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Journal of

MILK and FOOD TECHNOLOGY

Official Publication

International Association of Milk and Food Sanitarians, Inc.

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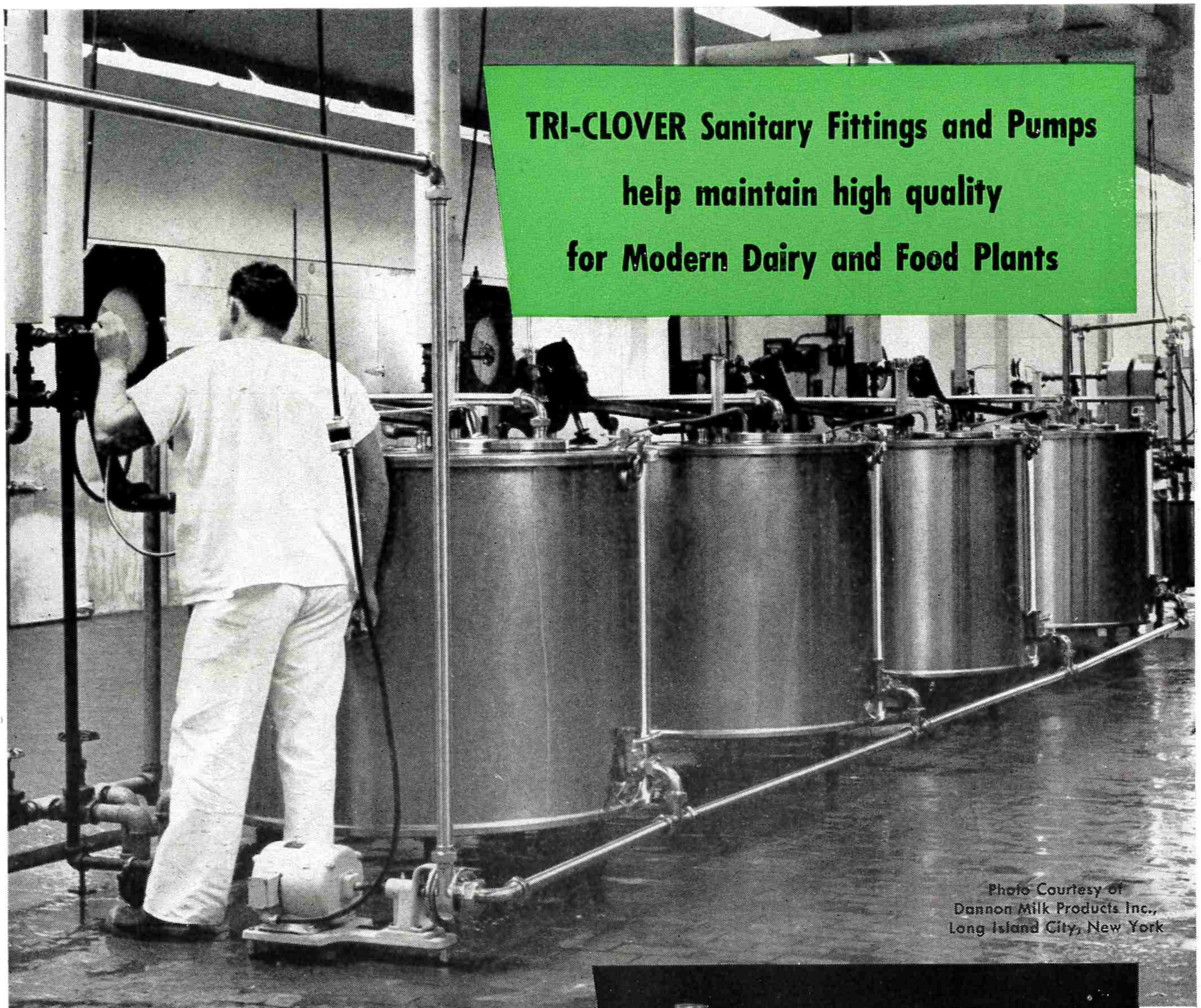

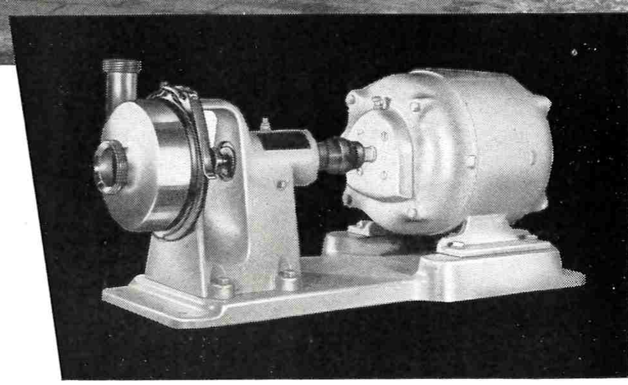

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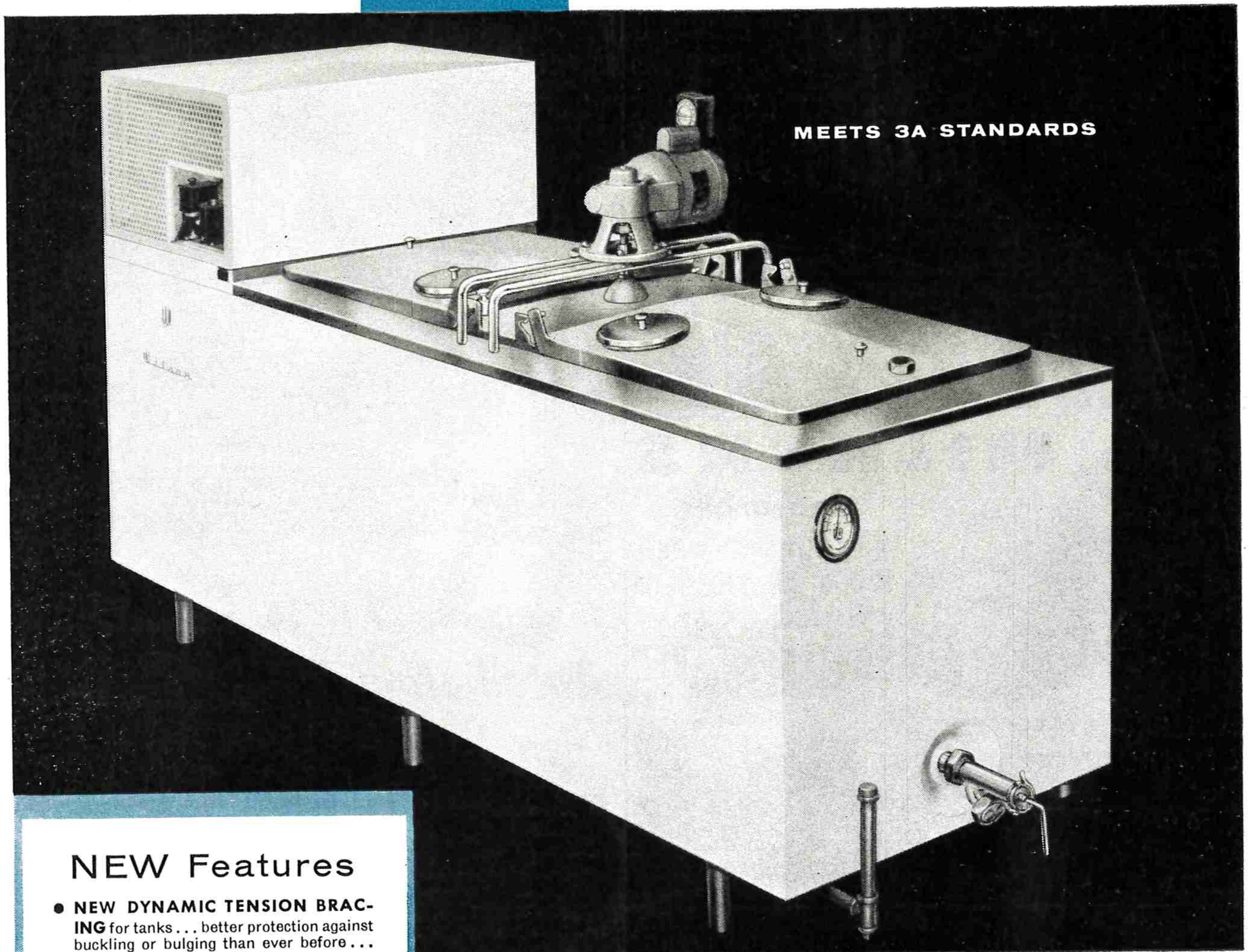

