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MARCH, 1955

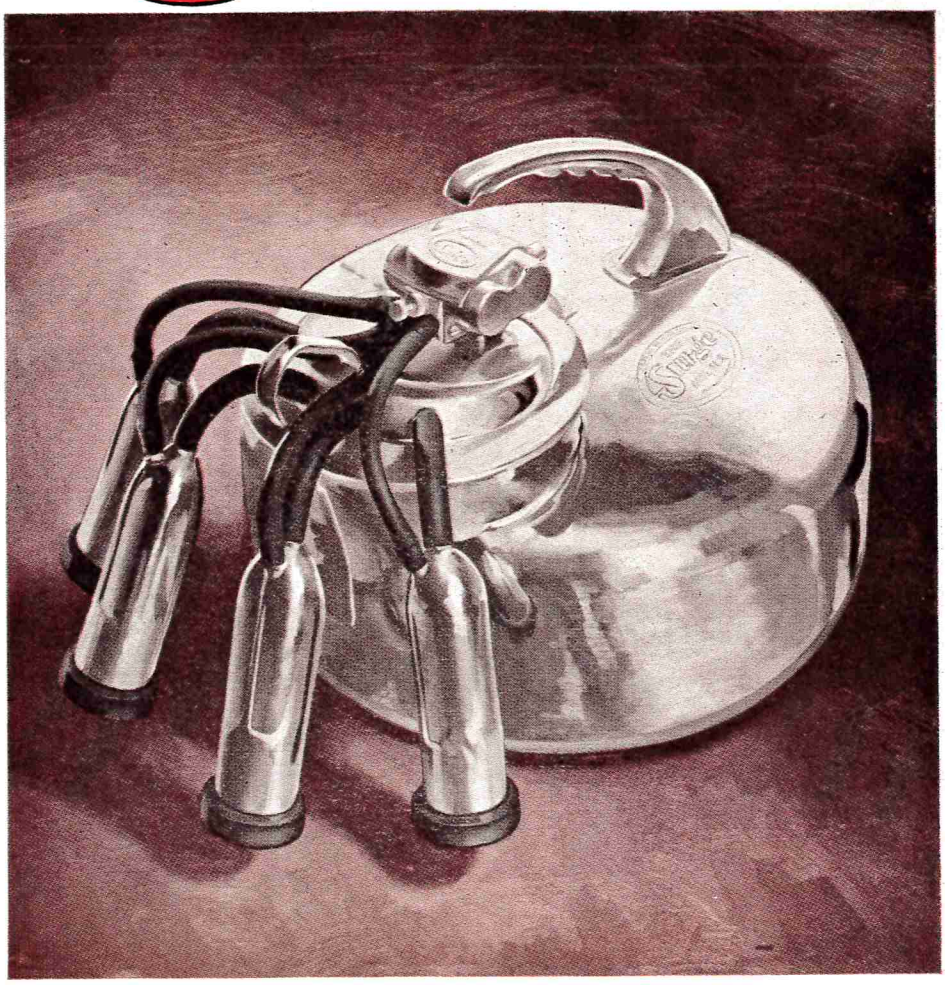
Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

Surge



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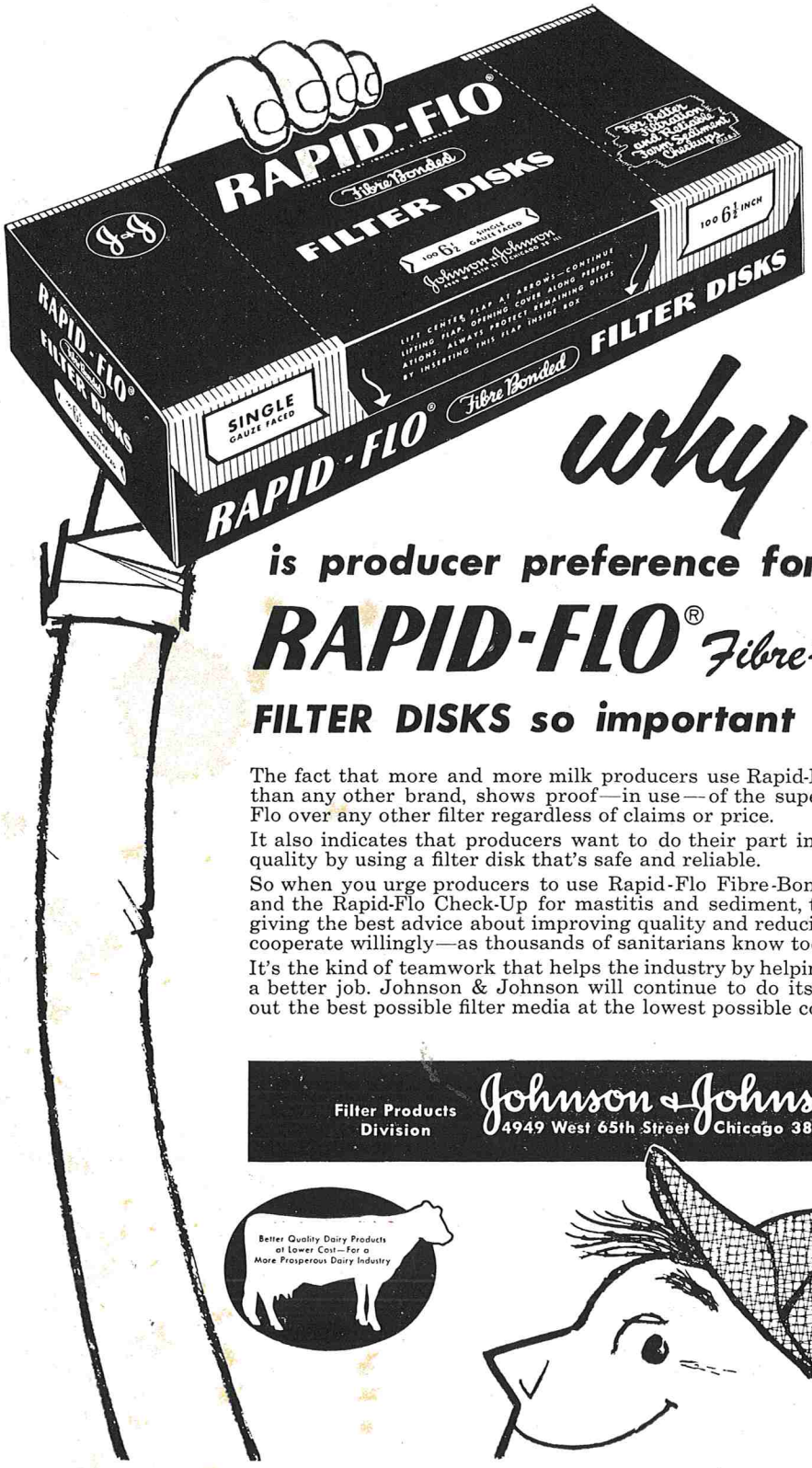

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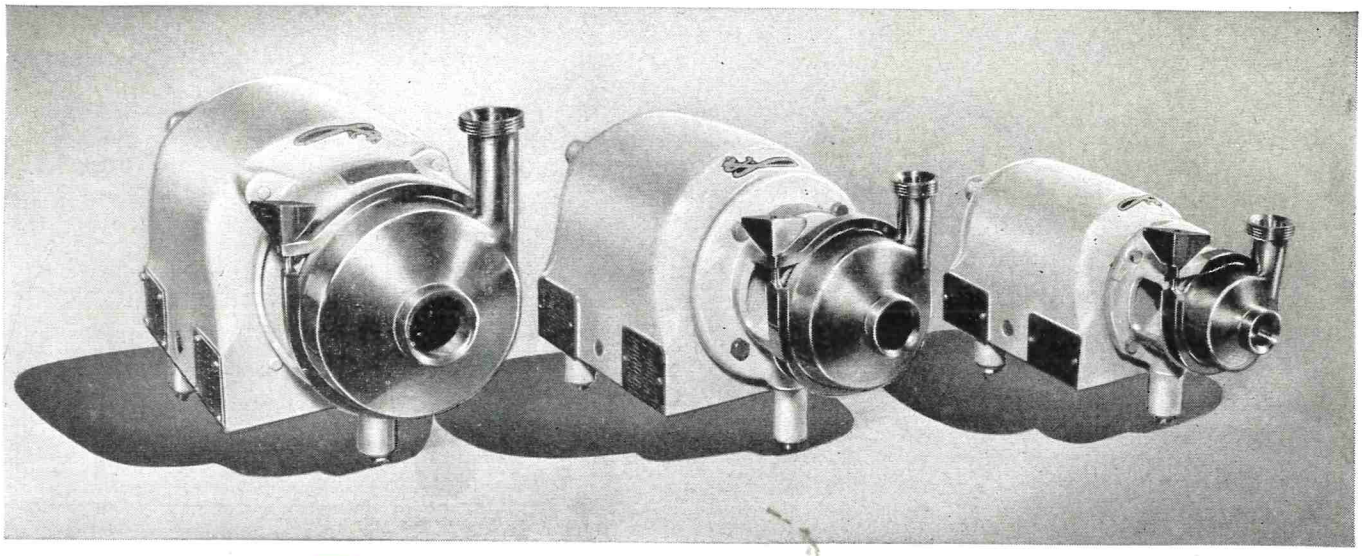

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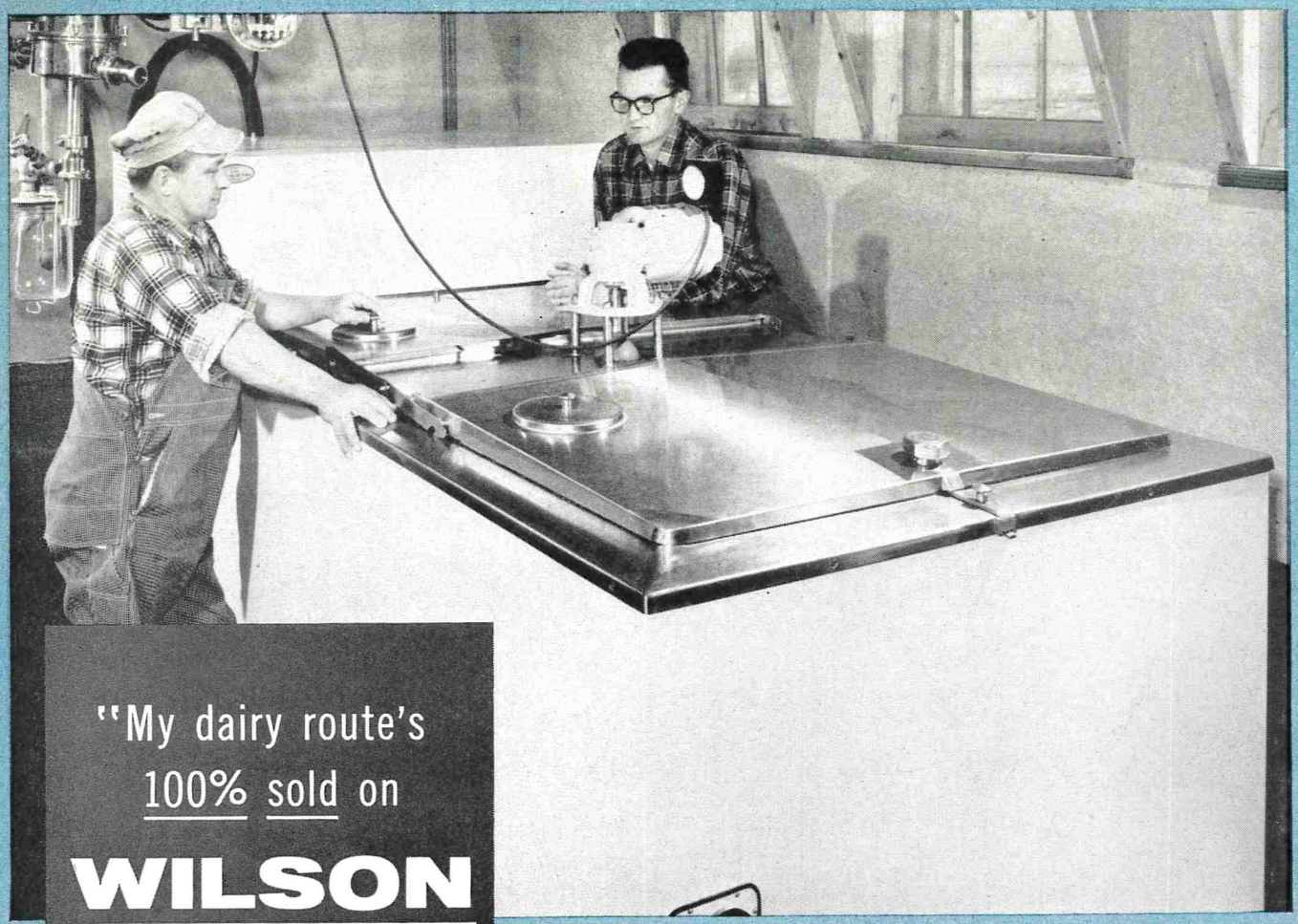

Above: Charles Nelson (right) talks with Iowa producer Ray Baetke.

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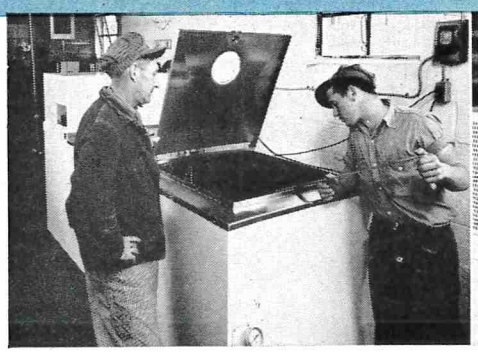
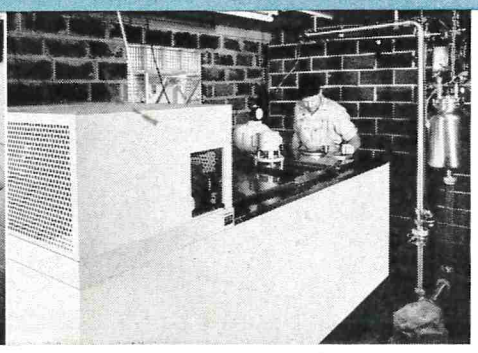
says Charles Nelson, field man for

ILLINOIS-IOWA DAIRY, Davenport, Iowa





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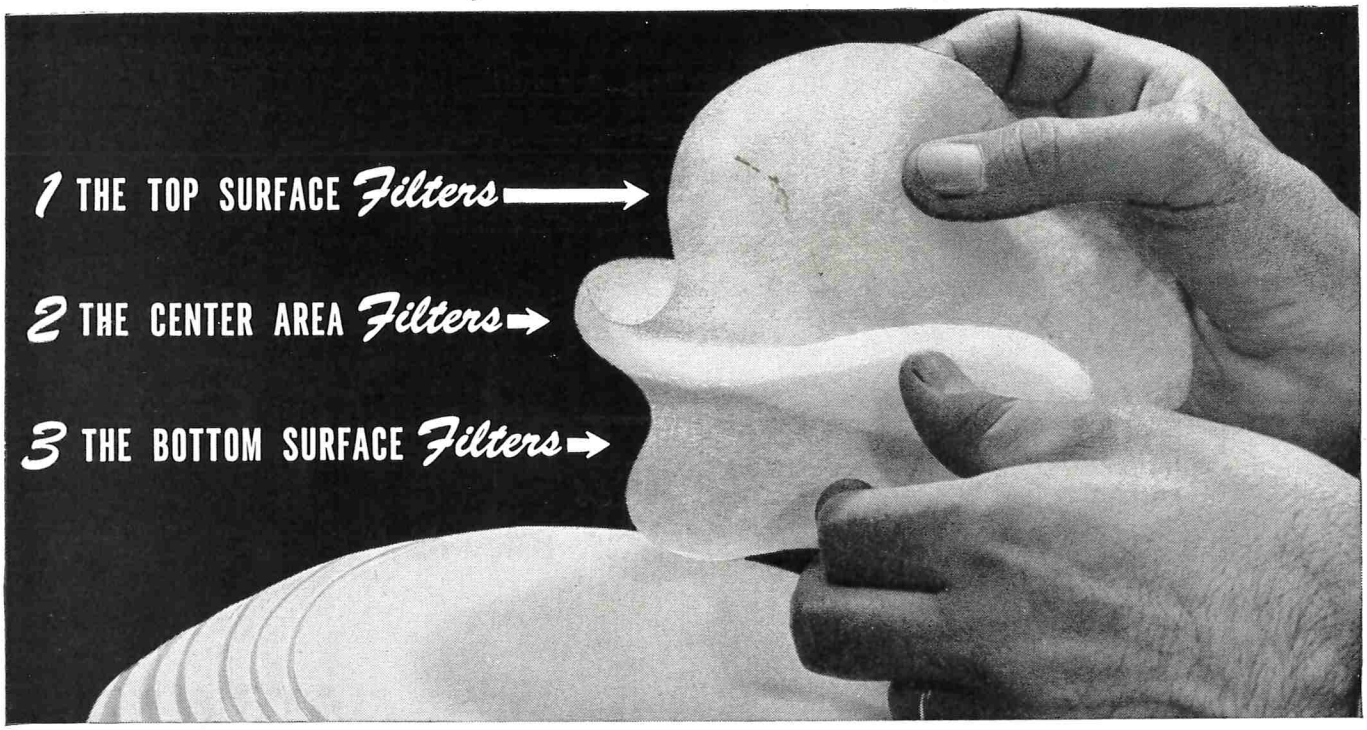

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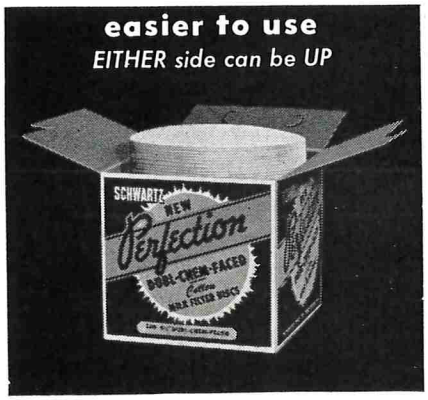

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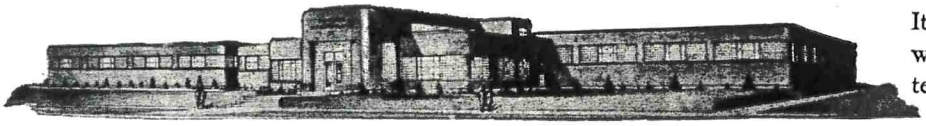

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Editorial Notes

A NEED AND A PLAN FOR PROFESSIONAL DEVELOPMENT

THE NEED

Considerable concern is being expressed by a number of national health agencies over the fact that the supply of technically trained people in the public health and sanitation field is lagging far behind the need. We are not recruiting enough trained people to fill the ranks created by such normal events as resignation, retirement and death. Many of the vacancies thus created are represented by people with technical training and special administrative ability. Replacements for them are difficult to find.

