:
(a) To provide complete protection for product.
(b) To render tamper-proof and seal in such manner that requires tearing of container to remove product.
"From the industry's point of view:
(a) To retain present low cost container.
(b) To provide low cost equipment for sealing container.
(c) To enable rapid and automatic sealing of product.
(d) To involve little or no additional labor cost to perform operation."

F. W. FABIAN, *Chairman*

L. C. BULMER
W. C. CAMERON
H. E. ERICKSON
R. E. IRWIN
A. J. KROG
H. N. PARKER
R. V. STONE
G. J. TURNEY

Further Observations on the Rapid Phosphatase Test. H. Scharer. Amer. Jour. of Public Health, 30, 1206-1210 (Oct. 1940). From Pub. Health Engin. Abs. XXI, Mi. 5.

"Careful repetition of earlier experiments has indicated that there is no advantage to be gained by the employment of magnesium salts in concentration from .01M to .001M as enzyme catalysts. The sensitivity of both the laboratory test and the field test can be greatly increased by prolonging the period of incubation . . ." Supporting data are presented.

"By means of a 24 hour incubation it is possible to detect the addition of as little as 0.01 percent raw milk. However, a 3 hour incubation period should be more than adequate for most purposes, and has in fact been found satisfactory in Europe where higher temperatures of pasteurization prevail. For practical considerations the 1 hour incubation period is still recommended."

If the butyl alcohol procedure is utilized to extract the indophenol from the serum of the laboratory method the sensitivity is further enhanced.

"Present investigations to interpret a positive finding of improper pasteurization as due to addition of raw milk rather than to other factors of operation are not conclusive."

Experimental data are presented to support the author's view that borax is the only common preservative that can be used in samples which are to be examined by the phosphatase test. Application of the phosphatase test to high-temperature short-time paseurization of milk has not been adequately studied.

Errors in the rapid phosphatase test may result from decomposition of reagents, and it is recommended that fresh reagent solutions be prepared daily. Each new batch of reagent should be checked by means of control samples. Apparatus should be thoroughly cleaned before use and corks must not be substituted for gum-rubber stoppers. Seven references are given.

PAUL D. HANEY.

Notes on Machinery Display at Dairy Industries Exposition

Atlantic City, October, 1940

The exhibit of equipment at the Dairy Industries Exposition at Atlantic City was so vast—over 300 exhibitors—that it is doubtful if any one person in attendance saw everything. At any rate, several persons who attended the "show" have submitted notes on equipment which particularly impressed them. Without doubt, a list supplied by different persons might be entirely different. The order of presentation of these items is in no way related to the order of their importance.

HOMOGENIZER

A new type of homogenizer employed as the homogenizing valve a small cone made of meshed stainless steel wire. The element itself in size and shape appeared somewhat like a chocolate bud. A new element is used for each operation. The milk is forced through the mesh of compressed steel fibers so that the fat particles are broken up. It is claimed that this is brought about with very low power consumption, stated to be a twenty percent saving. It is not yet in commercial production.

Another new type of homogenizer employed pressure through a small orifice. The pressure was obtained by means of a gear pump which results in a partial break-up of the fat globules.

It is believed that the sanitary supervision of the homogenizer will require a single service packing, and with it the necessity for seeing that the packing is changed each day.

The largest homogenizers shown have a capacity of 1500 gallons an hour. These are too small for the larger plants, so that two or more must be used. This is unfortunate, because it increases the cleaning problem.

DEAERATORS

Considerable interest was shown in the cream deaerator. This machine removes volatile flavors from cream and ice cream mix. The machine was originally developed in New Zealand, and has been used experimentally in some of the western states in handling cream for butter making.

There was also displayed what was called a "micro-film deaerator" for handling milk. By this machine pasteurization is effected in the absence of oxygen with attendant prevention of oxidation, together with removal of undesirable odors.

PLATE HEAT EXCHANGER

A horizontal plate heat exchanger was equipped with single service gaskets between the plates. Inasmuch as the rubber gaskets in plate systems become porous, sometimes slimy, and disintegrate from continued usage, they are difficult to clean, and constitute a source of a large number of thermophyllic microorganisms sometimes found in pasteurized milk.

Another manufacturer succeeded in vulcanizing rubber gaskets to the plates.

PUMPS

A new principle in design of a variable speed pump permitted a differential of 98 percent in the volume delivered. This change is volume is brought about without change of speed of the motor.

A number of manufacturers displayed milk pumps. Ease of take-down characterized all. One manufacturer had powered his pump with a motor constructed in accordance with the tentative specifications for motors of the Committee on Sanitary Procedure of this Association. This motor is as streamlined as an egg, with as few places for lodgement of dust and dirt.

A company displayed a type of sanitary

milk pump with provisions for determining the number of revolutions per minute of the impellors. In conjunction with this pump, a tachometer gives the continuous r. p. m. of the pump.

PIPE CONNECTIONS

Several innovations in pipe fittings and connections were observed. One manufacturer displayed a tee drawn from stainless steel tubing. There were no sharp inside angles or edges.

A removal spring ring to hold union nuts on pipes was also displayed. By removing the ring, the nut may be removed from the pipe to facilitate washing of both pipe and the nut.

One company has developed a new method of fabricating stainless steel sanitary pipe fittings. These are made by forming the two halves by a die press from flat drawn sheets, and then welding the two halves together. This method eliminates the casting defects formerly encountered.

IRRADIATORS

New irradiators were shown to be more compact and more easily cleaned.

FRUIT INJECTOR

A newly designed fruit injector for ice cream provided control of amounts injected from 4 to 109 gallons of fruit per hour.

MOTOR

A totally enclosed fan-cooled streamlined electric motor was designed for the purpose of being kept clean externally.

MILK METER

One company exhibited a new volumetric meter to determine the volume of milk flowing through a system. This was designed to eliminate the necessity of adding special equipment to each storage tank for measuring purposes.

Another device involved the use of an electric eye for measuring or metering the amount of milk, cream, or ice cream passing through a pipe line. This device was intended to eliminate many of the sanitary objections to some of the meters now available.

PASTEURIZERS

A new type of "all-purpose" pasteurizing equipment consisted of a barrel-shaped vat rotating in a horizontal plane similar to a churn.

