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INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS
(Association Organized 1911)

Designated Official Organ of:
ASSOCIATIONS OF MILK AND FOOD INSPECTORS AND SANITARIANS
and DAIRY TECHNOLOGY SOCIETIES
As Listed Herein

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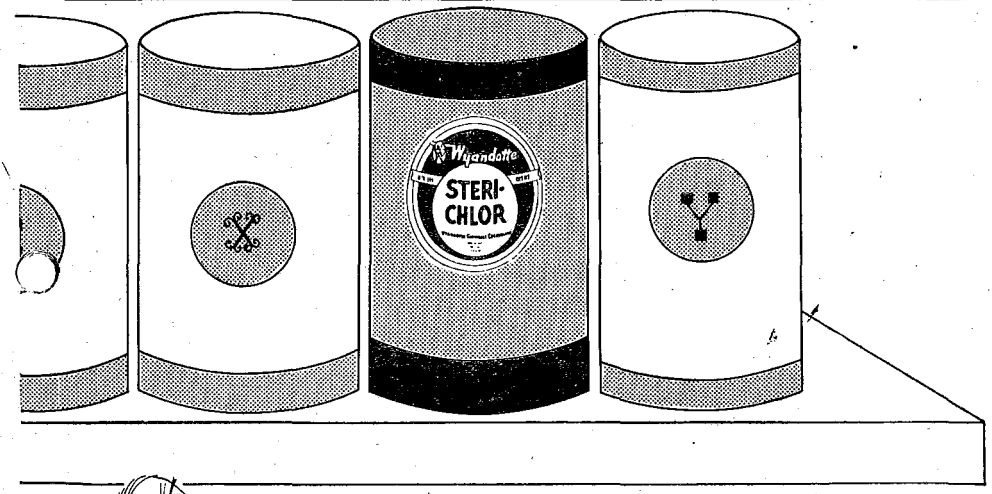

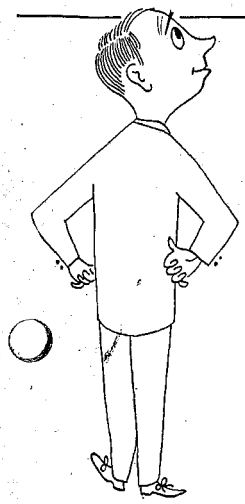

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JOURNAL of MILK and FOOD TECHNOLOGY

(*including* MILK and FOOD SANITATION)

Official Publication of the

International Association of Milk and Food Sanitarians

(Association Organized 1911)

Designated Official Organ of Other Dairy Products Organizations

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(For complete Journal Information, see page 174)

Volume 11 May–June Number 3

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Notes of interest from Borden's Quality Control Labs.

What Happens before Pasteurization?

When pasteurization first came to the dairy industry in 1906, it created, along with its great benefits to mankind, a heated controversy among dairymen.

One school of thought claimed that so long as milk was to be pasteurized, not too much attention had to be paid

to its cleanliness at the source – the dairy, the methods of milking, or the cow herself.

The other school of thought denied this, maintaining that pasteurization alone was not sufficient protection for so vital a food as milk.

CONTRIBUTION OF GAIL BORDEN

As far back as 1857, however, Gail Borden, founder of The Borden Company, had set certain standards of inspection for raw milk at the source, many of which are still in the health codes.

How far we have come since those early days of Gail Borden can best be tested by the nationwide purity of present day milk, and this progress is a tribute to the Boards of Health as well as to sanitarians of Dairy Companies throughout the country.

As one of these Companies, here is what Borden's does in its continued efforts to safeguard the sanitation of its sources of raw milk.

LABORATORY TESTS

At regular intervals, The Borden Company checks the sanitation of dairy farms through

field laboratory tests of raw milk delivered from those farms to Borden's country plants.

This inspection, made with the microscope and other means, is capable of revealing all general sources of contamination.

TEST FOR COOLING

Unless delivered to the plant immediately after milking, all milk must be cooled on the farm to a safe low temperature. It is checked on arrival at the plant to make sure this requirement has been met.

This low temperature not only keeps bacteria from multiplying, but also protects the milk flavor. A count of lactic

acid forming bacteria reveals how well the farmer has maintained cooling.

UTENSIL SANITATION

After this cooling test, and before final pasteurization, other purity controls are exercised. For example, at regular intervals a "laboratory pasteurization" is made of samples of incoming milk, which are then examined for thermoduric organisms.

Thermoduric organisms themselves are not harmful to man, but they do indicate poor sanitation in the dairy.

When an excess of these organisms is revealed, or when any negative condition is indicated in any test, a veterinarian or a dairy inspector is dispatched to the offending farm.

This constant control is but a part of Borden's continuing efforts to maintain the highest degree of milk purity... and is your assurance that Borden's products are products you can *always trust*.

BETTER NUTRITION THROUGH MILK RESEARCH AND QUALITY CONTROL

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JOURNAL of MILK and FOOD TECHNOLOGY

(*including* MILK and FOOD SANITATION)

Title registered U. S. Patent Office

Volume 11 May–June Number 3

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 the transactions.

DDT in Milk and Other Food

IN the symposium on insecticides in food production (1), reported elsewhere in this issue (page 177), the authors frankly consider the possibility of the effects of this ingestion by man of residues of these products remaining on foods or otherwise contained in food products. They unanimously maintain that "the possibilities of acute poisoning in man from the consumption of food products sprayed with DDT are so limited that incidence of acute intoxication can be expected to occur only from gross carelessness."

Several reports in the literature show that DDT is secreted in the milk of cows, goats, dogs, and rats. Such milk produces toxic symptoms when fed to other animals. All the DDT seems to be concentrated in the butterfat portion and is transferred to the butter made therefrom, so that a relatively small amount of DDT in whole milk builds up to a much greater concentration in the butter. The concentration is determined by the dosage level and the period of feeding. Data from long term feeding experiments show that dosage levels of DDT ranging from 10 to 200 p.p.m. build up a fairly constant level of DDT in the perirenal fat of 119–313 p.p.m.; higher feeding dosages produce higher levels yet. DDT in sprayed plots of pea vines did not come through in the peas, either raw or canned. The milk of dairy cows, fed such silage, contained some DDT at low levels. Somewhat similar results obtained in the feeding of sweet corn silage from DDT-dusted acres. It has also been found that some of the chlorinated organic compounds in this class of insecticides likewise accumulates in the animal fat. Inasmuch as this kind of insecticide seems to collect in the fat, hence also in butterfat, we raise the question as to what are the amounts that run in evaporated milk, cheese, and butter. This

may be expected to be seasonal, to a degree, following the schedule of insecticide treatment of the respective crops that are ensilaged.

Small amounts are found in the lean meat, larger amounts in the fat, fed on such crops. Cooking does not destroy nor remove these residues, although they are reduced in amount. Residues are found on the edible partions of various vegetable and fruit crops.

"Very little attention has been directed toward the importance and meaning of the metabolic fate of the insecticides other than their accumulation in the various tissues of the body. There appears to be some relation between storage and metabolism. . . . From a consideration of these storage data and from what is known regarding the metabolism of DDT, it seems reasonable to hypothesize that there is a critical level of intake of DDT below which no appreciable storage will take place since it will all be metabolized and excreted. . . . The determination of such levels for each insecticide would be of paramount importance in assessing its probable hazard to man and animals."

". . . Federal and state agencies have not set official tolerance levels for DDT in foods for human consumption, except for apples and pears." A reliable colorimetric method for the quantitative assay of DDT has been worked out by Schechter and co-workers (2) for its estimation down to about 10 micrograms. It involves intensive nitration and the production of color upon the production of intense colors upon addition of methanolic sodium methylate to a benzene solution of the nitration products. The colors range from blue to red, depending on the derivatives of DDT. Two other colorimetric methods are available.

It appears that here is a problem that needs further investigation, especially in the possible milk hazard involved. This may be important in the case of infants, the aged, and any others whose chief food is milk.

J. H. S.

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2. Schechter, M. S. *et al. Ibid.* (Anal. Ed.) **17**, 704–709 (1945).

George A. West, Secretary-Treasurer

MR. GEORGE A. WEST has just been appointed Secretary-Treasurer of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., to serve the unexpired term of office of Dr. J. H. Shrader, resigned.

George A. West is Director of the Division of Food and Sanitation in the Health Bureau at Rochester, New York, where he began his career in milk and food sanitation in 1928 under Dr. George W. Goler, one of the early pioneers in environmental sanitation. Mr. West is a graduate of Cornell University, where he specialized in Agricultural Economics, Marketing, and Farm Management, receiving his B.S. degree in 1923. For two years he took graduate work at Cornell in these fields and assisted in teaching and instruction in Agricultural Economics. In 1925 and 1926 he conducted a survey of the public market and food distribution problem for the City of Rochester, working under the direction of the Rochester Bureau of Municipal Research, Inc.

Born in Brookings, S. D., Mr. West was educated in the public schools of Brookings, S. D., Minneapolis, Minn. and Rhinebeck, N. Y., entering Cornell

(Continued on page 135)

The International Association of Milk and Food Sanitarians, Inc.: Its Accomplishments and Aims *

J. H. SHRADER

Secretary-Treasurer, International Association of Milk and Food Sanitarians, Inc., Wollaston, Massachusetts

IN Milwaukee, Wisconsin, October 1911, thirty-five men from Australia, Canada, and the United States, interested in improving the quality of milk, organized the INTERNATIONAL ASSOCIATION OF DAIRY AND MILK INSPECTORS. One year later, at their first annual meeting, our first president, Mr. C. J. Steffen, Chief Dairy Inspector of Milwaukee, in his presidential address, said:

> "How to proceed to more completely safeguard the milk supply, and to encourage the employment of competent, experienced men as inspectors, and to standardize and make uniform our work, are some of the objects for which this Association was organized, and for the accomplishment of which this Association will labor. . . . I trust the result of our work will be received by our superiors throughout this and other countries in the spirit and for the purpose for which this Association was organized, namely, to elevate and to improve the work and to place it in the hands of men who are best qualified and fitted to do the work. . . ." (1)

One of these organizers was P. J. Stahel, Chief Dairy Inspector, Toogoolawah, Queensland, Australia. One of the founders, Dr. J. A. Gamble, writes:

> "We had thirty-five members at that time of which only a handful of us remain. The membership has since expanded to the present high number and the influence of the group through its publication . . . has sure grown."

The Secretary-Treasurer at the first meeting reported the total income for this year as $70, expenses $68.26, leaving balance on hand of $1.74.

One of our recent past-presidents, Dr. F. W. Fabian, editorialized in the Journal:

> "Our Association, founded in 1911, is now going into the second generation of milk inspectors. The charter members who founded the Association are getting scarce. Now, any organization which has carried on for thirty-five years through two world wars, one depression, and the exuberant Twenties must have something or else it, like many other organizations, would have long since folded up." (2)

ITS EARLY FUNCTIONING

"We believe that for the past three and a half decades, the life blood of the Association has been the free exchange of ideas amongst a widely scattered membership during the formative period of milk sanitation. It was soon found that one of the most effective methods of disseminating the latest and best in milk sanitation was the annual meeting where were discussed the successes and failures of new methods and techniques. It should be remembered that it was during this time in which practically all the dairy equipment and sanitary procedures which we have at present were evolved. For example,

* Presented at the Third Annual Conference of the Virginia Association of Milk Sanitarians, Roanoke, Va., March 11–12, 1948.

it was not until 1910 when the first Report of the Committee on Standard Methods for the bacterial examination was printed. So it can readily be seen that our Association is really a pioneer in dairy sanitation with a long and honorable history of achievement." (3)

The first organization activities of the new Association were the annual meetings. These were held once a year in cities within the area where its membership lived. This territory predominantly lay along the Atlantic coast, stretching from Maine to Virginia, and running west as far as Pittsburgh and northern Ohio, reaching across Michigan into Chicago.

Most of the milk inspectors in those days had no specific professional or technical training for the work that they were called upon to do. However, these men were earnest and hard-working. Past president Dr. Brooks writes: "Twenty years ago the Association was relatively small, having a membership under two hundred. It was made up wholly of people interested in milk sanitation, most of them actually working at it. There was an evident and very apparent community of interest. Evening sessions were held and programs were, at times, too full for comfort. But members were in their seats on the dot, stayed until the last gavel fell, and discussion never languished. The enthusiasm was contagious and, of all the organization meetings which the writer had occasion to attend, these were the most interesting and inspiring.

"The 'kingpin' of the Association, in those early days, was Ivan C. Weld. He was the first secretary-treasurer of the Association and served until his death, in 1929. He was a man of high character and ideals, whose 'practical experience with both men and methods. . . . tact and kindliness, patience, thoroughness, and sincerity of purpose' made him outstanding. There were others who made important contributions to the success of the Association then, and there have been many since. They started it on its way to becoming what it is today: the greatest and most influential organization in its field." (4)

By 1936, the Association, originally the International Association of Dairy and Milk Inspectors had become the International Association of Milk Sanitarians. Again, in 1947, it again changed its name to the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., and was immediately incorporated under the laws of New Jersey as a nonprofit organization.

The itinerary of the annual meetings was a godsend to many an inspector by bringing to him what he needed in the way of practical information, encouragement from fellow inspectors, and a stimulus to his own mutual and official development. We got plenty.

The papers that were presented at the programs of these meetings, were assembled and printed in a series called the *Annual Reports of the International Association of Dairy and Milk Inspectors.* A stenographic report of attendant discussions followed each paper. In 1940, we published an index, covering all of the Proceedings for the first twenty-five years. These comprised about 700 papers, requiring about 7,000 pages, by 326 authors. The author of the index, the late Horatius N. Parker, points out that nearly all of the prominent dairy sanitarians of the period have presented papers before the Association or joined in their discussion. He writes: "The problems met by the early inspectors were very real and pressing, but they seem rather simple when compared with those discussed in the later proceedings." A glance through the pages of the index reveals how great the change has been since the days when the Association was formed. This printed information is still valuable, not only for its historical usefulness in tracing the development of milk sanitation but also for its record of many

studies whose findings are useful today. The writer was active in the defense of a fifty million dollar law suit wherein information from these annual reports furnished the means to refute successfully the charges with resultant withdrawal of the case.

In order to finance this publication, we had to charge five dollars each for membership dues. A few copies of the reports were available to the public at large at this same price. Such relatively high dues operated to limit our membership only to those who were able to pay this amount. We ran on with a membership of about two hundred or so for many years.

The papers were practical. In the early days, most of the emphasis was on the dairy farm aspect of milk control, on laboratory procedure, on enforcement practices, and on environmental hygiene—cleanliness. Along in the middle nineteen twenties, the "newer knowledge" of pasteurization technology began to be emphasized, spearheaded by the work of Frank, Putnam, Palmer, Grim, Tiedeman, and others. The nutritional properties of milk came in for attention. The so-called aesthetic aspects — cleanliness, appearance, flavor, packaging—receiving increasing recognition.

One of the main sources of contributions to our knowledge was the work of committees. Immediately after organization, four committees were set up: By-laws, Dairy Farm Inspection, Chemical and Bacteriological Inspection of Milk, and the Control of Bovine Tuberculosis. These groups were chairmaned by recognized leaders in their respective fields, especially those who had manifested inititiative, had possessed experience, and had showed that they could be depended upon to come through with a report. Perusal of these reports reveals rich experience and practical knowledge.

The work of these committees, supplemented and extended by the various other papers presented at the annual meetings, constituted the basis on which the work of milk inspection developed. The Association, though small in numbers, exerted a powerful influence on stimulating and shaping developments in this aspect of health work. Its output of information was backed by the most highly experienced and technically trained men in the field. Its data were authoritative. Its membership were experts.

ITS PRESENT FUNCTIONING

Journal

In order to bring its valuable collection of papers more conveniently to the membership of the Association, particularly to the majority who had been unable to attend the last annual meeting, a journal was deemed necessary. This project was spearheaded by William B. Palmer, encouraged especially by our then president, Dr. J. G. Hardenbergh, and others. They presented at the 1937 convention a sample journal such as they believed the Association could handle. This was volume one, number one, of the *Journal of Milk Technology*. This was to be issued bimonthly to carry the papers that had hitherto been printed in the single volume of annual proceedings, plus acceptable papers that might be offered by contributors.

At the next annual meeting, the Association reduced its membership dues to three dollars for active members and to two dollars for associate members. This change, together with the inauguration of the Journal, resulted in an immediate increase in membership. This now has reached 2210, of which 91 are foreign members in 14 countries—and the growth continues. The journal goes to 31 foreign countries.

The great increase in interest in general food sanitation and technology impelled the Association to give this subject particular emphasis. So we have just inaugurated a new journal called "Milk and Food Sanitation."

For a while, we shall include it within the *Journal of Milk and Food Technology*.

Judging by the steady increase in circulation, in offerings of papers, and in advertising, the Journal seems to be filling a need. It covers the field of milk and food technology with a breadth and at a level which serves the needs of practical milk and food sanitarians. Its original papers on research and new developments, its reviews and discussions of current problems, its listing of new publications, its abstracts of the literature of the preceding year, and its news items of events in the field, all serve to keep the busy milk and food sanitarian posted on the things that he needs to know. It is the outstanding mouth-piece of milk and food sanitarians. It is a door-opener for their professional recognition. It is the representative of their organized work. It carries a message that attracts attention. It enlists support in new areas. It constitutes a type of backing that commands respect. It gives us professional and organizational solidarity. It ties all groups in the country. It gives them a common medium of publication for their technical literature. Particularly, it gives worldwide distribution to papers that otherwise would get only a limited hearing. Obviously wide publication helps us to secure better papers for presentation at our meetings and improves the quality of our programs.

When sanitarians—or any other professional man—pays membership dues, he wants service in return. The best immediate service he can get is his professional journal. It comes regularly to his home. Ours comes six times a year. It would come oftener if costs of printing had not skyrocketed —with no accompanying increase in subscriptions.

Affiliates

It has been a matter of policy to hold all meetings as general sessions. We have no sectional meetings devoted to special subjects. We maintain that our membership of practical men needs the information that is afforded by the variety of papers presented at the annual meetings. We need the stimulation, the encouragement, the constructive criticism that comes by rubbing elbows, so to speak, with our collaborators who may not be engaged in exactly our kind of work but in related activity. This results indeed in large sessions, but helpful nonetheless.

Increasingly, the milk and food sanitarians in the various cities and states and provinces are organizing local groups. These men often cannot attend the annual meetings, and moreover, want to meet more frequently. To stimulate this trend still more, and to bring the support of the large body to the aid of these smaller groups, the Association has authorized the formation of affiliates. (5) These are city, state, or regional in scope. They are organized and operate on the model of the International Association but possess autonomous freedom of action in election of officers, handling of programs, and engaging in other activities of local interest. At the same time, they are *bona fide* members of the INTERNATIONAL—with all its rights, privileges, and standing.

By such association, these smaller groups enjoy benefits that they could not possibly obtain if they stood alone. Long ago, man learned that in union there is strength. This strength manifests itself in several particulars.

In the first place it is drawing into the Association membership an increasing number of the more outstanding and interested milk and food sanitarians in this country. These men make possible larger and better annual meetings. Such meetings produce a wealth of information and inspiration—the essentials for progress.