This is a problem with which the International is directly concerned. Our organization, over the course of its forty-three year history, has constantly advocated and actively advanced professional competence. Many of the advances in milk and food control have come about because our members and this Association, as a whole, have promoted and advocated them. Progress in this, or any other field, is the product of foresight, technical knowledge and preservance toward an ideal.

It is rather generally agreed by the large majority of our membership that the professional development of the sanitarian must be based, among other things, upon a sound educational background. While a number of technical and specialized backgrounds are needed in official control work, the training offered at public health schools is especially geared to the needs of states and local agencies. Through such courses the undergraduate has an opportunity to see the broad public health picture, plus specialization in sanitation.

Special undergraduate academic courses in sanitary science are relatively new most of them having been established slightly less than ten years ago. Since 1947, four hundred forty (440) students have graduated, but the greatest number in any one year was 101 at the close of the academic year of 1950. In 1953, fifteen colleges and universities offering undergraduate public health training graduated 77 persons. It cannot be assumed that all of these 77 graduates entered the official health field since some took industrial positions or accepted other types of employment. Seventy-seven graduates is a very small number, so small in fact, that some plan to encourage students to select sanitation as a career is urgently needed. Inquiry has revealed scholarships available to students choosing, chemistry, business administration, law, engineering, education, etc., but hardly any scholarship exists in the area of sanitary science.

Within the past five years the International has grown stronger. More affiliates have been added, membership has grown, business management markedly improved through a full time Executive Secretary, and during this same period interest has grown in the professional development of the Sanitarian. With facts such as these in mind, it appears fitting that the parent organization and the affiliates jointly sponsor a plan whereby scholarships could be established. Such a plan would serve to encourage undergraduate college students to select sanitary science and at the same time would assist needy students. The promotional significance as well as the publicity value to both affiliates and the International is well worth considering.

THE PLAN

The plan of administration as now conceived by the Committee on Education and Professional Development, while primarily tentative at this time would be about as follows:

To administrater the plan a scholarship committee would be appointed. The President Elect of the International with the advice and counsel of the Executive Board would make the appointments. This committee would select, by ballot, certain institutions as recipients of the scholarship funds where courses in public health and sanitary science are offered. Geographic distribution also would be considered.

The director of loans and scholarships at such educational institutions as are selected would be notified of the scholarship monies available. Only one scholarship would be allotted per institution per year at the outset. A student wishing to apply would make application on a prescribed form which would show such pertinent data as, academic courses and grades, aptitudes, financial position, reasons for selecting public health and similar facts essential to selection of the recipient.

The student in accepting the scholarship would agree to spend not less than one year in official milk, food, or sanitation work with an official agency after graduation.

The applicant would, if possible, be interviewed personally by a representative of the local affiliate nearest the educational institutional in which the applicant is enrolled. Such interview would have as its purpose an appraisal of the applicant's personality, suitability for public employment and personal characteristics.

In case two or more students from a given institution make application, the scholarship committee, could require the submission of an essay, for example, on such subjects as, "Why I have selected public health work as a career", or "Opportunities in the field of milk and food control". Such essay would serve as a supplementary means of assisting the committee in reaching a decision as to which candidate to select.

The scholarship would be "earmarked", for tuition, or subistence and would be paid on behalf of the applicant to the registrar or bursar of the university in question. The scholarship money would not be paid directly to the recipient.

It is the committee's opinion that a scholarship plan will serve as tangible evidence of professional interest and growth on the part of the International and the affiliates. A nominal appropriation by each affiliate will launch the plan and all affiliate secretaries have been notified in this regard. The National Association of Sanitarians has already established a scholarship plan for either undergraduate or graduate work. It is however, a single annual scholarship while the plan we envision would be available to at least six students annually.

If the plan meets the approval of the affiliates, steps to administer it will be taken as early as possible. During the first year of operation, it is possible that there may not be sufficient applicants to encumber all funds, but it should be remembered that a plan of this type once started will require annual financing and that the assessment or appropriation on the part of each affiliate will be needed annually. Here is a tangible proposal to demonstrate our active interest in maintaining a high level of competence in our chosen field. We believe this merits the attention of all Association members.

Harold S. Adams

VAN NORTWICK RESIGNS ADAMS BECOMES PRESIDENT-ELECT CORASH BECOMES FIRST VICE-PRESIDENT

It was with regret that the Executive Board of the INTERNATIONAL ASSOCIATION OF MILK AND FOOD SANITARIANS, INC. has accepted the resignation of President-Elect Ivan Van Nortwick.

"Van" recently accepted a position as Executive Director of the Kansas Ice Cream and Milk Institute, Inc. It was his opinion that he could not provide the necessary time to adequately perform the duties of President-Elect of the ASSOCIATION.

According to the constitution, the President of your organization can make appointments to fill vacancies until the next regular election. Because of the importance of this matter, your President asked the Executive Board for their opinions as to what to do to fill the vacancy. The decision was that your First Vice-President, Harold Adams be advanced immediately to the office of President-Elect and the Second Vice-President, Paul Corash, be immediately moved up to first Vice-President. The office of Second Vice-President will remain unfilled until the next annual meeting.

At the next regular election of officers two vacancies will need to be filled on the Executive Board, one to be designated as First Vice-President, the other as Second Vice-President.

As your President, I have authorized the above procedure to be followed.

President-Elect, Harold Adams will now have two major duties confronting him, that of general chairman for our 1955 annual meeting in Georgia, and that of nominating committee personnel for 1956. These are difficult tasks, so when he requests help, please give him all the cooperation you possibly can.

I. E. Parkin
President, IAMFS

NOTICE TO MEMBERS OF IAMFS

Please, notice letter by H. L. Templeton, Chairman, Membership Committee, on page 85, please, fill out questionaire (page 86) promptly and mail as directed.

FORTY-SECOND ANNUAL MEETING

HOTEL BON AIR — AUGUSTA, GEORGIA, OCTOBER 4 - 6, 1955

GENERAL SANITATION IN THE BAKERY INDUSTRY

J. O. SLAYBAUGH
Pacific Division Diversey Corporation, San Francisco, California

Until recent years the effect of proper sanitation on production was not considered as a major item. However, as studies were conducted on safety and quality control, a third factor became more and more apparent. That is, the personnel of a bakery is greatly affected by the conditions under which they work. In other words, clean floors, walls, locker rooms and equipment raise the morale factor and result directly in increased production or better quality products.

In bakeries where sanitation values have been highly developed, aggressive management can take the opportunity to benefit even further by cashing in on the sales appeal of the program. Open house for public inspection, school tours, television programs, etc., can pay big dividends.

Properly planned and carried out, sanitation pays its way. The planning should be considered just as carefully as the building of a recipe for a new product. For instance, it would not be possible to bake a desirable cake using flour and water only. Neither is it practical to clean painted walls, heavily contaminated floors, bread pans and utensils all with the same cleaner. *When a good recipe is worked out for one of your products it should be put down in black and white and thereafter it should be followed carefully to be sure of uniform results. Again, the same thing should be true when setting up a sanitation program. Whether the shop is a small type retail operation or a large diversified plant, a survey of the cleaning problems, analysis of the types of compounds needed for easy cleaning and method of application, can be made. A plan written up with separate direction cards for each area will go a long way toward achieving the desired result.*

The compounds selected for cleaning in any food plant should be of soapless nature. Soap leaves a greasy film which attracts dust and may harbor mold and bacteria. In a shop which bakes bread only, the cleanup is greatly simplified. Here the locker rooms, floors, bread racks, equipment surfaces, walls and pans are the major items needing attention.

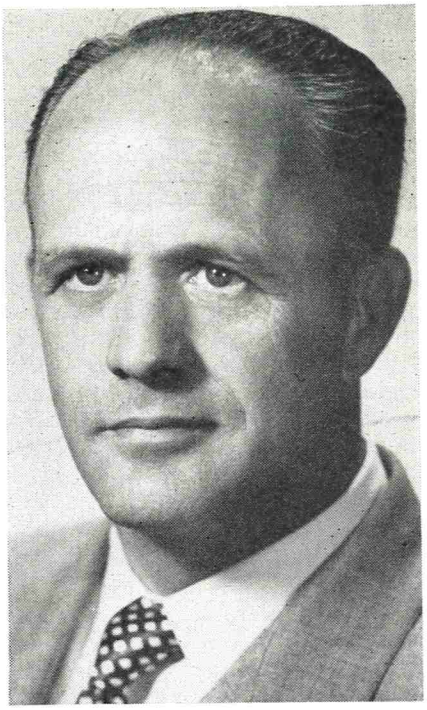
Locker rooms should be cleaned daily using a compound which combines cleaning and disinfecting properties. If the cleanup is conducted properly there should be no need for deodorant materials which serve only to cover up offensive odors originating, for example, from unclean toilet bowls and urinals or floor drains. Painted surfaces should be cleaned with a mild, soapless cleaner on a regular schedule. While the locker room is not usually open for public inspection, it certainly is of vital importance to the employee since he begins and ends his work day there.

Bread racks and similar portable equipment may be hand cleaned with brushes and a suitable compound should be used for this purpose. In larger bakeries, power cleaning is a very practical development from the standpoint of economy. Here again, a proper compound for spray or pressure cleaning, correct concentration, and proper temperature, together with time of contact are features which should be established and followed on a regular schedule.

The exteriors of dough mixers and other like equipment will accumulate grease from the air, and regular cleaning will minimize the possibility of odor development which may be imparted to the finished product.

The maintenance of bread pans is very vital to the quality of the bread. In many bakeries today the pans are commercially washed and glazed on a regular basis. Where this work is undertaken by the individual plant it can be done with a saving to the operator provided the equipment and knowledge of how the work should be done is available and used. Where pans are not glazed they certainly should be cleaned often enough to protect the pan itself and likewise protect the bread. Bread baked in a heavily carbonized greasy pan may come up with a bake shop odor. *The cleaning of bread pans is a separate subject in itself. Anyone interested in that procedure should obtain full information on type of equipment, proper compound and details of application.*

It is recognized practice to rotate raw materials in storage rooms. When an area is vacant it should be thoroughly cleaned before again being used for new supplies. When a bakery produces custard and cream fill products it is obvious that all containers and processing utensils used in this department



Mr. Slaybaugh was first employed by The Diversey Corporation as a Field Service Representative in 1941. Nearly three years as a POW during World War II, served only to heighten his interest in the field of food sanitation. On his return to civilian life he immediately picked up his work with Diversey and has progressed through the successive steps to his present position as Assistant Division Manager in the Pacific Division.

[1] Third of the series of papers on Bakery Sanitation presented at the Arizona Bakery Sanitation Seminar, sponsored by the Phoenix Health Department, Phoenix, Arizona, Oct. 6, 1954.

need special attention if high quality products are to be made which will have good keeping qualities. Spoilage from bacterial action is both dangerous from a public health standpoint and certainly contributes to loss of business if it occurs. Equipment and utensils should not only be washed but carefully disinfected after each production shift. Washing and disinfecting is usually accomplished by the hand method. Here again, correct compounds, properly used are very important. A direction card posted in this area will prove most helpful to cleanup personnel.

In a pie bakery, the containers for handling fruit are of major importance. The surface of the containers should be non-porous and smooth. In one large pie bakery where wooden tubs were used for fruit handling, very definite deterioration of the fruit was immediately traced to these tubs. The tubs were loaded with bacteria of a nature that, while it did not cause a problem of spoilage after baking the fruit developed very undesirable flavors.

Mechanical washing machines of various types for washing pie tins, cookie sheets, mix utensils, etc., are being used more and more. The labor savings affected are often substantial. If these machines function properly, good results can be obtained. However, if the compound used fails to protect the metal surfaces of the pan or utensil being cleaned, or if solution strengths are not maintained uniformily, the advantages may be easily lost. Compounds for such machines which will clean effectively and at the same time fully protect the pans and utensils are available. The solution concentrations can be held at very nearly a perfect level by an electronic feeder control unit. A direction card is a must for this type of cleaning and regular inspection of the machine condition and operation should be made.

Floor maintenance is probably the least interesting of all sanitation problems. At the same time it is one of the most important. Strictly from a safety standpoint, floors should be kept as clean as possible at all times. There are many kinds of flooring and each one presents a different problem. Hardwood floors, well sealed, can be maintained easily by simply sweeping and by periodic dry mopping with a cleaning compound which will not attack the sealed surface. Tile and concrete floors in mix rooms present a different problem. When new, they can be sanitized without too much difficulty. However, as these usually are in an area where heavy contamination builds up quickly they are subjected to harsh cleaning methods and often compounds which attack the tile grout or concrete surface. Fruit acids add to the deterioration once the surfaces are broken, crevices between tiles or tiny cracks in concrete afford a perfect habitate for growth of bacteria and odors resulting are often very undesirable. Since floors are uninteresting to begin with, it is often true that their cleaning and maintenance is conducted on a haphazard basis. This can be remedied when a complete survey is conducted for planned sanitation.

Very often in hard water areas, a film of scale builds up in the wash tanks where pans and utensils are hand washed. This scale is porous, like a sponge, and bacteria, mold or yeast find it a ready made incubator. As a result the equipment being washed may actually be contaminated while being physically cleaned. Scale may form in pan washing or rack washing machines with the same result. Scale build up in water jackets of dough mixers, circulating and storage tanks, condensers, heating coils, etc., not only may become a source of off odors but impair the efficiency of the equipment. Scale removal is accomplished easily with compounds for that specific purpose without danger to the equipment. While not a daily problem, scale should be considered and taken care of whenever it occurs.

You probably have heard of the two men working on a construction job who were asked the question, "What are you doing?" The first replied, "I'm laying bricks, can't you see?" The second man said, "I'm helping to build one of the most beautiful buildings this town will ever see." For many years the job of cleaning up was given to the lowest paid, poorly skilled labor available. Of recent years the relation of good sanitation practice to increased sales has received much greater recognition. As a result, aggressive management has realized the value of hiring better labor and upgrading the status of those individuals and their contribution to business success. Nothing is more effective in gaining that objective than a planned program of sanitation. In a large bakery a sanitarian or foreman should direct the activity. Such a program necessarily includes:

1. A survey of the bakery requirements.
2. Formulation of a recipe for each separate cleaning job.
3. Time interval frequency for each job.
4. Complete instructions in black and white for the entire plant, area by area.
5. Correct compounds with full "know-how" for each type of cleaning.
6. Adequate supervision of competent personnel.

The individual bakery where sanitation standards are high is in a very strong position to bid for more business. By the same token, as sanitation standards are raised nation wide the whole industry is better equipped in the constant battle for a greater share of the food dollar.

J. M. SCOTT RETIRES

The retirement of Mr. J. M. Scott, Chief Dairy Supervisor, Florida State Department of Agriculture, was announced in January 1955. Mr. Scott had completed over 25 years in this capacity, having been in charge of the Dairy Division since it was organized in 1929. Prior to that time he had served over 22 years with the Florida Agricultural Experiment Station, making the enviable record of almost a half century of outstanding service to the State of Florida. His successor will be Alex G. Shaw, who has also been with the Dairy Division since 1929 and state dairy supervisor of the north central Florida district. Mr. Shaw will be moving from Tallahassee to Gainesville where the headquarters of the Dairy Division are located.

A UNIFORM SIMPLIFIED DAIRY FARM INSPECTION REPORT*

A. C. DAHLBERG
Professor of Dairy Industry, Cornell University, Ithaca, New York
and
DONALD RACE
Dairy Products Improvement Institute, Ithaca, New York

(Received for publication September 27)

Any endeavor to formulate a uniform simple dairy farm inspection form must be predicated upon the concept that its principal function is to aid in the production of a sanitary milk supply. The issuance of instructions for the sanitary production of milk must precede inspection.