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Contents Page

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THIS NEW PENNSALT B-K AD

is part of an extensive campaign in farm and dairy magazines telling dairymen the many advantages of <u>clean,</u> <u>sanitized</u> equipment, thus giving a valuable "assist" to your own activities.

EDUCATION FOR A CHANGING WORLD

Editorial Note: The following are some selected remarks from an address given at the Association banquet at the 42nd Annual Meeting in Augusta, Georgia by Dr. Hugh B. Masters, Director of the Georgia Center for Continuing Education, University of Georgia.

"Today, free men in a free society are making new demands of education. These demands call for a new concept of education and a new generation of educational leadership. No longer may schools be built solely for our children."

". . . Schools exist for all the people of this country, not for anyone segment of the population or for any particular social class."

"Schools should be controlled by the people, not by small groups. Leadership . . . must accept responsibility for serving all the people of the community."

"The school of tomorrow will be concerned with providing educational opportunities for people irrespective of their age or previous education . . . . it must begin its program at the cradle and end it at the grave."

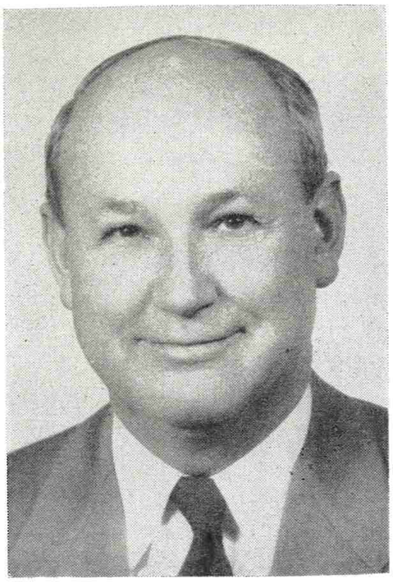
"The preparation of the professional educational leader in many areas of this country has been a wide open field where almost any institution that wishes might provide some courses that would meet the state requirements for administrative credentials. . . . . State departments, accrediting agencies and strong schools of education must devise ways and means of eliminating poor and ineffective pre-service training programs."

"In a mobile society . . . the educational leader must be systematically and continuously enrolled in a continuing education program . . . "

" . . . the professional educational leader of tomorrow must be able to find and enlist key personnel of the community who, with him, will constitute a team for educational leadership . . . "

"This leadership team must establish communication with the general public of the community . . . so that the whole public can participate in making changes in school policy. This process is not new. It has long been practiced by governmental agencies which hold public hearings . . . . "

" . . . this kind of professional educational leader might, in some respects, be called an "Imagineer" . . . concerned with using the school for the betterment of the community . . . primarily at those points where education has an important contribution to make to the solution of problems of the community."



"Ways must be found to involve greater numbers of persons in the school program; techniques must be developed to enlist as selective leadership . . . . outstanding persons in the community."

"This new educational leadership will be vitally concerned with the respect due the individual in a free society. . . . . a basic tenet is that leadership cannot show proper respect for personalities without making the personalities better."

"If communities are to continue to make progress toward a more refined kind of social, economic and political living, the effectiveness of . . . the school must be increased. The program of the school must be extended to encompass the total population. This, then, sets the stage for the community school."

"There are those who think that communities cannot afford more money for education. The answer is: If this kind of education were made available, the contribution made would be of such magnitude that it would secure needed financial support. Men everywhere in our free society would come to share the belief that in continuing education is a great sustaining force to help people help themselves in day-by-day living; to provide them with opportunities for growth, not only in a vocation, but in the broad cultural sense that makes life more endurable and more desirable for free people everywhere."

A YEAR IN RETROSPECT

Requested to write something for the Journal, I could not beg off. Unfortunately, I have a conscience: it does not let me rest when those who are carrying burdens and responsibilities indicate that they would like me to do so and so. Who could blandly ignore a request from them?

Really, it feels like old times to be writing to "my crowd"—because that is what the milk sanitarians are. One can't spend thirty years of his life with a bunch of earnest persons devoted to the public welfare without developing a feeling of spiritual (or psychic or mental or something) solidarity with them. This cannot easily be laid aside—as taking off one's coat. It has sunk deeply into one's protoplasm, so to speak. That is why you all are "earnest" and "devoted." You and your work are one. Neither you nor the Angel Gabriel can draw a line between what might be called your immediate, private, personal interests, and those of the public and the group whom you serve. Hence, the elan, the cordial spirit, the will to achieve, the feeling "for service."

This spirit is what I discovered in the Association way back in the "twenties." Ivan Weld's mantle of idealism has not worn thin over the years. The young-men who now run the Association have this spirit. It reveals itself in how they act, what they produce—and incidentally, in what they say.

Right here I take time out to say what I am sure you all agree with, namely, your masthead of officers and committmen do you proud. No one knows the amount of "labor of love" that lies under the operation of a large organization like our IAMFS. Their "salaries" (when there are any) are merely contributions to buy gas and to help keep moving on the road. They are not paid for services rendered. The chief reward and incentive is accomplishment and your appreciation. Then we ought to say so once in a while. It helps when the 'going is rough'—of which there is a plenty.