Furthermore, affiliation has brought in new blood, so to speak, thereby preventing the constructive program of

the Association from getting into a rut and bogging down into much ado over trivialities.

Then too, this broader enlistment of the interests of milk and food sanitarians has given us a better Journal. This is made possible by more papers and more subscribers, with attendant increase in advertisers.

There are other organizations of men interested in various aspects of the milk industry who are associated with us. These are the groups who have designated the Journal as their official organ. These men are not members of the Association. Their tie-in consists in their sponsoring the Journal in return for which they receive special club subscription rates. All subscriptions are handled by their respective secretaries and are sent to the Journal in groups. Such relationships include both regular associations of milk sanitarians as well as dairy technology societies. Their number is increasing over the country. They are adding their strength to ours.

Committee Reports

The Committee reports are valuable aids to improvements in our technology. At their best, they assemble the latest information as to the new practises in a given field, critically edit it, and then present it in concise form that is utilizable by the reader. They bring the latest and best information right to you. Sometimes these reports take on the nature of reviews, sometimes as studies in particular fields—in all cases, dependable reports on current practises as seen by competent observers and critics.

Food Sanitation

Probably more than half of our membership are responsible for the quality of general foods, in addition to their work with milk. Stimulated, without doubt, by the splendid work of the Sanitary Section of the U. S. Public Health Service, people are increasingly recognizing that the food industry in general needs the same kind of sanitary supervision that brought the milk industry to its present high state of safety, quality and technological development. The problems in the two fields are similar in many respects but nonetheless possess some aspects and applications that call for a degree of special treatment. The former so greatly predominates that the Association felt that its program could well be broadened to cover the general food field—without weakening its emphasis and accomplishment in the milk field as such.

In 1947, the constitution was amended to include general food sanitary technology. The name of the Association now became the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC. To protect our right to publish a journal in this field we have inaugurated the new journal "Milk and Food Sanitation." As stated previously, this will be included as part of the *Journal of Milk and Food Technology* for a time.

Standards

Growth of the Association in membership and prestige has brought new responsibilities. For many years its policy was to set no standards of any kind. This policy has been relaxed within the past few years in view of developments out of the work of the former Committee on Milk Plant Equipment. Dr. Brooks writes:

"Because the Association is the best-known and most outstanding organization of its kind in the world, already including in its membership most of the authorities in its special field, we believe that the responsibility for developing standards, where new standards are needed, is one which it should accept and assume." (8)

This group studied plant operations, and out of these studies made some recommendations for good plant equipment. The industry responded and requested the privilege of cooperating.

Early in 1945 the Sanitary Standards Subcommittee of Dairy Industry Committee was organized. This latter group, together with the U. S. Public Health Service and the Committee on Sanitary Procedure of this Association now constitute a collaborative group ". . . to cooperate with . . . health regulatory officials, in attaining universal acceptance of the sanitary standards upon which mutual agreement has been reached." (6)

The standards agreed upon are considered to be minima in the beginning of this work. It is expected to make them more rigid as advances in manufacturing and fabricating technique are evolved. Equipment which conforms to these standards will be designated by the symbol "3-A" (7). Application has been made for registration of this symbol in the U. S. Patent Office. It will be owned and controlled exclusively by this Association. Already four sets of standards have been agreed upon and published in the Journal, as follows:

Report of Committee on Sanitary Procedure (Pipe Fittings) May-June, 1946

Sanitary Standards for Storage Tanks for Milk and Milk Products, May-June, 1946

Sanitary Standards for Weigh Cans and Receiving Tanks for Raw Milk, Sept.-Oct., 1947

Sanitary Standards for Pumps for Milk and Milk Products, Sept.-Oct., 1947

Copies of the last three have been sent to the health officers of every city in the United States and Canada with a population of twenty-five thousand or over. Copies are available without charge to every member of the Association. A nominal price of five cents each is charged for additional copies to commercial interests.

It is recommended that these be filed in a loose-leaf binder for convenience in reference. This will constitute a useful handbook.

Already equipment manufacturers in some of the general food lines have requested the Association to extend its studies into their fields. President Tiedeman and Chairman Abele are now working on a plan.

Non-Conflicting Ordinances

Milk sanitarians have known for a long time that the dairy industry is plagued with multitudinous and conflicting rules and regulations governing the production and handling of milk products. One of the basic objectives for organizing the Association was the desire to secure some degree of uniformity in the procedure of milk control. The U. S. Public Health Service has done a constructive piece of work in preparing its Standard Milk Ordinance. This has been widely adopted. However, several years ago, this Association began a study to ascertain the possibility of writing a set of regulations that would comprise essentials without "frills." At the last annual meeting of this Association, the Committee made its first report. Copies of the preliminary draft will be mailed to active members of this Association for their study and comment. We do not consider that the work is ready yet for general publication.

National Services

By virtue of the ability of an organization to speak for its members, the International Association has had the privilege of rendering national service to the Federal Government and other national organizations when called upon to help in fields where the special knowledge of its members was essential. This has been particularly evident during the recent World War, and in collaboration with organizations such as the American Public Health Association and the National Research Council.

In reverse, the Association acts as a medium to bring local problems to national attention. Indeed the indi-

vidual milk sanitarian wants to receive help and assistance, but he also wants to render some. The International Association provides a sounding board, so to speak, to broadcast an idea around the world. The columns of our Journal and our programs at our annual meetings are open to our membership. One of our most successful projects was inaugurated and voiced to us by a local group. No one has a monopoly of ideas, and we solicit yours.

Summary of Accomplishments

1. The International Association was organized at the beginning of the modern period of sanitary control of food, and largely directed its development.
2. It provided annual meetings for the exchange of ideas and the development of professional spirit.
3. It published annual proceedings.
4. It established the JOURNAL OF MILK AND FOOD TECHNOLOGY as the most comprehensive and authoritative publication in the field, with world-wide circulation.
5. It organized affiliates to conserve and to foster competence and professional interest among local groups.
6. It arranged for local groups to designate the Journal as their official organ to encourage use of the literature and to foster interest and exchange of ideas.
7. It broadened the scope of the Association to include general food sanitation.
8. It organized 3A program for the standardization of dairy equipment along lines of approved sanitary excellence as determined by expert public health and engineering opinion.
9. It sponsored a committee to study ordinances in order to find a basis for eliminating contradictions.
10. It furnished advisory services to national organizations and the Federal Government.

ITS PROJECTED FUNCTIONING

There are a number of lines of additional service which the Association may well embark upon. All of these are in various stages of development.

One of the most immediate is that of improving our helpfulness to our membership as individuals. For example, we want to work out ways and means of improving the professional and economic status of our members. To do this in a sound way that will bring permanent results needs careful study. Here is a project that requires the united emphasis of a large and influential organization. President Tiedeman has appointed the new Committee on the Professional Status of Sanitarians to undertake this.

There are great potentialities for securing technical information from our membership. These are engaged in every aspect of regulatory control, research, and industrial use and development of milk and other foods. These men possess a wealth of information which is available for the asking. This readiness to give information is not indicative of any cheapness of service nor paucity of knowledge, but rather it reveals that spirit of helpfulness and earnestness in service that characterizes our membership. This is what has kept us going all these years. The office of the Secretary-Treasurer welcomes any inquiries along any line of milk and food sanitation and related technology. The inquiry will be sent by the secretary to the chairman of the standing committee in whose field the inquiry happens to fall, or otherwise, to some member who is particularly well qualified to answer the inquiry.

The increasing scientific and technological demands which modern milk and food sanitation technology is making on sanitarians is forcing us to face the problem of education in this field. In-service courses are regularly conducted for some plant operators. Training courses are required by some municipalities for the licensing of pas-

teurizing operators, and short courses are available for official sanitarians. Several of our colleges and universities have set up special courses which cover about every phase of production, operation, supervision, interpretation, and development, but we know of none that have integrated them into formal courses for food sanitarians as such. We need just this. Who will do it? This Association must take the initiative. How can we expect the professional world to recognize us professionally unless we take ourselves seriously enough to set up educational requirements of rigor, scope, and content that rate comparably with those of engineering, medicine, ministry, and law? We must do more than just label ourselves as being competent if we would command respect. Such a study is needed. Fabian suggests (9) that inspectors and operators might take the same course; this would help them to understand each other better.

Just as soon as we began the publication of our Journal, our membership began to grow—and still is growing. It is keeping par with the unusual growth of our Journal. We need to enlarge our Journal in two aspects, namely, to make it monthly, and to make it available to our friends in Latin America. Already a sizeable group down there take the Journal, but we are working on methods to make the contents of the Journal more accessible and attractive to a wider audience. To achieve both objectives requires resources which we do not have right now, but which should be available as our membership grows, our Journal circulation enlarges, and the number of advertisers increases. A larger and better journal is projected. It will be published monthly as soon as other groups like yours add their resources to the common publication fund. This fund is the treasury of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC.

The standardization of dairy and general food plant procedure throughout the country is desirable in order to do away with confusion. Of course great strides have been made in this direction by reason of the work of the U. S. Public Health Service with its standard codes for milk and restaurants. However, the studies on specifications for plant equipment, lighting, and layout; cleaning requirements; cleaning and sanitizing facilities; floor, wall, ceiling, and paint recommendations; and control of employee health and personal hygiene—all these need codification. Our studies in the standardization of general food plant equipment should be extended along lines already succeeding so well in milk plant equipment.

And then there is the research program. Milk and food sanitation must engage in the study of new ways and means for advancing our knowledge. As individuals we have been doing this ever since milk inspection began to be taken seriously. However, we need more than sporadic, hit-or-miss efforts at securing answers to our problems. We need a long-time, persistent, broadgage research program that will not only give us information concerning what we need to know now but one that will open up new fields that may show us that there is something to learn when we thought we already had all the answers. Furthermore, we need to enlist new talent to engage in research. The spirit of research needs cultivating. It must be informed of investigative needs, then stimulated to engage thereon, then encouraged to keep on and on (when the results are apparently non-existent or contradictory or otherwise disconcertingly discouraging), and finally to be recognized and appreciated. There must be many a young food sanitarian who has a bright idea that should be given a chance to show what it may lead to. Where are they? Do they want somebody to listen to their stories? Do they want to be contacted with others of

like interest? Do they need financial assistance? Such services are what we exist to facilitate. Let us know about your interest—or that of some one else whom you know about but we do not. This Association is interested in fostering research in the field of milk and food sanitation technology. Have you any ideas along these lines? Let us hear from you.

* * * *

All of the above are ambitious projects. They will die "aborning", as the saying goes, if something is not done about them. A strong association is in a position to construct a broad-gage development program, and to give it stability. It has great resources in brains, lively interest, and official position. Your interest is important to its success; your support is vital.

Fellow milk and food sanitarians and technologists, forward. J.H.S.

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George A. West, Secretary-Treasurer

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in 1919 after six months service in the U. S. Navy at the Naval War College at Newport, Rhode Island.

In 1943 Mr. West spent several months in Washington, D. C. as consultant and liaison officer in the Food Branch of the Office of Lend-Lease Administration. During this period he worked with the foreign purchasing missions and governmental agencies on procurement and allocation of essential food and machinery to Lend-Lease countries, serving on several subcommittees of the War Production Board, U.S.D.A., and Combined Food Board.

Mr. West has been active in several professional organizations, holding membership in the Health Council and Safety Council of the Rochester Chamber of Commerce, Spencer-Ripley Methodist Church, Seneca Lodge No. 920 F & A M, and Cornell Club of Rochester, holding the office of President in 1944 in the latter.

Mr. West is a member of Gamma Alpha graduate scientific fraternity. In the field of milk sanitation he was responsible for initiating some of the early studies in the United States on a method for the detection of underpasteurized milk, which were conducted in the Rochester Health Bureau Laboratories on the enzyme amylase, later superseded by the standard phosphatase test.

Mr. West resides in suburban Rochester in the Village of Penfield, New York.

J.H.S.

A Rapid Field Test for Quaternary Ammonium Salts Used as Germicides*

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The increasing use of various types of quaternary ammonium salts as germicides has indicated the need for a rapid, simple test for these materials which may be applied to routine determinations of concentration in the field. In connection with studies on various quaternary ammonium compounds to determine the degree of specificity of their germicidal action, a method has been developed which indicates promise as a routine quantitative field test.

Auerbach (1943, 1944) has shown that in alkaline solutions an anionic indicator combines with cationic quaternary ammonium salts to form a colored complex. The color, however, is similar to that of the anionic indicator, and the results must be determined in degrees of color intensity. The difficulty of accurately gauging such differences under poor lighting conditions, together with the necessary manipulations and attention to detail required by Auerbach's method, indicate that this procedure is not too well adapted to field use.

In a further study of this principle, it has been found that certain anionic indicators in acid solution, when added in excess to a mixture of quaternary salt and ethylene dichloride, produce a yellow-green color in the ethylene dichloride layer of the mixture which contrasts sharply with the blue-violet color in the aqueous layer, thereby rendering the end-point of the test much more easily visible. An added advantage of the test proposed here is the requirement of only two solutions to perform the test, as against the three required by the other method.

The proposed routine procedure for testing the concentration of bactericidal quaternary salt solutions may be carried out as follows:

(1) One ml. of the quaternary ammonium salt solution is placed in a small-bore test tube.

(2) Approximately 1 ml. of ethylene dichloride is added and mixed thoroughly by covering the end of the tube with the thumb and inverting several times. This method of mixing is preferable to shaking, since the layers tend to separate more rapidly after mixing.

(3) Brom phenol blue indicator solution, buffered at pH 4.5 to 4.8 with McIlvaine's standard citrate-phosphate buffer, is added dropwise (one drop to approximate 0.05 ml.), the contents of the tube being well mixed by inverting after each addition of indicator and the layers allowed to separate before adding the next drop. The concentration of the indicator solution may be varied somewhat, depending on the relative emphasis placed by the user on accuracy and speed. The test was developed on the basis of 0,04 percent brom phenol blue, which gives good sensitivity (Table 1) and excellent reproductibility of results. However,

* Journal Paper No. 640, New York State Experiment Station, Geneva, N. Y., June 9, 1945. This is the fifth in a series of articles on cleaning and sterlizing. For earlier papers in the series, see Food Technology I, 321–344, 1947; N. Y. State Agr. Exp. Station, Tech. Bulletins No. 280–281 and 282.

TABLE 1

RESULTS OF TESTING VARIOUS QUATERNARY AMMONIUM GERMICIDE SOLUTIONS BY THE PROPOSED METHOD

Quaternary Ammonium Salt		Number of drops of 0.04% brom phenol blue indicator required to give endpoint with germicide concentration:					
Trade name	Chemical name	1:14,000	1:12,000	1:10,000	1:8,000	1:6,000	1:4,000
Hyamine 10X	p-tert-octyl cresoxy ethoxy ethyl dimethyl benzyl ammonium chloride	7	8	10	12	15	21
Hyamine 1622, Polymine D, Phemerol	p-tert-octyl phenoxy ethoxy ethyl dimethyl benzyl ammonium chloride	7	8	10	12	15	21
Isothan Q4	lauryl pyridinium bromide	7	8	10	12	15	21
Isothan Q15	lauryl isoquinolinium bromide	7	8	10	12	15	21
BTC, Roccal, Zephiran	alkyl (C_8H_{17}–$C_{18}H_{37}$) dimethyl benzyl ammonium chlorides	7	8	10	12	15	21
Tetrosan	alkyl (C_8H_{17}–$C_{18}H_{37}$) dimethyl 3, 4-dichlorobenzyl ammonium chlorides	7	8	10	12	15	21
Quartol, Onyxide	oleyl dimethyl ethyl ammonium bromide	7	8	10	12	15	21
Ceepryn	cetyl pyridinium chloride	7	8	10	13	15	21

in practise it may be considered preferable to sacrifice somewhat on sensitivity in favor of speed, in which case an indicator concentration of 0.16 percent is recommended (Table 2). A large number of test kits have been assembled and used in the field, incorporating the stronger indicator solution, and have proved very satisfactory. The indicator solution is prepared double strength, according to Clark and Lubs' standards, and diluted with an equal volume of buffer as noted above.

TABLE 2

ENDPOINTS FOR RAPID TEST, USING STRONG INDICATOR SOLUTION

Germicide concentration in solution tested	*Number of drops of 0.16% brom phenol blue required to give endpoint*
1:9,000	3
1:7,000	5
1:5,000	7
1:3,000	10

(4) The number of drops of indicator required to produce a permanent yellow-green color in the ethylene dichloride (lower) layer, contrasted with a blue-violet color in the aqueous (upper) layer, indicates the concentration of quaternary ammonium salt in the germicidal solution (Tables 1 and 2).

It will be noted (Table 1) that all the quaternary germicides available for testing gave identical results by this method. While it is true that use of an acid medium destroys the specificity of the test, in that amines will give the same reaction, it is felt that the contrasting colors developed are a sufficient improvement in readability under poor lighting conditions to warrant use of the method for routine check tests on rinse solutions known to contain quaternary ammonium salts as the active ingredient.

Preliminary tests have shown that concentrations of 1 percent protein, fat, or starch in the germicide solution reduce the amount of indicator required to give the end-point by about 1 drop when 0.04 percent indicator is used. This may be considered to indicate the proportion of germicide bound by the contaminating material and thus unavailable for action against bacteria.

It is felt that this procedure indicates promise as a routine field test where a rapid and reasonably simple procedure is required for checking quaternary ammonium solutions. It is not claimed nor intended to be an accurate quantitative analytical method. Where such data are desired, techniques such as that of Auerbach or chemical analysis should be employed.

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A Comparative Study of Commonly Used Staining Procedures for the Direct Microscopic Examination of Milk*

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This study of direct microscopic methods for determination of the sanitary quality of milk was based (1) on a general review of the literature; (2) on personal interviews with workers directly responsible for the introduction and development of this method; (3) on observation of the accuracy and proficiency attained by laboratory workers, these observations being independent and in addition to those reported by one of the authors; and, (4) on results of laboratory studies carried out on an experimental basis.

Procedure and Techniques in the Field

Observations in various laboratories indicated that most workers making direct microscopic examinations generally stay within the broad limits of procedure-conformity suggested in *Standard Methods for the Examination of Dairy Products*. On the other hand, and as was previously indicated by Black,[1] many take advantage of the fact that statements in Standard Methods are in the form of suggestions, and employ procedures or steps not included therein. Thus, in making the milk smears, either the 10 x 10 mm. square, the 4 x 8 mm. rectangle, or the circular areas are used. Milk may be measured by a standard pipette, or by platinum loops of different diameters, despite the fact that Standard Methods does not permit the use of the loop for official control purposes.[2]

The desired area is established by a scratched or etched groove only in the few places where circular areas are used. With square or rectangular areas, guide plates are placed under the slides, with little attempt made to prevent slipping of the slide. Occasionally the pipette was used in spreading the milk. Where milk was deposited upon the slide by means of a loop, the latter was occasionally used as the spreader. The resulting film, after drying and staining, frequently appeared irregularly between a square and a circle. The prescribed bent needle was used in spreading milk over the slide in only a few instances. Even then this was commonly done in two rapid strokes, without apparent regard to slippage of the slide over the guide plate. From field observations it would appear that one could prepare a film by eye approximation, omitting use of the guide plate or the etched circle, without exceeding errors due to other inaccuracies observed in preparing films.