A low cost fifty-gallon pasteurizing outfit was designed for use by milk producers.

HIGH-SHORT PASTEURIZER

A company displayed a new experimental high-temperature–short-time pasteurizer which consisted of the plate type exchange system common to units manufactured by other companies, but with the heating done by hot water only to within three degrees of the desired pasteurizing temperature. The final heating of three degrees was obtained by using an electrical heating element very much on the order of that employed in the Trumbull Electro-Pure Pasteurizer. The theory back of the unit was that by heating the last three degrees with electricity, advantage was taken of the lower costs of steam heating of milk, and avoidance of the cooking of milk films on to the metal, which occur within the last few degrees of the heating stage. In addition, this company has developed an electro-mechanically operated flow diversion valve which was quite simple in structure and seemingly quite satisfactory.

Another company displayed a stainless steel tubular high-temperature–short-time pasteurizer. This particular unit consisted of a series of three-quarter to one-inch diameter tubes about fifteen feet long in a cylindrical horizontal jacket. Milk is passed through the tubes. The heating is done by steam admitted into the chamber in which the tubes are housed. The transfer of heating results in condensation of the steam, which drops out of the chamber. At no time is the steam under pressure. It is claimed that milk is heated in this equipment to temperatures even greater than 162° without adversely affecting flavor or cream line.

CAN WASHERS

One company displayed a can washer with a unit for injection of acid with the

steam, so that the cans are sterilized with acidified steam. This is an application of findings of the Beatrice Cream Company, that the use of acidified steam prevents the transfer of organisms which are able to survive in the alkaline films which persist on improperly rinsed milk cans.

Another manufacturer displayed a jet which operated on the flop principle, whereby the spray heads were pivoted for initial and final rinse. The jet was flexible. When the can passed over it, the jet would assume a horizontal position. When the first side of the can had passed over the jet, the latter flopped to the vertical so that its head was even with the inside rim. This permitted the spray to be directed with force against the neck, breast, and sides of the cans instead of against only the inverted bottom.

One can washer, conveyer, and weigh-can arrangement provided a drip-grid for one emptied can while the next is being dumped, a worthwhile economy if the exterior cleanliness is such as to justify complete inversion over the dump vat.

MILK COOLER DURING DELIVERY

One of the refrigeration companies displayed a mechanically operated refrigerator coil adaptable for milk delivery trucks. The unit resembles very much those already employed for ice cream delivery trucks.

MILK STRAINERS

One strainer was designed so that the shape of the openings in the dome produced a whirling motion in the milk as it passed through the filter disc.

A new filter disc possessed a new synthetic fiber of filament claimed to be more durable than those heretofore used.

A new strainer was shown with a rolled-up edge, thus eliminating the wire at the upper end.

MILKING MACHINES

A milking machine was shown with teat-cup rubbers which, when dismantled, are straight tubes—the teat tube and milk tube being separate, thus facilitating cleaning.

Another type consisted of a two-plate holder of a filter disc of about one foot diameter inserted in the bottom of a cylindrical container, so that the milk flows upward through the periphery area and downward and out through the central area. Another type consisted of a multiple disc filter housed in a container so that the milk could be subjected to pressure.

BRUSHES

A few brushes were shown with bristles made of Nylon. The advantages claimed were longer effective life and ease of cleansing.

THERMOMETERS

One of the thermometer manufacturers displayed a vermin-proof thermometer scale for milk equipment. The scales were enclosed in glass domes sealed to the metal ferrule on the stem so as to be waterproof. This protects the scale from the usual corrosion, permits complete submersion of the whole thermometer for washing, and makes it vermin-proof. This type of thermometer also prevents entrance of moisture beneath the case and the cloudy condition of glass which interferes with the reading.

FLOAT CONTROL

An improved electric float control was displayed for weigh cans, at country plants, for cooler troughs, for supply tanks, etc.

INSULATION

A glass wool was displayed with an average coefficient of heat transmission of 0.27 at 70° F. This comes in plain and semi-rigid mats for domestic and commercial refrigeration, truck bodies, and other refrigerated equipment.

VALVES

A company exhibited new case-hardened stainless steel cores for plug-type milk valves for reducing wear and damage to the valve, and thus preventing leakage after use.

HEATER AND COOLER

An oval type internal tube heater or cooler was displayed. Special oval hand

brushes are used in cleaning. The advantage claimed is a material increase in the efficiency of cooling or heating.

CREAM SEPARATORS

One of the foreign-made cream separators was shown with a stainless steel bowl. The appearance of this is quite welcomed because the separator—and also the clarifier—seem to remain practically the only pieces of milk equipment which are constructed of parts made of corrodible metals in direct contact with milk and cream.

MILK CANS

A straight neck milk can was exhibited. Our observer comments that it is similar to cans in use about two decades ago.

BOTTLE WASHERS

A number of new small soaker type bottle washers were shown for use in small plants. The amount of treatment given for bottles is considerably less than the treatment given bottles in the large washers.

BOTTLE FILLERS

A number of manufacturers exhibited small hand and power operated bottle fillers for small plants. In order to keep the price of these fillers low, they were constructed of light material.

MILK COOLERS

A company displayed a new stainless steel surface cooler for small milk plants, and a new sweet water cooler for use in conjunction with the stainless steel cooler.

WATER HEATERS

Several electric water heaters for dairy farmhouses were observed, but none was provided with bottom plugs for drainage and cleaning. The temperatures at which these heaters were recommended for operation do not destroy thermoduric organisms.

HANDLING OF ICE CREAM NOVELTIES

Some companies displayed machinery that would obviate the objectionable manual handling of ice cream pops during manufacture. They used a convey system which carried the molds through the entire process of washing, sterilizing, filling, freezing, defrosting, coating, and packaging. Such equipment has application only in the larger establishments.

A new ice cream candy novelty free from sanitary objections, was displayed.

GENERAL CONSIDERATIONS

There was an almost universal tendency to weld the parts of milk equipment and to eliminate solder and lock seaming. This aids in making the equipment more durable and eliminates the possibility of open seams and lead contamination.

The trend toward the use of stainless steel, noticeably on the increase from year to year, has reached the point where practically all exhibitors displayed their major lines constructed of this alloy.