The report in the Journal on the Annual Meeting reveals the growth impulses—indicating plenty of Association life.

The idea of a joint Council of sanitarians' organizations seem to be coming out of deep freeze. Proposed back in 1944, it has been urged as a needed development (J. Milk and Food Technol. **7**: 128. 1944; **12**: 129. 1949; and **13**: 258. 1950). The field of food sanitation can be adequately covered only when adjoining fields of environmental hygiene, public health practice, and sanitary engineering are recognized as contributory to the overall picture. These allied lines give bearing and perspective on our main interest. Each assists the other.

Herein lies a potentiality for professional advancement that speaks louder then self-acclaimed attainments. Constructive ideas and leadership are our best advocates.

We could contribute immensely to such recognition by producing a food sanitarians' manual. Food sanitation is now in the developmental stage of being a field of applied science—a technology. Many aspects are developing which give increasing emphasis on engineering. Some of these are the thermodynamics of food processing, the mathematics of the energetics involved in food plant operations, the impirical data of food processing such as heat transfer, flavor effects, organoleptic quality control, instrumentation, operational practices, principles of design, and other data which engineers need. The spendid work of the 3A Sanitary Standards Committee gives us a splendid start.

With regard to the Council, it has within its power the opportunity to bring the national aspects of food sanitation down to local application. It accords the basic tie-in of the technical developments as reported at the Annual Meeting and in our Journal and in the growing literature, to actual practices over the country. It was designed to do for the Association what the States do for the Federal Government. It should constitute the solid core of interest, ideas, recruitment, publicity, public relations in their regional aspects, and practical advices.

As per the President's report, the Association does show growth in stature. The problems ahead are not unsolvable. They all are amenable to applied interest, intelligence, and perseverance. We look on —and applaud.

J. H. SHRADER

FORTY-THIRD ANNUAL MEETING
HOTEL OLYMPIC — SEATTLE, WASH., SEPTEMBER 5, 6, 7, 1956

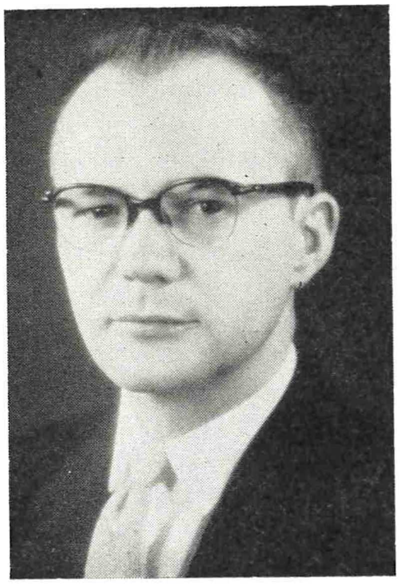
A TEST FOR THE KEEPING QUALITY OF PASTEURIZED MILK[1]

E. A. Day and F. J. Doan

The Pennsylvania Agriculture Experiment Station, University Park

(Received for publication November 3, 1955)

A simple color test, capable of detecting pasteurized bottled milk having poor keeping quality under refrigeration, is described. Neotetrazolium dye is mixed with milk in a test tube. The tube is evacuated and sealed, placed in an incubator at 37° C. and examined after four hours. A detectable pink color appearing in the sample is an indication that the milk will undergo flavor spoilage within a four day period. This test apparently measures the psychrophilic activity in the milk.



Edgar Allan Day's early youth was spent on a dairy farm in West Virginia. He received a B. S. degree in Dairy Technology from the University of Maryland in 1953, and an M. S. degree in Dairy Science from The Pennsylvania State University in 1955. Mr. Day is a Marine Corps veteran of World War II and the Korean War. He is currently continuing his graduate studies as a candidate for a PhD degree at Penn State.

It has become apparent that bottled pasteurized milk will keep under refrigeration at temperatures below 45°F. for considerable periods of time providing the product is essentially free of psychrophilic bacteria (3, 6, 12). Fortunately these organisms appear to be completely destroyed by pasteurization and those present are consequently the result of post-pasteurization contamination (3, 4, 6, 8, 11, 12).

A very small number of psychrophiles will definitely shorten the refrigerator life of milk. The critical number is so small that counts made on freshly bottled milk are completely futile as an indication of potential keeping quality (3, 6, 12). Furthermore, due to the extended incubation periods required for enumeration of psychrophiles and because of the wide variations in numbers of organisms at the time of flavor spoilage, among different lots of milk, the use of the psychrophilic plate count has not proved very successful in predicting the "keepability." This would seem to indicate that the specific types of psychrophilic organisms present in the milk are more important than total numbers in influencing keeping quality.

The growth of psychrophilic organisms in milk is supported by nutrient material in the medium. Undoubtedly various substances are acted upon and many new compounds formed, some of which are responsible for the array of off flavors associated with low temperature spoilage. The amount of a particular compound required to contribute a flavor is doubtless very minute, making chemical detection uncertain. Because of the variety of flavors encountered it is difficult to correlate changes of particular constituents of milk with eventual flavor spoilage detected organoleptically. Nevertheless, the consumer makes final judgment of the acceptability of the product by organoleptic means. This fact must be considered in the development of a test for predicting the keeping quality of milk.

Experimental and Results

Studies on Chemical Changes in Refrigerated Milk

In this study, a test for incipient spoilage was sought based on a change in some constituent or property of milk during storage at 40° F. The 29 lots of milk used consisted, for the most part, of commercially bottled pasteurized, homogenized, milk obtained at the bottling machine of a number of milk plants in the vicinity of State College, Pa. All lots of milk were stored at 40°F. and a replicate bottle examined at regular intervals during the storage life of the product. Spoilage was determined organoleptically by two experienced judges, and was based on the appearance of an objectionable flavor,

[1]Authorized for publication on Oct. 26, 1955, as paper No. 2021 in the Journal Series of The Pennsylvania Agricultural Experiment Station, University Park.

presumably a result of bacterial action. No samples in the lots of milk examined became oxidized.

Changes in protein stability as measured by the alcohol number, acetone number, and Storrs number (10) were noted during storage of the milk samples but these were too slight, too inconsistent, and occurred too near the time of flavor spoilage to be useful for the purpose in view. Similar conclusions were drawn relative to changes in pH and acidity. Variations in the nitrogen distribution of the non-casein fraction of milk during storage, as determined by the method of Rowland (9) were not well correlated with flavor deterioration. It is interesting to note, however, that the proteose-peptone fraction increased over 100 per cent while the non-protein fraction remained constant up to the time of off flavor detection. Furthermore, no significant change in protein degradation products such as tyrosine and tryptophane were detectable by the method of Hull (5), nor was there any observable change in lactose over the same periods when determined by a picric acid reduction method (7).