The methods used in defatting, fixing, and staining milk smears were noted. Some used xylene, 95 percent ethyl alcohol and either the aqueous-alcoholic solution or the carbolated aqueous solution of methylene blue. Others used a single dip combined defatting-fixing-staining solution, containing methylene blue, a strong acidifying agent, such as sulfuric, hydrochloric, or acetic acid, and a fat solvent, usually tetrachlorethane. Still others used a two-stain, single dip preparation of methylene blue and basic fuchsin, containing sulfuric acid

* From the Milk and Food Sanitation Laboratory, Water and Sanitation Investigations Station, Cincinnati, Ohio.

as the acidifying agent and tetrachlorethane as the defatting agent. Such staining procedures were adopted by many workers without previously making any critical investigation of the suitability of the methods to their laboratory needs. Occasionally, a heretofore unknown and undescribed procedure was found in use by a laboratory worker, of which the head of the laboratory had no knowledge.

The microscopes in nearly all cases observed were properly standardized to varying field magnifications, resulting in factors of 600,000, 500,000, and 300,000. In this connection it should be noted that in reporting on his survey of the direct microscopic method of examining milk and cream samples in approved and registered laboratories in Connecticut, Eglinton[3] lists "Microscope not standardized to a workable field diameter" among the deviations he found in practise.

Time spent in examining the slides varied with each laboratory worker, and it appeared that no careful account was taken of the number of fields examined. In view of the limited time spent on the examination of each stained milk smear, regardless of the number of bacteria and other organized elements present, it did not appear feasible that even the minimum number of microscopic fields required for the particular grade of milk could be examined, unless the observation of each field was very cursory. Reports were made in general terms, such as less than a certain number of bacteria, or in terms qualifying the milk as good, fair, or bad. Notations were entered in most cases regarding the presence of streptococci, unusual numbers of leucocytes, and large numbers of what the workers seemed to think were thermoduric bacteria.

In summarizing the field observations, it appeared that application of the direct microscopic method presented a state of mild confusion, primarily because of the lack of adherence to rigid standard requirements, and it would seem that this situation should be remedied as soon as possible. However, before any group of qualified workers can be asked to discard their habits or favorite techniques and adhere to the practise of prescribed new ones, evidence must be presented in favor of the changes offered. A restudy of the manifold variations now practised in laboratories engaged in the control of milk sanitation, therefore, appeared of primary and urgent importance.

Such a critical study was undertaken. Since, however, the number of variations is comparatively great and the study of each both exacting and time-consuming, so far only a few factors have been investigated. This paper is limited to reporting upon the results obtained in the study of staining procedures.

STAINING PROCEDURES STUDIED

Of the stains proposed for use in the direct microscopic examination of milk, the five most commonly known to laboratory workers and sanitary inspectors and most frequently used are the following: (1) The stain suggested in Standard Methods prepared by adding 0.3 gm. of certified methylene blue powder to 30 ml. of 95 percent ethyl alcohol, and adding this to 100 ml. of distilled water.[2] (2) Also suggested in Standard Methods is the stain prepared by adding 10 ml. of a saturated aqueous solution of methylene blue powder to 90 ml. of a 2.5 percent phenol solution.[2] (3) The Newman-Lampert Formula No. 2, likewise mentioned in the 8th edition of Standard Methods, and which is made up of 1.0–1.2 gm. certified methylene blue powder added to a solvent mixture consisting of 54 ml. ethyl alcohol and 40 ml. technical tetrachlorethane, and which is then strongly acidified by adding to the above 6 ml. of glacial acetic acid.[2, 4] (4) The Mallman Acid Stain Procedure, not suggested in Standard Methods, is prepared by adding 1.0 gm.

of methylene blue powder to 500 ml. of 95 percent ethyl alcohol, and acidified by adding up to 5 ml. of concentrated hydrochloric acid.[5] (5) The Broadhurst-Paley stain, not suggested in Standard Methods, consists of a mixture of 54 ml. of 95 percent ethyl alcohol and 40 ml. of technical tetrachlorethane acidified with 0.4 ml. of concentrated CP sulfuric acid, to which after heating to 55° C. are added 1.2 gm. certified methylene blue powder and 8 ml. of 1.0 percent alcoholic solution of basic fuchsin.[6]

In addition to the above, we included in our studies the following staining procedures found in the literature: (6) the North Aniline-Methylene Blue Stain [2] suggested in Standard Methods for use in the bacteriological study of powdered milk; and (7) Gray's two-stain method for direct bacterial counts.[7]

With the two Standard Methods methylene blue stains, defatting in xylene or other suitable fat solvent and then fixing the milk smear in 95 percent ethyl alcohol precede the staining of the smear. The procedure thereby becomes a three-step method. With the Mallmann acid stain the need for a separate fixation is eliminated, since the dye is dissolved in 95 percent ethyl alcohol, and the procedure is a two-step technique. In the Newman-Lampert and the Broadhurst-Paley stains the defatting, fixing, and staining are accomplished in one step, and the procedures are commonly referred to as single dip stains. Single dip stains, if satisfactory from every other angle, possess the merits of simplicity and time economy.

BASIC REQUISITES FOR GOOD MILK STAINS

On the basis of observations in the field and in the laboratory, it appeared that the most suitable staining procedure for the direct microscopic count of bacteria in milk must be characterized by the following qualities: 1. It must be simple. 2. It must show the presence of a maximal number of bacteria, as well as of leucocytes and other organized matter capable of living and proliferating in milk. 3. It must show the least possible tendency to overstaining. 4. It must produce a light background with the bacteria stained in different degrees of intensity corresponding to the degree of affinity various types of bacteria or bacteria of different ages have for the dye. 5. The resulting preparation must not be fatiguing to the eye. 6. The stain must not be conducive to bacterial growth. 7. The stain must not deteriorate with time.

The Mallmann Stain. In the Mallmann stain the hydrochloric acid apparently effects a denaturation of the milk proteins causing the film to lose its property to adhere to the surface of the slide. Upon washing, no matter how carefully done, the milk film frequently lifted off the slide and remained floating in the wash-water. Even with the greatest caution exercised, we lost as high as 50 percent of our smears stained by this method.

Questioning of laboratory workers in the field and associates in our laboratory indicated that others have had similar experience with this stain. Johns and Berard [8] reported that they tried the Mallmann acid stain in their work with dried whole eggs and experienced trouble with films washing off. Probably for the purpose of counteracting this difficulty in the fixing of the milk film to the slide, in a later publication Bryan, Mallmann, and Turney [9] suggested that the smear be allowed to air-dry, then fixed by heating in a flame until the slide is just too hot to touch, then cooled, repeating three times, or placed in an incubator for at least one hour.

Such modification in the procedure would increase the complexity of the staining procedure, lengthen the time required for the preparation of the slide, and is not in accord with the

requisites generally considered essential to an appropriate staining procedure. We did not try these additional steps in our comparative studies, and are not able to state whether or not they obviate the supposed denaturation of the milk proteins by the hydrochloric acid. Anderson [10] reports that he was able to obtain better stained smears and easier and higher counts by the Mallmann acid stain than by the standard methylene blue or the Broadhurst-Paley procedures.

The Broadhurst-Paley Stain. In the Broadhurst-Paley stain, the adhesive properties of the milk smears remain unimpaired, and upon macroscopic examination the film appears as a rather even and pleasant reddish pink color. Under the microscope, however, the picture is different. The red background proved fatiguing to the eye, and, apparently due to the formation of insoluble sulfates, there appeared on the slides crystalline and granular material which was not present in the milk originally, as judged by the study of smears of the same milks stained by other procedures. Apparently due to this formation of insoluble sulfates, the stain itself formed a precipitate and deteriorated in a comparatively short time.

The addition of acid to the stain where only methylene blue is used, as suggested in Standard Methods, lightens the background and renders the smear less liable to overstaining. Where basic fuchsin is used in conjunction with methylene blue, the addition of acid brings other influences into action. Due to the acid, a modification in the affinities of the protein constituents of the milk, bacteria, and other organized matter apparently takes place. The affinity of the bacteria and other cells for the methylene blue which varies with the species and age of the cells in the first place, is lessened or completely lost, and the affinity for the basic fuchsin is enhanced.

As a result, many of the bacterial cells stain a reddish pink and cannot be distinguished from the background. This appeared to be equally true, not only of the bacteria but of the leucocytes as well. Some of the cells take on both dyes to a varying degree and make judgment of the nature of the observed material far from easy. Some of the cells which stain distinctly blue, present what appears under the lens as distortions in the original shape. This may be due to sulfate compounds precipitating within the cells.

A summary of a comparative series of counts by the carbolated methylene blue, the Newman-Lampert No. 2, and the Broadhurst-Paley techniques is presented:

Triplicate sets of smears were made of fifty raw milks. One set of smears was stained by each of the techniques mentioned. All slides stained by the standard methylene blue and the Newman-Lampert procedures produced readable stains. In twenty of the fifty slides stained by the Broadhurst-Paley procedure we could see no leucocytes or bacteria stained blue. In the remaining 30 slides the numbers of bacteria and leucocytes fell far short of the number shown by either of the other two stains. The results of the leucocytes counts are summarized in Table 1.

TABLE 1

SUMMARY OF COMPARATIVE LEUCOCYTE COUNTS OBTAINED BY VARIOUS STAINS

	Carbolated Methylene Blue	*Newman-Lampert No. 2*	*Broadhurst-Paley*
High	17,000,000	14,000,000	3,000,000
Low	150,000	425,000	10,000
Average	5,000,000	4,000,000	600,000

This average number of leucocytes counted by the Broadhurst-Paley stain comprised only 12 percent of the average number obtained by the standard

methylene blue, and only 15 percent of that obtained by the Newman-Lampert stains in this set.

The results of the attempted bacterial counts can be summarized as follows: In two milk smears, counts by the standard methylene blue and the Newman-Lampert staining techniques averaged 300 evenly spread individual bacteria per field. Our counts in smears of the same raw milks, stained by the double stain solution averaged as low as 10. In twenty-eight smears we experienced considerable difficulty in deciding whether the blue observed represented bacteria distorted by the acid of the stain or adventitious matter. In the remaining twenty smears we could see no blue-stained material resembling bacteria. We tried the suggestions made by Cohen [11] to obtain better results, but found that nothing in the way of basic improvement in the final counts was assured.

The Addition of Acids to Milk-Smears Staining Solutions. As a result of our experience with the Mallmann hydrochloric acid and the Broadhurst-Paley sulfuric acid double-stain solutions, we are of the opinion that the use of inorganic acids in the preparation of milk smear stains should be discouraged. If for some reason a double-stain solution containing basic fuchsin is considered desirable, the solution will have to be strongly acidified to produce the double-stain effect. Such an effect can be adequately produced by adding some of the basic fuchsin dye to the Newman-Lampert stain. We did that on several occasions, and have found that with acetic acid the solution does not deteriorate upon standing, does not form crystalline or granular material on the smear, and does not distort the bacteria or the leucocytes. However, a loss of affinity for the blue dye and an augmentation in the affinity for the red dye is manifest even with the acetic acid. As the amount of glacial acetic acid added is reduced, this effect becomes less marked. We found that with less than 1 ml. of the acid per 100 ml. of stain, a balance in the affinities of the two dyes begins to make itself apparent. Violet, blue, and red colors appeared not only in the organized material, but in the milk protein background as well, and the stained smear became blotchy and not readable. With about 2.5 to 3.0 ml. of acetic acid per 100 ml. of the solution, a maximal number of blue-stained cells can be obtanied, without apparent distortion of the morphology of the cells. Such number, however, still remained considerably below the number obtained by other appropriate single-stain solutions, and the red background in our judgment still remained fatiguing to the eye.

The Standard Methods Methylene Blue Stains. Two methylene blue staining solutions are incorporated in the 8th Edition of *Standard Methods for the Examination of Dairy Products.* Both give up the dye to the milk proteins of smears with equal ease and rapidity. Therefore, both solutions easily and quickly overstain the milk smears, if they are not removed from the solution and washed in just the proper time. Both stain the background intensely enough to conceal from visibility many of the minute and faintly staining bacteria which do not form clumps or chains but which are evenly distributed through the smear as individual bacteria. Both staining solutions in most smears produce strong contrasts between the background and leucocytes and those of the bacteria which they stain clearly, but both lack the desired quality of producing a picture of the maximal number of bacteria differentially stained in correspondence with the difference in their affinities to the blue dye.

The ease and rapidity with which methylene blue dye is absorbed by milk proteins from its aqueous solution and the resulting intensely stained background of milk smears may offer the basic explanation to the fact that other

newly proposed staining solutions discussed in another paper[12] constantly produced counts far above those obtained by the officially recognized methylene blue solutions. They may also adequately account for differences and inconsistencies in counts obtained in smears of the same milks stained at different times with the same or different batches of the standard methylene blue staining solutions.

The Newman-Lampert No. 2 Stain. In the Newman-Lampert stain the background is generally considerably lighter than in the standard methylene blue stained smears. However, and as previously pointed out, the strong acidity caused by the addition of 6 ml. of glacial acetic acid to 100 ml. of the solution reduces the affinity of practically all the otherwise lightly staining bacteria, so that either they do not take up any blue dye or take it up to such a slight degree that the normal eye cannot see them under the microscope as it is usually used in the routine laboratory. In most instances they are the same bacteria which are concealed by the intensely stained background of milk smears. This may explain the remarkable closeness in the counts of cells which one can obtain in carefully counting smears of the same milks, as is shown in Table 2.

TABLE 2

COMPARATIVE COUNTS OF BACTERIA AND OF LEUCOCYTES IN RAW MILKS STAINED BY CARBOLATED METHYLENE BLUE AND NEWMAN-LAMPERT PROCEDURES

	Bacterial Counts		*Leucocyte Counts*	
Series	*Carbolated Methylene Blue*	*Newman-Lampert*	*Standard Methylene Blue*	*Newman-Lampert*
1	435,000	960,000	1,185,000	1,350,000
2	648,000	612,000	1,968,000	1,752,000
3	852,000	996,000	3,408,000	2,904,000
4	1,224,000	1,116,000	3,900,000	3,744,000
5	1,452,000	1,584,000	1,452,000	1,584,000
6	2,625,000	3,075,000	7,215,000	6,130,000
7	2,925,000	3,150,000	3,030,000	3,150,000
8	3,132,000	2,892,000	2,880,000	1,632,000
9	5,415,000	4,140,000	14,985,000	13,920,000
10	26,400,000	16,290,000	1,770,000	1,080,000
Average	4,510,000	3,482,000	4,404,000	3,481,000
Count Ratios	1.0	0.78	1.0	0.90
Average exclusive of milk No. 10	2,074,000	2,053,000		
Count Ratio	1.0	1.0		

The data presented in this table demonstrate several of the points brought out in the preceding discussion of stains. It will be observed, for instance, that the average of the first nine counts in the slides stained by the standard methylene blue and by the Newman-Lampert procedures are practically identical. However, when the count of slide No. 10 is included, the average of the Newman-Lampert counts becomes reduced by about 22 percent. A careful study of slide No. 10 showed that the greater part of the bacteria, averaging about 90 per field in the standard methylene blue slide, consisted of very minute faintly staining bacteria, mostly of coccus morphology. The stained smear in this case happened to be exceptionally good, and an average count of 90 bacteria could be made with ease. When stained by the highly acidified Newman-Lampert stain, a large number of the bacteria lost just enough of the difference in their affinity for the blue dye to render them unrecognizable after staining the slide.

Since the Newman-Lampert staining solution produces counts not lower

than those by the standard methylene blue solutions, it offers the additional inducement that it is a single dip staining solution and can be advantageously used for rapid screening purposes. The advisability of its removal in the 9th edition of Standard Methods from the official position it held in the 8th edition may be questioned by some competent workers who had extensive experience with this staining solution.

North's Aniline Oil Methylene Blue Stain. This stain is included in the 8th edition of Standard Methods as an alternative stain for microscopic counts of dry milk. It was recommended by W. R. North, Jr. of the Division of Bacteriology, U. S. Food and Drug Administration, in 1938, by personal communication to the committee on Standard Methods for Analyzing Frozen Desserts and Ingredients. In a footnote on page 175 of the 8th edition of Standard Methods the following statement appears: "This stain is very lightly absorbed by the milk proteins in the smear, while the microorganisms in the preparation take a deep blue color, thus facilitating recognition of the organisms. Significantly higher counts have been reported for smears stained with this solution than for duplicate smears stained with plain methylene blue stain." This statement points to several desirable properties any good milk stain should possess, and induced us to test the stain for possible use in the bacteriological study of raw milk.

It is appropriate to state here that in giving the outline for the preparation of this staining solution, the 8th edition of Standard Methods does not sufficiently emphasize the importance of caution to be used in its preparation. Not infrequently it will be found that upon filtering the solution, a great part of the dye remains behind, leaving the solution weaker than it was intended to be. The aniline oil may not go into complete solution and may remain suspended as minute fatty globules even after the solution is filtered through Whatman No. 50 filter paper. Upon staining the slide, these globules adhere to the milk smears permanently and seriously interfere with proper staining and reading of the preparation. These difficulties can be very substantially lessened, if the staining solution is prepared step by step with extreme slowness, all the while vigorously shaking the flask.

Ten raw milk smears were stained by the North and by the carbolated methylene blue stains and counted microscopically. The results are presented in Table 3.

TABLE 3

COMPARATIVE COUNTS OF RAW MILK STAINED BY THE NORTH * AND CARBOLATED METHYLENE BLUE STAINS

Sample	*Carbolated Methylene Blue*	*North Aniline Oil*
1	9,500,000	3,800,000
2	6,700,000	3,200,000
3	3,900,000	2,000,000
4	3,700,000	1,300,000
5	1,900,000	1,400,000
6	1,600,000	800,000
7	600,000	280,000
8	290,000	160,000
9	230,000	220,000
10	320,000	120,000
Averages	2,900,000	1,300,000

*Incorrect formula as published in *Standard Methods for the Examination of Dairy Products,* 8th edition.

The results indicate that the bacterial counts by the North stain, pre-

pared as outlined in the 8th edition of Standard Methods, fell short of those obtained by the carbolayted methylene blue by more than 50 percent. This was primarily due to the fact that in raw milk the North stain as used by us produced a background so light that observing and reading the stained smears under the microscope proved a fatiguing and extremely annoying procedure. In the absence of a well defined background it was frequently impossible to decide whether the stained spots were bacteria, microscopic oil globules, or some other extraneous material. When all the observed stained formations suspected of being bacteria were counted, unbelievably high counts were obtained in some milk smears. On the other hand, when those stained formations were counted which the observer felt sure were bacteria, counts similar to those presented in Table 3 became the rule.