The rather modest trend toward streamlining dairy equipment, observed in isolated instances heretofore, has broken forth in the display of an amazing array of streamlined dairy equipment of all types, with much attention given to styling of the exterior. Square corners, angles, and flat surfaces were replaced generally by rounded corners, and the elimination of angles and pitched surfaces. Particular improvement in this respect was observed in the construction of conveyors and supports, particularly the rounded contact with the floor as a substitute for the flat type support and the replacement of angle iron supports by round supporting members.

It was obvious that designers had given consideration to the question of clearances necessary to enable cleaning the exterior of equipment as well as the interior. Designers of dairy equipment were observed to be giving serious consideration to sanitary features without waiting for the sanitarian to enforce improvement in the sanitary design of each individual part. This situation is quite different from that confronting us more than a decade ago.

There was an almost complete absence of tinned copper and the use of copper tubes.

The surface finish of stainless steel sheets and tubing did not appear as good as in previous years. Unfortunately the American Society for Testing Materials has not established definite standards for finish on tubes and sheets by which the purchaser or inspector can determine whether the finish specified has been furnished. "Most of the fittings exhibited and too many of the vats were No. 8 or mirror finish outside and No. 4 inside."

The method of attaching ferrules to tubing by expanding the tube in the ferrule, using a ferrule of recessless type, has gained definite foothold. However, inspectors must exercise definite care to ascertain that the tube has been expanded uniformly to avoid leaving a crevice on the exterior at the lower end of the ferrule. The ferrule with a ground face was used almost to the exclusion of the gasket type, except in suction and vacuum applications.

An increasing array of removable union nuts was displayed. Stuffing boxes immersed in the milk were almost absent except in the case of horizontal coil vats, few of which were exhibited. The most noteworthy sanitary improvement which has taken place in years in this respect has been applied to milk pumps, tank agitators, and butter churns. Practically all the butter churns were without rollers, thus eliminating the objectionable stuffing box.

Progress was shown in development of machinery for handling frozen stick novelties free from personal contact with the operators—a most noteworthy accomplishment.

Visitors, representing the dairy industry, showed a particular interest in the function and operating features of the equipment rather than just in the appearance. A number of manufacturers asserted that sales used to be based almost entirely on appearance of equipment, but now the purchasers were insistent upon looking into and even crawling beneath the equipment to determine whether it was properly designed to perform efficiently the function for which it was intended.

Although there was much progress shown in the sanitary design and increased sanitary-mindedness of the industry, there were numerous pieces of equipment that showed neglect of proper consideration of commonly accepted principles of milk sanitation. Among these were pasteurizing vats without air space heaters or orifices in the lids in which to install them, an insufficient number of orifices in the lids for the required number of thermometers, interior surfaces inaccessible for cleaning, and poor finish.

Some Papers Presented at Milk Dealers' 1940 Convention

Instantaneous Heat Treatment of Milk, by G. C. Supplee

There is a straight line relationship between bacterial reduction and temperature up to 185° F. In the interests of better flavor and no precipitation of milk solids on the equipment, a pasteurization temperature of 185° F. for a period of 4 seconds is recommended. Milk pasteurized at this temperature and time always gave a count below 1,000 per ml.

Microscopic Method for Determining Thermodurics in Milk, by J. Hileman

Dairyleague is analyzing all milks for the presence of micrococci by the microscope to determine whether a high thermoduric count will ensue. In every case of high thermoduric counts as measured by H. R. count, there was a high micrococci count. The converse of this was true as well. The method bears further investigation. There is a question as to whether all high pasteurized counts are due to micrococci.

Wetting Agents, by F. M. Scales

Sodium tetraphosphate is the best water softener. Gluconic acid is the best wetting agent. Wetting agents and water

softeners are desirable since they reduce the total amount of alkali or cleaning agent required to do the cleaning job effectively. Gluconic acid should be used in can washers and bottle washers, and in solutions for washing trucks. There is a definite trend toward acid detergents rather than alkaline ones.

Retardation of Oxidized Flavor, by P. F. Sharp

Factors which destroy vitamin C in milk function as causative agents of oxidized flavor. If vitamin C is retained, the susceptibility of milk to oxidation is reduced and greater nutritional value results. This can be accomplished through the deaeration of milk. The apparatus for this deaeration is described in Dr. Sharp's paper. It consists essentially of imparting a vacuum into the milk, using steam to sweep out the oxygen. There is some question as to whether the vitamin C is worth talking about; however, when we consider the fact that there is as much vitamin C in the milk supplies of the country as there is in the total lime, lemon, and orange industries, milk as a source of vitamin C is very important. As a matter of fact, one quart of raw milk is equivalent in vitamin C value to one orange, hence the desirability of retaining vitamin C both from a nutritional and flavor standpoint.

Critical Review of the Phosphatase Test, by L. H. Burgwald

When 96 percent of the phosphatase is destroyed, all the tuberculosis organisms were destroyed. The Scharer, Kay & Graham, and Gilcreas & Davis tests are equivalent in sensitivity. Gibb's reagent is more sensitive to phenol than is Folin's reagent. All tests will indicate a reduction in holding time of five minutes and an addition of raw milk of 0.1 percent.

170° F. is the most effective temperature for phosphatase inactivation, destruction of creaming ability, and killing of *E. coli.*

Professor I. A. Gould of Michigan outlined his experiments which associate the development of cooked flavor, oxidized flavor, Vitamin C destruction with the formation of sulphydril compounds.

Dr. Ralph Little of Rockefeller Institute discussed the importance of mastitis control and expressed the belief that mastitis can be effectively controlled by early identification and complete segregation.

Mr. A. J. Powers of Borden's presented voluminous data showing the effect of the use of the new medium on the bacterial counts of milk. The most significant increases were observed in milk of poorer quality.

Legal Aspects

New Cheese Standards

As announced in the Federal Register, January 9, 1941, Cheddar cheese contains not more than 39 percent of moisture, and not less than 50 percent of milk fat.

Washed curd cheese contains not more than 42 percent of moisture, and not less than 50 percent of milk fat.

Colby cheese contains not more than 40 percent of moisture, and not less than 50 percent of milk fat.