Studies on Dye Reduction in Refrigerated Milk

Most information available on the use of oxidation-reduction dyes as a means of measuring keeping quality of refrigerated pasteurized milk has been discouraging, primarily because reduction is so slow that it is difficult to obtain results within a reasonable incubation period (2, 3). It was found, however, that by evacuating the incubation tubes and maintaining the vacuum during the incubation period, the time required for dye reduction can be greatly decreased. Apparently evacuation increases the sensitivity of the dye by removing a large portion of the oxygen from the tube, thus facilitating a more rapid drop in potential of the milk when bacterial action is significant. Thunberg oxidation tubes were found suitable for the purpose but due to their cost, fragility and difficulty of cleaning, regular 15 mm. x 60 mm. culture tubes were later employed. The culture tubes were fitted with number zero, one-hole, rubber stoppers. Glass tubes were fitted into the stopper holes and connected by rubber tubes to a header which in turn led to the vacuum source. Screw clamps were employed on the rubber tubes to maintain the vacuum after the test tubes were removed to the incubator. An ordinary laboratory water aspirator was found satisfactory for generating the vacuum. The milk and dye mixture in the tubes was tempered to between 0° C. and 5° C. using ice water and then evacuated for 3 minutes at 15 mm. pressure as measured by a mercury manometer.

Resazurin, methylene blue, and p, p'-diphenylene-bis -2- (3, 5-diphenyltetrazolium chloride), the latter commonly called neotetrazolium, were examined to determine the dye most suitable for detecting psychrophilic activity in refrigerated milk. Resazurin

TABLE 1 — PREDICTABILITY OF FLAVOR SPOILAGE OF COMMERCIALLY BOTTLED MILK BY THE NEOTETRAZOLIUM TEST DURING STORAGE AT 40° F.

Milk lot Number	Reduction of neotetrazolium: Day of positive test	Reduction of neotetrazolium: Days in advance of spoilage	25° C. Bacterial plate count on day of first positive test[a]	25° C. Bacterial plate count at time of flavor spoilage	Total keeping period	Off flavor at time of spoilage
1	7	3	2.5M	11M	10	Rancid
2	9	4	1.8M	17M	13	Fermented
3	0	5	45T	25M	5	Fermented
4	5	7	400T	110M	12	Bitter
5	7	3	1.4M	210M	10	Fermented
6	8	6	4.0M	72M	14	Fermented
7	5	4	1.8M	19M	9	Fermented
8	8	2	12M	200M	10	Fermented
9	7	3	3.0M	250M	10	Fermented
10	10	5	12M	32M	15	Bitter
11	8	3	14M	70M	11	Fermented
12	4	4	750T	320M	8	Bitter
13	5	4	380T	30M	9	Fermented
14	7	2	4.3M	7.0M	9	Fermented
15	11	1	65M	34M	12	Fermented
16	19	4	1.3M	27M	23	Bitter
Average	7.50	3.75			11.25	

[a]M = Million
T = Thousand

and methylene blue were employed at the concentrations recommended by Standard Methods (1) while neotetrazolium was used at a concentration of 0.2% in aqueous solution and at a rate of 0.5 ml. per 5 ml. of milk. On reduction this dye changes from colorless through pink to magenta.

An incubation temperature of 37° C. produced much more rapid reduction than did 26° C. and neotetrazolium was found to be the most sensitive of the three dyes studied. It was established that a pink color, developed in the neotetrazolium test after 4 hours incubation at 37° C., is an indication of significant psychrophilic activity in refrigerated milk and that flavor spoilage will usually occur within a period of four days.

A series of 16 lots of commercially pasteurized, homogenized, bottled milk was stored at 40° F. and examined during the keeping period for dye reduction, bacterial population, and changes in flavor with results as shown in Table 1. Bacterial counts were made after plate incubation at 25° C. for 3 days inasmuch as this procedure when used on milk stored at low temperatures gives results which check rather closely with psychrophilic counts made at 5° C. incubation for 10 days (3,13). No direct relationship was found between dye reduction and numbers of bacteria at any period of examination. The number of bacteria per ml. present at the time of dye reduction ranged from 45,000 to 65,000,000 and at the time of flavor spoilage from 7,000,000 to 320,000,000. The neotetrazolium test gave positive results an average of 3.75 days in advance of flavor spoilage with this series of samples which exhibited keeping periods varying from 5 to 23 days with an average of 11.25 days.

It was established that psychrophilic activity is responsible for the dye reduction in the milk by observation on a split lot of freshly pasteurized milk, one part of which was bottled in replicate half pints and capped by machine, the other part was distributed into a series of test tubes, sealed and repasteurized in the tubes. The split lots were held at 40° F. and replicate samples were examined daily by the neotetrazolium test and by making plate counts at 25° C. incubation. The milk which was not repasteurized showed the usual increase in bacterial numbers during storage, gave a positive dye reduction test on the 19th day and exhibited an off flavor on the 23rd day. The repasteurized milk showed no increase in bacterial numbers, no reduction of neotetrazolium and during the 23 day storage period still maintained an acceptable flavor.

DISCUSSION

Although data on bacterial counts are not presented for the 29 lots of milk examined in the first study of this report, the results were similar to those presented in the table. The growth curve, as determined by the average of logarithms of counts, up to the time of flavor spoilage, was typical of several such curves previously published. However, individual lots of milk varied considerably from the average and there was no consistency in total count at the time of flavor deterioration. These data together with those in the table again emphasize the fact that total numbers of organisms in refrigerated milk do not correlate well with keeping quality. The fact that physical and chemical changes do not correlate with flavor deterioration might be expected in view of the number of different types of off flavors encountered. The dye reduction test employing neotetrazolium and tube evacuation on the other hand, while not correlating with bacterial populations does appear to give evidence of bacterial action leading to flavor spoilage and consequently lends itself to a method for detecting the onset of spoilage. When used according to the procedure described below, it will predict flavor deterioration an average of almost four days prior to the appearance of the defect in the majority of instances.

Neotetrazolium in the oxidized form contributes no color to milk while the completely reduced form imparts a magenta color. During the 4 hour incubation period employed in this test, the milk normally changes only to a strong pink color. The reason for the various shades of pink is that the reduced form of neotetrazolium (diformazan) is insoluble in aqueous solutions and exists as a colloidal suspension. Consequently, as more of the neotetrazolium is reduced the color of the medium changes depending upon the size of the particles and concentration of the colloidal diformazan suspension. The degree of color considered as a positive test is slightly darker than the phenolphthalein end point obtained in the lactic acid titration of milk. A deeper shade after four hours incubation would only indicate that the milk is of more inferior keeping quality. The reduction of neotetrazolium to the diformazan is an irreversible reaction which is helpful in eliminating some difficulties encountered in the use of reversible dyes.