North [13] called attention to the fact that in the 8th edition of Standard Methods the statement: "Add distilled water to produce a total volume of 55.5 ml." is in error. The statement should have read: "Add 55.5 ml. of distilled water," which brings the formula up to a volume of 100 ml. Later Watrous and Doan [14] likewise called attention to this error in the 8th edition of Standard Methods. Nevertheless, we included the results of our study as described for the information of readers who may have used the North staining solution, as given in the 8th edition of Standard Methods. Later we received a quantity of the correctly prepared solution, as actually used in the laboratories of the Food and Drug Administration. We stained a number of raw milk smears and compared the counts with those obtained with carbolated methylene blue stain. We found that in no instance were the counts by the North stain lower than those by the carbolated methylene blue, and that in the majority of the smears counts were higher, ranging from 50 to over 100 percent. The correctly prepared stain produces a light background with relatively intensely stained leucocytes and less intensely stained bacteria. The background, however, is not clearly defined and appears as a greyish blue decidedly foggy screen.

We then stained a number of milk smears with the solution, leaving out the aniline oil. Upon washing, smears so stained rapidly gave up the stain and became almost completely decolorized, due to the effect of the hydrochloric acid. Apparently, the aniline oil in the North staining solution serves primarily as a buffer to the acid, and to a lesser degree as a mordant to the material of the smears. In solutions of methylene blue in alcohol or a 50–50 percent solution of alcohol and a suitable fat solvent, the buffer and mordant effects of the aniline proved in our experience to be considerably reduced.

The results of our observations in the application of the North aniline methylene blue staining solution to raw milk smears led us to believe that if the formula were further improved so that the milk proteins would stain more definitely, and the fogginess be completely eliminated, it would constitute an improvement over the plain aqueous methylene blue staining solutions.

The P. H. H. Gray Staining Solution. This two-stain solution [7] is prepared as follows: A—1.0 percent aqueous methylene blue—50.0 ml; methyl hydrate—50.0 ml. B—1.0 percent aqueous basic fuchsin—25.0 ml.; methyl hydrate—25.0 ml. Mix solutions A and B. The milk films are treated with xylene, washed with methyl alcohol, again dried and stained for a few seconds.

Theoretical considerations based on the knowledge of the principles underlying milk staining which previous studies placed at our disposal, led us to anticipate the following: 1. Due to the fact that the solution has a 50 percent water content, and to some extent that methyl instead of ethyl alcohol is

used, the solution would very readily give up its stains to the proteins of the milk smear, and cause rapid overstaining. 2. Due to the total absence of acid in the solution, the milk proteins as well as the bacteria and other cells would absorb both dyes simultaneously, and in rough correspondence with their concentrations. This should result in an homogeneously stained smear of a bluish-violet color, and no differential staining effect should appear.

We stained three sets of slides, one set being immersed in the solution for ten seconds, the second set for five seconds, and the third set for barely a second, the slides one by one having been rapidly dipped into the solution and immediately rinsed in tap water. Microscopic examination indicated that slides stained for ten seconds absorbed so much of the two dyes that only the fat vacuoles could be seen under the microscope and no cellular elements or granulation of the milk proteins were discernible. The smears stained for five seconds took on somewhat less of the dyes, but still not cellular elements and no granulation of the milk proteins could be seen. The slides stained for one second appeared much as do smears slightly overstained by the aqueous methylene blue. All showed the anticipated blue-violet color to the complete exclusion of the red.

Some of the slides stained as described were immersed for one minute into ethyl alcohol containing 3.0 percent of glacial acetic acid. The reddish color of the fuchsin began to appear. Such treatment, however, failed to render the slides usable for the purpose of counting bacteria.

Fifty milliliters of the Gray two-stain solution were then acidified with 3.0 percent of glacial acetic acid, and several milk smears were stained. After washing and drying the stained smears appeared as readily transparent evenly stained red films. Examined under the microscope, they showed an evenly stained red background and clearly defined blue-stained leucocytes and bacteria. The results were similar to those produced by us with the Newman-Lampert solution, in which the acid was reduced to 3.0 percent and to which an appropriate concentration of basic fuchsin was added.

The results of our experiments with the Gray two-stain solution led us to conclude that, as originally described, this solution fails to impart to raw milk smears the differential staining qualities for which it was primarily proposed, and that its readiness to overstain milk smears in a very few seconds far exceeds that of the two methylene blue solutions stipulated in the 8th edition of Standard Methods.

SUMMARY

We are in general agreement with opinions prevailing regarding the direct microscopic examination of raw milk, as expressed by the following statements: The procedure is characterized by a high degree of versatility, in that it can show with some accuracy the number of clumps or of individual bacteria per milliliter of milk; the types of bacteria predominating the number and types of leucocytes present, thereby calling attention to the possible existence of certain abnormal conditions in the cow; and the presence of extraneous material such as yeasts or molds, and grossly suspended material commonly classed as dirt. This method requires only a short time for its completion, it can be carried out wherever table space and electricity are available; the slides, after drying can be taken to a central laboratory for accurate examination; it can be applied with equal rapidity to various steps of milk processing; and it can tolerate to a variable degree, differences in technique, and still indicate whether the milk examined is poor, fair, or good, from a sanitary viewpoint.

Our studies with methylene blue and basic fuchsin dyes as applied to milk

smears may be summarized as follows: (1) aqueous solutions of methylene blue readily give up the dye to the milk proteins of the background, and cause frequent overstaining; (2) strong contrasts are attained at the expense of delicacy in color shades, which in turn results in the loss of visibility of numerous bacteria whose affinity for the dyes is only slightly greater than of the milk proteins forming the background of the smear; (3) sulfuric acid causes precipitates to appear and breaks down or distorts the organized cells; (4) hydrocloric acid causes an apparent denaturation of the milk proteins resulting in a loss of its adhesive properties; (5) all acids tried, including acetic acid, lighten the background of the stained smears by changing the original staining properties of the material in the milk smears, making many of the lightly staining bacteria imperceptible to the eye; (6) proper application of solutions containing both methylene blue and basic fuchsin requires a high acidification and results in the disadvantages previously mentioned, and the red background is fatiguing to the eye; (7) based on the studies reported, we believe that improved procedures for staining milk smears can be developed.

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Recent Amendments of the U. S. Public Health Service Milk Code*

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THE 1939 edition of Public Health Bulletin No. 220, the *Milk Ordinance and Code* recommended by the U. S. Public Health Service, has remained current longer than any previous edition. At the request of Army authorities no new edition was issued during the war period in order to avoid complications in the procurement of milk by the Quartermaster General under specifications based on the USPHS standards. A few minor changes were adopted as Amendments No. 1 and No. 2 by the USPHS Sanitation Advisory Board in July 1941 and December 1942, but these were issued as multilithed separates.

After the war ended, numerous requests were received from state and local health authorities for the issuance of a revised milk ordinance and code. Some municipalities which were contemplating the enactment of the ordinance hesitated to adopt the 1939 edition if a new edition was imminent. Nevertheless, the Public Health Service preferred to postpone consideration of any revision until the standards being prepared over a period of several years by the Committee on Milk Regulations and Ordinances of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS became available for study by the USPHS Advisory Board. It was the aim of the Public Health Service, in the interest of nation-wide uniformity of milk regulations, to attempt a revision of its recommended ordinance that would be acceptable not only to USPHS Milk Ordinance areas but also to those operating under other standards.

Over the years since the 1939 edition was first issued there have been accumulated hundreds of proposed changes suggested by state and local health agencies, the dairy industry, equipment manufacturers, the IAMS Committee on Milk Regulations and Ordinances, and the staff of the USPHS. In accordance with the recommendation of the 1938 Committee on Milk of the Conference of State and Provincial Health Authorities, the more important of the proposed changes were summarized and submitted early in May of this year as a 16-page mimeographed pamphlet to the several USPHS District offices and to state and city health officers of areas operating under the USPHS milk ordinance for their comments. The comments received were then summarized for the consideration of the USPHS Advisory Board. In addition, a complete and detailed compilation of all accumulated proposed changes was prepared in the form of an agenda and submitted to the members of the Advisory Board for study several weeks in advance of the meeting.

The USPHS Milk and Food Sanitation Advisory Board which met June 25-27, 1947, to consider proposed amendments to the milk ordinance and code was a new board appointed early in 1947, although some of its members had sat on previous boards. When the Sanitation Section was established in the Domestic Quarantine Division of the USPHS in 1940, to be followed

* Presented at the annual meeting of the NEW YORK STATE ASSOCIATION OF MILK SANITARIANS, Utica, N. Y., Sept. 19, 1947, and at the thirty-fourth annual meeting of the INTERNATIONAL ASSOCIATION OF MILK SANITARIANS, Milwaukee, Wis., Oct. 18, 1947.

by its transformation into the Sanitary Engineering Division of the Office of the Surgeon General by the Reorganization Act of 1943, the 16-member Milk Sanitation Advisory Board which had assisted the former Office of Milk Investigations in the preparation of the 1939 Milk Ordinance and Code was replaced by a 7-member Sanitation Advisory Board of consultants in all fields of environmental sanitation. This was the Board that was called upon in the preparation of Amendments No. 1 and No. 2 to the 1939 milk code and of the 1943 Ordinance and Code Regulating Eating and Drinking Establishments. Later it became apparent that the work of the Milk and Food Section would be benefitted by having its own board of specialists, and the Milk and Food Sanitation Advisory Board was accordingly appointed by the Administrator of the Federal Security Agency. Following is a list of its membership. Those designated by an asterisk are also members of the general Sanitation Advisory Board.

C. A. Abele, Director, Country Dairy Inspection Section, Chicago Board of Health

C. J. Babcock *, Market Milk Specialist, Bureau of Dairy Industry, USDA, Washington, D. C.

Dr. F. A. Clark, formerly Director, Division of Inspection, Alabama Department of Health; now School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, Ala.

Mrs. S. V. Dugan, Director, Division of Foods, Drugs, and Hotels, State Department of Health, Louisville, Ky.

H. A. Kroeze *, Director, Division of Sanitary Engineering, State Board of Health, Jackson, Miss.

Sol Pincus *, Senior Sanitary Engineer, New York City Health Department.

C. L. Senn, Engineer-Director, Bureau of Sanitation, Los Angeles City Health Department.

W. D. Tiedeman *, Chief, Bureau of Milk Sanitation, State Department of Health, Albany, N. Y., Chairman.

A. W. Fuchs, Chief, Milk and Food Section, USPHS, Washington, D. C., Secretary

Although wide geographic distribution was desired and achieved, the Board has been kept small in the interest of economy and efficient administration. A small board is more informal, less unwieldly, and can accomplish more in a limited time than a large one. The membership has been limited to those who are or have recently been in official positions in federal, state, or municipal agencies. It was obviously impossible to provide membership to all the geographic areas and to all the branches of the milk and food industry that would like to be represented. As the Board's sessions are limited to a few days, in order to avoid undue interference with the normal duties of the members, it cannot hold open hearings on the numerous proposals submitted but must instead deliberate in closed meeting. Nevertheless, consideration is being given to the suggestion that at future sessions a representative from the industry or industries affected be invited to the meetings as observers to be consulted by the Board when occasion arises.

During its three-day meeting in June, the Advisory Board was unable, despite a minimum of discussion and several night sessions, to complete its consideration of the 150-page typewritten agenda of proposed changes. Some of the less important proposals which could not be considered will be included in the next milk agenda. In the time available, the Board accomplished even more than could reasonably have been expected. The remainder of this paper will be devoted to a discussion of the most important amendments approved by the Board.

GENERAL REVISIONS

All previous editions of the recommended ordinance provided three different methods of enforcement—by degrading, or suspension of permit, or court action. Experience has shown that a dairy that has been degraded will lose customers, and that competition for public patronage through grade labeling serves to promote compliance by the industry. Furthermore, degrading promotes better enforcement by the control agency, as the health officer is more likely to resort to degrading a dairy for minor violations than to revoke or suspend its permit and thus put it out of business. Nevertheless, some health officers who are not familiar with the advantages of degrading object to it. To meet their objections, the revised ordinance contains both a degrading form, enforceable by degrading or permit suspension or court penalties, and a non-degrading form, enforceable by permit suspension or court action only. The two forms are presented as one text, with all references to degrading shown in parentheses, so that the degrading form is obtained by deleting the parentheses signs only, while the non-degrading form is obtained by deleting all passages within parentheses. The grade A designation is retained in both forms. Similar provision for the two forms of enforcement is made in other ordinances recommended by USPHS, including the restaurant ordinance and the frozen desserts ordinance.

A new departure will be the simplification of the interpretative code by removing all material that is not actually public health reason or satisfactory compliance, and placing such material in an appendix. The appendix will, therefore, contain detailed instructions and suggestions to the dairyman and to the inspector formerly scattered throughout the code, as well as many new features.

Several changes are to be made in the methods of computing milk sanitation ratings. Such ratings should not be confused with grading. Grades of individual milk supplies are established by the local control agency under the terms of the ordinance. Milk sanitation ratings, on the other hand, are made by state agencies to determine the weighted percentage compliance of an entire milk shed, or of a group of producers, with the grade A standards. One change in the rating procedure will be to assign twice as much weight to the plant rating as to the producers' rating in computing the pasteurized milk rating of a community, thus acknowledging the greater importance of pasteurization in the production of safe milk. Another change will be to assign 20 percent, instead of the present 15 percent, to bacterial quality, on the grounds that a series of at least four bacterial counts affords a better history of the production conditions than a single inspection made in the course of a rating survey.

Since half-and-half, cottage cheese, and creamed cottage cheese are fresh milk products usually produced in the same plants as milk and cream, some cities prefer to include some or all of these products in their milk ordinance. For the benefit of such municipalities definitions of these products are given in a footnote, with the suggestion that these products be listed in the definition of milk products thus making them subject to the same grade standards as other milk products. Definitions have also been added of light cream, whipping cream, light whipping cream, and heavy cream, conforming to those of the Food and Drug Administration.

The unavailability of adequate supplies of graded whole milk has led to the extensive use of ungraded concentrated milk in the production of buttermilk and milk drinks, particularly in the South, where large volumes of these products are consumed. Difficulties were reported in enforcing grade labeling of these products. Accordingly, reconstituted buttermilk and re-

constituted milk beverages made from concentrated milk have been defined separately from buttermilk and milk beverages made from fresh milk or skimmed milk, and have been omitted from the definition of milk products and from the grading provisions. Of course, where the state law prohibits the sale of reconstituted milk products, these and similar definitions should be deleted when the ordinance is adopted.

As in previous editions, the grades of milk which may be sold are left blank in Section 8 and are to be inserted by the adopting community. For those municipalities which are in position to require the pasteurization of all milk or of all except certified, a footnote in the revised edition will list the changes to be made in the ordinance in order to remove unnecessary and confusing references to raw milk.

ENFORCEMENT PROVISIONS

The watering of milk is classed as an adulteration even when the butterfat and solids-not-fat content still conform to the definition of milk.

In an emergency the sale of ungraded milk or milk products may be authorized by the health officer, upon the approval of the state health authority, in which case such milk or milk products must be labeled "ungraded." An emergency may be declared for a limited period only, and is defined as a general and acute shortage in the milkshed, not simply one dealer's shortage. In many cases it was necessary to utilize ungraded milk supplies during the war, and this condition still exists in a few areas.

Adulterated, misbranded, or ungraded milk or milk products may be impounded by the health officer and disposed of in accordance with state law.

The usual labeling requirements are waived, and only the identity of the producer will be required, on cans delivered to a milk plant which receives only raw milk for pasteurization of only one grade and which immediately dumps, washes, and returns the cans to the producer. In the case of vitamin D milk, the label must show the number of units per quart (at least 400 U.S.P.), in addition to the designation "Vitamin D Milk" and the source of the vitamin D.

The former requirement that restaurants, soda fountains, etc., shall display a placard stating the lowest grade of milk sold is deleted, as the advantages of such placards are considered as not worth the time and effort required for the inspector to post grades and change placards upon change of grade.

Where funds are insufficient for adequate official inspection, the health officer may accept the results of periodic industry inspections of producer dairies provided that such inspections have been officially checked periodically and found satisfactory. Similarly, the results of examinations by commercial laboratories may be accepted in the case of raw milk for pasteurization if officially checked periodically and found satisfactory.

Producers and distributors must permit the inspector access to all parts of the establishment, and distributors must furnish for official use, when requested, a true statement of the quantities of each grade purchased and sold, a list of all sources, records of inspections and tests, and recording thermometer charts.

Compliance with bacterial and cooling temperature standards in previous editions has been based entirely on averages of the last four samples, with logarithmic averages used for plate counts and direct microscopic counts and arithmetic averages for reduction times and cooling temperatures. The new edition permits the adoption of the 3 out of 4 method instead by communities which prefer to do so. It is simpler to understand, requires no calculation of averages, and where direct microscopic counts are made less time is required to count clumps to determine compliance.

A new provision of Section 10 prohibits the mixing of homogenized milk or cream with unhomogenized milk or cream. This so-called "partial homogenization" of milk was reported as being practiced by a few plants to increase the apparent butterfat content.

Under the revised Section 11 milk and milk products from distant points may be accepted without inspection by the receiving city if produced and/or pasteurized under standards that are substantially equivalent and are enforced with equal effectiveness as indicated by milk sanitation ratings.

STANDARDS FOR RAW MILK FOR PASTEURIZATION

Of particular interest to areas not operating under the USPHS milk ordinance are the changes in the production standards for raw milk for pasteurization, for it is in respect to these, rather than in the pasteurization plant standards, that the greatest differences between the USPHS and other standards were to be found. Many of these revisions were suggested by the IAMS Committee on Milk Regulations and Ordinances. It is believed that with these new standards and with the changes previously described, the ordinance can now be adopted by non-USPHS Milk Ordinance areas without creating undue hardship. On the other hand, it will be possible for areas now operating under previous editions of the USPHS milk ordinance to adopt the new edition without any material change in procedures. In this way it is hoped that the goal of country-wide uniformity of standards and of enforcement may eventually be achieved, to the benefit of both the public health and the industry.

Several changes have been made in the bacterial standards for grade A raw milk for pasteurization. While the plate count and the direct microscopic clump count of this milk as delivered from the farm remain at 200,000 per ml., the methylene blue reduction time is reduced to 5 hours, as determined by the modified inverted test prescribed in the forthcoming ninth edition of Standard Methods, and a resazurin reduction standard of 2½ hours to P 7/4 has been inserted. A new standard has also been added limiting the count of this milk after delivery but before pasteurizating to 400,000 per ml., 4 hours by methylene blue, or 2 hours by resazurin. These figures are tentative and subject to change as a result of an investigation now under way. The Advisory Board was convinced that the inevitable increase in count between delivery and pasteurization, particularly where the milk is transported from a receiving station, must be recognized and provided for.

Cows which show a complete induration in one quarter need not be excluded from the milking herd if the affected quarter is completely dry and inactive.

Milking stable floors of tight wood will hereafter be acceptable only if such floors are in existence when the ordinance is adopted locally. New floors must be of concrete or other approved and easily cleaned material. Horses, dry cows, calves, and bulls may be permitted in the milking stable provided that they are confined in stalls, stanchions, and pens which are kept clean and in good repair.

The previous provision concerning feed rooms in the milking barn has been relaxed somewhat by requiring them to be separated by a dust-tight partition and door from the milking space only if feed is ground or mixed or sweet (fly attracting) feed is stored in the feed room.