These cheeses are made from milk which may be pasteurized and which is subjected to the action of harmless lactic-acid producing bacteria, present in such milk or added thereto. Harmless color may be added. Conventional production methods are prescribed.

Confusing Diversity in Butterfat Standards*

Bills for the enactment of food laws are now before the legislatures in several states, some of them patterned after the model uniform law accepted and endorsed by the Association of Food and Drug Officials of the United States. While the efforts of that organization have been directed toward obtaining uniformity in state food laws, the model bill does not conform with the Federal Food, Drug, and Cosmetic Act in at least one particular of great interest to the dairy industry. No provision is made for the exemption of butter, cheese, or ice cream from the requirement that added color must be declared on the label of the product. Such an omission in a state law comparable with the Federal law can cause much regulatory confusion .

Of the "Copeland type" food laws already in effect, those of California, Indiana, Nevada, New Jersey, New York, Tennessee, and Virginia grant this exemption to butter, cheese, and ice cream in language identical with that of the Federal Act.

Connecticut, Florida, Louisiana, and North Carolina, on the other hand, do not expressly provide for such exemption in their laws.

Arkansas authorizes its State Board of Health to adopt, "in so far as practicable, the regulations from time to time promulgated under the Federal Food and Drug Act."

Oklahoma requires that "the regulations and definitions adopted for enforcement of the Federal Food, Drug and Cosmetic Art of June 25, 1938, shall be adopted for the enforcement of this Article (Article 4, Chap. 24, Session Laws, 1939—Pure Food, Drug, and Cosmetic Act)."

Massachusetts (House Bill No. 134), and Montana (House Bill No. 50), have before them measures uniform with the Federal law and containing exemption for butter, cheese, and ice cream. Oregon House Bill No. 79 passed the House minus this provision, but we are assured that this oversight will undoubtedly be rectified in the Senate.

Utah Senate Bill No. 102 and Ohio House Bill No. 43 omit exemption of butter, cheese, or ice cream.

Another point on which effort should be exerted to bring about uniformity with the Federal Act is that of the butterfat standard for butter. In the Federal Food, Drug, and Cosmetic Act the definition and standard for butter are preserved as before by making applicable to the new Act (in Sec. 902, Effective Date and Repeals), the Act of March 4th, 1923 (U.S.C. 1934 ed., title 21, sec. 6; 42 Stat. 1500, ch. 268), defining butter and providing a standard therefor.

In some states the 80 percent butterfat standard for butter is provided for by law. In such cases, where new food laws do not make provision for the adoption of the Federal standard, it would be

* From Service Bulletin, American Butter Institute, Chicago, Ill.

well to make sure that the law providing this standard is retained.

Other states provide for a butter standard by regulation, and where such regulations differ from the Federal standard efforts should be directed toward securing the necessary change to bring about uniformity.

According to the Bureau of Dairy Industry publication "Legal Standards for Dairy Products" (1936), the following states have by law provided for the Federal butterfat standard of 80 percent: Arkansas, California, Colorado, District of Columbia, Idaho, Illinois, Indiana, Iowa, Kansas, Maryland, Massachusetts, Missouri, Mississippi, Montana, Nebraska, New York, Oregon, South Dakota, Tennessee, Utah, Virginia, Washington and Wyoming. The same standard is provided for by regulation in Florida, Georgia, Louisiana, Nevada, Ohio and Rhode Island.

The double standard (80 percent fat and 16 percent moisture), still prevails in Alabama, Arizona, Connecticut, Kentucky, Michigan, Minnesota, New Hampshire, New Jersey, New Mexico, North Carolina, North Dakota, Oklahoma, Pennsylvania, Vermont and West Virginia.

Wisconsin requires 82.5 percent butterfat in butter, allowing a tolerance of 2.5 percent, while no provision is made for a standard in Delaware, Maine, South Carolina, and Texas.

A new Montana Food, Drug, and Cosmetic Act, following in its general provisions the Federal Act, is awaiting the approval of the Governor.

The Arkansas legislature has just passed a dairy law, to become effective June 1st. This law incorporates the Federal definition and standard for butter (80 percent fat) and, in addition, defines other dairy products. Provision is made for three grades of cream for butter manufacturing purposes, namely, "Sweet Cream", "First Grade Cream", and "Second Grade Cream", with a definition for each. Enforcement of all provisions of the Arkansas law will be in the hands of the State Board of Health which, among other things, is authorized to condemn and denature with harmless coloring all unclean or unwholesome dairy products.

On February 15th the Tennessee Food, Drug, and Cosmetic Act was approved, to become effective July 1st 1941. Tennessee thus becomes the fourteenth state with a "Copeland type" food, drug, and cosmetic act, that is, a law uniform in practically all provisions with the Federal Food, Drug, and Cosmetic Act.

New Books and Other Publications

Proceedings of the First Food Conference of the Institute of Food Technologists. Held in Chicago, Ill., June 16, 17, 18, and 19, 1940. The Garrard Press, Champaign, Ill. 385 pages. $3.50.

This book contains forty-five articles grouped under the following headings:

1. Process Engineering in Food Technology.
2. General Food Technology.
3. Effect of Processing on Vitamin Content of Food.
4. Technology of Food Preservation.
5. Packaging of Foods.
6. Methods of Analysis and Control of Unit Operations in Food Processing.
7. Microbiology in Food Processes.

The papers are enriched with tables and references of great value to the food technologist. New applications of unit processing are described for broadening the base of food engineering and facilitating the production of better food more economically.

Industrial Microbiology, by Samuel C. Prescott and Cecil G. Dunn. McGraw-Hill Book Co., Inc., New York. 541 pages. $5.00.

The authors state that the book is written for students and readers who have had somewhat extensive training in biology and general bacteriology, and at least in the fundamentals of organic chemistry and bio-chemistry. Outlines are given of the fundamentals of industrial microbiology. Part I deals with the yeasts; Part II, bacteria; Part III, molds; and Part IV, specialized activities of all three in textile microbiology, detergency and sterilization, wood, and wastes.