In the course of the work it was observed that some freshly pasteurized lots of milk reduced neotetrazolium. The reason for this is not definitely known but may be due to a lowering of the oxygen tension as a result of pasteurization. This is a temporary situation and disappears by the third day of storage. To avoid false positive tests, however, the keeping quality test should not be made until after the milk has been held for a three day period.

There are several ways in which this test may be used and some of the details doubtless could be studied further in order to develop procedures to fit the specific needs of various laboratories interested in the problem of milk keeping quality.

One procedure would be to obtain sufficient replicates of a lot of milk for periodic examinations and store it at refrigeration temperatures. If the milk is examined at daily intervals, after the third day of storage, it is possible to predict flavor spoilage at least 3 days prior to the appearance of off flavors in the majority of instances. If replicates are examined periodically but not daily, it is possible to predict at each examination that the milk will either keep or spoil during the following 3 or 4 day period.

Perhaps the simplest way for a milk plant laboratory to use the test would be first to determine the maximum number of days their product might be held before being consumed. This interval would then be employed as the period of time a sample would be held before applying the test. A negative test at this point might well be considered satisfactory, for it would indicate a keeping period of at least 3 days more than that absolutely required.

Summary of Procedure for the Test

Reagents and Equipment

1. p,p'—Diphenylenebis -2-(3,5 — diphenyltetrazolium chloride) (neotetrazolium). 0.2 per cent aqueous solution.
2. Incubation tubes, either Thunberg oxidation tubes or tubes so fitted and set up as to be easily evacuated and to be capable of maintaining the vacuum during the incubation period.
3. A means of evacuating the tubes such as a laboratory water aspirator or vacuum pump.
4. Thermostatically controlled water bath incubator (37° C.).
5. Mercury manometer or a vacuum gauge to test the apparatus and assure satisfactory evacuation of the tubes before incubation.

Procedure

1. Pipette 0.5 ml of neotetrazolium (0.2% aqueous solution) into a clean dry incubation tube (preferably sterile).
2. Pipette 5.0 ml of milk to be tested into the tube and mix.
3. Temper the contents of the tube to 0° to 5° C.
4. Evacuate the tube at 15 mm pressure for 3 minutes and then seal the tube.
5. Temper to 37° C. and incubate at this temperature for 4 hours after which observe for a change in color of the milk from white to pink.

Interpretation of results

Reduction of the dye to a definitely discernable pink color at the end of 4 hours incubation at 37° C. is the criterion for a positive test. Such a result obtained on bottled milk after a minimum of 3 days refrigerated storage, would predict spoilage within a 3 to 4 day period.

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CAREER OPPORTUNITIES IN THE FOOD INDUSTRY[1]

Frank K. Lawler

McGraw Hill Publishing Company, New York

Looking from here into the tomorrow of food manufacturing and processing, I see nothing more important to continued progress than the problem of technical careers in the industry.

I say "problem" advisedly, because that's what the industry is up against.

We are undergoing a revolution. Our field is developing into a "big-time" technical industry. Rising costs and competition are forcing food factories to develop and adopt highly efficient production, packaging, and distribution methods. Yes, even sanitation is becoming mechanized.

There are other basic trends, too. The industry has moved into a new era of consumer demand and sales opportunities. We are in the age of convenience foods. Both the homemaker and the institutional food buyer want foods as nearly ready to put onto the table as possible. They want a built-in servant in every package. They have the money to pay for it. They are willing to spend for such a worthy purpose.

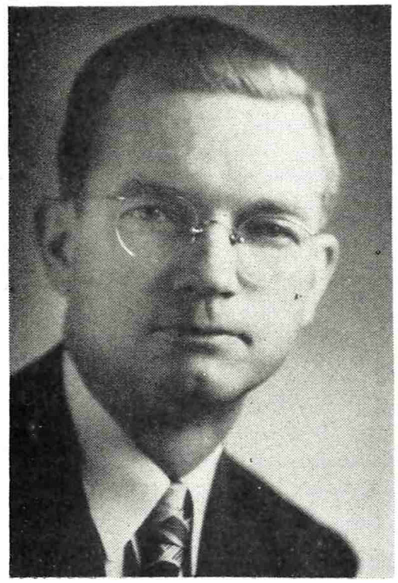
Then we have a market that insists more and more on quality foods, processed and packaged in a sanitary manner—from clean, wholesome materials and ingredients. The days of sloppy food plants and careless selection and handling of materials definitely are numbered.

We are in a ruggedly competitive business where steady development of new and improved products is essential to long-range success. And new and better items come largely from technical research, just as do most improvements in processing.

On top of all these things, the industry faces some stiff technical challenges. Outstanding is the interest in preservation of foods by ionizing radiation from electronic or nuclear sources. This might develop into something of revolutionary proportions—if technical men in the field are smart enough to work out the deep-seated problems involved.

But forget for now this dream of cold sterilization and pasteurization. Let us visualize the food plant of the future without it. This plant of tomorrow will be radically different from the average one of today.

Stretching parallel across a great expanse of open floor area—between receiving and shipping platforms —will be continuous, automatic process, materials handling and packaging lines.



Mr. Lawler was graduated from Purdue University with a BS in electrical engineering in 1930, and immediately joined the editorial staff of McGraw-Hill Publishing Co., New York. He became associated with Food Industries in 1932, and was Managing Editor from 1939 to 1945. He then served as Technical Editor of Business Week and Editor of McGraw-Hill Digest, returning to Food Industries as Executive Editor in 1948. Mr. Lawler became Editor of the publication (now Food Engineering) in 1949.

Bulk ingredients will be automatically proportioned into the lines where required in the formulation of the product. These will be continuously mixed with other ingredients, then continuously processed. With no change of pace, the finished product will feed into packaging lines operating at speeds far faster than today's, and without the expensive labor force required now.

Packaging materials will feed from bulk rolls into machines that form containers at a rate synchronized with processing. Filling, sealing, closing, labeling, and casing will be automitic.

With few exceptions, processing and packaging lines will have no workers stationed along them. And transfers between operations will be automatic.

Directing the operations of this fast efficient factory will be a high-caliber production expert. He

[1]Presented at the 42nd Annual Meeting of the *International Association of Milk and Food Sanitarians, Inc.,* at Augusta, Georgia, Oct. 2-6, 1955.

will be stationed in a glass-paneled control room above the production lines and overlooking the entire production area.

Before this expert, in his glass tower, will be a battery of instruments, signal lights, and alarms on graphic panel boards. Every key process factor will be indicated, recorded, and controlled by the instruments. Any deviation from proper operation will be revealed immediately by the automatic signals.

Television screens, too, will be mounted in front of the process director. Those will be wired to cameras at points in the process that require visual observation. They will enable the director to watch for such emergencies as jam-ups in automatic feeds and off-color product discharging from the process line.