A provision has been inserted that milking must be done in the milking stable or milking parlor. The acceptance of loafing, resting, or pen type stables, formerly in the Code only, is now a part of the ordinance, with the same provision relative to the removal of manure droppings or the addition of

clean bedding with sufficient frequency to prevent the accumulation of manure on cow's udders and flanks and the breeding of flies.

One of the controversial issues in the past has been whether milk utensils used on producing farms may be washed in the farm kitchen instead of the milk house. The USPHS ordinance has always required washing in the milk house because of the communicable disease hazard involved in kitchen handling to which the entire family has access. While admitting the advantages of washing in the milk house, the IAMS Committee suggested a compromise whereby this ideal would be attained eventually but which would permit northern areas to adopt the ordinance without having to rebuild their milk houses immediately. This compromise was approved by the Advisory Board as an alternative wording in a footnote to item 8r, requiring that in milk houses hereafter constructed, reconstructed, or extensively altered, facilities shall be provided for the washing and rinsing of utensils, including an adequate water heater and stationary wash and rinse vats. Where these facilities are available, washing and rinsing of utensils must be done in the milk house. In all cases, utensils must be given bactericidal treatment and storage in the milk house.

Another compromise suggested by the IAMS Committee and approved by the Advisory Board was on milk pails. It was agreed that small-top milk pails keep much dirt out of the milk and that difficult cleaning is due largely to open seams. Accordingly, the revised wording requires that all milk pails obtained after the ordinance is adopted locally shall be of the seamless hooded type, thus permitting the use of existing open-top pails until replacement is needed.

The revised ordinance provides that if milk is strained, single-service filter pads shall be used and shall not be re-used.

The thorough rinsing of the inner surfaces of pails and cans with a solution containing chlorine or other approved chemicals is accepted as bactericidal treatment in lieu of immersion. The revised code will also permit the treatment of milking machine rubber parts in a 0.5 percent lye solution followed by a water rinse before use.

Straining milk in the milking barn will be permitted under conditions which protect the milk from flies, dust, and other contamination, as by means of a can set on a dolly and provided with a pedal-operated self-closing cover.

Milk for pasteurization must be cooled immediately after completion of milking to 60°F. or less (instead of the former 70°) and maintained at that temperature until delivered and dumped, except morning milk delivered and dumped before a stated hour and night milk delivered and dumped before another stated hour. The adopting municipality is instructed in a footnote to fill in the time to suit local condition but should not allow more than four hours after completion of milking as locally practiced. Milk which does not comply with the temperature standard is subject to rejection.

The revisions described in the preceding four paragraphs were suggested by the IAMS Committee on Regulations and Ordinances.

STANDARDS FOR PASTEURIZED MILK

Numerous changes were made in the standards for Grade A pasteurized milk. Very few of these were drastic, however, most of them being for purposes of greater clarification or improvement in technical requirements.

The revised code will recommend that monthly platform tests of each producer's milk be made by the milk plant or its receiving station, including odor, strainer-dipper, sediment, and temperature. It will be further recommended that milk found unsatisfactory by these tests be rejected and that follow-up inspections be made by the

plant to discover and correct the cause. Official inspectors will be urged to check the plant's platform test procedures.

In the 1939 edition the use of the phosphatase test to determine the efficiency of pasteurization was recommended in a footnote. In the revised edition the phosphatase test is made mandatory in the ordinance definition of grade A pasteurized milk. Because of the supreme importance of proper pasteurization, a violation of the phosphatase test requirement will be treated differently from other types of violations. Section 6 will provide that in case of violation of the phosphatase test standard the cause of underpasteurization shall be determined and removed before any pasteurized milk or milk products can again be sold from this plant.

A coliform standard for pasteurized milk of not over 10 per ml. has been added, for the purpose of detecting post-pasteurization contamination when phosphatase tests are negative. The Advisory Board felt that this was a liberal standard which may be made more stringent in future editions, but which is justified for an initial program.

For plant lighting either natural or artificial light will be accepted in the Code if 10 foot-candles intensity is provided either on the work or on a plane 30 inches above the floor, with greater light intensities at special points where necessary.

Control and elimination of rodents and roaches from the plant has been provided in Section 5p, and the Code will require poisonous substances to be stored and handled so as to prevent the accidental contamination of milk, milk products, or containers.

With regard to water supplies, a recommendation will appear in the Code that the water supply of pasteurization plants and producer-distributor dairies be sampled for bacteriological examination at least twice a year. Section 11p of the ordinance also provides that all plumbing and equipment shall be so designed and installed as to prevent contamination of the water supply and of milk equipment by backflow. No interconnection will be permitted between a safe and an unsafe water supply.

A suggestion will be inserted in the Code under item 10p that health officers accept new equipment complying with the 3-A standards as reported from time to time in the JOURNAL OF MILK AND FOOD TECHNOLOGY. It is not intended, however, to recommend the immediate replacement of existing equipment with that conforming to 3-A standards. A list of 3-A sanitary standards thus far approved and those under consideration will appear in the appendix. Similarly, reference will be made to standards on paper packaging materials * prepared at Syracuse University with the aid of a public health advisory council for the self-policing of the industry, with the suggestion that health officers utilize Dr. Sanborn's plant inspection and laboratory reports.

A table will be inserted in the Code showing approved caustic strengths for certain soaking times and temperatures in soaker-type bottle washers.

The testing of pasteurizer thermometers by inserting a test thermometer into the milk in the vat for comparison will be discontinued and is to be replaced by testing in a can of hot water.

For the sake of greater clarity, the detailed requirements of the Code applicable to high-temperature short-time pasteurization will be segregated from the requirements applicable to other automatic pasteurization equipment. Provision is made to prohibit high-temperature installations from being equipped with any device for short-circuiting a portion of the holder section.

It may interest you to know that there will be included a sketch and description of at least one design of a 3-way plug-type leak-protector inlet valve developed by the USPHS.

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* See this JOURNAL, Jan.–Feb. issue, p. 31–35.

(Continued on page 161)

MILK and FOOD SANITATION

Cleaning HTST Pasteurizers

W. H. HASKELL

Klenzade Products, Inc., Beloit, Wis.

THE necessity for adequate cleaning of all pasteurization equipment has its beginning on the milk producing farm. The cleaning necessity for plant equipment is emphasized in HTST pasteurization because of the changes in the character of the "soil" due to the higher temperature employed, and the fact that certain microorganisms either survive or definitely increase in number at the higher temperature employed. Inasmuch as many of the heat-loving and heat-resisting bacteria gain access to the milk supply because of inadequate preparation of dairy farm utensils—milking machines being a major consideration—it is not unreasonable to assume that dairy farm sanitation is important.

FACTORS INVOLVED

In any cleaning procedure the following factors should be considered:

1. The character and composition of the material to be effaced; 2. The composition of the water used for cleaning; and, 3. The composition of the cleaning compounds employed.

It is advisable to discuss these factors briefly in the order named.

Composition of Material to Be Effaced

Milk is a complex substance containing, essentially, fat, proteins, and varying amounts of mineral substances. The constituents of milk react specifically to variations in temperature. This specific reaction to temperature must be considered because high temperatures applied to milk invariably provide a "burn-on" of milk solids, principally calcium caseinate, with entrapped milk fat. This type of "soil" is different in character from the soil encountered on producing farms or in milk plants employing low temperature pasteurization.

Composition of Water Used for Cleaning

Water, as we find it, varies widely in its chemical composition. The "sealing" properties of water are increased as the water hardness increases. Lake water, under correct use conditions, varies greatly in chemical composition from water derived from underground sources. Applying heat to water tends to produce precipitates; in fact, water hardness may be removed by boiling through the formation of calcium carbonate, an insoluble substance.

From this brief discussion, it is obvious that water itself may vary the methods of cleaning treatment applied to specific milk equipment.

The Composition of Cleaning Compounds Employed

The Chemical composition of cleaning compounds used in removing "soil" from HTST equipment is deserving of major consideration. It is not unusual to encounter cleaning compounds so constituted that they create additional cleaning problems. Obviously, the use of such compounds should be approached with reluctance.

CLEANING COMPOUNDS

It is well established that no one type of cleaning compound, either alkaline or acid, will permit a satisfactory cleaning job over a period of time. Proteins and mineral deposits

are the most difficult to remove. Milk solids at high temperature are not soluble in water. These two facts alone clearly indicate the necessity for the application of the principles of chemistry for efficient cleaning.

Alkaline cleaners will remove fats, proteins, and heavy character "soil".

Acid cleaners will remove mineral deposits that precipitate and bind protein to the equipment.

In average dairy farm cleaning procedures an alternate cleaning method is recommended, involving the use of a balanced alkaline cleaning compound for three days, followed by a balanced acid cleaning compound for one day. This alternate cleaning procedure is altered in the cleaning of HTST pasteurizers, due to the characteristics of the soil encountered. The alternate cleaning method recommended for HTST pasteurizers includes the recirculation of a balanced acid cleaner, thorough flushing, followed by the recirculation of a balanced alkaline cleaner, and again thorough flushing.

To be more specific, the acid and alkaline compounds are used in the same cleaning operation, one immediately following the flushing of the other. The acid compound acts more as a solvent for mineral matter than as an actual cleaner, although definite cleaning properties are possessed by the acid product. It should also be emphasized that thorough flushing with hot water should follow both acid and alkaline recirculation.

Inasmuch as it is not chemically possible to mix acids and alkalies in the same solution and maintain a definite desired balance, either acid or alkaline, the need for employing alkaline and acid balanced cleaning solutions in separate operations is obvious.

pH Value

The pH value is of extreme importance in the balancing and control of various cleaning compounds designed for specific type of work. The neutral point of 7 provides an excellent point at or near which it is possible to balance cleaning compounds for the lighter type cleaning work. In the case of HTST pasteurizers with the problem of "cooked-on" deposits to consider, it is essential that cleaning materials used for balanced cleaning compounds provide a pH approaching 12.4 on the alkaline side and a pH of 4.5 on the acid side. These pH values obviously are those recommended for use dilutions.

The consideration of the pH value as a determining factor in the construction of balanced cleaning compounds clearly indicates the possibility of blending cleaning solutions designed for specific cleaning jobs of any character, under reasonably accurate laboratory control.

It should not be forgotten that consideration of other factors in cleaning is of prime importance. Correct water softening, emulsification, wetting ability, lack of corrosiveness, free rinsing, etc., are all part of the problem.

Recirculation Cleaning

The cleaning of HTST pasteurizers is frequently a time consuming task. In an effort to shorten the time and labor factors involved in this daily chore, there has been a definite trend toward the use of a chemical recirculation method of cleaning in place of the hand scrub method. Chemical recirculation cleaning does offer some advantages over hand cleaning. In the chemical recirculation method, the plate gaskets are in place and not subject to "bumping" and displacement. The chemical recirculation method also offers the application of increased pressures during recirculation. Increased pressures are desirable because of better penetration of the cleaning solution. Penetration of properly balanced cleaning solutions into the rubber gaskets is desirable because it decreases the possibility of milk fat remaining in the rubber cells. Fat left

in rubber definitely shortens the period of usability of the gaskets and tends to create leaks due to hardened rubber. If cleaning is properly done, there should be no tendency of gaskets to become unseated.

Increased pressures used during the recirculation of cleaning compounds has definite value in providing increased flushing action for cleaning.

It should also be remembered that present-day chemically balanced cleaning compounds provide much greater cleaning efficiency than was formerly the case.

It is not considered good practice for those engaged in providing chemical cleaning compounds to become too intimately involved in the engineering features inherent in HTST pasteurizers. Following the same line of reasoning, there appears to be no valid reason for those engaged in engineering to become too involved in the chemical demands of cleaning. Obviously, there are many reasons why both participants should consider the problems of the other and cooperate for the benefit of the equipment user.

A few major factors should be considered in the recirculation method of cleaning. They may be stated as follows:

1. The cleaning compound used should be designed specifically for the cleaning problem.
2. The cleaning solution should be recirculated at a greater pressure than the usual operating pressure.
3. There should be a plentiful, uninterrupted supply of *hot* water.
4. Recirculation, both for cleaning and flushing, should be of sufficient duration to secure desired results.
5. Recirculation of cleaning compounds should be at a temperature at least 10° F. above pasteurization temperature.
6. Flow diversion valve should be removed from unit before recirculation is begun and valve dismantled and hand cleaned.
7. Pasteurizer should never be permitted to run dry during recirculation, either cleaning or flushing.
8. After completion of recirculation cleaning, pasteurizer should be flushed with cold water, dismantled, and *inspected*.
9. The plates of the HTST unit should be cool to the hand before dismantling begins.

It is imperative to remember that thorough cleaning, is essential, no matter what method is employed.

Professional Status of Sanitarians

President Tiedeman has appointed a committee to study ways and means for improving the professional status of milk and food sanitarians. The committee is as follows:

Harold B. Robinson, *Chairman*, U. S. Public Health Service, New York, N. Y.
Charles E. Carl, State Board of Health, Jefferson City, Mo.
John J. Donovan, Health Department, Brookline, Mass.
J. A. King, City and County Health Dept., Denver, Colo.
H. Clifford Mitchell, State Health Dept., Richmond, Va.
John Taylor, State Board of Health, Indianapolis, Ind.

Testing Equipment—A Practical Aid to Efficient Sanitation

LEE H. MINOR

Technical Service Department, Wyandotte Chemicals Corporation, Wyandotte, Michigan

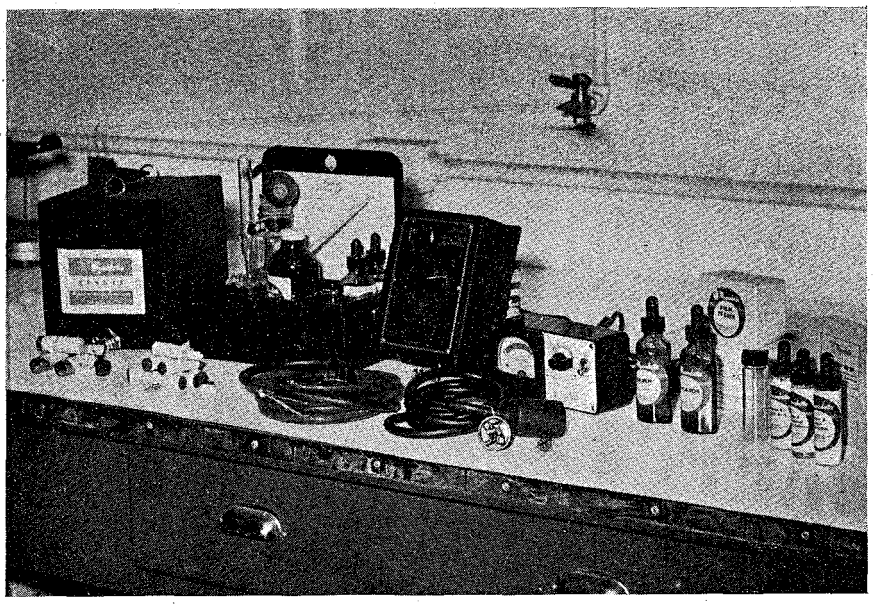
THE quality of food products as well as the health of the nation depends much on the proper use and control of cleaning and sanitizing materials. Through the proper use of suitable cleaning materials and effective yet safe germicides, food processing equipment and food containers are easily made physically clean and bacteriologically safe. In order to assist food processors and manufacturers in obtaining these necessary results, the use of efficient testing equipment is almost indispensable.

The Service Testing Equipment, shown in the accompanying photograph, reading from right to left is:

Germicidal Test Kit
Film Tester
Control Meter
Alkameter
Titration Teskit
Germicidal Test Papers
Alkacid Papers

The germicidal Test Kit is used for determining the amount of available chlorine in parts per million in germicidal rinse solutions. The test is based on the standard laboratory method used for the determination of available chlorine using starch potassium iodide, acetic acid, and a tenth normal solution of sodium thiosulphate.

A germicidal water rinse solution containing available chlorine turns blue in color upon the addition of starch potassium iodide. The acetic acid is used to liberate chlorine which may be



This testing equipment may be easily and quickly operated by regular plant personnel

chemically combined with alkaline materials such as sodium or calcium. Chlorine combined in such a manner, according to a report from Michigan State College by Mallman and Ardrey, "is not free to act in a germicidal capacity." *

However, when testing a solution of a germicide containing chloramine-T for available chlorine, it is not necessary to make use of the acetic acid. This germicide containing chloramine-T dissolves rapidly and completely in water and all of its chlorine is immediately available for germicidal purposes.

Note that for hypochlorite solutions this test shows the amount of available chlorine present in the germicidal rinse solution from which the sample was taken, plus that chlorine which was chemically combined and not free to act in a germicidal capacity until it was released by the addition of acetic acid. The use of an acid to release chemically combined chlorine in calcium and sodium hypochlorite germicidal rinse solutions increases the corrosive action of these materials on metal and other surfaces.

This determination of the amount of available chlorine with sodium thiosulphate is approximately equivalent to 10 p.p.m. of available chlorine for each drop of the sodium thiosulphate used. When the chlorine is combined or "locked in," this test may show a higher strength of available chlorine than is present in actual use for germicidal purposes.

Intelligent use of a Germicidal Test Kit will aid the staff to maintain efficient sanitation.

Films which are sometimes found on equipment, glasses, and dishes following the cleaning and germicidal treatment are not only unsightly but have been found to harbor bacteria. High bacetria counts as well as some off-flavors in food products have been eliminated by the removal of these innocent appearing films on equipment. To remove and to prevent the reoccurrence of these undesirable films it has been found advantageous to locate the source responsible for the film formation. The use of a Film Tester aids in determining whether the source of the film is:

1. A precipitate deposited by the reaction of the minerals in the wash water with some of the chemicals in the cleaning materials, or
2. Oily or greasy substances which were not completely removed because of improper cleaning procedure.

In some instances it has been found that rinse solutions containing the recently introduced quaternary ammonium compounds produce films which adhere tenaciously to the surfaces of equipment and glasses due to a reaction with food products present.

Use of a Film Tester in many instances has aided in locating the sources of possible insanitary conditions.

The Control Meter is an electrical instrument which automatically registers on a dial the concentration of a cleaning solution by percentage. With its use uniform concentrations of cleaning solutions are constantly maintained in can and dishwashing machines. The instrument is also used to determine whether an excess amount of the solution in bottle washing machines is being carried over and lost in the rinse water.

In machine bottle washing operations the proper caustic concentration of the washing solution is necessary to provide physically clean and bacteriologically safe bottles. The Alkameter is an electrical instrument which registers on a dial the percentage of caustic concentration in the washing solution.

The Titration Teskit shown here is a miniature laboratory equipped with a burette, standardized acid solution, indicator solutions, and other chemicals used for making chemical tests and titrations. The Teskit is easily hand carried and is convenient to use near a bottle-washing machine or other

* Bul. No. 91 (1940). Michigan Eng. Exp. Station.

equipment where samples of solutions to be checked are obtained.

Germicidal rinse solutions can be quickly checked for the approximate parts per million of available chlorine with the use of Germicidal Test Papers. These papers are impregnated with starch potassium iodide and turn blue in color when dipped into rinse solutions containing available chlorine. After dipping the test paper into the germicidal solution the approximate number of parts per million of available chlorine contained in the solution can be ascertained by matching the blue color of the test paper with the colors on a standard color chart.