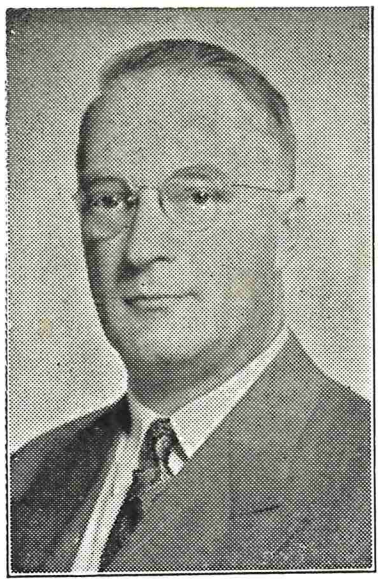
Most of the dairy books of the last century scarcely mention sanitation or the fluid milk industry. Probably one of the earliest milk sanitation programs was that of Gail Borden as reported by Sheldon[5]. About 1860 Borden selected areas in which to locate milk condenseries in New York and Connecticut on the basis of the reputation of the dairymen for producing clean milk of good flavor. He required that dairymen frame the fifteen rules for producing clean milk from which the following excerpts are taken. "The milk shall be drawn from the cow in the most cleanly manner . . ." "The cows are not to be fed on turnips or other food which would impart a disagreeable flavor to the milk . . ." "The Company shall clean and steam the cans at the factory free of charge, but milk suppliers shall keep the outside clean. The pails and strainers employed shall be by the seller thoroughly cleaned, scalded in boiling water, and dried morning and night." ". . . reduce the temperature of the milk within forty-five minutes to below 58°; and if night's milk . . . to below 55°." In winter "reduce the temperature of night's milk speedily below 50°." These quotations are sufficient to show some effective directives to dairyman for sanitary milk production.

As the fluid milk industry progressed such directions were developed rather extensively. The advent of Certified Milk in 1893 and the grading of milk in 1908 introduced detailed directions for sanitary milk production. Then the dairy farm score card was a logical means of determining compliance. The situation at that time was stated well by Ross[4] of Cornell University who was active in milk sanitation in New York and in the production of certified milk.

"One of the things which in the beginning hindered the progress of milk inspection was a lack of uniformity in rules and regulations governing milk production. Ideas concerning the necessary conditions for the production of clean milk were not standardized and this led to great confusion, especially on the part of producers. The dairy score card was an attempt to unify and standardize peoples' ideas as to what conditions are necessary on the farm for the production of clean milk."

"The dairy score card originated in 1904 with Dr. William C. Woodward, who was Health Officer of the District of Columbia. The following year, in 1905, R. A. Pearson, who was Professor of Dairy Industry at Cornell University, presented a score card, and in 1906, E. B. Lane, Assistant Chief of the Dairy Division, United States Department of Agriculture, offered for consideration a third form of score card. Mr. Lane's card had already been put into practical use and has received favorable comment from health officers and others. It is almost needless to state that at this time the score card was receiving a great deal of attention and many suggestions were offered for changes and revisions."

In 1915 a study by Brew[1] who was formerly a member of the staff at Cornell University and of the New York State Department of Health, showed that there was no relation between the numerical scores of dairies and the quality of the milk as measured by bacterial counts. In some instances dairies receiving low scores were as clean as those given high scores. The three score cards used then are interesting today. The Official Score Card of the U.S. Department of Agriculture and the Official Dairy Instructors' Association as adopted by the New York State Health Department appears rather modern with its six major items, 48 detailed items, all grouped under the two broad headings of equipment and methods. The score card of the Department of Health of the City of New York had 58 items grouped under the general headings of equipment and methods.



Arthur C. Dahlberg was born in Wisconsin, received the B. S. degree from the University of Minnesota in 1915 and the Ph.D degree from the University of Illinois. He was an instructor at the University of Minnesota, creamery extension specialist in North Dakota, superintendent of a cooperative creamery in Fargo, North Dakota, and in 1921 became head of the dairy department at the New York State Agricultural Experiment Station, Geneva, New York. In 1943 he went to Cornell as Professor of Dairy Industry.

He was given the Borden Award for dairy research in 1943; he conducted a special study of the dairy industry of Central America for the U. S. government during the war; and recently he directed a nation-wide study of city milk regulations and milk quality for the National Research Council.

*Presented at the 31st Annual Meeting of the New York State Association of Milk Sanitarians and the 10th Dairy Industry Conference of Cornell University held jointly at the Hotel Ten Eyck in Albany, New York on September 20-22, 1954, and will be published New York State Association of Milk Sanitarians.

It was unique in that the inspector had to give a full score or zero on each item. The Cornell Score Card, was divided into five headings as follows:

"1. Health of the herd and its protection.

2. Cleanliness of the cows and their surroundings.

3. Construction and care of utensils.

4. Health of employees and manner of milking.

5. Handling the milk."

As there were only 17 detailed items under these five headings the Cornell score card represented a simplified form of the character in which we are interested today. It should be noted that all of the score cards gave numerical scores.

This early work on milk inspection and milk grades contributed materially to the advances made in sanitary milk production and eventually raised all milk for direct consumption to "Grade A" standards. The directions and inspection forms were concerned largely with raw milk in this period so that there was justification for extra production details. An incentive to meet higher sanitary standards was often given to dairymen by price premiums. Thus, in some markets there was a premium if "Grade A" standards were met, for low bacterial counts, for high dairy scores, and for tuberculin testing. Unfortunately, today the payment of money to producers as an inducement to meet and maintain high sanitary standards is not common in most areas, but some markets still pay premiums for good compliance with ordinances, for very low bacterial counts, etc.

PURPOSES OF THE SCORE FORM

There can be no uniform simplified dairy farm score report until there is more general agreement concerning its purposes and use. We can conceive of two major purposes for scoring farms.

One function of the score form is to determine compliance of the dairy with the requirements of the sanitary codes of the state and local community. A dairy farm sanitation report which rates a milk producer for eligibility to sell milk in a given market must list on the form the items given in the ordinance as required by that market. In a few cities the sanitary milk code is brief and specifies that the regulations shall be those given on a dairy farm score report developed by the department of health. In either case the farmer obtains most of his instructions from sanitarians using the score form as the basis for sanitary requirements. The sanitarian accepts or rejects the producer on his findings as given on the report. The sanitation report serves the producer and sanitarian as the condensation of those structural, equipment, health, and sanitary conditions set forth in the code to assure proper facilities and methods for the sanitary production of milk. A score form to serve this purpose cannot attain desired uniformity and simplicity in the various producing areas until some ordinances are reduced to the factors applicable to milk sanitation.

The basic function of the dairy farm sanitation form is to determine that the fundamentals of milk sanitation are being practiced so that the milk supply will be of good sanitary quality. Many sanitarians will not like the distinction between compliance with the ordinance and sanitary milk production for it is true that the former includes the latter. However, there is no better manner of stressing the possibility of a more uniform and simple score form than by separating out of the ordinance those factors essential to sanitary milk production. After all, the only legitimate purpose of the ordinance is a sanitary milk supply but we hasten to state that some other required items in ordinances do make it easier to produce good milk even though not essential. This basic function of scoring dairies makes it possible to use a form limited to those items that are necessary to produce milk of good sanitary quality. Such a score form could be used to advantage in both routine scoring and in assisting producers experiencing trouble with the quality of their milk. In the entire field of milk production it is this type of score form that is most useful in developing and maintaining a sanitary milk supply.

REASON FOR A UNIFORM SCORE CARD

A uniform score sheet is desirable if milk and cream are to be moved freely from one area to another. Such transportation of milk and cream is necessary to provide certain markets with an adequate supply of milk during periods of shortage and to aid in relieving areas of surplus milk during certain periods of the year. The transfer of a supply from one market to another is greatly facilitated by a uniform farm score sheet. It permits one regulatory official to transfer information to another in an understandable manner so that the receiving official will know the conditions on farms in the area of production.

THE COMPLETE DAIRY FARM SANITATION REPORT

The most extensively used dairy farm sanitation form to determine compliance with ordinances is the Producer Dairy Inspection Form of the United States Public Health Service[3]. It has been adopted in more than half of the states, by the armed forces, and is required on interstate carriers. In other areas the cities often use the form recommended by the state if the local ordinance requirements are not too much in excess of the state requirements. In most instances there is no numerical rating of producers but certain producing areas are rated by the United States Public Health Service. With very few exceptions, these ordinance reports are designed only for milk and cream for bottling.

In order to illustrate certain ideas that merit consideration in all score forms, whether for use with milk supplies produced for bottling or for manufacture, we have developed a complete or ordinance type score form and a simplified or quality score form. In this Complete Dairy Farm Sanitation Report all items are listed that can be logically required or recommended in ordinances as desirable in sanitary milk production. Some sanitarians will question this statement as, for example, the milk stool is omitted. One inspection report that recently came to our attention had three items about the milk stool.

It is possible to add many informational items to this score sheet that might be interesting in a quality control program. However, such additions to an official score sheet generally tend to discourage

uniformity. The sixteen main items are grouped under six headings and the form is simplified by not separating facilities from methods. The value of this report is enhanced by permitting the sanitarian to check details not satisfactory under any main item and then decide whether or not the extent of the unsatisfactory condition is serious enough to score the entire item perfect or in violation. It sometimes happens that a detail is not just as it should be but the sanitarian would not condemn the entire item. This minor defect can be thus brought to the attention of the producer without condemning the entire item. We have inserted a numerical score even though not popular today, as it serves a useful purpose, but the score form can be used also on a compliance and non-compliance rating basis.

Eight of the main items on this score sheet are marked with asterisks. These are the items which are considered necessary and should be complied with in order to produce a sanitary quality milk. Non-compliance with any item marked with an asterisk may be considered grounds for exclusion.

In using this score form we suggest that a score of 85 or above should be considered "passing". However, if there is a violation of one or two main items marked with an asterisk, the dairy may be put on probation subject to reinspection after a definite period. A dairy scoring 70 to 85 should require a reinspection whether or not an item marked with an asterisk is in violation. A dairy with a score of 70 or less should be excluded.

In the case of milk which is to be used for manufactured products we suggest that a score of 70 or above should be considered "passing" provided not more than two main items marked with an asterisk are in violation. However, the violation of any one of the main items marked with an asterisk may be grounds for exclusion. A dairy scoring 70 or above with two or three main items marked with an asterisk in violation should be put on probation subject to reinspection after a definite period. A dairy with a score of 60 to 70 should be reinspected whether any items marked with an asterisk are in violation or not. If three or more items marked with an asterick are in violation or the score is 60 or less the dairy should be excluded.

A score sheet such as this has considerable merit in that it can be used for both fluid milk and cream, and milk and cream for manufacturing purposes. This alone is an important step toward uniformity in that the same score sheet can be used in areas producing milk for manufacture as in fluid milk areas.

A SIMPLIFIED DAIRY SANITATION REPORT

The items marked with an asterisk in the long sanitation report are compiled as a Simplified Dairy Farm Sanitation Report. This simple report includes the essentials of sanitary milk production but it does not include many recommended items of facilities and construction that aid in sanitary milk production. It can be used for routine inspection or to aid producers with milk of unacceptable quality. The eight main items state simply that (1) the cows must be healthy and clean, (2) the milking barn must have impervious floors, be clean, free from other stock and flies, and the yard well drained, (3) the milk must be promptly cooled in a clean milk room or house, (4) the milk utensils must be properly constructed and clean, (5) the water supply must be safe and adequate, and (6) the sewage must be properly disposed. It is a simple score form that covers the basis for sanitary milk production and we recommend its consideration or similar forms for general application.

This short form is satisfactory for the inspection of dairy farms producing milk for drinking or manufacturing purposes. Non-compliance with any one of the eight main items may be grounds for exclusion.

In using this score sheet for market milk and for milk which is to be used for manufacture into ice cream, cream, and cottage cheese, etc., we suggest using the same standards for classifying the dairy farm as were recommended for market milk and milk for manufacture in the complete score form, bearing in mind that each item in the simplified form is an item which was marked with an asterisk in the complete score form. The suggested system for classifying dairy farms which is applicable when using either the Complete Dairy Farm Sanitation Report or the Simplified Dairy Farm Sanitation Report is presented in tabular form as follows:

	Bottling		Manufacturing	
	Score	Asterisk headings in violation	Score	Asterisk headings in violation
Pass	85	1	70	2
Reinspect	70 - 85	1 or 2	60 - 70	2 or 3
Exclude	70 or less	2 or more	60 or less	3 or more

Several score sheets which are in use today give exact rules for classifying a dairy farm and leave little opportunity for the sanitarian to use his own judgment. Other forms which have been developed offer no method of classification and leave the decision entirely to the sanitarian. Although considerable leeway is given the sanitarian using either the complete or the simplified score form presented herewith, the suggested system of classifying a dairy farm will furnish a useful guide which should effect greater uniformity.

In the past, instructions for classifying the dairy farm and the interpretation of each item have been printed on the backside of the score sheet. There are certain disadvantages to such a system, therefore consideration should be given to developing a booklet for use by sanitarians which would contain uniform interpretations of the items on a score sheet and instructions for classifying dairy farms.

The simplified form is specific in details so that the report is understandable to any sanitarian or milk producer. In this connection it should be observed that if the form is limited to a few general state-

SIMPLIFIED DAIRY FARM SANITATION REPORT

Patron No. ..... Time ..... A.P.M. Date .....

Dairyman ..... Owner .....

Address ..... Address .....

Person Interviewed ..... Delivered at .....

Milk Grade ..... Operated by .....

No. Milking Cows ..... No. Milking ..... Pounds Milk Daily .....

	Violation Score 0	Perfect Score
COWS		
1. Health: Herd physically examined: Date ..... Tuberculin tested: Date ..... Accredited..... Brucellosis tested: Date..... Approved..... Mastitis program..... Herd apparently healthy.....		15
2. Cleanliness: Cows clean..... Flanks, udders and tails clipped.....		10
CONVENTIONAL BARN..... MILKING AREA..... LOOSE HOUSING.....		
3. Cleanliness: Walls and ceiling clean..... Floors and gutters impervious..... clean..... Bedding ample and clean..... Manure removed daily..... inaccessible to cows..... Freedom from flies..... and other animals..... Barnyard clean..... well drained..... Loose housing properly maintained.....		10
MILK HOUSE OR ROOM		
4. Cooling Milk: Milk delivered or cooled within 2 hours..... to 50°F..... or to 60°F..... or less; or facilities available..... (✓) Method used: Flowing water .....°F. or mechanical .....°F. Insulated tank..... Surface cooler..... Dry box..... Bulk tank.....		15
5. Cleanliness: Milk house..... Cooling facilities..... Freedom from flies..... Utensils..... Approved procedure used for sanitizing utensils and milk machines.....		20
6. Utensils: Proper construction..... Good repair..... Single service strainer..... Metal racks or chamber for storage.....		10
WATER SUPPLY		
7. Adequate..... Safe.....		10
TOILET AND SEWAGE DISPOSAL		
(✓) Privy..... Flush toilet.....		10
8. Sanitary maintenance..... Sewage and waste properly disposed.....		

Bacterial counts: Last four

Standard Plate	.....	.....	.....	.....
Microscopic	.....	.....	.....	.....
Thermoduric	.....	.....	.....	.....
Methylene Blue	.....	.....	.....	.....
Resazurin	.....	.....	.....	.....

Total Score	.....	100
No. of Main Items In Violation	.....	

Method of scoring:
Numbered headings consisting of several items may have one or more violation and, depending upon whether or not the entire heading is to be considered in violation, the sanitarian must give a full score or zero.

REMARKS: .....

..... DAIRYMAN ..... SANITARIAN

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COMPLETE DAIRY FARM SANITATION REPORT

Patron No. ..... Time ..... A.P.M. Date .....

Dairyman ..... Owner .....

Address ..... Address .....

Person Interviewed ..... Delivered at .....

Milk Grade ..... Operated by .....

No. Milking Cows ..... No. Milking ..... Pounds Milk Daily .....

	Violation Score 0	Perfect Score
COWS		
* 1. Health: Herd physically examined: Date ..... Tuberculin tested: Date ..... Accredited..... Brucellosis tested: Date..... Approved..... Mastitis program..... Herd apparently healthy	.....	10
* 2. Cleanliness: Cows clean..... Flanks, udders and tails clipped.....	.....	5
CONVENTIONAL BARN..... MILKING AREA..... LOOSE HOUSING		
3. Construction: Adequate size..... proper arrangement..... Floors and gutters watertight..... Walls and ceiling tight..... Light adequate..... Ventilation adequate..... Good repair and finish.....	.....	3
* 4. Cleanliness: Walls and ceiling clean..... Floors and gutters clean..... Bedding ample and clean..... Manure removed daily..... inaccessible to cows..... Freedom from flies..... and other animals..... Barnyard clean..... well drained..... Loose housing properly maintained.....	.....	10
5. Milking: (✓) Milking inspected..... Method used: Hand..... Milk machine..... Pipeline milker..... Milkers' hands clean and dry..... Udders, teats, and flanks clean at milking..... Strip Cup used..... Abnormal milk not sold..... Milk immediately removed to milk room.....	.....	10
MILK HOUSE OR ROOM		
6. Construction: Adequate size..... Convenient sanitary location..... Water tight, drained floor..... Tight walls and ceiling..... Adequate light and ventilation..... Openings screened and doors open outward and self closing..... Good repair and finish.....	.....	4
7. Used exclusively for handling milk and utensils.....	.....	1
* 8. Utensils: Proper construction..... Good repair..... Single service strainer..... Metal racks or chambers for storage.....	.....	5
9. Washing facilities: Water piped into milk house or room..... Hot water available..... Two compartment wash and rinse vat.....	.....	5
*10. Cooling Milk: Milk delivered or cooled within 2 hours..... 50°F..... or 60°F..... or less; or facilities available..... (✓) Method used: Flowing water .....°F. or mechanical .....°F. Insulated tank..... Surface cooler..... Dry box..... Bulk tank.....	.....	12
*11. Cleanliness: Milk house..... Cooling facilities..... Freedom from Flies..... Utensils..... Approved procedure used for sanitizing utensils and milk machines.....	.....	13
WATER SUPPLY		
*12. Adequate..... Safe.....	.....	6
TOILET AND SEWAGE DISPOSAL		
(✓) Privy..... Flush toilet..... *13. Sanitary maintenance..... Sewage and waste properly disposed.....	.....	7
MISCELLANEOUS		
14. Milk handling employees apparently free from disease.....	.....	5
15. Premises neat and clean.....	.....	3
16. Milk protected in transit.....	.....	1

Bacterial counts: Last four

Standard Plate	.....	.....	.....	.....
Microscopic	.....	.....	.....	.....
Thermoduric	.....	.....	.....	.....
Methylene Blue	.....	.....	.....	.....
Resazurin	.....	.....	.....	.....