Two-way radio will be installed in the control tower, too. This will enable the process director to call maintenance crews and direct their work, order lift-truck operators to points where needed, and direct replenishment of dwindling supplies. In a big canning operation, he will direct harvesting and hauling operations to keep his plant humming at maximum capacity, while avoiding pileups at the receiving docks.

If all this sounds far-fetched, remember that everything mentioned is in operation somewhere on a piecemeal basis. And one must never lose sight of the strong incentive to automatize provided by steadily rising labor costs—plus threat of the guaranteed annual wage. Nor should one forget that machines and gadgets considered fancy and impracticable ten years ago can be built in this electronic age.

We very definitely have entered the era of automation in American industry—including food manufacturing and processing.

Let's take a "for instance." Now in successful commercial operation is an automatic sequence-controlled process for high-temperature, short-time sterilization and aseptic canning of a chocolate milk drink. This demonstrates what can be done in the way of integrated, interlocked, foolproof control techniques, adaptable to automation of complex processing and packaging operations.

As sanitarians, you will appreciate the fact that this system automatically sterilizes the process and filling lines, then switches to process. And if at any time any part of the processing or packaging operations fails to maintain sterile conditions, the flow of product is automatically bypassed back to the supply tank until the condition is cleared.

You can see why I say that our industry has become "big-time" in a technical sense.

Sanitarians will have a big hand in shaping up the food plant of tomorrow. It will be a factory that can be kept clean with little effort and minimum expense. In fact, it will have built-in pushbutton cleaning of process lines and equipment. And the building itself will be easily and quickly sanitized with power and pressure devices.

If we accept even a reasonable facsimile of this plant-of-tomorrow concept, then we can see that technical personnel will be required in plentiful numbers to develop and operate it.

And to those requirements we must add the number of men needed in research to improve product quality and to develop new convenience foods and packages. Here it is interesting to note the results of a survey recently conducted by General Foods Corp., among executives accounting for half of all employment in the grocery manufacturing field.

Of these executives, 85 percent foresee a large or moderate increase in research and development expenditures in the industry.

What's more, revolutionary new developments are expected by 40 percent in the area of new products in their own companies; by 33 percent in manufacturing and processing methods; and by 33 percent in packaging materials and methods. Moderate changes are anticipated by 50, 60, and 47 percent, respectively.

Product development, particularly of convenience foods, will be one of the prime targets of research. Sixty-three percent of the executives responding to the General Foods survey see this as the area that will receive the most attention in the next ten years.

And as you all know, once a new product is developed, the technical gap between the formula and efficient manufacturing, processing, and packaging methods has to be bridged. Only technically trained food men can build that bridge.

Now here's another significant straw in the wind, also from General Foods. This pace-setting company spent \$5.8 million for research in its 1955 fiscal year. Which is a little more than 0.7 percent of its sales dollars—an increase of about 0.2 percent over earlier research budgets. Looking at this another way, the research expenditure amounted to more than 18 percent of earnings after taxes. Some 375 technical and professional specialists are employed in the labs of General Foods.

As a result of such research activity, the company sold \$237.5 million of new products in the past year. New items accounted for nearly 29 percent of the firm's total sales.

With pace-setters in the industry stepping up research and making it pay dividends, others will move in the same direction.

This trend is going to require a lot of technical personnel.

Now let us get at the technical manpower question another way. There are 10,000 food factories (of a total of 36,000) with 20 to 99 employees. Each of these needs at least one technical man. Another 3,000 factories have 100 or more employees. On the average each of these can use a couple of technical people. Then at least 1,000 companies producing equipment and technical materials and supplies for the industry ought to have no less than one technical food man.

This adds up to 17,000. Estimates point to some 7,000 technically trained men in the field today. So there is room for another 10,000.

We don't believe this to be an exaggeration. One of our surveys revealed that 70 percent of the men directing the operations of food plants find food engineering involved in their work. Since most aren't technically trained, they need technical men on the payroll.

There are, without any doubt, career opportunities in the industry for a lot of additional technical people.

But you and I and others in our field must understand the factors that make a career in food rewarding to the individual. And we must pass the word along to young people who are about to select a career and train themselves for it. It is not enough to point up the demand for numbers.

Scientists, technologists, and engineers are badly needed in practically every type of industry. So we in the food field have to offer something that is particularly attractive to get our share.

I have developed a Career Check-List for sizing up our industry's advantages. Perhaps you are curious as to what is included. Here are the points:

YOUR CAREER CHECK-LIST FOR QUICK APPRAISAL OF FOOD INDUSTRY'S ADVANTAGES

Big Demand for Technical People
Good Starting Pay
Conditions Favorable to Progress
Limited Technical Competition
High Degree of Job Stability
Work in Non-Seasonal Industry
Interesting Technical Work
More Than 30,000 Companies in Field
Industry Top Spender for Improvements
Great Engineering Advances Under Way
Revolutionary Techniques Imminent
Most Major Industry Advances Still Ahead
Challenging Problems on Which to Work
Chance to Get in on "Ground Floor"
Industry Serves 165,000,000 People
Products Vital to Consumers
Industry More Depression-Proof Than Others
Can Help Improve Public Health
Work Contributes to National Wealth
Opportunity to Work in Preferred Area
Pleasant Working Environment
Chance to Pioneer Great Developments
Way Open to Top-Management Jobs
Can Start Your Own Business
Opportunity to Become a Consultant
Profession Carries High Prestige
Variety of Professional Activities
Training Suited to Allied Industries
Opportunity to Meet Many People on Job
Chance to Pick Preferred Type of Work:

Process Development
Equipment Design and Fabrication
Plant Design and Construction
Engineering Research
Scientific Research
Technical Sales and Service
Purchasing Equipment and Supplies
Teaching Your Profession
Supervision and Management
Product Quality Control
Statistical Quality Control
Sanitation and Pest Control
Waste Disposal
Product Development and Testing
Packaging Engineering
Instrumentation of Process
Materials Handling Engineering
Heat Transfer
Refrigeration and Air Conditioning
Biological Processing
Chemical Processing
Horticulture and Agronomy
Nutrition
Maintenance
Industrial Engineering
Accident Prevention
Employee Relations
Public Relations

A few of these points merit discussion. To get the latest on starting pay, I surveyed schools with courses in food technology and engineering. Graduates with a BS degree are going to work for \$350 a month. A Masters brings \$395. And a PhD is worth \$505. These are averages. The ranges are \$300 to \$375 for a BS, \$350 to \$450 for a Masters, and \$450 to \$500 for a PhD.

The head of the food technology department in one school added this pointed comment to his data:

"Some of my graduates have gotten higher salaries to start than I get now."

If willingness to make a financial sacrifice is a measure of professional greatness, our teachers truly are outstanding.

Another particularly important item on the career check-list is the point: "conditions favorable to progress." This refers not only to the supply and demand situation, but to the accelerating rate of technical progress and to the acute need for high caliber technical men in management as well as technical positions.