The study of organisms for ripening butter and cream are considered to belong to dairy bacteriology, although a short chapter is devoted to some lactic acid bacteria with fermented milk products, and eight pages are devoted to cheese. Twenty pages are devoted to lactic fermentation, followed by chapters on sauerkraut, pickles, silage, and the above. A brief but practical discussion in ten pages of 6 point type reviews practices in the arts of detergency, disinfection, and sterilization.

Many references, some as late as 1939, numerous tables, chemical structural formulas and charts support the text.

The authors state that "Chappell and his associates of the Sheffield By-Products Company and others of the research laboratories of the National Dairy Products Corporation at Baltimore were largely responsible for making the process (lactic acid from waste milk whey) a commercial one." As a matter of fact, the latter organization initiated, organized, and drove the research to successful completion, ably assisted by the former group who supplied raw material, plant space, equipment, and much practical assistance.

The book is in no sense a laboratory manual. It gives outlines, flow sheets, theory, and practise for general reference as well as for advanced class room instruction.

"Doctor Jones" Says—, by Paul B. Brooks, M. D., New York State Department of Health, Albany, N. Y. 110 pages. 1940.

This booklet is a collection of one hundred and fourteen sayings of "Dr. Jones," with a full page picture of the cast of the Health Hunters, including our own Dr. Brooks who "plays" the part of Dr. Jones, the elderly country physician. A limited number are available upon request, while they last. All communications should be addressed directly to Dr. Paul B. Brooks, State Office Building, Albany, N. Y.

JOURNAL OF MILK TECHNOLOGY

Official Publication of the

International Association of Milk Sanitarians

(Association Organized 1911)

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Association News

Chicago Dairy Technology Society

At the February meeting, Henry Wolf, Ambrosia Chocolate Company, gave a very interesting talk on "Cocoas and Chocolates for use in the Dairy Industry." At the March meeting, Oscar Olson of the Chicago Mercantile Exchange talked on "The Functions of a Commodity Exchange" and more especially the value of futures trading as affecting the stabilizing of the market for farm commodities. On Friday, March 14, the Society held its annual party for members, wives, and girl friends. The party this year was held at the Club Minuet, where good food, dancing, and entertainment was in order.

C. HALE,
Publicity Chairman.

International Association of Milk Sanitarians

A poll of the Executive Board indicates that a majority of the members desire to hold our next annual meeting in Tulsa, Oklahoma, on October 27, 28, and 29. Dr. Ross is Chairman of the Local Committee on Arrangements. The Mayo Hotel has been selected for official headquarters.

Metropolitan Dairy Technology Society

Dr. R. Adams Dutcher, Pennsylvania State College, spoke at the February Meeting on the subject, "Recent Nutrition Research with Special Reference to Milk and Milk Products." His talk dealt mainly with the very latest information on vitamin research, paying special attention to vitamin A, thiamin, riboflavin, nicotinic acid, ascorbic acid, vitamin B_6, and pantothenic acid.

Col. A. P. Hutchins, University of Pennsylvania School of Medicine, discussed, "The Role of the Dairy Industry in the National Defense Program", at the March meeting.

At the April meeting, Dr. A. C. Dahlberg, New York State Agricultural Experiment Station, will speak on "New Research in the Manufacture of Ice Cream".

O. F. GARRETT,
Secretary-Treasurer.

Michigan Association of Dairy and Milk Inspectors

The 14th Annual Meeting of the Michigan Association of Dairy and Milk Inspectors was held at Grand Rapids, Michigan, on March 12 and 13. More than 125 city, county, and state inspectors and field men attended. The meeting as in former years was in conjunction with the Michigan Allied Dairy Convention and Supplies show.

The program consisted of papers and discussions on the following topics: "Bottle and Can Washing Problems"; "Plumbing Problems in the Dairy Plant"; "Proper Construction of a Milk House"; "Handling Milk and Milk Products in the Small Plant", a resumé of the success of the U.S.P.A. Milk Ordinance in Iron County. A slide film entitled "All Washed Up for Clean Safe Milk" and a report on the progress of the four committees brought their accomplishments up to date on the coordination of standards for dairy farms, dairy plants and ice cream.

Speakers included Doctor H. A. Trebler of Sealtest Laboratories, Baltimore, Maryland; John M. Hepler and W. S. Feagan, Michigan Department of Health; H. S. Adams, Flint; Tom Laughlin, Stambough; and A. J. Bell, Michigan State College. The work of the committees on standardization which have been working for two years to coordinate requirements and standards, was presented in detail. All committees have done an excellent job and the membership was left intact to continue for another year.

Officers were elected for the coming year.

Plans are being made for the annual summer conference at Michigan State College in July. This is a three day conference or short course which is growing in popularity each year.

HAROLD J. BARNUM,
Secretary-Treasurer.

New York State Association of Dairy and Milk Inspectors

Members of the New York State Association of Dairy and Milk Inspectors are invited to submit promptly any suggestions of subjects they would like to hear discussed at the annual meeting of the Association scheduled to be held in Buffalo on September 24, 25, 26, 1941.

The Executive Committee is scheduled to meet in Albany on March 28 to discuss the program for the meeting.

Amendments to the New York State Sanitary Code effective May 1, 1941, eliminate Grade B pasteurized milk and cream, leaving Grade A pasteurized as the only grade of pasteurized milk and cream, other than Certified. The standards for this grade are the same as those set by the *U. S. Public Health Service Ordinance and Code.* Milk cooled on the farm is required to be cooled to not less than 60° F.

W. D. TIEDEMAN,
Secretary-Treasurer.

Philadelphia Dairy Technology Society

Due to the attendance of several Philadelphians at the meetings of the Metropolitan Dairy Technology Society (New York), initial efforts were made to organize a similar society in Philadelphia in 1939.

The first meetings were held in a class room in the University of Pennsylvania in the afternoon. These meetings were sparsely attended on account of employment conflict of hours, so dinner sessions were started. These proved to be quite a success as evidenced by the increase in attendance from 21 in November 1939 to 114 in March 1941.

The society promptly designated the Journal of Milk Technology as its official organ. Its year ends in May with election of officers then as no meetings are held in July and August.

Professor Doan of the Pennsylvania State College is to be the speaker at the April meeting, Professor Dahle in May. At the June meeting, the Society expects to visit the Eastern Regional Research Laboratory, located just outside of Philadelphia, for a two hour inspection tour of the buildings. This institution will house a total of seventy-five laboratories in operation.