100

Total Score .....

No. of Main Items Marked * In Violation .....

Method of scoring:
*Items so marked are grounds for exclusion.
All violations are marked X and numbered headings with single items so marked are scored zero.
Numbered headings consisting of several items may have one or more violations and, depending upon whether or not the entire heading is to be considered in violation, the sanitarian must give a full score or zero.

REMARKS: .....

....

DAIRYMAN SANITARIAN

ACD-DHR 9-13-54

ments, then no one, except the sanitarian who did the inspecting, can be sure of conditions reported. Whether or not a given producer complies with the details of the ordinance can be ascertained only by scoring with the complete form but the short form will give the situation regarding the essentials of producing a sanitary milk supply.

INSPECTION REPORTS AND MILK QUALITY

The quality of milk can be ascertained only by tests on the milk to determine its quality; however the problem is not that simple.

Tests for quality of milk do not reveal most cattle diseases and the presence of bacteria producing diseases in man which might be derived from water polluted by human excreta. The dairy farm inspection report would exclude the milk supply from such farms and give the dairy a low score even though tests on the milk might show it to rate high in quality. There would be no relation between dairy score and milk quality in such an instance. Also, everything about the farm might look excellent but if the milking machine rubbers were not properly sanitized the bacterial count might be high so again dairy score and milk quality might not agree. Dairy farm sanitation reports and milk quality tests should supplement and not replace each other.

Nevertheless, in general the best milk is produced on the farms with highest inspection ratings though there are exceptions to this statement. It was shown by Dahlberg, Adams, and Held[2] that dairies with milk utensils scoring highest for cleanliness and with best milk cooling produced milk with lowest bacterial counts. Also when the utensils were clean the cows, barns, and milk houses were generally clean. On the simplified score form 40 points are given to cleanliness and 15 points to milk cooling, 10 points to construction of milk utensils, and the remainder or 35 points to health of cows, good water, and proper disposal of sewage.

ONE FARM SANITATION REPORT FOR ALL MILK

There has been much discussion of a single standard of farm sanitation for milk produced for all uses. The good reason for such a standard is recognized; however, there is little possibility of widespread application today. In considering this problem it must be remembered that there is no necessity from a a public health standpoint for a single standard. The basic sanitary requirements for producing a manufacturing grade of milk should include all the essentials for the production of quality milk. Furthermore, assurance of milk of high sanitary quality would result from enforcing suitable tests on the milk for quality at the plant where the milk is received. The significant differences between the usual standard for the production of milk for bottling and the one we are proposing for milk for manufacture are the non-essential items which are helpful in producing milk of high quality but are not absolutely necessary.

Extra fine quality is necessary in milk used for bottling as such milk may be subjected to unfavorable treatment prior to consumption as compared with milk used in a manufactured product such as ice cream. Milk for fluid consumption may be only cooled at the receiving plant and held at 40° F or below for a day of shipment and holding at the large city plant prior to pasteurization. At the bottling plant pasteurization is generally done at a relatively low temperature such as 144° F for 30 minutes followed by cooling to 50° F or below. Although delivery to the store or consumer is made within a day Although delivery to the store or consumer is made within a day after pasteurization the milk is held from a day to a week at various cool or cold temperatures prior to final consumption.

Milk for ice cream is usually separated into cream and then promptly pasteurized at 155° - 160° F for 30 minutes at the receiving plant. The sweet cream is cooled to 40° F or below, shipped to the city plant where this temperature is maintained during the time prior to use. The entire mix is then pasteurized at 160° F for 30 minutes, frozen to −10° F, at which temperature it is held until consumed. Thus the public health aspect of sweet cream used in ice cream may be cared for with less rigid sanitary standards, and economics of production become more significant in open markets. A local cream supply produced under market milk sanitation requirements would be at an economic disadvantage in competition with cream produced in manufacturing areas. There is need, therefore, for a dual standard of quality in milk depending upon usage.

Under the circumstances these increased costs, due to special sanitation requirements, cannot be justified economically for milk for manufacture as the consumer generally is not willing to pay the extra price necessary for dairy products manufactured from milk and cream produced under existing fluid milk requirements. One quality standard for producing milk for all uses is not economically feasible at the present time.

The industry must continually work with manufacturing supplies to develop and keep them beyond reproach in respect to sanitation and quality tests of the product. This, of course, can be most effectively accomplished through a long-term educational program.

A simple dairy farm sanitation report which includes only the essentials of sanitary milk production is feasible for use on all dairies because many details of fluid milk ordinances and laws can be omitted in such an inspection form. A dual sanitary standard for milk production may be applied effectively with one score report for the essentials of sanitary milk production are uniform. There is need for such unification of inspection reports even though standards vary.

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EVALUATION OF A DETERGENT-SANITIZER FOR USE ON PRODUCER MILKING UTENSILS

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In a field study involving 26 Grade A milk producers a detergent-sanitizer was compared with the customary method of cleaning and sanitizing milking equipment. The producers were divided into two comparable groups and placed on a double-reversal trial with three 5-week periods. Milking utensils appeared cleaner and milk-stone deposits were reduced when the detergent-sanitizer was used in place of the regular procedure. The difference between the two methods of cleaning and sanitizing utensils was not statistically signifcant as measured by thermoduric and total bacterial counts. The relation between the effectiveness of the detergent-sanitizer and the hardness of water was not statistically significant. There was no appreciable amount of quaternary ammonium compound in any of the milk samples as determined by direct measurement and by the activity of a buttermilk culture.

The introduction of detergent-sanitizers to the dairy field has been an attempt to accomplish the cleaning and sanitization of milk-handling equipment in essentially one operation. Products compounded for this purpose contain certain detergents that are compatible with the quaternary ammonium compound used for the disinfectant. After rinsing milk from utensils they are scrubbed in the detergent-sanitizer solution and then allowed to drain until used. During the storage period the quaternary acts as a germicide, as long as moisture is present, to destroy bacteria remaining on the utensils or those deposited from outside sources. Immediately before use the utensils are rinsed with water to free them from the remaining detergent-sanitizer ingredients.

The present study was undertaken to evaluate the effectiveness of a detergent-sanitizer as used by producers having records of varying magnitudes of bacterial counts and having farm water supplies of different degrees of hardness.

Experimental

Selection of producers and experimental plan

A representative group of Grade A milk producers was selected on the basis of their records of sanitation practices, level of raw milk bacterial count, and their distance from the processing plant. These producers were then visited and their participation in the proposed study was solicited. Of the group 26 agreed to participate. During the next 19 days, 5 weigh-vat samples were collected for each producer. On the basis of the raw and laboratory-pasteurized bacterial counts of these samples, the distances of the producers from the processing plant and the times of the arrival of the milk at the plant, the producers were divided into 2 comparable groups.

The experimental plan adopted was of the switchback or double-reversal type. After the grouping of the producers at the end of the initial nineteen-day period, those in Group I were placed on a cleaning program using the detergent-sanitizer[2], and instruction was given on its proper use. Group II was permitted to continue with its conventional cleaning methods (alkaline and acid detergents, chlorination). After 5 weeks, Group I reverted to its usual cleaning procedures and Group II was placed on the detergent-sanitizer cleaning method. After 5 weeks, the groups again reversed cleaning procedures for a final period of 5 weeks. The experimental plan is given in Table 1. This plan was selected because it is particularly effective in removing between-farm differences from experimental error.

Marvin L. Speck was educated at the University of Maryland and Cornell University. He was bacteriologist at Western Maryland Dairy, Baltimore, 1935-36; instructor in bacteriology at the University of Maryland, 1940-41; assistant chief bacteriologist with National Dairy Research Laboratories, 1941-47; and employed in his present position in 1947. He also has held temporary appointments as bacteriologist in the Dairy Research Laboratories, U.S.D.A., 1936, and with the Dairymen's League, Poughkeepsie, N. Y., in 1940.

Instructions and observations made on the farm

At the beginning of each detergent-sanitizer period, detailed instructions were given on the method of cleaning with the detergent-sanitizer. The instructions were to rinse the equipment with cool water immediately after use, to brush wash in a warm (about 110° F.) solution containing the proper concentration of detergent-sanitizer, and then to use dry storage of the equipment until the next milking, at which time the utensils were to be rinsed with hot water (which actually was 110 - 120° F.).

Each of the cooperating dairy farms was visited at the beginning of each of the test periods, and again at the termination of the trial. These visits were to observe

[1]Published with the approval of the Director of Research, North Carolina Agricultural Experiment Station, Raleigh, as paper No. 579 of the Journal Series.

[2]This product under the label of D-S was obtained from the Rigo Manufacturing Co., Inc., Nashville, Tenn.; active ingredients listed were sodium carbonate 35%; methyl dodecyl benzyl trimethyl ammonium chloride (Hyamine 2389) 5%; inert ingredients 60%, composed of non-ionic detergent, sequestering and chelating compounds. The manufacturer's instructions specify that this product be used in a concentration of 1¼ oz. to 10 qt. water.

the condition of the equipment and utensils and to give instructions on the use of the detergent-sanitizer. Also noted on these visits were the types of detergent, sanitizer, and milk stone remover normally used by the producer, and the method usually employed in cleaning and in storing the teat-cup liners. Observations were made on the sanitary condition of the milking machines and all their parts as well as milk cans, coolers, and the general cleanliness of the milk house. Milk-stone deposits in the teat-cup liners, pails, and parts of the machines were noted as well as the age and condition of all the rubber parts.

Milk sampling

Samples of raw milk were collected at the weigh-vat with a stainless steel dipper (about 50 ml. capacity). The dipper was rinsed in water after use and placed in a 200 p.p.m. hypochlorite solution before taking the succeeding sample. The samples were placed in rubber-gasket, screw-cap vials, and the vials kept in a mixture of ice and water from the time of sampling until aliquots were taken for bacterial counts (about 6 hours).

Samples were collected approximately at weekly intervals and on a different day of the week when possible. Generally, 5 samples were collected from each producer during each cleaning period.

Bacterial counts

On each raw sample the standard plate count was made in accordance with *Standard Methods for the Examination of Dairy Products* (9th ed.), using 35° C. for incubation of plates.

Six ml. of each raw sample were placed in a sterile screw-cap vial, pasteurized at 143° F. for 30 min., cooled, and a standard plate count made. These pasteurized samples provided the thermoduric counts.

Activity of buttermilk culture in milk samples

The 4.9 - 5.0 ml. of pasteurized sample remaining after plating was inoculated with 1 per cent of a buttermilk culture. In order to measure the inoculum accurately, 0.5 ml. of a 1:10 dilution (in sterile skim milk) of a buttermilk culture was used to obtain the 1 per cent inoculum. The vials were incubated at 70° F. The purpose of these tests was to determine if any inhibitory activity was present that could be attributed to residual sanitizing agent.

TABLE 1. CLEANING SCHEDULE OF THE PRODUCER GROUPS

	Preliminary period	Period I	Period II	Period III
	Farms visited 7/30/53 Sampling started 8/3/53	Farms visited 8/17/53 Sampling started 8/24/53	Farms visited 9/21/53 Sampling started 9/28/53	Farms visited 10/25/53 Sampling started 11/2/53
Group I	Regular[a]	D – S[b]	Regular	D – S
Group II	Regular	Regular	D – S	Regular

[a]Alkaline detergent and hypochlorite; intermittent use of acid detergent; lye soak for teat cups.

[b]Detergent-sanitizer

Residual quaternary in milk samples

Each sample of raw milk produced where the detergent-sanitizer was being used, was tested by the Furlong and Elliker (3) method for measuring quaternary ammonium compounds in milk. This method was found to be quite sensitive to the active quaternary in the detergent-sanitizer. The standard titration curve of the number of milliliters of anionic solution plotted against p.p.m. of the quaternary was very similar to that of Furlong and Elliker.

Hardness of water measurements

At the time of the farm visits samples of the water supply were collected. The hardness of the water was determined by the Versenate procedure (1).

RESULTS

Appearance of equipment

In normal procedure all producers were using non-soap-type detergents and chlorine-type disinfectants recommended for dairy equipment. Acid cleaners (milk-stone removers) were used periodically. Most producers soaked teat cups in lye solution although a few used a chlorine solution. The age of the teat cup liners varied widely. Prior to the use of detergent-sanitizer about one-third of the liners were either new or in a clean, milk-stone-free condition; the remainder were either old and cracked or very rough and pitted on the inside, and frequently coated with milk-stone. Some of the liners showed indications of having been boiled in lye which kept them in fair condition, but others showed evidence of neglect. At the start of the experiment most of the milk cans observed had rust spots and the tin was dull. Considerable milk-stone was present in cans and pails.

The teat cup liners showed considerable improvement after the periods of detergent-sanitizer use. The new liners were in excellent condition while those showing evidence of milk-stone build-up prior to use of detergent-sanitizer were soft, pliable, and relatively free from milk-stone. The old cracked liners had a gummy layer on the outside which was probably due to the loosening and sloughing off of the dead rubber. After the use of detergent-sanitizer for the 5-week periods, the milk cans and pails took on a luster that was very noticeable. Although the rust spots were still present in the cans, the tinned areas were bright and shiny. The milk-stone was removed in most cases, but some remained, particularly in areas where brushing was difficult.

The general opinion of the producers was favorable to the detergent-sanitizer; in fact after the termination of the experiment a number of the producers expressed a desire to use the detergent-sanitizer procedure routinely. This

TABLE 2A—MEANS OF THE LOGARITHMS OF PASTEURIZED MILK COUNTS FOR THE PRODUCERS IN THE DIFFERENT PERIODS

Farm No.	Water hardness ppm	Mean logarithms of standard plate counts: Preliminary period	Period I	Period II	Period III	Difference[a] (I−(2II)+III)
			Group I			
		(Regular)	(D - S)	(Regular)	(D - S)	
121	118	3.963	3.696	4.447	4.319	−0.879
203	100	3.438	2.913	2.546	2.184	+0.005
208	196	3.082	2.701	2.734	2.382	−0.385
213	225	4.939	3.148	2.770	2.480	+0.088
49	149	2.842	2.668	2.801	2.762	−0.172
28	50	3.088	3.242	2.466	2.602	+0.912
32	66	3.208	2.854	2.924	2.687	−0.307
43	477	2.580	2.576	2.785	2.566	−0.428
152	25	.....	2.679	2.606	2.582	+0.049
160	78	2.264	2.522	2.126	2.030	+0.300
207	64	2.469	2.579	2.381	2.290	+0.107
89	53	2.696	2.908	2.850	2.651	−0.141
CD	70	.....	2.481	2.240	1.969	−0.030
Mean		.....	2.843	2.744	2.577	−0.068
Mean omitting nos. 121 and 208			2.779	2.590	2.436	+0.035
			Group II			
		(Regular)	(Regular)	(D - S)	(Regular)	
99	484	2.652	2.876	2.624	2.469	+0.097
130	48	4.124	2.956	2.309	2.239	+0.577
135	62	3.510	3.891	2.952	2.531	+0.518
220	166	3.785	3.349	3.273	3.231	+0.034
40	702	3.422	3.752	2.736	2.640	+0.920
93	89	2.712	2.711	2.772	2.461	−0.372
150	98	3.222	3.215	2.585	2.481	+0.526
6	288	2.651	2.763	2.428	2.706	+0.613
47	84	2.828	2.954	3.252	2.690	−0.860
122	105	2.414	2.399	1.797	2.005	+0.810
131	140	2.525	2.791	2.790	2.434	−0.355
134	105	2.802	3.140	2.438	2.427	+0.691
BS	140	.....	2.996	2.247	2.228	+0.730
Mean		.....	3.061	2.631	2.503	+0.302

[a]A *negative* difference is an advantage for detergent-sanitizer in Group I
A *positive* difference is an advantage for detergent-sanitizer in Group II

preference was based on the improvement in the condition of the equipment and the simplicity of the detergent-sanitizer method for cleaning and sanitizing.

Effect of cleaning procedures on bacterial counts of milk

Results were computed using all 5 weekly samples of each experimental period, and also using only the last 4 weeks of each period. This was done because of the possibility that the detergent-sanitizer in loosening milk-stone, etc. when first used, might cause some temporary fluctuations in bacterial counts. Statistical analyses showed that the 5-week and 4-week results were essentially the same. A direct test of the change in bacteria count in the first week following the change from regular practice to detergent-sanitizer, showed the possible temporary effects not to be significant. Because the transitory effects were negligible, results are presented only on the 5-week basis.

The mean logarithms of the counts for each producer in each period are shown in tables 2a and 2b. The summarized comparisons of the bacterial counts obtained with detergent-sanitizer and with regular practice are shown in Table 3 for both the pasteurized and the raw samples. Results in Table 3 are given on the basis of the means of the logarithms of the observed counts, and also as the geometric means of counts.