Because our industry is in an era of technical upsurge, it is almost a new industry for the technically trained man. In a sense, he starts "on the ground floor." Then he can ride upward in his career on a tidal wave of technology and engineering.

Furthermore, food manufacturing is growing rapidly in business volume. Between 1929 and 1950, food manufacturers' sales increased 234 percent. And since 1950 the rising curve has steadily bent more sharply upward. Population is increasing more rapidly—in fact the stork made a record 4 million trips last year.

Also, manufactured and processed foods are slicing a steadily bigger share of total food business.

We predict that the industry will double its business to reach annual sales exceeding $100 billion in the next 25 years.

By comparison with the food industry, steel, automobile, and other greats are "lesser operations."

The career check-list mentions the industry as a top spender for improvements. In recent years, from $750 million to $1 billion has been spent annually for new plant and equipment. In most years, food has been second only to the great chemical processing industry in capital expenditures. Just to intelligently direct the spending of this kind of money calls for a lot of technical manpower. And certainly there is an advantage in making a technical career in a field that spends so much for improvement.

One point on the career check-list calls for an explanation. I refer to the advantage of working in a non-seasonal industry. This is an important point to get across to youngsters. When they think of food processing, many people think of the local cannery—a little seasonal operation. But the larger canners have broadened their product lines enough to keep them going pretty much the year around.

Other food plants—such as those producing bottled milk, beverages, beer, and meat—often have seasonal peaks in their operations. But they operate at a high level year in and year out. Factories producing such products as floor, bread, and cereals operate steadily throughout the year because demand is constant and raw materials are stockpiled.

But whether or not there are peaks and valleys in plant operations, the technical man in the food industry is busy the year around. In fact most of his production-line improvements are developed and put into effect at off-peak times, for obvious reasons.

The country-canning-plant and mamma-and-popa-bakery concept that so many have of the food industry is a serious deterrent when it comes to inducing young people to study for technical careers in our field. And it's going to take a lot of education of high school students and teachers to attract the technical manpower that is badly needed now, will be urgently necessary in the future.

The need to take action is made particularly acute by today's industrial competition for technical talent. Never has the bidding been so strong, and at a time when young people are shying away from difficult studies like science and mathematics. Then there is a critical and worsening shortage of science teachers in high schools.

Pick up a copy of the Sunday *New York Times* and you find four or five pages of display advertisements for engineers. And many of these ads promise practically everything but the business to engineers who will take the jobs offered. That's tough competition for technical talent. And it influences young people who are choosing their careers.

Look over the literature issued to "sell" young people on certain types of careers. You see attractive booklets from organizations like the Engineers' Council for Professional Development. These explain and extoll the career opportunities for mechanical, civil, electrical, electronic, and chemical engineers. And not a word about the food industry, except maybe a line pointing to it as a place where chemical engineers can find jobs. Food technology and food engineering are not mentioned.

Then you see equally attractive and persuasive booklets from engineering and agricultural colleges and universities. The engineering booklets are much like that of the Engineers' Council. The agricultural booklets paint a pretty picture of the opportunities in farming and the agricultural and allied industries. But they don't say anything about careers in food processing science, technology, or engineering.

The Association of Land-Grant Colleges and Universities has just issued a well-illustrated, king-size booklet under the title, "There's a Career Ahead for You in Agriculture." In a section devoted to agricultural industry, food and fiber processing is mentioned as a field for agricultural engineers. And this section makes a couple of interesting statements:

1. "In the enterprises that serve the poultry industry, there are 20 jobs for every qualified applicant. The industry says that it can use from 2,500 to 3,500 graduates in the next five years."

2. "With rapid expansion, the soybean industry estimates it will need at least 1,000 more agricultural graduates in 5 years."

A table in the booklet carries this enticing title, "Each Year—15,000 New Jobs in These 8 Fields." One of the 8 fields is agricultural industry, and its quota is 3,000 new jobs annually. A dozen different branches of agricultural industry are listed. Among them are food processing, grain and seed processing, meat and poultry packing, dairy processing, and fats and oils. We would combine all of these under food processing. But to the Association of Land-Grant Colleges and Universities, dairy processing, for example, is not food processing.

Perhaps we should be grateful for the little attention that our industry gets in this booklet. Certainly it is more promotion than the food processing industry has done for itself.

Which brings us to some suggestions as to what we ought to do to get more people interested in technical careers in food manufacturing and processing.

Here I pass on to you comments which I recently obtained from the heads of several food technology and engineering schools:

1. "Carry out programs at the local level; in other words, programs of secondary school recruitment and programs aimed at keeping the college men interested in the field. And offer opportunities for advancement after graduation."

2. "Organize a national cooperative advertising campaign to mention the need for engineers and food technologists in all food company national advertising. Have any funds donated to universities earmarked for underwriting the expenses of their food engineering or food technology departments."

3. "Be more aggressive in inducing promising high school seniors to enter the scientific fields, publicize the opportunities in the food sciences, and encourage promising young employees to enter this field."

This particular educator adds an interesting indictment of the industry to his suggestions: "I mention the last point (encouraging young employees to enter the field) because I have encountered several young men employed in the food industry who plan to enter a university this fall. None intends to enroll in a field which even touches upon food processing, or the more fundamental fields related to the food industry."

4. "Contact high schools and acquaint them with the opportunities of the food industry. We are doing this, and our classes have tripled and quadrupled for succeeding years."

5. "Publicize food technology as a profession with opportunities. And establish and support scholarships and fellowships, both undergraduate and graduate."

6. This one tosses the ball to me: "Keep writing about opportunities for young food technologists. Publish an article now and then which can be reprinted for greater distribution by universities to high schools."

We have published one such article, and 22,500 reprints have been distributed. Perhaps it is time for us to print another. But if we do, I hope that not only schools, but people in the industry, will do something with it—or at least with the information and ideas presented.

Just think what an impact could be made if one or more food companies in every town across the country would do a career promotion job in its local high school.

An inspired speaker can make a strong and lasting impression on high school students.

7. "Publicize the enormous opportunities available for technically and scientifically trained people in the food industry. And provide scholarships for students majoring in food technology or in biochemistry, microbiology, and chemical engineering."

8. "Grant scholarships. Establish 'chairs' of Food Technology so that teachers of food technology will be paid enough to hold them."

9. This one really tears into the problem:

"There has been a dormant situation as regards undergraduate enrollment in food technology for the past several years, for a variety of reasons. Among the contributing factors is the apparent reluctance of the food industry to help establish and support the necessary educational facilities and to encourage the essential basic curricula to the end that graduates might assume a recognized professional status upon their college education. There has been a tendency in state institutions to incorporate food technology curricula into departments of science education in fields somewhat remote from food processing, to say the least."