Since chloramine-T germicidal solutions do not bleach, the color of the test paper does not change. However, as solutions of sodium and calcium hypochlorite chlorine have a bleaching action, the blue color of the test paper bleaches or fades soon after it is used for checking the available chlorine content.

Many times it is of interest to know whether a solution is alkaline or acid in reaction, or whether a surface has been completely rinsed free of cleaning solution. This information can quickly be obtained with the use of an Alkacid Test Paper. These papers have a range from a pH of 2, a strongly acid reaction, to a pH of 10, a strongly alkaline reaction.

Just as the "rule of thumb" days have passed in dairy plant operation so too have they passed in checking sanitary procedures. Testing equipment of this type has been well proved over a period of years as a practical aid to efficient sanitation.

Amendments to USPHS Milk Code

(Continued from page 155)

The lip-cover cap requirement has been changed so as to require that single-service containers shall be so constructed that nothing on top thereof can contaminate the contents or the pouring lip when the container is opened.

A new provision is made in the ordinance governing milk tank cars and tank trucks, and detailed specifications covering construction, cleaning, bactericidal treatment, storage and handling will appear in the Code.

Many other changes have been adopted to improve the specifications of items 16p and 17p on insurance of adequate holding time, regenerator pressures, other features of automatic systems, equipment tests, and pasteurizer valves, but these are too technical and lengthy to discuss at this time.

SUMMARY

In June 1947 the USPHS Milk and Food Sanitation Advisory Board met to consider several hundred proposals from public health officials and the dairy industry for amending the 1939 edition of the USPHS Milk Ordinance and Code. The most important changes adopted have been discussed. A tentative draft of the revised ordinance, subject to change, was issued in mimeographed form in August 1947, and the complete revised ordinance and code will be issued as a printed bulletin by the middle of 1948. It is believed that certain changes contributed by the Committee on Milk Regulations and Ordinances of the International Association of Milk Sanitarians will make this ordinance more universally acceptable, thus promoting national uniformity of milk standards to the benefit of both the public health and the industry.

Report of Frozen Desserts Committee for 1947

It is clearly evident, in reading over the reports of the various Committee members, that the problems in frozen dessert sanitation are never solved, and presumably never will be. It is obviously a matter of vigilance and education by the inspectors. Each new manufacturer and practically every new employee that enters the industry—to say nothing about the old ones—must be checked and watched constantly for their sanitary habits. The same sanitary problems present themselves anew each inspection. Carelessness, indifference, and ignorance are the worst enemies of sanitation.

Proper handling of the ingredients, correct washing of the machinery, and wrapping or packaging the finished products must be checked constantly. Such a simple matter as the correct handling of flavors and colors to avoid contamination is easy and yet, in most plants, they are handled so carelessly that they are a constant source of contamination.

The greatest problem the counter freezer presents is one of sanitation. Frequent changes in the ownership of places operating them, the type of place in which they are operated, the fact that making frozen desserts is usually only one of the many duties required of the operator, and, finally, that the mix and the frozen desserts themselves are treated in the same manner as any of the other foods dispensed, all adds up to a real problem in sanitation and a headache for the inspector.

Postwar problems in the frozen dessert industry have been even greater than during the war. During the war, scarcity of labor and materials were the chief consideration. Now another and more formidable foe, high cost of labor and materials, has entered the picture. Quality and sanitation are almost sure to suffer as a result of these factors.

One of the more hopeful signs from a sanitary standpoint is the manufacture and more common use of automatic filling, capping, and wrapping machines for novelties and package goods. Another cheering thought is the provision which is being incorporated into state and city laws that the plans and specifications for new buildings and extensive alterations of old ones must be approved by the Board of Health or other agency responsible for the sanitation of the plant. Manufacturers of machinery have long since seen the advisability of asking the advice and cooperation of sanitarians in building equipment which is easily cleaned and sanitized.

So it is that we are slowly but surely making progress. One in educational work such as a food or milk inspector should never become discouraged. They should look for the bright spots and remember the infinite capacity of the human mind to resist knowledge.

As usual, the meat of the Report of the Frozen Desserts Committee is found in the individual reports of each of its members. The information in their reports serves as an excellent cross secitonal view of what is going on throughout the United States and Canada. It should serve as a source of information and guidance for other inspectors.

FROZEN DESSERT SANITATION IN CALIFORNIA

O. A. GHIGGOILE
Sacramento, California

A comparison of ice cream production figures for the year 1946 with those from 1947 shows a very noticeable decline in the production of ice cream. This decline has caused the manufacturers of ice cream to give more serious consideration to the quality of the product.

There has been a marked tendency to improve quality, and one of the greatest improvements has been accomplished by the elimination of sweetening substitutes which were necessary during the war. An increase in the use of fresh condensed skim milk and fresh cream is quite evident and is replacing powdered milk and frozen or plastic cream to a considerable extent.

It is recognized that an increase in the consumption of ice cream can be accomplished by producing a high quality product acceptable to the consumer.

Many manufacturers have inaugurated as a company policy, a very definite and comprehensive quality program. There has been established a program wherein all department supervisors are being held for the operational functions in his department. There is to be a closely controlled supervision over all operations from the careful selection of ingredients until the finished product reaches the consumer. Such a program can hardly fail to reflect itself in the quality of the finished product.

Specific consideration has been given to the improvement in the body and texture of ice cream. As a result of this, there is a very definite trend toward the use of products having distinctive emulsifying properties. It is felt that where these products are used, there is brought about a more definite control over the freezing operation, greater control of the crystallization and greater dispersion of the milk fat with improved whipping properties.

During the period when industrial sugar was under government restriction, the amount of sherbet manufactured showed a decided downward trend. This is due to a greater amount of sugar required in the manufacture of sherbet as compared with ice cream. We have felt that due to substitute sweetenings used in sherbet during the war period, the consumer would be an unwilling purchaser even when the quality of the sherbet is improved. However, it appears that many plants are again manufacturing a good fruit sherbet and are enjoying good sales.

Special attention is being given to improve the quality of sherbets to regain consumer confidence which apparently is being achieved. The manufacturers of sherbets feel that there is a definite place for this product, but that to be acceptable to the average consumer, it must be of high quality.

The manufacture of so-called novelties, which in the past has been confined to a few manufacturers is now being undertaken by many of the smaller plants. In this connection, close supervision must be given to the washing and sterilizing of the molds that are being used. In this connection, old bottle case washers were made suitable for the washing and sterilization of the molds at the end of operation each day. Means for the washing and sterilization of these molds upon emptying and before being returned for filling are now being devised. This means that the molds will be continuously washed and sterilized each time emptied and sent through the cycle of operation.

For a number of years, we have been confronted with complaints due to the presence of brine in certain novelty items. This condition was brought about by the use of leaky molds and brine splashes in the tank. This problem was partially overcome by the addi-

tion of colored dye to the brine, making it possible for the operator in the defrosting tank to detect the presence of brine in the frozen product should there be a leaky mold. Although this precaution has merits, it has not completely solved the problem.

Several installations are now in the process whereby the semi-frozen product passes directly from the freezer to the automatic filler. The filler fills the respective molds as they travel through their cycle on a conveyor passing directly into a low temperature blast tunnel. Upon leaving the tunnel, the novelty items are defrosted and passed on to an automatic bagger, the molds washed and sterilized before refilling. By this system, the use of brine is eliminated and the operation being automatic reflects a decided improvement in the sanitary features of novelty production.

Now that building materials, supplies, and equipment are generally available, a determined effort is being made for repairing, remodeling, and rebuilding of factories and the installation of modern and new equipment. Many factories which started to remodel and modernize in keeping with more efficient operation, better quality control, and sanitary features, are at last being completed. There has been a great tendency toward cooperation in regard to the sound planning of new construction before work actually begins. Cooperation on the part of the equipment salesmen, manufacturers of ice cream, and regulatory officials has been very helpful in directing prospective plant operators to members of the Department of Agriculture so that they may become familiar with legal requirements before proceeding with the construction work. In nearly all instances, sketches or plans have been submitted for review before construction is started.

Perhaps one of the largest turnovers in the manufacture of ice cream and similar products is with operators of so-called counter freezers. Several makes of these machines are again available, and many people gathered the impression that the operation of a small malt shop with a counter freezer would be a lucrative business. Counter freezers were, therefore, installed in many malt shops, drug stores, cash and carry dairies, etc., without regard of the location. As a result, some of these places change hands several times during the year and constitute a problem for the control officials having to do with the enforcement of laws governing factory sanitation, licensing, and composition and sale of product. This requires a large portion of the inspector's time in making reinspections to determine if conditions are satisfactroy for the issuance of a factory license and properly to instruct operators of the factories in washing and sterilizing methods, composition control, manufacturing operations, and many other factors entering into the production of quality products because this operation is entirely new to them.

A tremendous increase is noticed in the number of so-called ice cream peddlers on the streets. In some portions of certain cities, the streets are so crowded with putputs, carts, and trucks catering to the children and door to door delivery that it seems like a parade. It will not be surprising to see a majority of these operators who are doing business on a shoestring drop out of business by fall.

During the 1947 session of the California State Legislature, many important changes were made in the law pertaining to the construction of ice cream factories as well as other milk product plants. The new law which becomes effective September 19 requires that all plans and specifications for new milk product plants or extensive repairs to existing plants be submitted to the Director of Agriculture for review and approval.

Another section of the law which has been added strengthens the requirements pertaining to equipment

used in processing frozen milk products and calls for sanitary design and construction. The placing of equipment must be so that it can be readily cleansed and so located as to permit the cleaning of walls and floors. All freezing and processing rooms must have water-proof walls high enough to take care of any splash. The material used for the walls must be non-absorbent and acceptable to the Director.

The water supply used in milk product plants, including ice cream factories, must be properly located, easily accessible, adequately operated, and protected against contamination. The bacteria quality must conform to the standards of the State Board of Health for public supplies of drinking water.

Separate rooms will be required for each operation and includes separate rooms for receiving and weighing of milk or cream and washing or sterilizing containers in which milk or cream is received; for pasteurization, processing, cooling, and manufacturing, washing and sterilizing of bottles or cans used in delivering products to the wholesale or retail trade; for bacteriological and chemical analysis, for adequate and efficient cold storage rooms; for boilers, compressors, and other machinery; for storage of supplies and for toilets, lavatories and lockers.

The importance of adequate supervision over the manufacture of ice cream and similar frozen products and strict control over all phases of ice cream manufacturing can not be over emphasized.

CONTINUOUS FLOW EQUIPMENT FOR ICE CREAM MIX

RALPH E. IRWIN

Camp Hill, Pennsylvania

After several years of experience with continuous flow equipment for the pasteurization of milk, the milk plant operator and the health officials have given almost universal approval to this type of equipment. Likewise, the continuous flow ice cream freezer has been with us many years. Now equipment is in use for continuous flow during the preparation of ice cream mix.

The Hershey Creamery Company of Harrisburg, Pennsylvania, has continuous flow equipment in operation in their plant in Chambersburg, Pennsylvania. Mr. Harry E. Sauers, Director of Research, assisted me in collecting the following information for the use of our Committee on Frozen Desserts Sanitation.

Milk is purchased from 450 local farms. Some cream is obtained outside of Pennsylvania. The milk is cooled and stored in two 3,000-gallon tanks and three 2,500-gallon tanks. Milk from the storage tanks and cream from cans in cold storage are weighed into a mixing vat and sugar added. From this vat, the mix is pumped through a continuous flow heater. A part of the heated mix is returned to the mixing vat to hasten the melting of the sugar. The mix is heated to 150° F. and pumped to either of two vacuum pans where the temperature is approximately 135° F. About one third of the water is removed in the vacuum pans.

From the vacuum pans, the mix flows to measuring tanks to permit a check on the butter fat, solids, etc. The mix then flows to a surge tank from which it is pumped through a filter to the second heater, where the temperature varies between 150 and 160° F., and thence to the homogenizers. The homogenizers pump the mix through the tubular pasteurizers equipped with a diversion valve set to divert at 175° F. The mix is held in a 4-inch holder pipe at 175° F. for 22½ seconds.

From the holder, the mix flows to

a cabinet cooler and thence to any one of five storage tanks. The stored mix is pumped to a battery of continuous freezers for the preparation of bulk ice cream or novelties, or to tank trucks for transportation to the Harrisburg plant where the mix is stored or pumped to continuous freezers for the preparation of pint packages of ice cream.

Heating before condensing and before pasteurizing takes place in what is called Ste-Vac equipment. This consists of cylinders approximately 10 feet long and 30 inches or 35 inches in diameter. In the first Ste-Vac, there are forty-eight 1½-inch tubes arranged so that the mix flows through two parallel tubes and thence to the vacuum pans.

The second Ste-Vac has sixteen 1½-inch tubes arranged in two sections. The first section of eight tubes maintains 150° F. for homogenization while the second section of eight tubes raised the temperature for holding at not less than 175° F.

Both Ste-Vac units operate on vacuum to prevent burning. Each unit has a capacity of about 20,000 pounds per hour. The first operates at full capacity and the second unit at about 15,000 pounds per hour for six hours daily.

To clean the equipment, one of the prepared milk stone removers is circulated through the equipment for about one hour. This is followed by hand brushing and final sterilization with hot water or steam. Before starting operations in the morning, a chlorine solution of 200 p.p.m. is circulated through the equipment. The mix follows the chlorine solution.

Each ice cream plant is equipped with a laboratory. Bacteriological samples are collected daily from each step in the preparation of the mix. The finished product gives a standard plate count of 1,000 to 1,500 colonies. Seldom are colon organisms obtained from samples from the cooler, final storage tanks, or finished product by the use of desoxycholate agar.

During 1946, 70 percent of the mix was used in the preparation of over 32,000,000 pint packages of ice cream.

FROZEN DESSERTS SANITATION IN BROOKLINE, MASSACHUSETTS

J. J. DONOVAN

Brookline, Massachusetts

For the past year, I have personally made a concerted effort to cover the ice cream field as extensively as the fluid milk industry from the standpoint of inspection. Of the twenty-six ice cream plants inspected, all but two have given whole-hearted cooperation. Needless to say, these two dealers are on probation and will be eliminated from the eligible list of dealers in our town soon unless they comply with our regulations.

Our biggest problem seems to be the lack of experienced help. They do not understand the principles of sanitation. They are careless in handling the ingredients used in the mix. They cut corners in washing equipment and the result is usually high counts. In packaging ice cream, the girls were careless, sometimes neglecting to wear hair nets, and will only wear rubber gloves when someone in charge stands over them and insists on it.

Most all of the plants inspected are up-to-date structurally with the exception of about four. Plant sanitation, as a whole, is satisfactory with the exception of two places.

Vermin control was one of the problems that was giving considerable trouble, but this is gradually being brought under control. I insisted, in order to rid the plants of insects, rodents, etc., that a qualified extermi-

nator would be the best approach on a contract basis. Once they are cleaned out, good housekeeping, watchfulness, and the selection of one of the employees to devote time to this project can keep pests under control.

Proper storage of ingredients was another item lacking. This is practically solved through the operators setting aside certain rooms devoted to the storage of the various ingredients not needing refrigeration. Shelves were built, skids were made, and doors and partitions erected to safeguard against spoilage and waste.

Quality control of the product was another project that was lacking. Here again, the dealers were sold the idea of controlling their product, starting with the raw ingredients and controlling the product all the way through chemical and bacteriological analysis.

Together, we have profited by our working agreement. The dealer is doing a better job and is proud of it. It reflects in the quality of the product and doubtless in the sales. The consuming public profits since it is getting a better, purer, lower count ice cream.

SOME PHASES OF THE ICE CREAM INDUSTRY IN CANADA, 1947

W. C. CAMERON

Ottawa, Canada

Wartime restrictions limiting the volume of ice cream mix and sherbet mix that could be manufactured in Canada were lifted by the Canadian Government on the 1st of April, 1947, after being in force for five years. At that time, there was considerable speculation as to what the increase in production would be as a result of removing these restrictions. Reports from the Dominion Bureau of Statistics show that during July, 1947, there was an increase of 41.9 percent in the production of ice cream in Canada as compared with that of the corresponding month of 1946, while during August the increase was 79.3 percent. For the period January to August inclusive, the increase in ice cream production was 41.1 percent as compared with the corresponding period during 1946.

Sugar is still rationed in Canada, and has been a limiting factor on production to some extent, but allotments to manufacturers were increased during the year, and were 90 percent of their 1941 usage from the 1st of June onwards. Glucose and Cuban hard candy have been available and freely used as sweeteners to supplement any shortage of cane sugar. As a result of the shortage of sugar during and since the war, ice cream generally has had a lower sugar content than prior to the war. There are some manufacturers who maintain that this condition may continue even when sugar becomes plentiful, because they feel the lower sugar content is conducive to increased consumption of ice cream.

Prior to the war, the use of sweeteners other than sucrose and honey in the making of ice cream was prohibited by Regulations under the Food and Drugs Act. During the war, because of the scarcity of sucrose, these Regulations were amended to permit the use of dextrose, glucose, and corn syrup. At the present time, the definition for ice cream in the Regulations under the Food and Drugs Act is being revised, and the sweetening agents enumerated in the preliminary draft of this definition are sugar (sucrose), invert sugar, honey, or a mixture consisting of not less than 75 percent by weight of sugar (sucrose) and not more than 25 percent by weight of dextrose or glucose.

Due to the short supply position of milk fat, the composition of ice cream in Canada is still restricted to wartime levels, namely, a milk fat content of not less than 9.5 percent and not more than 10.5 percent; a total solids content of not less than 34 percent; a minimum weight of 5 pounds per gallon; and a minimum food solids content of not less than 1.7 pounds per gallon, of which 0.47 pound shall be milk fat.

During the war, it was found necessary to define "ice cream mix" and "imitation ice cream," and to prohibit the manufacture, importation, and sale of imitation ice cream. These wartime amendments to the Regulations under the Dairy Industry Act are being retained.

The ice cream industry in Canada has been confronted with many problems during the year, mainly lack of supplies and efficient labor. It is safe to say, however, that the industry has not lost sight of the importance of high quality goods dispensed under sanitary and attractive conditions, but this has been difficult because of the aforementioned conditions. Some manufacturers, in an attempt to increase the total solids in the face of limited milk fat and sugar supplies, have used milk-solids-not-fat to an extent beyond what is usually considered safe in this country. Some have experienced sandy ice cream if the product did not reach the consumer within a few days.

Cocoa for chocolate coatings on novelties, etc., has been in short supply, thus reducing the volume of this type of ice cream which otherwise would have been manufactured.

Paper containers have been difficult to secure, and in some cases this necessitated manufacturers adjusting their output of packaged goods accordingly. Although bulk ice cream has been plentiful the scarcity of packages has no doubt had an effect on total sales because the "take-home" sundae, particularly, has been popular where available.

The supply of tin also has been short, with the result that replacements and repairs of metal containers have been difficult. The same holds true of equipment generally.

There has been an increase in the number of counter freezers in operation. These new operators are for the most part, veterans of the armed services who were anxious to own their own busines. On the other hand, many of the established counter freezer operators are turning to the purchase of bulk ice cream, either to supplement their own make, or in some cases, to replace it entirely. The main reason for this trend in certain areas seems to be the lack of reliable labor, and a better quality of ice cream coupled with effective advertising by ice cream firms. There is, however, an increase in the total number of counter freezers in Canada this year as compared with 1946, partciularly on the Pacific Coast.