H. F. BRADY,
Secretary-Treasurer.

Tulsa—The Oil Capital of the World

R. G. Ross
City Health Department, Tulsa, Oklahoma

Next October, several hundred members of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS are going to thank their officers and executive committee for deciding to hold the 1941 convention in the "Oil Capital of the World", Tulsa, Oklahoma.

For those who never have visited this magic city of the southwest or who possibly haven't even traveled into this part of the country, it should be a real treat. For those who live in this territory, it will be a wonderful opportunity to attend a convention of the association without traveling a far distance, for this will be the first time that the mid-section of our country has been chosen.

The invitation to attend naturally will go to all those who are eligible to participate in the association's activities, and in all probability a very healthful increase in our membership will result.

Those who will travel to Tulsa from a generally easterly direction will pass, in all probability, through the famous Ozarks. If they come by car, they probably will approach over U. S. Highway No. 66, sometimes called "The Will Rogers Highway", and they'll come through Will's famous "Claremore, U. S. A." Here they will find the beautiful official Memorial which has been built to his memory, where his body will be buried some time this year and where many of his most treasured belongings are housed.

There are many other interesting things to see in Oklahoma, regardless of the direction from which our delegates will come.

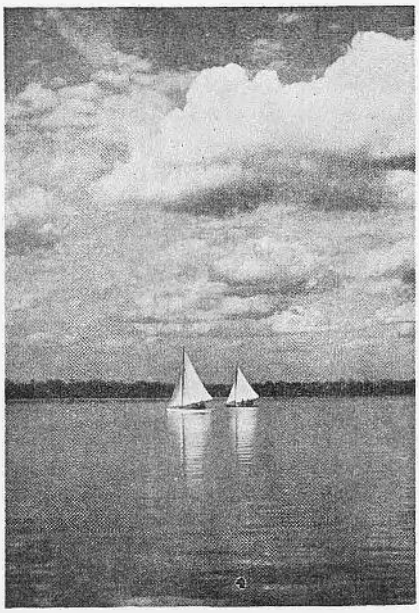
From the far west, for instance, the visitors will probably come by Boulder Dam, Grand Canyon, and the Painted Desert. From the north, they'll cross the broad expanses of such states as Iowa, Nebraska, Missouri, and Kansas. From the south they'll have a chance to come up through the state capital, Oklahoma City, where oil derricks rise from the front yard of the capitol building and the governor's mansion.

Let me urge you to start planning your visit, now. Write to the Tulsa Chamber of Commerce for descriptive literature,

(1) Part of the imposing Tulsa skyline. Here a modern metropolis has risen, from Indian tepees to the towers of commerce, in the space of two decades. Here are the headquarters of more major oil companies than in any other city in the United States, the home offices of more petroleum industry firms than anywhere else in the world. It's Tulsa, the Oil Capital!

or ask your favorite oil company or travel bureau to map out your route for you.

There's real pleasure ahead of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS, and here in Tulsa we're getting ready for your visit!



(2) Do you think Oklahoma is arid, that Tulsa is a land-locked city? Here's a picture taken on one of Tulsa's own Mohawk Park lakes. The sailboats are real, and Tulsa is the home of some of the country's leading boatsmen.

The Application of the Photelometer to Kay and Graham's Phosphatase Test. J. Wyllie. Can. Pub. Health Jour., 31, 147-155 (Mar. 1940). From Pub. Health Engin. Abs. XXI, Mi. 4.

A description of the use of the photoelectric cell for the more accurate determinations of the thoroughness of pasteurization by use of the phosphatase test. The author gives an excellent description of the procedure used. In general the extent of pasteurization is recorded as the difference in readings on a microammeter scale between reagent controls and the test sample. The extent of pasteurization varies inversely as the difference in scale reading.

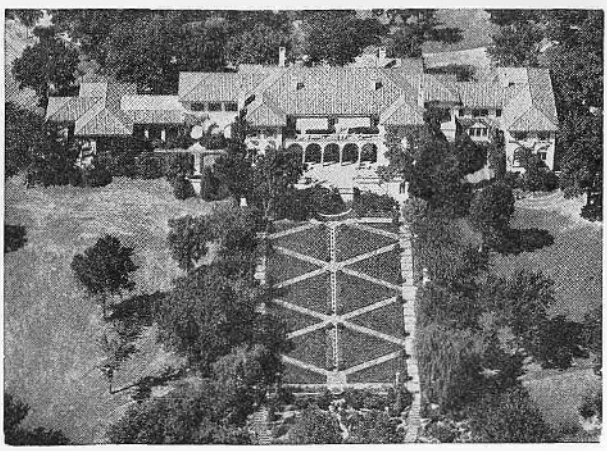
A. E. WILLIAMSON.

The Application of Phage Typing to Strains of B. Typhosus Recovered from Typhoid Fever. Kenneth F. Brandon. Can. Pub. Health Jour., 31, 10-12 (Jan. 1940). From Pub. Health Engin. Abs. XXI, Mi. 5.

An account of 2 outbreaks of typhoid, 1 milk-borne and the other supposedly from crabmeat in which utensil washing with infected water was suspected. A technique for typing different strains of the organism was employed so that chronic carriers are now known according to the type of typhoid bacillus present. This may prove to be useful information when subsequent outbreaks occur.

A. E. WILLIAMSON.

(3) Here's a sample of "oil capital" philanthropy in Tulsa. This mansion once was the home of an oil millionaire. He gave it to Tulsa to use as an art center. It's Philbrook Art Center, where I.A.M.S. delegates and their wives will be welcomed while attending the 1941 convention.



"Doctor Jones" Says—*

Getting compliance with health regulations (you remember we were speaking about regulations here awhile ago?)—when it comes to enforcing 'em there's what you might call two schools of thought. One of 'em: you're supposed to exercise a certain amount of judgment and discretion—the spirit rather than the letter of the law—first things first and so on. Then there's the all-or-nothing fellows: if the letter of the law ain't met in every particular, the whole thing's out.