Results were computed using all 26 farms and also deleting 2 farms in Group I. These 2 farms developed a temporary sanitation problem

TABLE 2B—MEANS OF THE LOGARITHMS OF RAW MILK COUNTS FOR THE PRODUCERS IN THE DIFFERENT PERIODS

Farm No.	Water hardness ppm	Mean logarithms of standard plate counts: Preliminary Period	Period I	Period II	Period III	Difference[a] I − 2(II) + III
			Group I			
		(Regular)	(D - S)	(Regular)	(D - S)	
121	118	5.136	5.195	5.651	5.236	−0.871
203	100	5.308	4.859	4.086	4.303	+0.990
208	196	5.400	5.471	5.046	4.466	−0.155
213	225	5.536	5.283	3.928	3.452	+0.879
49	149	4.618	4.675	4.192	5.344	+1.635
28	50	4.818	5.890	4.152	3.883	+1.469
32	66	3.964	4.034	4.672	4.089	−1.221
43	477	4.171	4.350	4.072	3.342	−0.452
152	25	.....	4.912	4.111	4.266	+0.956
160	78	4.039	3.865	4.148	2.773	−1.658
207	64	4.051	5.343	3.925	3.978	+1.471
89	53	4.693	5.591	4.110	4.471	+1.842
CD	70	.....	4.238	4.015	3.871	+0.079
Mean		.....	4.901	4.316	4.113	+0.382
Mean omitting nos. 121 and 208			4.822	4.128	3.979	+0.545
			Group II			
		(Regular)	(Regular)	(D - S)	(Regular)	
99	484	5.772	4.843	5.632	4.851	−1.570
130	48	5.046	4.216	4.812	3.606	−1.802
135	62	5.362	5.497	4.256	4.213	+1.198
220	166	5.272	4.884	5.236	4.672	−0.916
40	702	4.793	4.894	5.685	4.336	−2.140
93	89	4.580	4.196	4.494	4.951	+0.159
150	98	4.940	4.731	4.370	3.828	−0.181
6	288	4.138	3.924	3.748	3.572	0.000
47	84	3.655	3.690	4.080	3.657	−0.813
122	105	4.085	4.066	3.991	3.867	−0.049
131	140	3.679	4.215	3.833	3.839	+0.388
134	105	4.410	4.540	4.186	4.376	+0.544
BS	140	.....	4.729	4.062	4.655	+1.260
Mean		.....	4.494	4.491	4.186	−0.302

[a]A *negative* difference is an advantage for detergent-sanitizer in Group I
A *positive* difference is an advantage for detergent-sanitizer in Group II

that resulted in very high bacterial counts and required immediate correction during the course of the experiment.

Statistical analysis of the data followed the method of Brandt (2). Analyses were made on the mean logarithms of the 5-week or 4-week bacterial counts. Logarithms were used to prevent undue weighting by an occasional very high count. To obtain the results expressed as geometric means of the counts, antilogarithms of the mean logarithms were taken.

From Table 3 it can be observed that the means of the pasteurized milk counts were lower when the producers were using the detergent-sanitizer than when using their regular methods; this difference in the thermoduric counts when the two methods were used was, however, not found to be significant by statistical analysis. The means of the raw milk counts were higher during periods of detergent-sanitizer use, but the difference obtained by the two methods of cleaning and sanitizing again was not significant. From these results it appeared that the detergent-sanitizer was as good as the regular method for cleaning and sanitizing milking utensils.

The average logarithmic bacterial counts of the pasteurized samples from the various farms during the experiment ranged from about 2.2 to 4.2 and the geometric means ranged from about 160 to 16,000. The logarithmic range for raw samples was from about 3.6 to 5.4 and the geometric means ranged from about 4,000 to 250,000. The relation of general level of bacterial count to the difference between detergent-sanitizer and regular

TABLE 3—SUMMARY OF BACTERIOLOGICAL RESULTS COMPARING DETERGENT-SANITIZER AND REGULAR METHODS OF TREATING MILKING EQUIPMENT

Basis of comparison	Pasteurized samples				Raw samples			
	D-S	Regular	Diff[a]	LSD[b]	D-S	Regular	Diff[a]	LSD[b]
Means of log-counts								
All farms	2.670	2.763	−0.093	0.099	4.499	4.328	+0.171	0.228
Omitting farms 121 & 208	2.619	2.686	−0.067	0.100	4.446	4.234	+0.212	0.241
Standard plate counts (geometric means)								
All farms	468	579	−111	119	31,600	21,300	10,300	13,800
Omitting farms 121 & 208	416	485	−69	104	27,900	17,100	10,800	12,300

[a]Difference = count with detergent-sanitizer minus count with regular.
[b]Least difference required for significance at the 5 percent level of probability.

practice was studied, subdividing the farms into high, medium, and low groups with respect to bacterial count obtained in the preliminary test period.

Statistical analyses provided no evidence that the difference between detergent-sanitizer and regular practice was related to the general level of bacteria count. As a further check on this point, the correlations between mean logarithmic bacterial count and advantage for detergent-sanitizer on the individual farms were examined. The correlation coefficients were found to be 0.16 and −0.30 for the pasteurized and the raw samples, respectively. Neither of these values is large enough to be of concern and neither is significant at the 5 per cent level of probability.

Residual quaternary and activity of buttermilk cultures

During Period I out of a total of 60 milk samples from the producers using detergent-sanitizer, 3 contained 5 p.p.m. and 2 contained 2 p.p.m. of quaternary ammonium compound; from a total of 41 samples in period II, 1 showed the presence of 2 p.p.m. and 2 samples showed a slight trace of quaternary; in period III out of a total of 67 samples 1 contained 2 p.p.m. and 4 had a slight trace. In none of these samples was the buttermilk culture inhibited in forming a curd. There was in each period, however, one sample from the group not using the detergent-sanitizer which failed to show rapid curd formation; also, in periods II and III one sample in which no quaternary was found failed to coagulate. These data indicated no deleterious effects by the use of detergent-sanitizer on buttermilk culture activity, although the culture was inhibited at times by other unidentified factors.

Water hardness and the effectiveness of detergent-sanitizer

Water hardness varied from 25 p.p.m. to 702 p.p.m. (Table 2a). The relation of water hardness to effectiveness of the detergent-sanitizer was examined. Little evidence of a relationship was found. For the pasteurized samples the correlation coefficient between water hardness and disadvantage for detergent-sanitizer was −0.30 and for the raw samples 0.25. Neither of these values is large enough to be of importance and neither is significant at the 5 percent level of probability. Thus, there was no indication that water hardness had any deleterious effect on the activity of the detergent-sanitizer.

DISCUSSION

The satisfactory performance of any cleaning and sanitizing procedure involves many factors, such as the removal of milk residue from treated equipment after cleaning, interference in the action of the detergent and/or sanitizer by components in water, and the adaptability of the method to a routine clean-up procedure.

It might seem desirable to compare cleaning and sanitizing procedures on producers having high thermoduric counts. For the evaluation of such procedures by regulatory agencies, however, it is necessary also to obtain data for producers who maintain satisfactory counts using accepted procedures. Therefore, the milk producers chosen for this study constituted a representative portion for a grade A milk supply.

In the present study the milking equipment had a cleaner appearance when the detergent-sanitizer was used. The thermoduric count of the milk produced with this equipment was also a reflection of the satisfactory cleaning and sanitizing performance of the detergent-sanitizer. The failure of the raw milk counts to be significantly different for the 2 types of utensil treatment might be expected since these counts are of secondary importance in regard to equipment sanitation. Unless equipment is grossly contaminated, other factors, particularly improper refrigeration of the milk, can be dominant in affecting raw milk counts.

The hardness of the water on certain farms had no apparent adverse effect on the activity of the detergent-sanitizer. This was rather unexpected since the effectiveness of quaternary-ammonium compounds frequently is lowered by various ions contained in such water. The present findings possibly resulted from the chelating action of certain ingredients in the detergent formulation. The extreme hardness of certain water supplies probably was not typical for these supplies throughout the year, but was a temporary condition aggravated by

negligible rainfall and water shortage during the greater part of the duration of the experiment.

Significant quantities of the quaternary ammonium compound appeared in none of the samples of milk, as shown by direct measurement and by the activity of a buttermilk culture. These results indicated that no deleterious effects should be encountered in the making of fermented milk products from milk produced with utensils cleaned and sanitized with the detergent-sanitizer method as used in this study.

The results obtained show that the detergent-sanitizer treatment used in this study is one easily adopted by the producers. The operations and the instructions for performing them are simple. An advantage is gained by eliminating separate products and treatments for cleaning, disinfection and teat cup storage. It would seem reasonable to expect that a single product, suitable for various cleaning and sanitizing operations, might be more effectively integrated into a routine procedure than the three or four products which are often used for these purposes.

SUMMARY AND CONCLUSIONS

In a field study involving 26 Grade A milk producers a detergent-sanitizer was compared with the customary method of cleaning and sanitizing milking equipment. The producers were divided into two comparable groups and placed on a double-reversal trial with three 5-week periods. In the first period, one group served as a control while the other was on test. In the second period, the treatments of the groups were reversed, and in the final period treatments were again the same as in the first period.

Milking utensils appeared cleaner and milk-stone deposits were reduced when the detergent-sanitizer was used in place of the regular procedure.

The difference between the two methods of cleaning and sanitizing utensils was not statistically significant as measured by thermoduric and raw milk bacterial counts.

The relation between the effectiveness of the detergent-sanitizer and the hardness of water was not statistically significant.

There was no appreciable amount of quaternary ammonium compound in any of the milk samples as determined by direct measurement and by the activity of a buttermilk culture.

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20TH DAIRY INDUSTRIES EXPOSITION, MAJOR DAIRY CONVENTIONS TO RETURN TO ATLANTIC CITY IN FALL OF 1956

The 20th Dairy Industries Exposition in concurrence with conventions of major dairy processor organizations will be held in the autumn of 1956 in Atlantic City, N. J., is a February announcement authorized jointly by International Association of Ice Cream Manufacturers, Milk Industry Foundation, National Association of Retail Ice Cream Manufacturers and Dairy Industries Supply Association. The last named is the organization of dairy industrial equippers and suppliers which sponsors and manages the Show in which its member firms display.

The most recent Dairy Industries Exposition was held last fall in Atlantic City, and there has been some industry speculation as to whether in 1956 it might revert to a mid-Western site, Chicago having been its scene in 1952. A more widespread understanding in the industry, however, has been that the hotel interests in Chicago had failed in a clearing of city-wide accommodations there for the dairy events in 1956 in a week into which the cycle of operations in the dairy processing field would permit the conventions and the Show to fit.

The current four-associations announcement confirms this somewhat general trade-talk supposition.

The annual conventions of Milk Industry Foundation and International Association of Ice Cream Manufacturers will be held in October 1955 in St. Louis without a concurrent Exposition, and with members of DISA in the relative background. National Association of Retail Ice Cream Manufacturers' 1955 annual convention will be held in November in Milwaukee.

Referring to the 1956 arrangements, a DISA spokesman has said: "Officers of the processing associations are aware of the earnest and constant efforts made by DISA to develop, by and through appeals to the civic and commercial interests of Chicago, a suitable opportunity for the great biennially linked dairy industrial events to be scheduled in that mid-continent center with regular four-year frequency. So far hotels' management policies have balked a possible return to Chicago after either a two-year or a four-year gap. The DISA efforts are to be maintained, however, looking to the years beyond 1956."

St. Louis 1955 hotel arrangements involving the needs of Milk Industry Foundation, International Association of Ice Cream Manufacturers and Dairy Industries Supply Association—and National Association of Retail Ice Cream Manufacturers' 1955 Milwaukee convention hotel arrangements — will be announced later by the organizations concerned, jointly or singly as will be appropriate.

ENZYMIC INHIBITION OF GELATION IN FROZEN EGG YOLK[a, b]

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INTRODUCTION

Commercially egg yolk is generally mixed with sodium chloride, a sugar, or glycerol in order to inhibit changes that take place in the yolk during freezing, frozen storage, and thawing. Frozen, untreated yolk takes on a pasty, viscous consistency upon thawing. This "gelation" makes it unsuitable for many commercial and household uses. However, the yolk is still edible.

This report is concerned with the use of enzymes for inhibiting gelation in frozen yolks.

REVIEW OF LITERATURE

A patent on the use of pancreatin and other enzymes for inhibiting the gelation of yolk upon freezing was granted to Tressler[4] in 1932.

It has been found by Colmer[1], that *Bacillus cereus* and related species produce a hardening of the yolk when the yolk of fresh shell eggs is inoculated with one of these species and incubated at 37° C. (98.6° F.). The explanation given is that the lecithoprotein of yolk is broken down by the action of the lecithinase produced by these bacteria on the lecithin. With the loss of the binder action of the lecithin, the fat and protein change from their dispersed state to that found after the bacteria have grown in the egg.

Romanoff and Romanoff[3] state that a number of enzymes may be found in the active state in fresh eggs. Additional enzymes appear upon incubation. The fresh yolk contains a diastase, a lecithinase, and a monobutyrase. It is believed that yolk also contains erepsin, a salicylase and histozyme (hippuricase). Phosphatase activity is said to occur in the yolk of infertile eggs. No true proteinase has been found in the yolk.

Lopez, Fellers, and Powrie[2] reported that colloid milling of yolk previous to freezing inhibited gelation, and that very quick freezing combined with rapid thawing partially inhibited gelation in frozen and thawed yolk.

EXPERIMENTAL PROCEDURES AND RESULTS

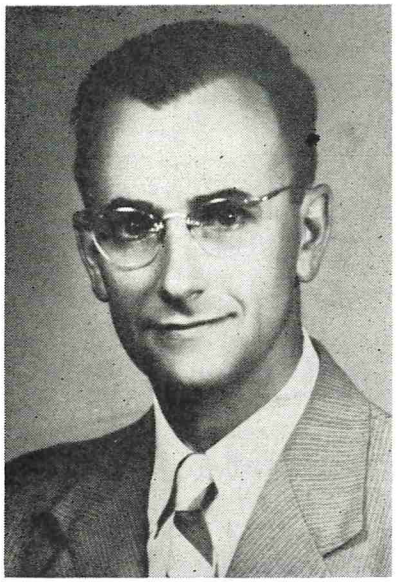
The eggs used in these experiments were fresh hens' eggs from mixed breeds of the University flocks.

A 10 per cent aqueous suspension of the enzyme was added to 100 grams of fresh mixed yolk to make up the desired concentration of the enzyme in yolk. The mixture was blended for two minutes in a Waring blendor. All samples were run in duplicate. Controls were prepared by mixing 100 grams of fresh yolk in a Waring blendor with a volume of water equivalent to the volume of enzyme solution or suspension used for the samples.

Samples and controls were placed either in polyethylene bags or in glass jars, and incubated for various lengths of time. At the end of the incubation period they were stored in a freezer at –18° C. (0° F.) for various periods of time. They were thawed either by immersion in water at 50° C. (122° F.) or by standing at room temperature. The flavor, odor, color, and degree of gelation then were observed.

GELATION-INHIBITING ENZYMES — PRELIMINARY STUDY

The following enzymes were investigated in the concentrations indicated: papain, 2.00 and 0.33 per cent; pepsin, 0.2 and 0.02 per cent; trypsin, 0.5 and 0.05 per cent; lipase, 1.00 and 0.10 per cent; erepsin, 0.5, 0.2, 0.1 and 0.066 per cent; pancreatin, 0.5, 0.2, 0.1 and 0.066 per cent; and Rhozyme[d] 1.0, 0.5, 0.1 and 0.05 per cent. The incubation periods previous to freezing ranged for all samples from 15 seconds to 15 hours. It was observed that only papain, pepsin, trypsin, and Rhozyme were able to inhibit gelation of frozen and thawed yolk. Under the conditions of this experiment, however, all samples had an off-flavor and sometimes a change in color. It was obvious that the enzyme concentrations were too high.



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[b]Research conducted under a U. S. Navy Research Contract Grant N-140s-35314B. The views or conclusions contained in this report are those of the authors. They are not to be construed as necessarily reflecting the views or endorsement of the Department of Defense.

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[d]Rhozyme is a proteolytic enzyme, manufactured by Rohm & Haas Co., Washington Square, Philadelphia 5, Pa.

[e]Manufactured by Difco Laboratories, Inc., Detroit 1, Michigan.

[f]Manufactured by Baltimore Biological Laboratory, Inc., Baltimore 18, Maryland.

TABLE 1—EFFECT OF ENZYMATIC DIGESTION OF YOLK[1] WITH PAPAIN PREVIOUS TO FREEZING[2] ON THE GELATION OF YOLK

Concentration of papain in yolk (percent)	Time (minutes) of incubation at 24° C. (75° F.)					
	5	10	15	20	30	60
0.1	Gelled	Low gelation	Not gelled No off flavors but lack of fresh flavor	Not gelled Off flavor	Not gelled Off flavor	Not gelled Off flavor
0.066	Gelled	Gelled	Not gelled Lack of fresh flavor	Not gelled Off flavor	Not gelled Off flavor	Not gelled Off flavor
0.05	Gelled	Gelled	Not gelled No off flavor No color change No odor change	Not gelled No off flavor No color change No off odor	Not gelled Slightly off flavor	Not gelled Slightly off flavor
0.04	Gelled	Gelled	Gelled	Medium gelation	Not gelled Off flavor	Not gelled Off flavor

[1]pH of yolk was 6.1
[2]Frozen in air at −18° C. (0° F.). Kept frozen for 4 days. Thawed by immersion in water at 50° C. (122° F.)

EFFECT OF FREEZING ON ENZYME ACTIVITY

An experiment was designed to find out whether there was a combination of enzyme concentration with time and temperature of incubation which would yield after freezing, frozen storage, and thawing, a yolk of normal appearance, flavor, odor, and color. The concentrations of papain, pepsin, trypsin and Rhozyme were lower than those used in the first experiment. At low concentrations papain was the only enzyme which could prevent gelation and still not cause any change in flavor, odor, and color.

Fifteen-gram portions of fresh yolk, containing various amounts of papain, were filled into polyethylene bags, incubated for various periods of time at room temperature, frozen and stored at −18° C. (0° F.). The yolk was thawed by immersion in water at 50° C. (122° F.) after various storage times.