There appears to be a decrease in the sale of dried household ice cream mix preparations now that ice cream is more plentiful.

There has been a new development in the distribution of ice cream in some sections of this country which is of interest. Some ice cream manufacturers have contracted with locker storages at country points to store and distribute ice cream. Retailers of ice cream have also been using locker storages to supplement their cabinet space. These ventures have not been entirely satisfactory because ice cream has been stored with other food products and, as a result, absorbed the food odors.

As mentioned in our report of a year ago, manufacturers of ice cream were quite concerned regarding the increase in cost of their basic mix, due largely to advances in the cost of milk fat and serum solids. On the 20th of January, 1947, slight advances in ceiling prices of ice cream and ice cream mix were authorized by the Government, equivalent at retail levels to 8 cents per gallon, 2 cents per quart, and 1 cent per pint of ice cream. The wholesale price of mix was also advanced

by 16 cents per gallon. These price increases were the first ones granted to the industry since the imposition of price ceilings in October, 1941. On the 9th of June, 1947, ceiling prices on all dairy products were removed by the Canadian Government. Since that time, there have been price increases in butter, cheese, and concentrated milk, but only isolated increases in prices charged for ice cream. In fact, present retail prices of bricks are only about 3 percent higher than in 1939, and the wholesale price of ice cream is only approximately 6 percent higher than in 1941. It is believed that the relatively large increase in volume of sales during the summer is due, in part, to these steady and unchanged price levels.

In conclusion, it can be stated that the ice cream industry in Canada has enjoyed a good year from the standpoint of volume. The people of Canada are consuming greater quantities of ice cream than ever before. It is to be hoped that this demand will not only continue but increase in the future, particularly as ingredients, supplies, equipment, etc., become more plentiful, and thereby enable the industry to provide a high quality product at all seasons of the year.

FIFTEEN YEARS OF FROZEN DESSERTS SANITATION

ANDREW J. KROG
Plainfield, New Jersey

This will be my last report to this committee, as health officer of Plainfield, New Jersey. My resignation from that post, to enter another field, becomes effective on October 1.

I would like the privilege, therefore, to review frozen desserts control at this time, not merely from the standpoint of the past year's developments, but from the perspective of the fifteen years I spent as executive officer of the Plainfield, New Jersey, Health Department.

The mechanical technology of frozen desserts manufacture has taken great strides, during the past decade and a half. Sanitary head homogenizers; precision pasteurization controls; vacreators; improved batch freezers; perfected continuous freezers and fruit hoppers; refrigerated storage tanks; all automatic cup filling and capping machines; fully mechanical mold filling and cutting machines; completely non-manual novelty filling, coating and packing machines; fast-freezing tunnels; pressurized hardening rooms with cyclic defrosting are but a few of the engineer's contributions to the frozen desserts field.

But the control of the finished frozen desserts has become more complicated, as time has gone on. Years ago, we did not know enough to insist on coliform-free products; we did not know how to determine the egg yolk contents of an ice cream sample; we did not check fruit and nut products, as routine, for yeast and mold counts. The number of operations to which an individual sample of frozen dessert must be submitted to determine its adequacy has increased many fold.

Years ago we had trouble with the transient "hokeypokey" sellers; these, you will recall, merchandized articles represented to be ices, sherbets and ice creams whose genesis was questionable, most of the time. We had trouble, too, with the "homemade" frozen desserts manufacturers—who generally utilized formulas which were more describable as puddings than ice creams. Too frequently, too, their concepts of sanitation were far from satisfactory, even though our own were then quite elementary.

When we found products whose origin and manner of preparation were

questionable, we arranged that the products of approved manufacturers be used. Our present calibrations have shown that the practices of many of the so-called "approved" manufacturers also require standardization.

While the mixes prepared in large plants will usually comply fully with the quite critical standards of today, mixes continue to be ruined at the freezers through the addition of unsatisfactory products, or at the packaging equipment through inadequate preparation and handling.

In our report last year we reviewed the difficulties attending the recently reborn desire for "freezer fresh" and "homemade" frozen desserts. While ice cream mixes prepared by large plants were frequently employed as the basic ingredient, normal storage times at small freezer installations at milk plants and roadside stands ranged from a day to a week, and sometimes longer if the weather was not conducive to sales. Storage facilities were generally inadequate. While fruits and nuts might be purchased in sterile No. 10 tins, the utilization of the entire contents of a tin might not occur on one day; the storage interval thus provided an incubation period for organisms introduced through faulty handling.

The storage of materials added to mixes at the freezers of large plants multiplied the control problem. Consider, then, how tremendously enlarged it becomes when it is found that a single freezer at a dairy bar may turn out, from a single mix, twenty batches of ice cream, each different, because of varying the flavor and color added at the hopper.

Control? The concept has grown (through adoption by individual municipalities of standards which do not coincide with those of adjacent areas) that the control is to be provided by the health departments, financed by the taxpayers; only the very largest plants attempt to calibrate their own finished products, and then, usually, only on a very limited scale; the effect of the different materials added to the basic mixes is rarely considered important enough to warrant testing other than the vanilla and chocolate.

It is time that the problem were faced, and steps taken to meet it. The situation is quite analogous to that which exists in the fluid milk shed; specifications are not constant throughout an entire aera, and those of the most critical region will be broken down whenever any commodity goes into short supply. In the milk industry, nothing has as yet been done to establish a floor for the product from individual milk producers, and until this is done, it is to be expected that market and seasonal variations will negate all of the standardization sought for by individual control systems.

In his recent article "Trade Barriers in the Milk Industry" (JOURNAL OF MILK AND FOOD TECHNOLOGY 10, 195–205, 1947) A. W. Fuchs, Sanitary Engineer Director of the United States Public Health Service, describes the difficulties due to not fixing a "bottom" on the characteristics to be required of milk from the producer. Mr. Fuchs suggests a plan for certifying the acceptability of shippers whose products meet definite standards (which will demonstrate the effects of practices as well as facilities), to permit the use of the milk for interstate shipments. The plan is, in my opinion, a step in the right direction although I would not class the reduction type tests as equivalent to the agar plate technique,, and I would also like to see the microscopic method used regularly as a complement to the agar plate count for "type analysis."

The consumer utilizes the milk as food, and not the facilities employed to prepare the products. Good facilities do not guarantee good products. Calibrating products by laboratory technique does not entail the tremendous manpower which would be involved in calibrating facilities. It seems to me that a practical system of establishing a floor for the basic raw milk to be utilized in the preparation of fluid milk

products, or of manufactured items, could well be established through employing laboratory procedures primarily. But there is no individual municipality or state (and it certainly is impossible for the Federal Government) which can afford to establish a control system even on a limited laboratory scope for all shippers, and to attempt to maintain it.

I have already remarked that the frozen desserts industry has adopted the reasoning that the control of their products is the responsibility of the official agencies, and not of the industry itself. The same, or similar reasoning has been followed by the fluid milk industry, as well. If uniform specifications are developed, it will help to make the dairy industries realize that the control of the products they seek to sell is strictly their responsibility; that the control services of the official agencies are to be expended in checking random samples to see if the conformity which may be reported by the industrial divisions is actually prevailing.

Professor B. L. Herrington of the Dairy Division of Cornell University detailed at the Ithaca Conference on September 4, how only a small fraction of the students trained in dairy technology remained in that field. Small wonder—the men trained for the industry's technology are sublimated through the present "fluctuating standards" system. The laboratory staff members are made the "hatchet-men" during the flush periods, and the "alibi-givers" during short seasons; they are often placed in such a subservient position to other members of the management staff that they must withhold information which would reflect unfavorably on superiors; they are given compensation which is frequently inferior to that received by even the least trained members of a cleanup crew (who are generally protected by union contracts). The dairy technology graduate rarely locates employment with official agencies; there are very few municipal or state divisions whose control systems are elaborate enough to require full time, a possessor of such advanced training. A majority of dairy technology majors have been absorbed in other food industries where the kind of efficiency developed by research in dairying is appreciated from its profit-yielding demonstrations.

If we are to obtain fully satisfactory fluid milks or frozen desserts, then, it is essential that we plan for uniform standards throughout the milk shed; the individual states could, by accepting a system developed by a national committee (constituted of both industry and official agency representatives), arrange for uniformity among adjacent states. The official control agencies, by promulgating that the industry develop and maintain its own control, could then formulate their programs to check random items to see that the industrial control systems functioned properly. Until such a system is established, I prognosticate a continuance of the present definitely inadequate condition.

Of essential importance is the consideration of the fundamental purpose of control, with respect to those who consume the final foods. It has long been recognized that the greatest threat from pasteurized products is not the possible presence of pathogens but of staphylococcus enterotoxin. This may be formed in any raw milk which is not cooled rapidly, after its removal from any dairy animal's udder. (Enterotoxin-producing staphylococci may be recovered from any gland of ectodermal origin.) In spite of this—and in spite of regulations requiring rapid cooling of milk following its withdrawal, there is no control system, to my knowledge, which mandates that the inspectors check the producing farms on completion of night milking. It is gratifying to report that the control services of some of the advanced industrial organizations have adopted inspection after night milking to be able to check on this very point. With regard to the enterotoxin situation, it is disappointing to note that while "summer com-

plaint" was fully described before the turn of the century (review Swithinbank and Newman's *Milk Bacteriology,* Dutton, 1903), neither official agencies nor the industry has as yet adopted an effective program to combat it, beyond applying pasteurization. While the heat treatment inacitvates the staphylococci, it does not destroy already formed toxin.

That staphylococcus enterotoxin may become a problem even in ice cream mixes processed at high temperatures, which are subjected to long storage periods following handling, is readily established, considering the principles for its development laid down in G. M. Dack's text *Food Poisoning* (University of Chicago Press, 1943) and in W. C. Haynes and G. J. Hucker's "Review of Enterotoxin Poisoning" (*Food Research* 11, 281–298, 1946). Ice cream mix contains the required carbohydrate and protein; handling will furnish the universally present staphylococci; and the long storage period will amply satisfy the incubation requirement.

From the foregoing, what will be necessary, then, for adequate control of frozen desserts is that their preparation will have to be restricted to those who will demonstrate not only their understanding of proper sanitation, but their practice of it. This will mean that some who have entered the business—in inadequate roadside stands, department stores, soda fountains, milk plants, and even some ice cream plants —will definitely not be permitted to continue until they really arrange to give consumers consistently safe, health-promoting products. It is again stressed that if specifications are not made uniform, the system will be torn down. It has been done before—someone will be sure to say that his products "have not caused death" in an adjacent area where no standards at all are maintained. As Dack has so frequently reminded us, the adult does not complain about the random stomach upset, which is the common index of enterotoxin poisoning; the child who demonstrates a violent gastric complaint has frequently ingested so many different things that the source of the upset is clouded; and the infant, during whose first six months dairy products are essentially the sole source of nutriment, is unable to report his symptoms verbally—though he may do so vocally—and pediatricians are so frequently prone to assume that the mere approval of a supply by a health department makes every package the equivalent of what the Certified Milk Association would like its products to be.

My message, as I leave the municipal control field, is, therefore, that it is high time that all cooperate really to solve the problem.

* * * * * *

To consider briefly, now, the developments in the frozen desserts field, during the past year, in this area: Frozen cream put up during the flush period continued to be the major source of butterfat for the frozen desserts industry; butter oil has definitely become more accepted; plastic milk was not used to as great a degree, probably because of its higher price; sweetened condensed whole milk, which returned to the market primarily because of sugar restrictions during the war, has practically disappeared by now; sweetened condensed skim milk has receded, too; skim condensed (not superheated) is the most popular serum solids source in this area at this time, although spray and roller powders are coming back.

Rennet curd, prepared during the flush season, pressed and frozen, has been put up by one plan in the area for experimental purpose, and I anticipate that, if its use is successful, it will provide a means of preserving much of the serum solids lost to this market annually, during flush seasons.

The greater availability of cane sugar has curtailed utilizing the sweetened condensed products, as reported above, and has also decreased the tonnage of high-conversion corn syrups entering plants in this market. Sugar percent-

ages are being elevated back to pre-war levels as supplies increase; sugar is still the lowest-cost ingredient of the ice cream mix.

The elevated egg yolk solids content required by some of the state laws for French ice creams has (a) curtailed the acceptability of some of the ice creams made with a full yolk solids complement—some of the yolk powders on the market exhibit strong flavors; (b) caused the birth of some products called "egg yolk blends" which are employed as if the entire contents were yolk solids, but whose composition rarely recites the actual percentage of yolk.

The flavorings added to the freezer, or following freezing, continue to be a source of high coliform and yeast and mold concentrations. Since the fruit supply was short this year, because of both the weather and high labor costs, it was impossible to get packers to agree to furnish fruits on specifications requiring coliform absence. Until plants are reminded that bulk-packed products which contain coliform and yeasts and molds must be given a heat treatment to inactivate these, before adding to the frozen dessert mix, the flavors utilizing these products will not adhere to standards. Ice cream merchandizers have been troubled by only a few health departments on this score, since the lack of personnel at health department laboratories generally keeps the testing of ice creams (where it is practiced at all) confined to vanilla and chocolate. (Since the number of ice cream outlets, and of individual products has more than trebled, during the past year, it has been quite impossible for municipal control agencies to attempt to test all varieties distributed by all manufacturers even once a month.)

Color solutions, prepared from powders in such a manner that they become contaminated, are still used at many plants. To prevent these solutions from becoming nutrient media for organisms introduced through carelessness, the color solutions should be boiled, packaged in small bottles, and measured out, employing single-service paper graduates, before they are used.

Heavy manufacturing equipment continues to be slow in delivery, in this area, probably because of the great backlog of orders. A few packaging devices exhibited for the first time at last year's Dairy Industry Exposition have already made their appearance at some plants in the area with the resulting automatic filling and capping of cups, and filling, coating and packaging of novelties. These pieces of equipment are hailed for their proper maintenance of satisfactory products.

* * * * * *

It has been a pleasure to me to serve on the Frozen Desserts Committee during the past number of years. I have been grateful to the Committee for the information it has supplied to me. I have attempted to use many of the lessons taught, in my work at Plainfield. If my own reports have been helpful to others, I am particularly gratified. In the new field which I will enter soon, I will continue to strive toward the goal of public health work—to make good health more obtainable by all.

Committee on Frozen Desserts Sanitation:

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JOURNAL of MILK and FOOD TECHNOLOGY

(*including* MILK and FOOD SANITATION)

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Association News

SECRETARY-TREASURER GEORGE A. WEST

MR. GEORGE A. WEST has just been appointed Secretary-Treasurer of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC., to fill the unexpired term of office of Dr. J. H. Shrader, resigned.

Until June 1, all membership dues should be sent to Dr. Shrader in Wollaston as heretofore. After that date, Mr. West will take over entirely. In the interim, all other business of the Secretary-Treasurer is being handled by Mr. West. His address is:

Mr. George A. West
Rochester Health Bureau
44 Marshall Street
Rochester 2, New York

J.H.S.

Chicago Dairy Technology Society

Seventy-four members attended the April meeting and heard Dr. John H. Hetrick speak on "Recent Technological Advancements in the Dairy Industry."

He traced step by step the progress that has been made in the dairy industry because of technological advancement: new products, new uses for old products, better quality, improved nutritional qualities, and increased efficiency.

The industry should pay a tribute to the Universities for training personnel who are capable of making these great improvements.

Gradual improvements of existing products have been made by working for better quality at the farm and standardization of equipment. To attain this end, research has given analytical tests to check the progress which is being made.

Pasteurization is a step forward. It is now standard in Chicago. Its efficiency is shown by the fact that during the last eight years there has not been an outbreak of disease due to milk.

In 1940, the first homogenized milk was introduced into Chicago. Today its acceptance is shown by the fact that 90 percent of all the milk here is homogenized.

These great technological improvements clearly show the need of increased realization of the necessity for further technical progress.

Plans for the Society's Party, June 12, in the Furnture Mart were discussed. Dinner, dancing and entertainment are included.

H. P. SMITH
Recording Secretary

SUMMARY OF SYMPOSIUM ON INSECTICIDES IN FOOD PRODUCTION

(Presented before the Division of Agricultural and Food Chemistry, American Chemical Society, New York, N. Y. and reported in full in *Industrial and Engineering Chemistry,* April. 1948)

This symposium was designed to survey the insecticide field by outstanding entomologists, to present papers on the chemistry of insecticides, and to assemble available knowledge in the chemical control of insect pests in food production. These latter comprised growing crops, livestock, and food in storage.

Insects damage food products in the United States to the extent of two billion dollars annually. The insecticide industry totals over $50,000,000. Insecticides are generally grouped according to the feeding habits of insects into the following classes:

1. Stomach poisons or internal insecticides—to kill chewing insects such as caterpillars, beetles, grasshoppers, and other similar pests which ingest this poison on the leaves and fruit eaten.

2. Contact poisons or external insecticides—to kill sucking insects such as aphids, leaf hoppers, thrips, mealy bugs, and similar pests, which do not eat solid food by mouth but which contact the poison by other parts of the body.

3. Fumigants—to destroy insects, either chewing or sucking, which attack stored products or infest granaries, milk, and ships.

With regard to properties, the insecticide must possess miscibility, spreading, penetration, wetting, and adhesion. They may be applied as dusts, liquid sprays in suitable solvents, oil emulsions, water suspensions, and aerosols.

It is estimated that there are 80,000

kinds of insects in North America, and that 5,000 are known to be economically important. Of the latter, less than 200 have been the objects of research and test work. In many cases, probably 10 percent of stored food is lost through infestation, and the average is 5 percent in countries with well-developed technical services.

In general fungicides differ from insecticides in that they are protective rather than directly lethal. Seldom do they eliminate infections already begun. Wet weather facilitates the spread of fungus diseases. Sulfur and copper fungicides resist sun, wind, and rain, and yet will dissolve and penetrate a fungus spore. A new one is tetrachlorobenzoquinone for protecting peas from rot-producing fungi in the soil—in the dark. Research is recently directed to finding fungus killers by chemotherapy, "the treatment of plants from inside out."

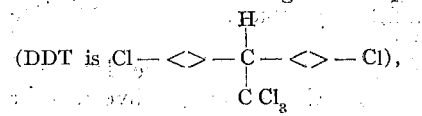
Insecticides derived from plants are tobacco alkaloids (nicotine and its related anabasin). Important ones of commercial interest are also pyrethrum, rotenone, sabadilla and hellebore, ryania (less toxic to warm-blooded animals), quassia, yam bean, and others. Inorganic insecticides function best as stomach poisons whereas the organic ones are more effective by contacting the outer parts of the insect. They are more stable and non-volatile. Chief among them are the arsenic and fluorine compounds (lime-sulfur is used more as a fungicide). Ethyl phosphates were synthesized in Germany for use as substitutes for unobtainable nicotine insecticides.

In order to make the insects wettable or to reduce the surface tension of water so as to enable it to penetrate small capillaries, various addition products have been used. Then too, bentonite with skim milk or casein, aluminum hydroxide gel, and certain oils—all for increasing rain resistance and to reduce wash-off of foliage sprays.