I was at a meeting where they were talking about a milk plant—whether it met the requirements and so forth. The report showed that everything that counted most was O.K.—pasteurizing equipment in good shape and well handled and all that and everything clean. There was no question about the milk. But there was one or two little things—a door in the wrong place or the cement floor had a crack in it or something—I forget what 'twas. Anyway, one of the older men there—he said they'd met all the important requirements; if 'twas him he'd approve the plant and let 'em fix up those little things later on. But one of these hew-to-the-line fellows—he said "No, sir!", not him. "Here's the regulations," he says, "and those things are required. If you're going to let 'em violate those requirements and still approve 'em", he says, "you might just as well throw the whole sanitary code out the window."

Well—I remember my mother used to say—"I want you to be as good as you can. I don't expect you to be perfect," she says, "if you were perfect it wouldn't be you." A suit of clothes is supposed to have a complete outfit of buttons but I'll wear one any time with a button or two missing before I'll go without any. The buttons—they're all needed more or less but some are relatively more important than others. You take a suspender button, for instance—anyway, I don't know of any set of regulations that's so perfect that it don't require some judgment and discretion to apply 'em. A hundred per cent compliance—it's the desideratum, as the books says, but if I get ninety-five per cent and all the important things done I figure it's considerable better'n not having any regulations at all.

Of course being reasonable's one thing and being lax—that's something else. Regulations that're necessary—sloppy enforcement's bad for all hands. But walking in the "straight and narrow path"—while it's the thing to do, if there's a tree in the middle of it, it may be necessary to walk around it—if we want to get where we're heading for. Hitching our wagon to a star, like Mr. Emerson said—it's always safer to have enough slack in the tow-rope so we can keep the wheels on the ground.

PAUL B. BROOKS, M.D.

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* Health News, New York State Dept. Health, Albany, N. Y., Jan. 6, 1941.

National Cream Quality Program

A nation-wide program to improve the sanitary quality of cream for butter making has just been launched by the American Butter Institute. On March 20, a meeting of the industry was held in Chicago, made up of an audience of nearly 300 men drawn from 25 states. Conducted under the auspices of the Cream Quality Committee of the American Butter Institute, the audience heard reports on the work done to date, and made plans for the future. M. E. Parker discussed a new departure in station can washing equipment. Dr. B. W. Hammer stated that work on the Parsons method for the visual demonstration of mould in cream has proceded with such promise that within a reasonably short time, it is probable that station operators, without special technical training, can determine whether a given sample is relatively high or low in mould. Mr. J. O. Clarke, Chief of the Special District, Federal Food and Drug Administration, in addressing the meeting, stated that the federal government was determined to prosecute vigorously its program of quality improvement.

Members of the industry spoke from the floor in hearty approval of the plans, and expressed readiness to take action. Regulatory authorities from ten states likewise approved the program, and indicated a willingness to do all in their power to insure its success. Financial support was promised, and a substantial fund of $40,000 to $50,000 was quickly subscribed for the founding and first year's work of an organization to coordinate, on a nation-wide scale, the industry's cream quality improvement program. The program for cream improvement is as follows:

1. REJECT UNFIT CREAM! Rejection of unfit cream and refusal to pay for unfit cream at station, plant, or buying point—a fundamental principle that must be rigidly followed.

2. GET UNFIT CREAM OFF THE MARKET—"out of circulation." Condemnation and destruction of unfit cream, carried out by or under the supervision of proper authorities, city, local, State, or Federal. In no case, however, should the fact that such authorities may not be readily available deter any manufacturer from rejecting unfit cream.

3. WHAT IS UNFIT CREAM? It is cream that is cheesy, dirty, putrid, rancid, decomposed, or that contains oil or other foreign substances, or is excessively foamy, or cream of the foregoing descriptions that would be classified under the American Butter Institute Mold Standard as No. 4. (Cream samples and can rinsings are to be considered unfit cream and shall be discarded at the station.)

4. EXAMINE ALL QUESTIONABLE CREAM OFFERED FOR SALE—Carefully and systematically. Such examination should take into account ALL quality factors and should include testing by the Parsons method for visual demonstration of mold in cream. Reject all unfit cream.

5. GET EXAMINATION RESULTS BACK TO BUYERS AND PRODUCERS—Give them any and all reasons for rejection, including mold test pads. A careful check of tests from stations will reveal consistent shippers of questionable cream. Work with such stations and through them with producers.

6. QUALITY FIELD WORK—with buyers and producers, at stations, should be carried on consistently. Field men trained in the use of the Parsons visual method and with a thorough grounding in quality cream production methods should devote a portion of each week to educational work.

7. BUY CREAM ON GRADE—see that grades are kept segregated at point of purchase.

8. FACTORIES AND EQUIPMENT—should be maintained in clean, sanitary conditions at all times.

9. BUYING STATIONS AND EQUIPMENT—should be maintained in clean, sanitary condition at all times. States which do not provide minimum requirements for the operation of cream buying stations should be urged to enact such legislation or equivalent regulation. Cream should not be bought from stations which do not meet the minimum requirements prescribed by law or regulation or voluntary industry standards.

10. SPEED UP TRANSPORTATION—See that cream travels from cow to churn in the shortest possible time.

11. IMPROPER CONTAINERS KILL QUALITY—Cream should be handled and held on the farm and delivered to market in standard

containers only—containers that meet the requirements of state law or regulation. Syrup pails, lard buckets, preserving jars, cooking vessels, etc., cannot be properly cleaned and sterilized, and rusty or open-seam vessels of whatever kind harbor bacteria which hasten the spoilage of milk and cream—they are a menace to quality.

12. DO YOUR PART—Get behind quality improvement work with a will. Get behind the national plan, your state or area plan—give them your strength.

13. PLAY SQUARE—Commit no act designed to interfere with the grading efforts of others, nor use advertising material whatsoever designed to take advantage of their grading efforts.

14. PLACE RESPONSIBILITY—Every butter manufacturing establishment should have in it one person with full responsibility and authority for the execution of cream quality procedures.

15. SUPPLEMENTARY WORK — Further scientific investigation and effort directed toward production of a more satisfactory method for the return to patrons and cream buyers, of perfectly clean and sanitary containers. Extensive trials given to sterilization of farm milk and cream utensils. Development of methods of cleaning cream containers, having in mind the complete removal of cream without introduction of steam or water into containers, and elimination of rinsings.