Table 1 shows the thawed yolk with 0.05% papain and incubation periods of 15 and 20 minutes was not gelled and possessed normal flavor, odor and color after 4 days of storage. The thawed yolk was mixed with fresh egg white in the proportion of 1 part of yolk to 2 parts of white and was cooked as scrambled eggs. At the same time, fresh eggs were scrambled. In a taste panel test, no significant difference in flavor, odor or texture was found between the scrambled egg containing papain-treated yolk, and the scrambled fresh eggs.

Table 1 shows results obtained only when concentrations of papain ranging from 0.1 to 0.04 percent were used. Also, similar experiments were performed using several other concentrations of papain ranging from 0.1 to 0.4 per cent, and incubating times ranging from 15 seconds to 15 hours. Results other than those presented in Table 1 are not reported inasmuch as they were all negative.

Long-time storage studies on yolk containing 0.05 per cent papain with an incubation time of 15 minutes indicated that the thawed yolk in the third month of freezing storage was slightly gelled and was completely gelled in the sixth month. After three months the yolk viscosity had increased somewhat but not to the point where yolks did not reconstitute well. However, after six months in frozen storage the yolks were completely gelled. Additional work is in progress in an effort to explain the gelation of the papain-treated yolks during freezing storage.

EFFECT OF CONTAINER SIZE ON ENZYME ACTIVITY

This experiment was performed to study the effect of size of freezing containers upon gelation of papain-treated yolk. Yolk packaged in one quart glass jars (diameter 3.5 inches) showed gelation at all concentrations and incubation times tested. Of course, heat transfer takes place entirely by conduction. However, no off flavors nor gelation was produced in papain treated yolk packaged in polyethylene bags (yolk depth one inch) under the same conditions. The different results obtained with glass jars and with polyethylene bags were due undoubtedly to the difference in depth of the yolk in the jars and in the bags. That is, papain activity is dependent upon time, temperature and concentration. In large containers the papain continues to act until the center of the yolk mass is solidly frozen. If frozen commercially, the yolk mass should be frozen as rapidly as possible.

EFFECT OF FREEZING AND THAWING ON PAPAIN-TREATED YOLK

When freezing papain-treated yolk at −18° C. (0° F.), the enzyme is not entirely inactivated. Papain activity continues slowly at this temperature but does not prevent gelation after a few months. Providing some papain is still present in the frozen yolk activity is resumed upon defrosting. For this reason, off-flavors caused by products of protein hydrolysis develop rapidly in papain-treated frozen and thawed yolk within about 30 to 60 minutes after thawing. The

time depends upon yolk temperature.

Fifty-gram portions of mixed yolk, containing 0.05 percent papain, were placed in polyethylene bags. The sealed bags were held for 15 minutes at 24° C. (75° F.); then five bags were frozen by dipping in solid carbon dioxide-acetone mixture at approximately −68° C. (−90° F.), and held in the freezing mixture for 15 minutes; still another five bags were frozen in solid carbon dioxide-acetone mixture and held in it for five hours. After being frozen, all the bags were stored in the same freezer at −18° C. (0° F.) for 4 days. Samples were simultaneously thawed by immersing in water at 50° C. (122° F.). None of the samples gelled, and the flavor, color and odor in all were normal. Samples were then placed under observation at 24° C. (75° F.) to detect any change in organoleptic qualities. The results of the observations are shown in Table 2. Simultaneously, all samples started developing an off-flavor and off-odor. This means that papain was not affected by the different freezing conditions that were used.

TABLE 2—EFFECT OF FREEZING AT −68° C. (−90° F.) FOR FIVE HOURS UPON THE ACTIVITY OF PAPAIN ON YOLK[1]

Time subsequent to thawing[2] (hours)	Air frozen[3] papain yolk	CO_2-acetone frozen papain yolk (15 min.)	CO_2-acetone frozen papain yolk (5 hrs.)
1	Normal flavor Normal odor Normal color	Normal flavor Normal odor Normal color	Normal flavor Normal odor Normal color
1½	Normal flavor Normal odor Normal color	Normal flavor Normal odor Normal color	Normal flavor Normal odor Normal color
2	Off flavor Normal odor Normal color	Off flavor Normal odor Normal color	Off flavor Normal odor Normal color
3	Off flavor Normal odor Normal color	Off flavor Normal odor Normal color	Off flavor Normal odor Normal color
4	Off flavor Off odor Normal color	Off flavor Off odor Normal color	Off flavor Off odor Normal color

[1]pH of yolk was 6.0
[2]Thawed by immersion in water at 50° C. (122° F.)
[3]At −18° C. (0° F.)

MECHANISM OF ENZYME ACTION ON YOLK

The gelation-inhibiting action of some enzymes may be caused by: (a) the breaking down of the substances which in yolk is responsible for gelation and the formation of derivatives which do not have the property of producing gelation; (b) the formation, upon the action of the enzyme on yolk components, of an inhibiting substance which prevents gelation; (c) the enzyme itself, for it might have gelation inhibiting properties. In order to ascertain whether the products of either acidic or enzymic hydrolysis when mixed with fresh yolk, have an inhibitory effect upon gelation, the following procedures were used to obtain the hydrolysates:

(a) Acid hydrolysis of yolk.

1) 3 ml. hydrochloric acid, density 1.19, were slowly added, while mixing, to 200 grams of fresh yolk to make an approximately 0.3 N solution of hydrochloric acid in yolk, considering the yolk as having 50 per cent water.

2) The acidified yolk was placed in a boiling water bath under reflux for 1 hour.

3) 100 grams of hydrolysate were removed.

4) The remaining hydrolysate was held in the water bath for a total of 5 hours. Temperature of yolk mixture during the period of hydrolysis was 95° C. (203° F.).

5) The 1 hour and the 5 hour hydrolysates were neutralized with NaOH to pH 6.2.

6) Both hydrolysates were dialized for 24 hours using non-moisture-proof cellophane film and tap water. This dialysis was carried out for the purpose of eliminating the sodium chloride from the hydrolysates. During the dialysis, the hydrolysates increased in weight from 90 grams to approximately 200 grams.

(b) Enzymatic hydrolysis of yolk.

1) 2 grams of papain suspended in 5 ml. of water were added to 200 grams of fresh yolk, and mixed in a Waring blendor.

2) The mixture was incubated at 40° - 42° C. (104 - 108° F.).

3) After 4 hours of incubation, 100 grams of hydrolysate were extracted.

4) After 24 hours of total incubation time, the rest of the hydrolysate was taken out.

(c) Freezing tests with yolk hydrolysates.

The two acid and the two enzymatic hydrolysate fractions were separately added to fresh yolk in proportions of 2, 5 and 10 per cent, and mixed in a Waring blendor. Fifty-gram samples were placed in polyethylene bags. Five samples were prepared for each hydrolysate fraction and each concentration, together with 5 controls made up of untreated fresh yolk. All were frozen at −18° C. (0° F.) and kept frozen for 4 days. They were thawed by immersion in water at 50° C. (122° F.).

It was observed that all yolk samples as well as the controls were highly gelled.

(d) Freezing tests with meat, yeast, and vegetable hydrolysates.

Fresh yolk samples were well mixed with water suspensions of one of the following at the concentrations indicated: Bactopeptone, Difco[e], 2 per cent; Bacto-Tryptone, Difco, 4 per cent; Bacto-Autolysed Yeast, Fifco, 2 per cent; Polypeptone[f] 3 per cent and 10 per cent; Phytone[f] (a vegetable hydrolysate), 3 per cent. The mixtures were placed in polyethylene bags, 50 grams in each, frozen and stored

at −18° C. (0° F.). Prior to examination, they were thawed by immersion in water at 50° C. (122° F.). After four days of storage all samples were highly gelled. Apparently neither acid nor enzymic hydrolysates had any appreciable effect on the degree of yolk gelation.

Discussion of Results and Conclusions

Of the enzymes tested, only papain, trypsin, papain and Rhozyme appreciably inhibited gelation in frozen and defrosted egg yolk. Erepsin, pancreatin and lipase did not inhibit gelation.

Among the enzymes which were effective in inhibiting gelation, only papain did not seriously affect the organoleptic qualities of yolk. This result was obtained only at a concentration of approximately 0.05 per cent of papain in yolk, and only with incubation times of 15 or 20 minutes at 24° C. (75° F.) previous to freezing. Other papain concentrations and other incubation times yielded thawed yolk with off-flavor and off-odor. It was difficult to control the enzyme activity so as to obtain non-gelled frozen yolks of good culinary properties. While excellent frozen yolks and whole eggs were obtained in our laboratory, it is felt that it would be difficult to obtain acceptable products under field conditions such as on shipboard or in an Army mess.

The activity of papain added to yolk was not significantly affected by freezing at −18° C. (0° F.) and storage at same temperature for four months or longer, neither was the papain activity affected by freezing at −68° C. (−90° F.) for 5 hours and subsequent storage at −18° C. (0° F.). No effort was made to inactivate added papain in yolk by other means. For this reason, the hydrolytic action of papain upon yolk becomes very active upon thawing the yolk, producing flavor and odor changes in yolk. In order to be able to use papain commercially as a gelation inhibitor in frozen yolk, a method for inactivating the enzyme either before freezing the yolk, or while it is frozen, has to be developed. The flavor, odor, texture and color of yolk should not be affected by the enzyme inactivation procedure, neither should the nutritive value nor palatability of the yolk be affected. Effects of longer frozen storage periods upon gelation and organoleptic qualities of yolk should be studied further. Small diameter containers that allow fast thawing should be used because enzyme action continues in the unfrozen portion. Very rapid freezing and defrosting are distinctly advantageous.

In the experiments on the mechanism of action of enzymes in inhibiting gelation of yolk, the products of acid and of enzymatic hydrolysis of yolk, and the meat, yeast, and vegetable hydrolysates were not able to prevent the onset of gelation in fresh yolk. Furthermore, if the enzymes "per se" had gelation-inhibiting properties, the yolk samples with enzyme hydrolysate should not have gelled. These experiments tend to show that enzymes break down the component or components responsible for gelation. Since only proteolytic enzymes were found effective, it appears logical to consider a protein complex as being responsible in total or in part for the gelation of yolk.

Summary

Papain mixed with fresh yolk in a concentration of 0.05 percent and incubated for 15 or 20 minutes was found effective for inhibiting gelation of frozen and thawed egg yolk. The flavor of the raw or cooked yolk was not affected by this treatment. Papain, trypsin, and Rhozyme also inhibited gelation of yolk. However, these enzymes developed off-flavors and off-odors in yolk. Pancreatin, erepsin and lipase did not inhibit gelation.

Papain-treated yolk intended to be frozen should be packaged in a container that makes fast freezing and thawing possible.

Upon thawing, the activity of papain in papain-treated yolk was found unaffected by freezing at −68° C. (−90° F.) for 5 hours, and subsequent storage at −18° C. (0° F.) for up to 4 months when the experiment was discontinued.

Gelation in frozen and thawed yolk was not inhibited by the addition to fresh yolk of either acid or enzymatic hydrolysates of yolk, a yeast hydrolysate, meat hydrolysates, and a vegetable hydrolysate. A protein or protein complex is believed responsible for gelation in frozen and thawed yolk.

Acknowledgment

The authors wish to thank Mr. Arthur C. Avery, Technical Director, Commissary Research Division, U. S. Navy Supply Research and Development Facility, Naval Supply Base, Bayonne, N. J., for suggesting this problem and for his many helpful suggestions during the course of the investigation. Thanks are also due Mr. Manohar Sathe who assisted in carrying on some of the laboratory experiments.

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MARKET MILK AND ICE CREAM MEETINGS TO BE HELD AT PURDUE

Two one-day dairy meetings will be held in April, 1955 at Purdue University according to an announcement by Professor H. W. Gregory, Head, Department of Dairy Conference, April 6, and Ice Cream Institute, April 7.

The conferences are a continuation of the series held annually in cooperation with the Indiana Dairy Products Association. Specialists from the dairy industry and universities will be on the programs. Current problems relating to the processing and distribution of bottled milk and cottage cheese will be discussed at the market milk conference. Also, a clinic on commercial samples of market milk and cottage cheese will be held in connection with the conference. Ice cream samples submitted by plants to Purdue for analysis and scoring will be examined and discussed as a part of the ice cream meeting.

For further information write to: Professor V. C. Manhart, Smith Hall, Purdue University, Lafayette, Indiana.

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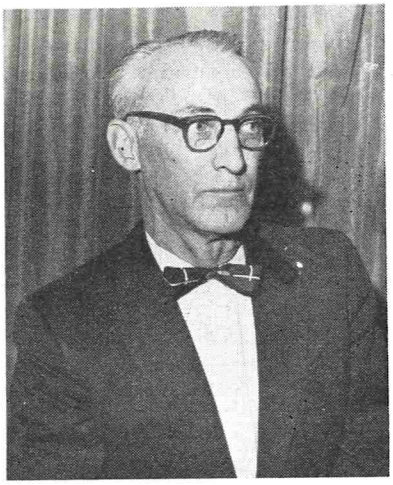
NEWS AND EVENTS

DAIRY PRODUCTS IMPROVEMENT INSTITUTE MEETS IN NEW YORK

The Eighth Annual Meeting of the Dairy Products Improvement Institute, Inc. was held at the Hotel Commodore in New York City on January 27, 1955. Following a luncheon provided by the Institute, the general meeting was called to order by W. A. Wentworth. The meeting was attended by about 200 individuals representing milk regulatory officials, Universities, dairy journal representatives, milk producers and processors, dairy producers associations and dairy equipment manufacturers located in the northeastern section of the United States.

M. J. Dotter



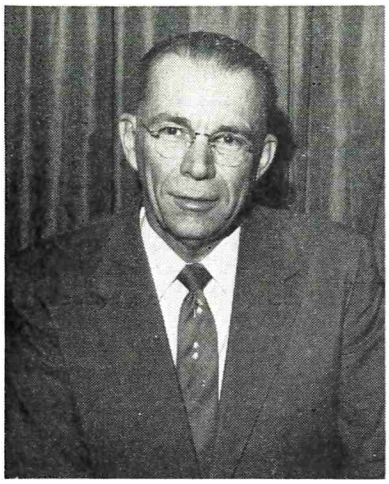
F. M. Skiver

The topic for the panel presentation was "State Sanitary Regulations Pertaining to Milk Production, Processing, and Product Control for Cream for Manufacturing". A detailed discussion of the sanitary regulations, the present status of the program and the progress being made in Michigan, Ohio, and Wisconsin was presented. F. M. Skiver, Chief of the Bureau of Dairying and R. R. Dalton, Milk Consultant for the Michigan Department of Health described the program of these departments and how they worked together in the control of high quality milk and cream.

M. J. Dotter, Milk Sanitarian of the Department of Health, discussed the development of the Ohio program and the progress being made in the development and enforcement of a uniform code of fluid milk regulations for all local health departments. An in-service training program and the approval of laboratories are essential parts of this extensive program.

H. J. Weavers, Chief, Dairy and Food Division of the Department of Agriculture, not only discussed the sanitary regulations in Wisconsin but also described several other programs of the state which affect the quality of dairy products. The state has an enabling act containing 12 sections each dealing with specific problems. In addition there are the following: The Brucellosis Control Program, the

R. R. Dalton



H. J. Weavers

butter grading program, the cheese grading program, and the bulk milk tank program. The goal in Wisconsin is cleanliness in everything—barns, cows, personnel, utensils, equipment, and surroundings.

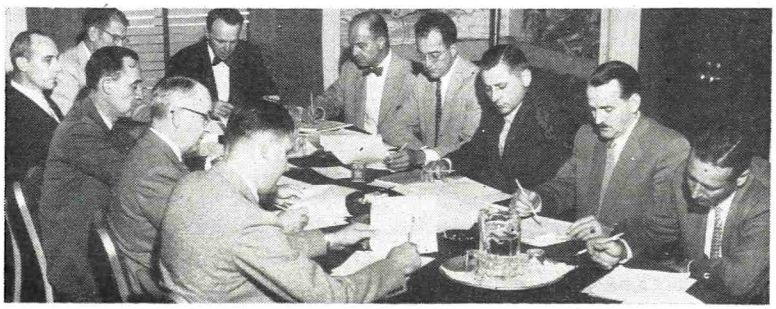
The details of each report are too numerous to be stated briefly; therefore, the papers as presented are available for those interested in these sanitary regulation programs. Requests for copies may be addressed to: Dairy Products Improvement Institute, Inc., 302 E. State Street, Ithaca, New York.

PHI TAU SIGMA HONORARY SOCIETY AMHERST, MASSACHUSETTS:

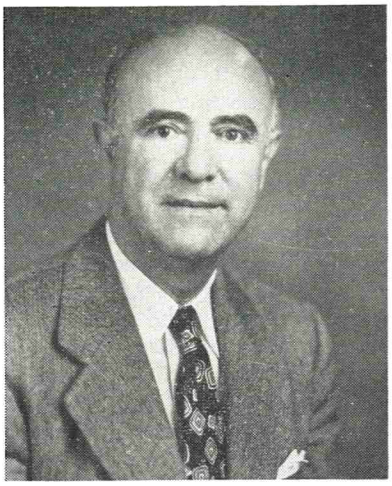
Coincidentally with the first anniversary of Phi Tau Sigma, the national food science honor society founded here December 1, 1953, the University of Massachusetts Chapter of the Society elected its officers for the year 1955. Elected President was Maynard A. Steinberg; Vice President, Enio Feliciotti; Treasurer, Rauno A. Lampi; Secretary, Tilford D. Miller; and national councilor Dr. F. John Francis. Dr. Arthur S. Levine was elected to a two-year term as national councilor earlier this year. Retiring officers are Dr. Irving S. Fagerson, President; Miss Elizabeth Elbert, Vice President; Professor Kirby M. Hayes, Secretary; Maynard A. Steinberg, Treasurer; and Pericles Markakis, Councilor.