The great industrial expansion in the use of insecticides has led to the development of methods for the determination of relative toxicity and to facilitate regulatory control. This is done by comparing the toxicity of the given product with a standard one.

DDT ingested by animals in small amounts has been found to be stored in the milk fat of cows and transferred to the butter, and it may be stored in the fat of animals. This at levels in the diet as low as 10 p.p.m.

Rotenone is the best insecticide known for use against cattle grubs. It is also useful against lice or livestock, sheep ticks, fleas, and certain ticks. It is giving place to the new chlorinated synthetics. Pyrethrum is used in oil-based sprays for temporary control of flies on cattle and in barns. Its use is declining in favor of residual type sprays although its freedom from toxic properties commends it. It remains one of the most rapidly-acting insecticides known. DDT is an excellent insecticide for residual or surface treatment against houseflies. It can be used effectively on oil solutions, aqueous emulsions, or wettable powders. It is used against horn flies as wettable powder and emulsions, and also against lice, ticks, stable flies, mosquitoes, but not for horse flies and deer flies. New synthetic insecticides, often containing chlorine, are now being developed



some of which seem to be superior to DDT itself.

Residual residues of DDT were formed on field crops treated with dusts and sprays, and on fruit treated with oil solutions of DDT. When fed to animals, it was found in pork meat and fat, and in beef—both raw and cooked. It showed up in milk from cows fed on pea vines which had been treated with DDT. Eggs showed it in small amounts when the diets of the

chickens contained up to 0.250 percent of DDT.

Research is directed to learn the relationship between chemical structure and toxicity, and to elucitate the problem of insect toxicology. It is believed that mastery of insect control is near; insects that could not be adequately controlled heretofore are now succumbing to the newer insecticides.

Industrial Notes

Abele Joins Diversey

C. A. Abele, Director of the Country Dairy Inspection Section of the Chicago Health Department since 1940, has resigned to accept the position as Director of Public Health Research of The Diversey Corporation.

Mr. Abele is well-known in public health circles. During World War I, he was a member of the United States Public Health Service. He organized the Bureau of Inspection for the Alabama State Department of Health, an organization which he served for 20 years. He is a member of the Surgeon-General's Milk and Food Sanitation Advisory Board. Mr. Abele was also president of the INTERNATIONAL MILK AND FOOD SANITARIANS from 1942 to 1944, and at present is chairman of that group's Committee on Sanitary Procedure. He is a Life Fellow of the American Public Health Association and, in that organization, is a referee on the Committee on Standard Methods for Dairy Products. During 1947, he was president of the Chicago Dairy Technology Society.

These new duties will not prevent him from engaging in his erstwhile activities in the work of the Association. In fact, he will be in a position to render even greater service to the public than he has heretofore—and that has been much.

Glass Milk Bottles and Closure Caps

Glass bottles represent over 90 percent of the milk containers used by the dairies of the country today. Over 60 percent of these bottles are distributed with a sanitary closure.

General interest since the war in improving health standards has given considerable impetus to the use of closures to improve the sanitary protection of milk. The prophecy is that in the not too distant future practically all glass milk containers used in the United States will have a closure type cap.

During recent years the cost of all milk containers has increased materially. Although closure prices have also increased, the percentage of increase has been much less than the material or labor increases. Increased volume and improved efficiencies in the closure industry have made this possible.

Early in the history of the milk business there was a very limited choice of closure caps but today there is a generous selection available to the prospective customer. The forward looking dairy, intent on improving its protection service to its customers, now has a sizeable closure industry ready to satisfy its demands for improved milk sanitation.

Molyneux Enters Milk Industry

Gordon W. Molyneux, formerly Supervising Milk Inspector for the Westchester County Department of Health, has resigned from the county service to enter industry effective April 1st. Mr. Molyneux became associated with the department when it was or-

ganized eighteen years ago and developed the milk sanitation program which has gained a reputation in the field of public health.

Mr. Molyneux has been active in public health activities serving as president of the New York State Association of Milk Sanitarians and the New York Conference of Health Officers and Food and Drug Officials. He is a fellow in the American Public Health Association, a member of the International Association of Milk and Food Sanitarians, and Westchester Milk Council, Inc. During the war he was Director of Emergency Milk Supplies for Westchester County and has been a member of the Advisory Committee on Milk Sanitation to the State Department of Health for a number of years. He is also a member of the Public Health Advisory Council on Paper Packaging of Perishable Foods at Syracuse University and has contributed articles, addresses and lectures on milk and food control.

Recently the Westchester Milk Council, Inc. honored Mr. Molyneux with a testimonial dinner at the Rail, Pleasantville, New York at which time he was presented with an engraved wrist watch and desk set.

Brief on Wisconsin Dairy Manufacturers' Conference Held in Madison, March 17 and 18, 1948

(Prepared by DR. K. G. WEEKEL)

Over 400 dairymen attended the two day annual University of Wisconsin Dairy Manufacturers' Conference held at the University Memorial Union Theater, Madison, on March 17 and 18. The theme of the conference was Efficiency, and every speaker hewed the line in reviewing the subject. An interesting student Babcock club sponsored evening meeting with employers was held on March 17. At this meeting, employers and personnel managers were enabled to meet with students contemplating employment for the summer or upon graduation. Over 150 attended the successful evening of student-industry men activities.

MR. G. H. BEMIS of the International Business Machines Corporation explained that reductions in distribution expenses can loom large in the profits dollar. By reducing the bookkeeping time of route salesmen, more time can be devoted to actual sales work. A route saleman's time is divided among the duties of driving, delivering, bookkeeping, and sales work. The latter can be increased by more efficient bookkeeping methods. Route errors and mistakes can be greatly minimized by the mechanization of route accounting systems.

MR. ARTHUR TOWELL, of Towell Advertising Associates, pointed out that in a survey of food consumers, 7 out of 10 mentioned milk first as the most important food in the diet. Only 3 percent said they would take milk off the list of foods purchased if the price became too high. People in the city of Madison think that the profit on a quart of milk is about 8 cents, and something should be done about this misinformation. Only 30 percent of ice cream made is consumed in the home, whereas 70 percent of all other foods is eaten in the home. Mr. Towell pointed out too many dairies do not know their true advertising costs as too many items as incidentals are lumped under the classification of advertising. With the 107 billion cups of coffee sold annually, each with one ounce of cream, would require some 3 billion quarts of cream. Advertising, he pointed out, is a message for many minds at once. A main appeal should be in a headline. If it is not, 83 percent of the readers will miss the item. A headline should rate self interest, news and curiosity.

MR. R. H. REMALEY of Kraft Foods pointed out that while specifications may provide for 2.5 percent moisture in skim powder, a reduction to 1.0 percent will more than double the shelf life in terms of stale flavor. The presence of copper in milk is a factor in development of stale flavor. The copper-casein complex produced also increases tendency to browning. The amount of water in a product such as dried ice cream mix should be thought of in terms of the milk solids present, Remaley noted. Ice cream mix with 2.25 percent moisture has a milk solids moisture relationship of about 7 percent. Dry ice cream mix should have less than 1.0 percent moisture. Remaley noted that plastic cream has certain

qualities that suggest its use for storage purposes. It is practically sterile at the time of packing, and will keep clean and sweet for a period of a year. The sulfhydryls developed as the result of heat treatment serves as an antioxidant for it. Plastic cream must be kept free of copper, as is true of other high fat products for storage. In planning to put products up for storage certain procedures are suggested. Use only high quality raw materials, have the best in plant sanitation, provide for clean acceptable packaging, control the storage conditions, eliminate copper contamination, and use high temperatures for their antioxidant effect.

MR. WILL FOSTER of the Borden Cheese Company pointed out that no nation in the world has the combination of producing facilities in agriculture ranging from citrus fruits to cattle ranges, grain belts and maple syrup. The human population is increasing more rapidly than the cow. The consumption of milk is increasing annually. The population has increased some 40 million in 28 years, and a good portion of this increase has been of shift from rural to urban areas. The increased use of dairy products is due to several factors: rationing caused people to consume more dairy products; army meals taught many young men and women the healthy advantages of eating properly balanced diets; some 9000 locker plants have resulted in greater over-all utilization of foods; individual parcel shipments of food to Europe exclusive of Care from only two large ports amounts to an equivalent of 17 Liberty shipments annually. From 1910 to 1945 there has been little change in the per capita consumption of two foodstuffs, meat, and fats and oils, while for two it has declined, potatoes, and cereal, and for eggs, tomatoes and citrus fruits, cabbage and lettuce, and dairy products, it has increased significantly. The long period required to put a calf into production necessitates faith and long range planning in dairy farming. The cow numbers are of important concern to all dairymen.

MR. FRANK MCKEE of Kraft Foods Company pointed out that with the disappearance of small cheese factories and centralization of operations in fewer but larger ones, there has developed a centralization of the problem of industrial waste of the factories. The mixing of waste with stream waters results in discoloration of the water and utilization of its oxygen. The amount of oxygen in water in the summer is about 8 pounds per million. When the oxygen content is reduced, fish suffocate, green plants die out, and foul smells develop. The control of this problem consists of either or both greater amounts of water to make available more oxygen, and more practically, to treat the waste before it goes to streams to partially stabilize it. BOD (Biological Oxygen Demand) indicates the strength of industrial waste. The amount of dissolved oxygen used up in stabilizing waste is biological activity. The control of sewage problems lies in waste prevention, including such things as leaky pipes and pumps, collection of can washer pre-rinsings, reducing the volume of waste water in plants.

DR. A. H. RISHOI of Cherry Burrell Corporation reviewed the work done to date in the development of the continuous churn. The process consists essentially of passing 35–40 percent cream through a three spout ADCO DeLaval Separator and obtaining an 88–92 percent oil, and a residue of light skimmilk and heavy skimmilk. The cream is flash heated and separated; the oil is vacreated and passed to a standardizing tank, where adjustment in fat, color, flavor and salt is made. The mixture is then passed through a churn much like a modified ice cream freezer, and a texturator. Dr. Rishoi pointed out that pilot plant experimental work on sweet cream butter will be undertaken shortly.

MR. T. H. GUSTAFSON of Creamery Package Company discussed the problems of reorganizing the layout of existing dairy plants to accommodate greater volumes, and of planning new layouts to project for future expansion. One of the important points cited by Mr. Gustafson is that the arrangement should be so made that future expansion is not blocked by certain improperly placed rooms such as refrigerator, and that steam power and water lines be so located as to minimize need for their extension.

DR. D. H. JACOBSEN of Cherry Burrell Corporation pointed out that normally men do not brag about being the clean up men; "we talk of churn men, pasteurizer men and intake men, and it is time that clean up men are given a rank of equal importance." Dr. Jacobsen reported on experiments in universities which indicate that on equipment bearing only cold films of milk, alkali detergents do not seem to be so necessary and that rather polyphosphate and wetting agent mixtures work very satisfactorily. The use of rinse waters containing added polyphosphates appears to be better for the condition of the equipment than when rinsed with plain water.

MR. GEORGE TOOBY of Tooby and Associates, River Falls, pointed out that fittings cost about ten times as much as piping. Thus piping layouts should be arranged to minimize the need of fittings. High temperature locations should be avoided since the temperature rise of milk in them may be as much as 14 degrees. Piping and fittings should comply with the 3A standards which enables greater acceptability of installation.

MR. R. J. RAMSEY, Ramsey Laboratories,

Cleveland, talked on planning efficiency in plant operations. He pointed out that top management, a good personnel program, an efficient accounting system are necessary factors in a good plant. A quality control program must supervise sanitation, development of new products, and the maintenance of consistent quality. Planned use of space, efficient air condition and insulation, humidity control, use of regeneration and latent heat lead to increased efficiency. It is important that expansion programs must be planned with the help of experts and with an eye for future developments. Quality control can be improved by alert management, good systems of inspection of the products, prior group approval of all ingredients, the use of a processing manual, and by investigation of new products, with revision of formulae.

MR. D. M. IRVINE, Department of Dairy Industry, University of Wisconsin, speaking on potentials in efficiency in cheese factory operation, stated that the trend toward equivalent pricing or one price systems including cheese milk will necessitate increased efficiency in cheese manufacture. Utilization of whey for by-products by the larger plants, use of regeneration in pasteurization, mechanization of many back breaking jobs like turning of the curd, are potentials in increasing the economy. The use of enzymes for cheese ripening, reducing the time element, use of aluminum equipment, controling the temperature during pressing are important possibilities that should be investigated. The adoption of standardized sizes for finished cheese is desirable in the interests of efficiency.

DR. H. H. SOMMER from the Department of Dairy Industry of the University called attention to considerations in the utilization of solids-not-fat in the dairy industry. Increasing use of other food fats, especially oleo, as nutritional substitute for butter necessitates the reorientation of our emphasis on milk fat and milk solids not fat. The value of milk solids not fat must be more correctly appraised. Skimmilk solids must be valued more, butterfat less and yet the price value of milk must remain unchanged. There must be developed an improved balance in the production and utilization of butterfat and milk solids not fat. A practical test for solids-not-fat to take the place of the Babcock test is therefore needed. The dairy industry must meet the challenge by emphasizing an equal value upon solids not fat and extending their use beyond that in bakeries and confectionaries.

MR. R. K. FROKER, Department of Agricultural Economics, University of Wisconsin, talked on "Efficiency in the Hauling of Milk." The efficient hauling of milk depends upon reliable equipment and service. A compact well planned area is a big factor in efficient operation. Statistical surveys show the importance of selecting efficient and dependable truck drivers. The possibilities of utilizing the advantages of individual trucking and fleet operation should be investigated. The rate structure employed has an important bearing upon hauling economy. The trucker must act as a public relations man between the patron and the plant to bring about increased cooperation and hence increased efficiency. Trucking efficiency is encouraged by laying out centralized routes, more complete use of labor and of the truck including the making of two and three trips per day, and the selection of drivers, and the combination of routes in low periods of production.

Below is an abstract of the talk given by MR. L. C. THOMSEN, Department of Dairy Industry, University of Wisconsin, entitled "Efficiency in the Use of Capital and Labor in the Dairy Industry."

Items of cost in the manufacture of dairy products which have shown the greatest percentage increases since 1939 are labor and "fixed" charges which include taxes and depreciation. Labor costs have gone up over 80 percent. Building costs have doubled in many cases, and taxes likewise have skyrocketed. Exclusive of taxes and profits, the plant costs for making a pound of butter have increased from an average of 2.35 cents in 1939 to 3.96 cents in 1947; for Cheddar cheese this change has been from 2.34 cents to 3.99 cents; and for evaporated milk the change has been from 3.0 cents to 5.14 cents per pound.

Depreciation costs per 100 pounds of milk handled now range from a low of 1.65 cents for bulk evaporating plants to a high in excess of 11.5 cents for fluid milk plants. In gathered cream plants depreciation costs are relatively low and amount to roughly 0.25 cent per pound of butterfat.

There are numerous yardsticks which can be appied to determine if a plant is financially efficient in its operations. These guides should be used if new construction is contemplated or if new equipment is to be bought. In the case of the latter it is usually assumed that a purchase is justified if it will pay for itself in from 2½ to 3 years, either by saving in labor, or because of improved quality of products.

Picture of Fifth Annual Dairy and Food Inspector's and Sanitarians' School, Michigan State College, East Lansing, Mich., April 5–9, 1948

Helmer Rabild, Founder of Dhia, Dies

Helmer Rabild, who more than 40 years ago laid the foundation for the present nation-wide dairy-herd-improvement-association program in the United States, died January 1, 1948, at his home in Titusville, Pa.

Mr. Rabild, who was born August 10, 1876, in Denmark, came to this country in 1898, and soon became a naturalized citizen. He operated a creamery in Michigan the first few years and then attended the dairy school of the Michigan Agricultural College, where he later served as a dairy instructor for a time.

In 1905 he joined the Michigan State Dairy and Food Department as an inspector. While engaged in this work, he took "leave" to organize a group of Newaygo County, Mich., farmers into a cooperative association for testing their cows and keeping records of their production. He had seen the advantages of testing and record keeping as practiced in his native Denmark and could not rest until he had made an effort to introduce the idea in his adopted country. Following the organization of the first association in the fall of 1905, the testing movement soon spread to other counties and to other States. When in 1908 the U. S. Department of Agriculture saw the need for coordinating the movement into a nation-wide herd-improvement program, Helmer Rabild was employed by the Bureau of Animal Industry to introduce and develop the work.

After 16 years with the federal department, Mr. Rabild resigned to become manager of a milk plant and creamery at Titusville, but during his lifetime it was his privilege to see the movement he had fostered grow into one of the most potent forces now available for improving dairy efficiency on the farm. In the first cow-testing association, the 239 cows completed the first year test with an average butterfat production of 215 lbs. Forty years later, in 1946, the average butterfat production of the 755,546 DHIA cows on test in the United States was 349 pounds.

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Olmstead, Samuel, Moberly Health Dept., City Hall, Moberly, Mo., to Health Office, Benton Co. Court House, Bentonville, Arkansas.

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"Dr. Jones" Says—*

By Paul B. Brooks, M.D.

All these laws putting obstacles in the way of the sale and use of oleomargarine—taxes, restrictions and prohibitions—I've often wondered how they got on the books. Thirty thousand cows must have considerable influence. Anyway, a lot of people still're under the impression that, because margarine is made from vegetable instead of animal fat, it's inferior to butter, from the standpoint of nutrition.

But during the war, when butter was hard to get, more'n more people got started using margarine. Since then, with prices of most foods out of bounds and margarine costing less'n half as much as butter, its use has increased. In the meantime scientific investigations have shown that, now't margarine is "fortified" with vitamin A, butter has nothing on it, so far as nutritiousness is concerned.

One of the latest of these studies: it's on the effect on the growth of children and it's reported, here in one of my medical journals. (1) This work was done out in the University of Illinois College of Medicine. They cite reports from other investigators that've concluded that "margarine fortified with vitamin A is nutritionally equal to butter" or that in effect. Those words were used in a report by a committee of the New York Academy of Medicine. The Food and Nutrition Board of the National Research Council and the Council on Foods and Nutrition of the American Medical Association have reported substantially the same conclusions.

What these men out in Illinois did: over a period of two years they studied the growth of 267 children, in two different institutions. Part of 'em had margarine as "table fat," the rest butter. They followed their heights and weights, tested their blood and watched their general health. The upshot of the matter was that the margarine group did just as well, in every respect, as those on butter.

Personally, I like good butter, when it's made from pasteurized cream and I'm reasonably sure it's from clean milk from healthy cows. They've got the margarine, now, so there isn't much difference in flavor but you can notice a difference in the consistency. I try to keep a little butter in the icebox for company that might be fussy but, until the cost of living comes down, my "table fat" is going to be margarine mainly. Yes, and Marjorie Main is alright, too. I couldn't resist that.

---

* *Health News*, State Dept. of Health, Albany, New York, March 8, 1948.

[1] *American Medical Journal*, Feb. 7, 1948, p. 388.

(with apologies to Tennyson)

If there is one place on a milk bottle which should never be promiscuously handled—that place is the pouring surface.

The reason is obvious.

Every drop of milk in the bottle must pass over that pouring surface before it can be used.

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