Flint Department of Health Produces Sound Slide-Film

The Department of Public Health, Flint, Michigan, recently completed a fifteen-minute talking slide-film entitled, "All Washed Up For Clean Milk" designed for use in educational activities with milk producers.

The film tells the story of milk production on an average, but good, dairy farm, with a department inspector describing essential requirements to a new producer when both visit a farm where milk is correctly produced and handled. Fundamental principles of milk sanitation are stressed with particular emphasis placed upon the care, cleaning, and sterilizing of milking machines.

The script, photography, and direction is by the Flint Department. The production is a joint effort of the Divisions of Food, Health Education, and Laboratories, and demonstrates that by considerable work but at a relatively small expense, effective visual education material can be developed. The recording, using professional voices, was made by Audivision, Incorporated, 285 Madison Avenue, New York, from whom duplicate copies of film and record can be purchased at cost, which is $5.00 f. o. b. New York. Further details may be obtained from H. S. Adams, Director, Division of Food and Sanitation, Flint Department of Health, Flint, Michigan.

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On this page you see three of the many reasons why Sealright is "Tops" in Sanitary Packaging Protection. These snapshots, taken in the great Sealright plant at Fulton, N. Y., typify the extreme care, the strict sanitary control that stand behind every Sealright paper milk bottle, every Sealright bottle cap or container. Sealright spares no expense to safeguard the purity of its products. That's why millions of consumers accept the Sealright Emblem as their assurance of the ultimate in sanitary packaging.

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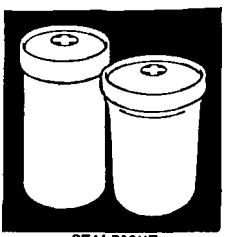
MANUFACTURED UNDER STRICT LABORATORY CONTROL, millions of Sealright packaging products are made daily. Constant "double-checking" assures really sanitary products.

SEALRIGHT
CONTAINERS

ROUND AND NESTYLE—for cottage cheese, ice cream and other moist foods.



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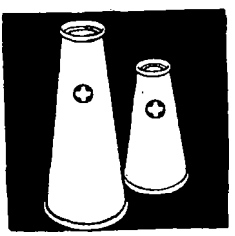
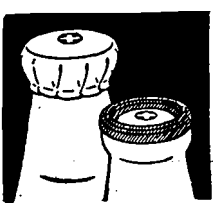
PAPER MILK BOTTLES

The modern, sanitary, business-building container for milk sold in stores.



SEALRIGHT
MILK BOTTLE CAPS

Made in many styles—both cover caps and regular—to suit every capping need.



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REPRESENTATIVES IN ALL PRINCIPAL CITIES OF THE U. S. AND CANADA

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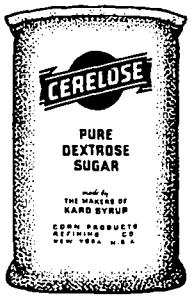
appearing currently in Life, Collier's, Saturday Evening Post and Fortune Magazines, will be seen by millions of people. It is destined to create a greater demand for Ice Cream made with Dextrose. Manufacturers know that Dextrose aids in producing smooth textured, flavorful ice cream and ices. For further information write Corn Products Sales Co., 17 Battery Place, New York.

CERELOSE

PURE DEXTROSE SUGAR



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A BLUNT QUESTION FOR HEALTH OFFICIALS:

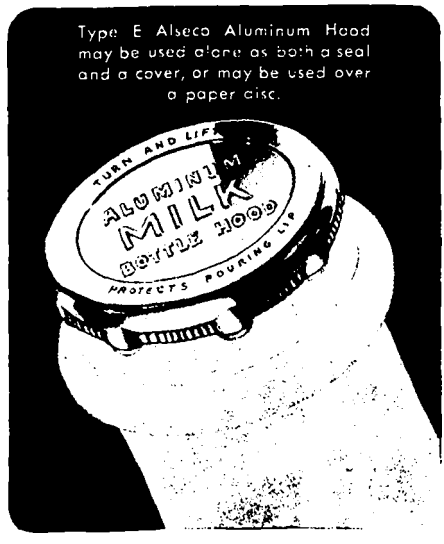
Do you know enough facts about Alseco Aluminum Hoods to pass judgment on their adoption by local dairies?

In the interest of public health, hundreds of dairies are adopting hoods or cover caps, of one kind or another, to seal their bottles. Local health officials must decide whether these hoods are acceptable.

To do that intelligently requires full knowledge about the various hoods and caps. Questions that must be answered include: Is the protection afforded adequate? What happens under extreme temperature conditions? How about icing the cases? Can the necessary identification markings be accommodated? How is the hood applied? Is it convenient for the consumer to take off and replace? What does it cost to use it?

The answers to these and other pertinent questions regarding Alseco Aluminum Hoods can easily be obtained from two sources. First, from a representative of the Aluminum Seal Company who will be glad to lay before you all the information about Alseco Hoods that has been revealed by more than 10 years of use in dairies. Second, by checking with health officials in some of the 1,500 communities where Alseco Aluminum Hoods are in daily use.

For names of officials from whom you can obtain opinions and observations on the performance of Alseco Aluminum Hoods, write Aluminum Seal Company, 1347 Third Avenue, New Kensington, Pa.



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Alseco

ALUMINUM HOODS

DIFCO

BLOOD AGAR *Plates for Examination of Milk*

THE use of blood agar plates is recommended for the detection and the differentiation of streptococci in milk.

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Bacto-Heart Infusion Agar is an excellent base for the preparation of blood agar. Upon this medium, enriched with sterile defibrinated blood, the streptococci produce characteristic zones of hemolysis. The base medium is readily prepared and sterilized in the usual manner. After it has been cooled to 45°C. five per cent sterile defibrinated blood is added and plates are poured or tubes are filled and slanted at once.

●

The examination of milk for the presence of hemolytic streptococci is especially indicated whenever the milk supplies are suspected of having caused epidemics of septic sore throat or scarlet fever. Routine examination for streptococci is also indicated in the production of raw or certified milk.

Specify "DIFCO"

THE TRADE NAME OF THE PIONEERS

In the Research and Development of Bacto-Peptone and Dehydrated Culture Media

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