Three members of the University of Massachusetts' Faculty were elected to membership in the Society this Fall. They are, Dr. Anne W. Wertz, Research Professor of Nutrition; Dr. Denzel J. Hankinson, Head of the Dairy Industry Department and Dr. William S. Mueller, Associate Research Professor of Dairy Industry.

TASK GROUP ON FILLERS AND SEALERS FOR FIBRE MILK CONTAINERS MEETS



Among the items of equipment for which a 3-A Sanitary Standard will be considered at the forthcoming meeting of the 3-A Sanitary Standards Committee, April 26-28 in Kenwood, Md., are fillers and sealers for fibre milk containers. Pictured above is a DISA Task Committee, composed of representatives of all firms which make the equipment. At a recent meeting in Detroit, this group considered comments on a proposed standard which were submitted by both public health sanitarians and users of the equipment. A tentative standard for fillers and sealers of fibre milk containers was first drafted in September of 1951, and the draft has since gone through six revisions. A final official 3-A Sanitary Standard may emerge from the forthcoming Kenwood meeting. Seated around the table, clockwise, are: A. J. Columbus, Sealright Co., Inc., Oswego Falls Corporation; I. L. Wilcox, Sealright Co., Inc., Oswego Falls Corporation; John B. McCabe, The Creamery Package Mfg. Company; Chas. Z. Monroe, Ex-Cell-O Corporation, Pure-Pak Division; Kingsley P. Karnopp, Mojonnier-Dawson Company; E. R. Andre, Ex-Cell-O Corporation, Pure-Pak Division, Chairman; John Marshall, Secretary, DISA Technical Committee; Herbert F. Cox, Jr., Smith-Lee Co., Inc.; Alfred Steiner, American Can Company; Edward Chittim, The Perga Company and F. E. Ullman, Triangle Package Machinery Co.



A. W. FUCHS RETURNS

Mr. Abraham W. Fuchs, Sanitary Engineer Director, engineer officer of the Public Health Service Commissioned Corps, who has been Chief of the Health Division of USOM to Israel for the past three years, recently returned to the United States. He is now temporarily on duty with the Foreign Operations Administration, in Washington, D. C., as Acting Chief of the Far East Branch, pending another foreign assignment.

Mr. Fuchs obtained his civil engineering degree, with major in sanitary engineering, at Cornell University in 1913. Entering the Public Health Service in 1916, he has held various assignments with the Service. Before going overseas in 1952 he held the position of Chief of the Milk and Food Branch, United States Public Health Service, at Washington since 1940.

In Israel as Chief of the Health and Sanitation Division, he was principle advisor to the Ministry of Health on public health problems.

Mr. Fuchs is a past president of the International Association of Milk and Food Sanitarians and a fellow of the American Public Health Association.

DR. A. W. RUDNICK JOINS DAIRY STAFF UNIVERSITY OF KENTUCKY

Dr. A. W. Rudnick, Jr., joined the dairy staff at the University of Kentucky on February 1, 1955. His appointment is for the position of Assistant Professor of Dairy Technology and Superintendent of the Dairy Plant.

Dr. Rudnick is a native of Iowa, having graduated from Iowa State College in 1939 with a major in Dairy Industry and a minor in Economics. In 1940 his Alma Mater granted him the M. S. degree in Agricultural Economics. His next two years were spent in the employ of the National Butter Company at Dubuque, Iowa. From 1942 to 1945 "Art" was rendering faithful service to the U. S. Army in the capacity of Medical Laboratory Technician, with the rank of T/3, highest grade.

After the war he further broadened his experience by serving as staff writer for "Modern Dairyman and Dairy Record". By this time Art had acquired the urge to go the whole way in his dairy training. In 1948 he was appointed research assistant at the University of Minnesota, and began his studies leading to the Ph.D. which was granted in 1954. He was promoted to Instructor in 1951, which position he held until assuming his duties at the University of Kentucky. Dr. Rudnick is married and has six children — all girls.

HELPFUL INFORMATION

Editorial Note: Listed below are sources of information on a variety of subjects. Requests for any of the material listed should be sent by letter or postcard to the source indicated.

Report of the 39th National Conference on Weights and Measures. 1954. Published by the U. S. Department of Commerce, Washington, D. C. 50 cents.

'Plan a Lab'. A planning kit for laboratories. Available from Metalab Equipment Corporation, 224 Duffy Ave., Hicksville, Long Island, N. Y.

Machine Milking Efficiency. A booklet on the physiology of milk secretion. Available from Surge News, 2843 West 19th Street, Chicago, Ill.

Stability of Dehydrated Eggs. Published by Advisory Board on Quartermaster Research and Development. Available from Quartermaster Food and Container Institute, 1800 Pershing Road, Chicago, Ill. No charge.

An Industrial Waste Guide to the Meat Industry. Published by the U. S. Department of Health, Education, and Welfare, Washington, D. C. Available from the Superintendent of Documents, Washington, D. C. 10 cents.

Manual of Industrial Water. Second edition. Published by the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. 1954. 430 pages. Price $5.00.

Principles and Procedures for Evaluating the Safety of Intentional Chemical Additives in Foods. 8 pages. Available from Food and Nutrition Board, National Research Council, National Academy of Sciences, Washington 25, D. C.

What the Farmer Should Know about Biological Warfare. Handbook. Available from the Superintendent of Documents, Washington 25, D. C. 25 cents.

Rezistal Stainless Steel Selector for selection of the proper style stainless for various operations. Available from Crucible Steel Company of America, Henry Oliver Building, Pittsburgh, Pa.

Assay for Vitamin D. 8 page booklet. Available from Public Relations Department, Foster D. Snell, Inc., 29 West 15th Street, New York 11, N. Y.

Handbook of Emergency Toxicology, by Sidney Kaye. Book. Published by Thomas Publishing Company, 301 E. Lawrence Avenue, Springfield, Ill. 303 pages. Price $5.75.

Rabies. World Health Organization Bulletin. Vol. 10. No. 5, 1954. Publication No. 10,703-866. Columbia University Press, 2960 Broadway, New York, N. Y. Price $1.50. (Contains 15 presentations on the subject.)

PIPELINE CHATTER

Communications to this column must bear the signature and address of the writer. Short letters are most interesting. The right is reserved to condense lettters if space limitations require it.

TO THE EDITOR

Judging from recent actions, it appears that some of us are not using good common sense in the application of milk sanitation practice.

The application of Milk and Food Sanitation practice is done for the purpose of protecting the public's health.

Unfortunately, some of our sanitarians are wielding the big stick to make people conform to antiquated laws and regulations.

Those of us in the International Association of Milk and Food Sanitarians should be careful of our powers. Our aim should be to help to provide the public with more healthful milk and food without applying unnecessary restrictions to those who produce and process these products.

Sanitary codes, like all machinery, become obsolete in time. We, as sanitarians, can do much to keep our requirements up to date, sensible and economical of attainment. Remember, burdensome inspection is not fair to the consumer who eventually has to bear the expense.

I. E. Parkin
Pennsylvania

CONNECTICUT ASSOCIATION SENDS FOLLOWING LETTER

To Instructors in Vocational-Agriculture in Connecticut High Schools:

Gentlemen:

The International Association of Milk and Food Sanitarians, with which our State Association is affiliated, is interested in setting up scholarships to assist individuals in obtaining a course in milk and food sanitation, or in public health sanitation.

Our Association is desirous of fostering such a project, and in our desire to develop such interest in individuals we are providing the libraries of high schools teaching vocational-agriculture with subscriptions to the Journal of Milk and Food Technology.

At the time of our 30th Annual Meeting on January 11, we invited all teachers of vocational-agriculture in our state high schools to attend and bring with them one of their students. Mr. Jacoby, State Director of Vocational-Agriculture in the State Department of Education, informed us in advance that only a few representatives would be able to attend a meeting held during the school week. However, we do want to keep you informed and will be glad to have the names of all teachers of vocational-agriculture included on our mailing list and receive all of our state literature.

Sincerely yours,
H. Clifford Goslee
Secretary

COMMITTEE APPOINTED ON ENFORCEMENT FEDERAL FOOD AND DRUG LAWS

A committee of fourteen distinguished citizens to evaluate the adequacy of enforcement of the Federal pure food and drug laws was named today by Oveta Culp Hobby, Secretary of the Department of Health, Education, and Welfare.

The purpose of this committee, Mrs. Hobby said, is to "make recommendations as to the amount and kind of enforcement of the Federal Food, Drug, and Cosmetic Act, and related statutes, which will best serve the interests of the country." Funds for the study amounting to $21,000 were set aside from a special appropriation made by the 83d Congress shortly before its adjournment.

Secretary Hobby said that the committee members were selected for their interest in civic affairs and broad knowledge of consumer and industry problems. Regarding the assignment of the committee Mrs. Hobby said, "Great expansion of the food, drug, and cosmetic industries and scientific and technological changes in the methods of processing these commodities have brought with them important changes in the enforcement responsibilities of the Food and Drug Administration. The extent to which our present enforcement program is effective in protecting the consumer, and the amount and kind of enforcement that is necessary to give the maximum amount of protection need to be reexamined. That is the fundamental purpose to which this committee will devote its study."

UNIVERSITY OF IDAHO, MOSCOW, IDAHO

A short course in "Starter Making and the Manufacture of Cottage Cheese" was held March 14 through March 19, 1955, on the campus at Moscow, Idaho. Instruction was given in the composition and properties of milk; milk quality tests; starter making including bacteriology of starters, starter activity tests, growth inhibitors, ie. antibiotics and bacteriophage; cottage cheese making, defects and keeping quality of cottage cheese; and the manufacture of some related varieties of cheese, ie. blue mold cheese.

A second course in "Milk Plant and Dairy Farm Sanitation" was given March 21 through 26, 1955. This course included instruction in the principles of sanitation, the composition of cleaning and sterilizing compounds, water and its correction for proper cleaning, dairy farm sanitation, pipe line milkers, bulk handling of milk, and in-place cleaning of dairy equipment on the farm and in the plant.

Further information concerning these courses can be obtained by writing Professor D. L. Fourt, Department of Dairy Husbandry, University of Idaho, Moscow, Idaho.

NOTICE

Re: Complete sets of 3A Sanitary Standards.

To: Previous and Future Purchasers.

We offer a five year service for $2.50. When ordering a set of standards, if you wish this service, add $2.50 to the $1.75 unbound or to the $3.50 bound price. You will be placed on a mailing list and each new standard will be sent to you upon publication. To those who have already purchased complete sets and wish to bring them up-to-date, please indicate standards which have been published since receipt of your set. For the price of $2.50, we will send the standards which you do not have and place your name on the mailing list for the five year period.

Send to: IAMFS, Box 437, Shelbyville, Indiana.

CLASSIFIED AD

FOR SALE: Single service milk sampling tubes. For further information, please, write: Bacti-Kit Co., 2945 Hilyard Street, Eugene, Oregon.

QUESTIONNAIRE FOR INFORMATION ON VOCATIONAL DATA OF MEMBERSHIP

Dear IAMFS Member:

Your association and the Journal of Milk and Food Technology has steadily grown in stature over the years. Beginning with January 1954, the Journal was issued monthly. In order to continue this and to increase the size and scope, it is necessary to increase our advertising volume. Prospective advertisers have informed us that they need additional information relative to the professional activities, employment and other general data of our membership. We would therefore appreciate it if you would fill out the following questionnaire to the best of your ability and send it to H. L. Templeton, Chairman, Membership Committee, 6125 Florence Blvd., Omaha 11, Nebraska. The material you submit will be held completely confidential. In addition, we would appreciate having any comments you wish to make.

Very truly yours,
H. L. Templeton, Chairman
Membership Committee

1. *Which of the following occupational groups would you say you would fit? (You may answer more than one category.)*
   - Attorney ☐
   - Bacteriologist ☐
   - Chemist ☐
   - Consultant ☐
   - Educator ☐
   - Engineer (general) ☐
   - Farmer ☐
   - Food Processor ☐
   - Laboratory Technician ☐
   - Librarian ☐
   - Manufacturer of Food Equipment ☐
   - Manufacturer of Milk Equipment ☐
   - Milk Processor ☐
   - Physician ☐
   - Publisher ☐
   - Sanitarian ☐
   - Sanitary Engineer ☐
   - Student ☐
   - Veterinarian ☐
   - Other ☐

2. *How many of the following do you visit each year?*
   - Barber Shops _____
   - Butcher Shops _____
   - Dairy Farms _____
   - Food Plants (excl. milk) _____
   - Groceries _____
   - Hotels _____
   - Lodging Houses _____
   - Milk Plants _____
   - Nurseries _____
   - Restaurants _____
     - Drug Stores _____
     - Soda Fountains _____
   - Schools _____
   - Sewage Disposal Plants _____
   - Tourist Homes _____
   - Trailer Camps _____
   - Water Works _____
   - Other _____

3. *Milk Sanitation*
   a. Approximately how many cows are there on the farms under your supervision? _____
   b. Approximately how many milking machines are there on these farms? _____
   c. How many farms are now under the bulk milk pickup system? _____
   d. What is the total production of the farms? _____ plants? _____ under your supervision?
   e. Are the plants filling bulk milk dispensers? _____ How many? _____

4. *By which of the following agencies are you employed?*
   a. Government Agencies —
      - Federal ☐ State ☐
      - Civilian ☐ City ☐
      - Military ☐ County ☐

   b. Educational Institutions —
      - University or College ☐
      - High School ☐
      - Federal, State, or City ☐
      - Industrial ☐

   c. Laboratories —
      - Official agency ☐
      - Commercial or industrial ☐
      - Institutional ☐

   d. Industry —
      Milk and milk processing plants:
      - Receiving stations ☐
      - Evaporating plants ☐
      - Dry milk plants ☐
      - Ice cream plants ☐
      - Fluid milk plants ☐
      - Cheese plants ☐
      - Butter plants ☐
      - Butter ☐

   e. Other ☐

5. *Automatic Vending Machines — How many of the following are under your jurisdiction?*
   Carbonated and non-carbonated beverage _____
   Coffee _____ Sandwich _____
   Milk _____ Other Foods _____
   Soup _____ Other _____

6. *For statistical information, please indicate size of the city or place in which you have your residence. (If a suburb, check size of city of which it is a suburb.)*
   - Over 1,000,000 (in the United States, *only* New York, Chicago, Philadelphia, Los Angeles, Detroit) _____
   - 100,000 to 1,000,000 _____
   - 25,000 to 100,000 _____
   - 2,500 to 25,000 _____
   - Under 2,500 (non-farm) _____
   - Farm _____

7. *Please write in the state in which you have your permanent residence* _____

8. *Please furnish the following information relative to the car you drive.*
   Make _____ Year _____
   Miles driven per year _____

9. *Do the advertisements in the Journal of Milk and Food Technology help you in your work?* ..... Yes ☐ No ☐

10. Comments:
    _____
    _____

Ask Us For Help

KLENZADE TECHNICAL RECOMMENDATIONS FOR YOUR IN-PLACE CLEANING PROBLEMS

KLENZADE

O-R SYSTEM FOR Recirculation Cleaning

O-R ORGANIC ACID CLEANER

Klenzade nation-wide pioneering research and development work bring you today's most advanced recirculation cleaning methods with the Klenzade O-R System and the miracle of "chelation." With this system you can be sure of physical, chemical and bacteriological cleanliness without corrosion or injury to metal surfaces. The O-R System begins with Klenzade O-R Organic Acid Cleaner for milkstone, lime, and soil dissolution followed by Klenzade O-R Alkaline Cleaner for complete clean-up.

O-R ALKALINE CLEANER

The use of these two special acid and alkaline cleaners produces a chemical "doublet" . . . an amazing series of reactions called "chelation." Soil, film, and baked-on deposits are completely removed. Water-borne minerals are sequestered and isolated from re-precipitating onto cleaned surfaces. Result: No flocking, streaking or film. For recirculation cleaning at its best, consult Klenzade.

Free Cleaning Manual

Free Manual

"IN-PLACE CLEANING PROCEDURES WITH RECIRCULATION METHODS"

"There's A Klenzade Man Near You"

KLENZADE PRODUCTS, INC.

Branch Offices and Warehouses Throughout America

BELOIT, WISCONSIN

SAFEGUARDS MILK FROM CAPPING TIME TO CONSUMING TIME

● Most bottle caps protect milk sufficiently from dairy to doorstep. But for safeguarding milk both before and after delivery, none can match the "last drop" protection assured by Seal-Hood and Seal-Kap closures (disc and cap in one compact, easy-to-open unit).

No metal to fight with... no annoying prying or special tool is needed to open a Seal-Kap or Seal-Hood closure. Both open easily... yet snap back on tightly every time the milk is used. This means sure sanitary protection—right down to the last drop of milk in the bottle.

Both Seal-Kap and Seal-Hood have the double-safe qualities of a cap-plus-hood —*without* its cost or operation trouble. These one-piece closures bring dairymen *single-operation* economy.

AMERICAN SEAL-KAP CORP.

11-05 44th DRIVE

LONG ISLAND CITY 1, N. Y.

INDEX TO ADVERTISERS

uncommonly good for...

the most common nutritional defect

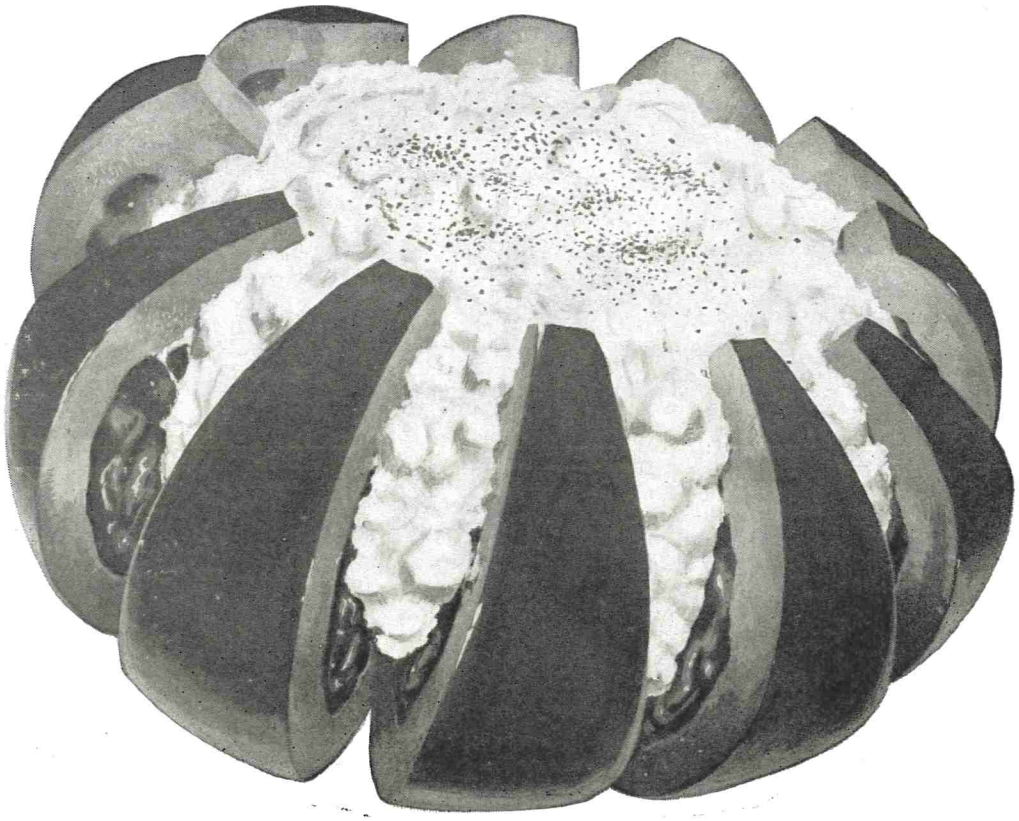
Whether garnishing a salad or fortifying a casserole dish, cottage cheese offers a most gratifying and wholesome solution for many problems that stem from "undernutrition." Not only has protein deficiency been singled out as "the most common nutritional defect in the aged,"[1] but inadequate dietary regimens are found with surprising frequency among children referred to physicians because of growth failure.[2]

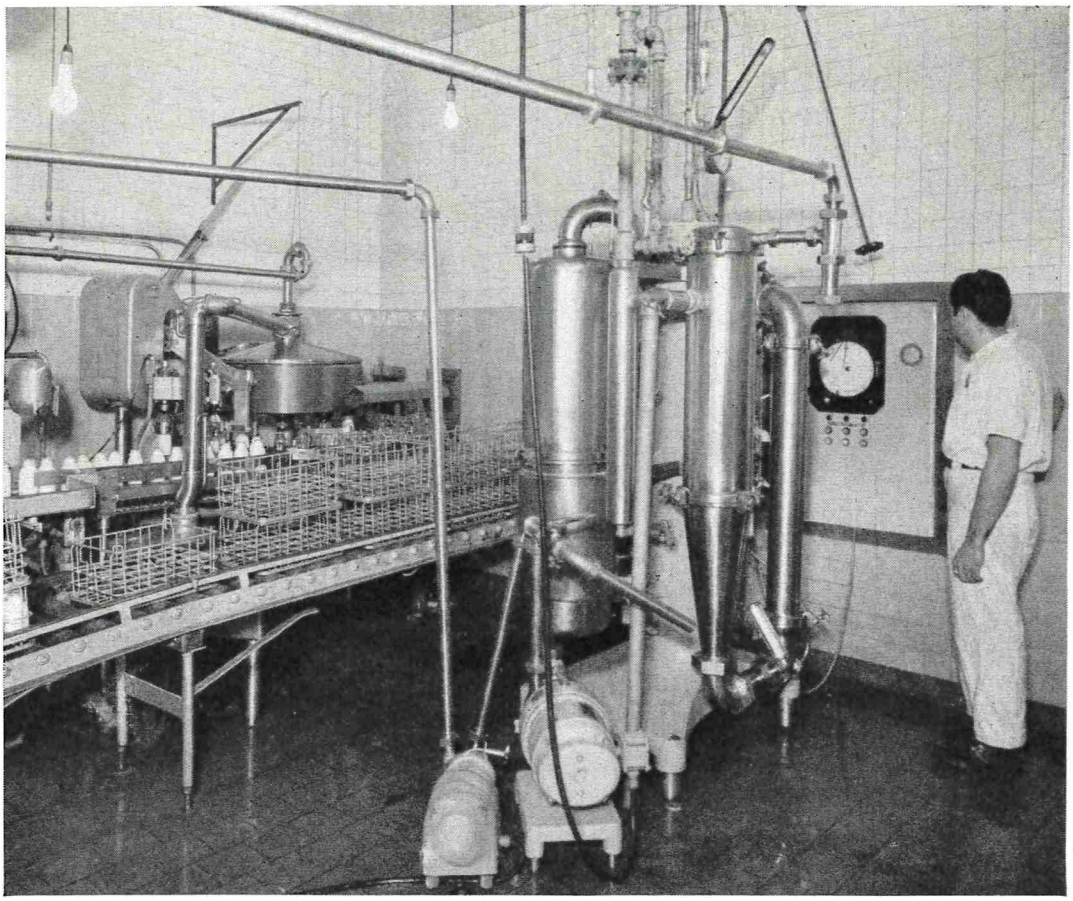
Indeed, the stigmata of chronic undernutrition may be evident even before birth, when fetal bone and tooth impairment give telltale signs of poor mineral and vitamin intake by the mother. And the same dietary inadequacies may simultaneously take their maternal toll by precipitating such complications as eclampsia, vomiting, osteomalacia and premature labor.[3,4,5] The recommended diet of pregnancy and lactation, therefore, stresses *high calcium, high protein* and *low fat*[6]... requirements specifically fulfilled by cottage cheese.

The high protein diet, moreover, plays an important role in improving liver function,[7,8] and in significantly decreasing convalescence time following viral hepatitis.[9] In addition, neurologic and psychologic complications resulting from "undernutrition" are problems that confront pediatrician and geriatrician alike.[10,11,12]

And for all such patients, Borden's Cottage Cheese proffers so many advantages...easy digestibility because of low fat content...soft fine curds resulting from careful selection of bacterial "starters"... and as with all Borden dairy products, choice of only the finest of fresh pasteurized milk, hygienically skimmed and incubated, to serve as the basis of a cottage cheese with pleasing flavor to complement its high nutritional value.

1. Sebrell, W. H., Jr., and Hundley, J. M., in Stieglitz, E. J.: Geriatric Medicine, ed. 3, Philadelphia, J. B. Lippincott Company, 1954, p. 181.
2. Stevenson S. S.: Pediat. Clin. North America *1*:433 (May) 1954.
3. Tompkins, W. T., and Wiehl, D. G.: Pediat. Clin. North America *1*:687 (Aug.) 1954.
4. Macy, I. G., and Mack, H. C.: Am. J. Obst. & Gynec. *68*:131 (July) 1954.
5. Burke, B. S.: Am. J. Clin. Nutrition 2:425 (Nov.-Dec.) 1954.
6. Murphy, G. H., and Wertz, A.W.: J. Am. Dietet. A. *30*:34 (Jan.) 1954.
7. Boyden, A. M.: Surg. Clin. North America *34*:1375 (Oct.) 1954.
8. Barborka, C. J.: Treatment by Diet, ed. 5, Philadelphia, J. B. Lippincott Company, 1948, p. 494.
9. Davidson, C.S.: A.M.A. Arch. Int. Med. *94*:460 (Sept.) 1954.
10. Ant. M.: Am. J. Digest. Dis. *21*:261 (Sept.) 1954.
11. Bakwin, H.: J. Pediat. *45*:110 (July) 1954.
12. Cohn, H., et al.: Am. J. Digest. Dis. *21*: 281 (Oct.) 1954.





This operator has no worries about feed flavors

Why should he? Even if his producers' cows have weeds in their feed, he isn't going to get excited about milk flavor problems. They just don't exist . . . after he has pasteurized his milk in a Vacreator Vacuum Pasteurizer.

That's because each drop of milk is *instantly* and *completely* pasteurized at 194° F. or higher, thereby releasing all undesirable, weed and feed flavors.

Safe pasteurization is assured by an improved control system. There is no holding time to check.

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your Cherry-Burrell Representative—about Vacreator Vacuum Pasteurization . . . the continuous, precisely controlled system that assures better tasting, better keeping milk. Or write for free bulletin.

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JOURNAL OF MILK AND FOOD TECHNOLOGY
INSTRUCTIONS TO CONTRIBUTORS

Manuscripts.—Manuscripts should be submitted on suitable 8½″ x 11″ paper. The original typewritten copy double or triple spaced with wide margins not less than 1″ on all four sides should be submitted. Tabular material and illustrations should accompany the manuscript; also, each manuscript should be accompanied by (a) a glossy personal photograph of the author, (b) a brief biographical sketch of the author not more than 50 - 75 words, and (c) an abstract of the paper not to exceed 75 words. These will be used at time of publication of the paper. All material should be sent by first class mail in flat form to the Managing Editor, H. L. Thomasson, P. O. Box 437, Shelbyville, Indiana.

Authors should make every effort to present their material accurately and in a clear and concise form. In preparing manuscripts, use of the first person should be avoided. Manuscripts should be proofread carefully before they are submitted. Each manuscript will be reviewed by one or more Associate Editors. Anonymity of reviewers will be preserved.

Manuscripts reporting the results of experimental work, generally, should be divided into sections, for example: Introduction; Experimental; Results; Discussion; Summary and Conclusions; References.

Figures, Tables and Photographs. — Tables should be clear and concise. Excessively large tables, as well as those consisting of only one or two lines, should be avoided if possible. Headings should be brief but fully descriptive. Avoid presenting the same data in a table and again in a figure. Place each table or figure on a separate sheet—not in the body of the manuscript.

Figures consisting of drawings, diagrams, charts and similar material should be done in India ink on 8½″ x 11″ tracing paper or cloth. A lettering guide should be used for all written material on figures. Submit original figures rather than photographs of such figures.

Photographs should be glossy prints free of imperfections.

Legends. — Legends for figures and photographs should be typed on a separate sheet. The legends should be brief but fully descriptive.

References. — References should be double spaced and arranged alphabetically as to authors. References to papers by a single author should preceed references to papers by the same author and associates. References to papers by multiple authors should be listed in the alphabetical order of the several authors. Initials rather than the full first names of male authors should be given. Reference citations in the text should be made by a number in parentheses, corresponding to that number in the reference list.

Sample of journal citation: (1) Mallmann, W. L. Sanitation in Bulk Food Vending. J. Milk and Food Technol., *16*: 267-269. 1953.

Sample of Book citation: Adams, H. S. *Milk and Food Sanitation Practice.* The Commonwealth Fund. New York, New York. 1947.

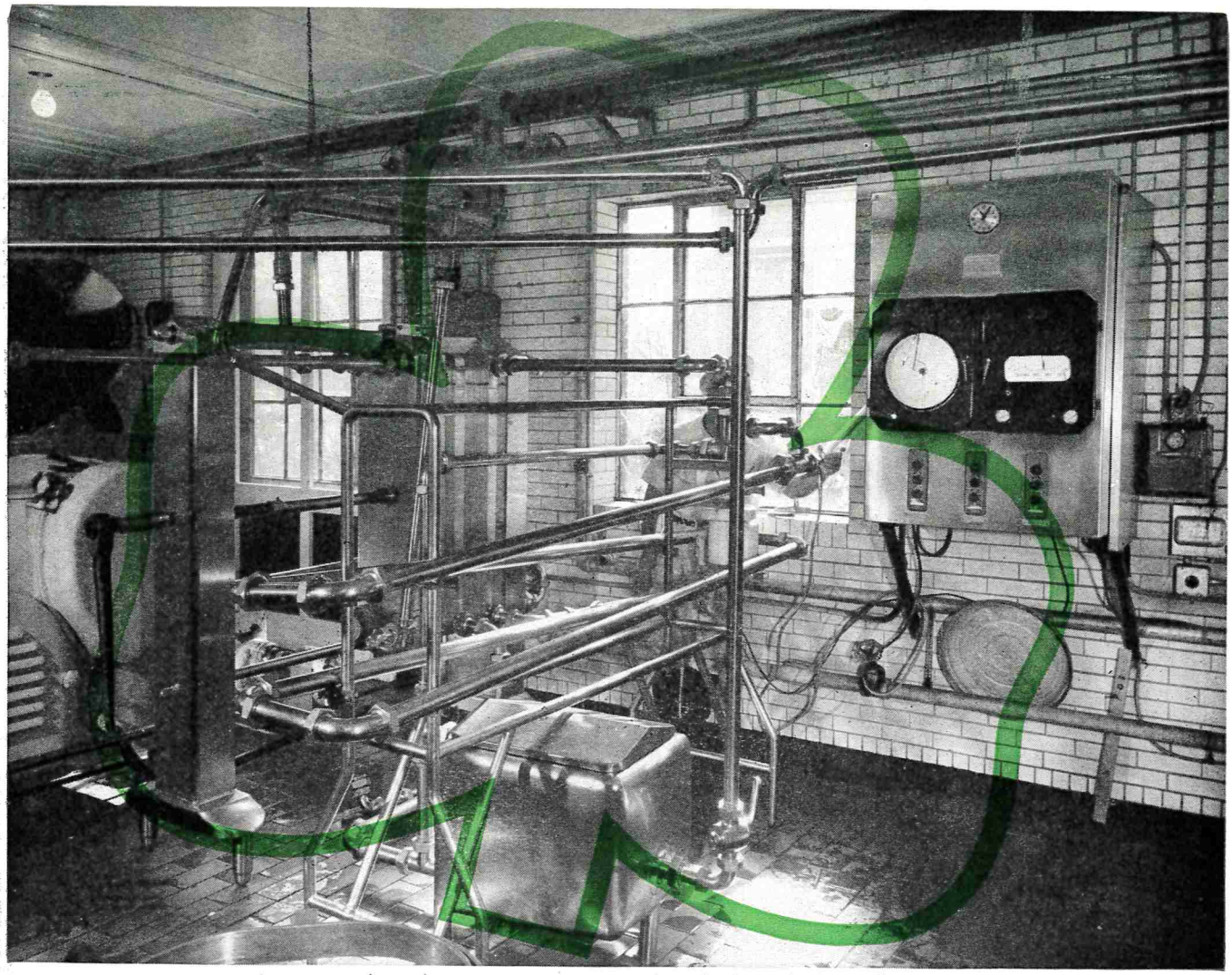
Sample of Experiment Station publication citation: Watrous, G. H., Doan, F. J. and Josephson, D. V. Some Bacteriological Studies on Refrigerated Milk and Cream. Penn. Agr. Exp. Sta. Bull. 551. 1952.

Publications should be abbreviated according to the form given in CHEMICAL ABSTRACTS, vol. 45. no. 24, part 2. 1951.

Abbreviations.—Common abbreviations to be used in the text are: cm., centimeter(s); cc., cubic centimeter(s); C., Centigrade; F., Fahrenheit; g., gram(s); log., logarithm; lb., pound(s); μ, micron(s); μg., microgram(s); mg., milligram(s); ml., milliliter(s); oz., ounce(s); sp. gr., specific gravity.

News items and announcements. — Items of general interest should be submitted in the same manner as indicated for manuscripts. An informal writing style is preferred. News of the activities of affiliate associations, members and events is particularly desirable.

Letters to the Editor.—Letters to the editor are encouraged. Letters should be addressed to the Managing Editor and must be signed by the writer. Excessively long letters should be avoided due to Journal space limitations.



CLOVERLEAF DAIRY INSTALLS MODERN COMPACT PASTEURIZING UNIT WITH EFFICIENT TRI-CLOVER HOLDING TUBE ASSEMBLY

Instead of a major expansion program to increase the output of its conventional pasteurizing system, the Cloverleaf Dairy at Downers Grove, Illinois, installed an HTST "package"—a compact unit which was easily fitted into the existing plant setup. The results—production was doubled with only a 10 per cent increase in labor force.

An important part of Cloverleaf's new HTST unit is the Tri-Clover Holding Tube Assembly shown above. These Tri-Clover "Assemblies" are made up of highly polished, sanitary, stainless steel. This includes the solid welded hanger frame as well as fitting and tube sections. As an aid to fast washup, all parts are designed for easy assembly and disassembly. And in addition to sanitation and utility, Tri-Clover "Assemblies" are designed to give long years of dependable service—even under the stresses of continual heating and cooling. Tri-Clover Holding Tubes are pre-assembled in standard sizes. Send us data on physical dimensions required, tubing size, holding time and capacity and we can ship the complete holding tube assembly to meet your needs.

Let our experienced engineering staff help meet all your needs for sanitary fittings, valves, pumps, tubing and assemblies.

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. . . for the isolation, identification and cultivation of pathogenic fungi. These media are also widely used in phytopathological studies. Several are neutral in reaction, giving optimum conditions for growth of a variety of fungi. The following may be prepared as selective media by the adjustment of reaction, addition of antibiotics or other agents:

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CLASSIFICATION

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THE DIFCO MANUAL, NINTH EDITION, including descriptions of these media and their use, is available on request.

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