The author of these last remarks also points to indifference on the part of technical people in our industry when it comes to encouraging their own children and others to go into food technology or engineering.

And he suggests the establishment of some agency similar to the Engineer's Council for Professional Development to promote technical food education and to set up a system of accrediting courses.

Further ideas for promoting our industry as a place to make a rewarding technical career are found in activities carried out, or planned, by a few companies and associations.

The American Dairy Science Association, President Gould tells us, recognizes that it has a leading role to play in regard to the training of future leaders for the industry, and also in respect to the shortage of trained personnel. The Association has made some moves in this direction:

1. It has gone on record as recognizing the need for an effective film, or films, promoting the dairy branch of the industry, and calling attention to the career opportunities which the industry offers. Such films would be shown before high school students and counselors, the counselors of other agricultural groups, and before lay groups in general.

2. The Association also is considering the development of a new section which will be concerned with dairy education. It is thought that each annual meeting of the association should have at least one session dealing with teaching techniques, procedures for recruitment, etc.

The Institute of Food Technologists has a committee on education. And one of its problems is to determine what type of curriculum is best suited to training technical people for the industry. There is a wide difference of opinion, not only among members of the committee, but among people in the industry. Some say the industry needs pure scientists, others think technologists are the answers, and still others, including me, believe that more food engineering ought to be taught.

An example of what a single company can do to encourage young people to prepare for technical careers in the industry is an affair conducted a year or so ago by Continental Can Co. This firm held a conference to which technical teachers in the greater Chicago area were invited. At this meeting, speakers explained the need and opportunities for technical talent to the teachers, so that they might pass the information along to their students.

Also out in Chicago, technical people in our industry have been highly successful in getting the food career story on TV. This is something to think about. They tell me that, with the right approach, it is fairly easy to get free time on some local TV programs. The right approach seems to be to offer interesting information and speakers, on trends and developments in the industry, as well as on career opportunities.

I am informed by Col. Charles S. Lawrence, executive secretary of the Institute of Food Technologists, that approximately 300 food technologists and engineers were graduated this year. Of these, 76 hold a Masters degree, and 59 have a PhD.

This is indeed a pitifully inadequate number for our great industry.

From the colleges and universities, I have learned that an average of five jobs were available for every graduate with a BS, six for each man with a Masters, and three for the PhD.

One MS graduate being released from the Armed Forces was interviewed for 26 positions.

Now this situation will get worse before it gets better. Educators report that fewer young people are interested in technical training. There is a decreasing number of math and science teachers in high schools. And other industries are doing much more to attract young technical talent than is our industry.

Unless people like you take a serious interest in the problem and do something about it, the food industry is going to be seriously handicapped in the not distant future.

A survey recently by National Science Foundation found food firms suffering already from lack of adequate technical personnel.

We've got to get our industry out of the category of the great unknown. We must get the story of its challenging career opportunities across to the public, and particularly to students and teachers in the high schools. We've got to crystallize the industry's requirements in technical training and get the right curricula in the colleges and universities. We must support those schools teaching food science, technology and engineering. And we should get technical food courses on an accredited list.

Only through such steps can we bring the number of technical careers in the industry anywhere nearly in line with career opportunities. And that we must do to insure progress.

Meanwhile, we should take better care of the technical talent already in the field—so that we may keep them there. Statistics show that more professional people leave the food field than depart from other major industries. To hold a good man requires good pay, effective use of his talents, delegation of authority, and promise of bigger opportunity.

I am told that not all companies in the dairy, canning, and other branches of the industry are wise to these up-to-date personnel policies.

And one more point: If a dairy, canning, or other food company brings in technical high school students for summer work, it should do more with them than assign menial tasks. An effort should be made to acquaint these youngsters with the technical opportunities of the business, and to encourage them to take a technical food course when they go to college.

THE INDUSTRY PROGRAM ON CRABMEAT PLANT SANITATION[1]

G. Clifford Byrd

Technology Division, National Fisheries Institute, Washington, D. C.

Mr. Byrd received the B.S. degree in Dairy Manufacturing from the University of Maryland in 1931. While at the University he was Assistant Manager of the University Dairy and taught classes in products testing and manufacturing. After graduating he was placed in charge of quality control at Royal Farms Dairy in Baltimore for one year. He subsequently was employed as Laboratory Manager of Southern Dairies in Washington, D.C. and as Superintendent of the New York Eskimo Pie Corporation. In 1949 he established his own laboratory firm. In addition to operating his own firm, he serves as Assistant Director of the Technology Division, National Fisheries Institute.

Before talking about the Industry's program on Crabmeat Plant Sanitation let us project ourselves back forty years and think for a few moments about the lack of sanitation in food handling in that era. At that time there was no dairy industry as we know it today. Diseased herds were prevalent and there were no codes for producing milk at the farm level. The same thing applied, with conditions even worse, if possible, in other aspects of the food industry, and particularly in the crabmeat industry. Crabmeat processing was carried on in any available shack or building, which in many cases could be compared to the old dairy barn. The buildings were of wooden construction with wooden floors and benches. The water supply was from a wooden barrel or tank filled with rain water which drained off the roofs. The buildings were neither rodent nor fly proof. The picking basins used comprised anything from tin to broken agate, brought by the pickers from home. The opening and closing, single-blade, bone-handle knife, commonly known as the Barlow knife, was used to pick the meat from the crabs. The handles of these knives often were wrapped with rags, frequently dirty and bacteria–laden. The crabmeat was packed into gallon oyster cans, some of which had been used many times. There was no finely crushed ice available, therefore, refrigerating and chilling of the meat in the gallon cans was slow. Thus, it can easily be seen why the then common belief "to eat crabmeat and dairy products at the same time was sure death" was prevalent. At this early time, however, it is very possible that some of the blame for this could have been credited to the dairy industry itself.

The dairy industry, however, became conscious of sanitation years ago, and after studying many laboratory findings, developed codes and tests which were put into effect. The industry then educated the farmer to produce and deliver milk which conformed to these standards.

The steps in producing crabmeat are many more than in the production of milk, and it is necessary to have the same kind of general good housekeeping and sanitation throughout every one of them. In the beginning, crabmeat was consumed locally within a radius of 100 miles. Soon the demand and production were increased to a point where crabmeat was marketed through wholesale and retail channels. The profits were good and this enticed more producers, particularly since the initial investment of capital was small. This meant an influx of producers who had no knowledge whatsoever of sanitation. The results were complaints to health authorities, seizures, condemnations, and court actions which served to show the dire need for investigation into the cause and source of contamination.

By the year 1938, much progress had been made in the physical plant conditions such as better con-

[1]Presented at the 42nd Annual Meeting of the *International Association of Milk and Food Sanitarians, Inc.*, Augusta, Georgia, October 2-6, 1955.

structed buildings with adequate light, ventilation, running water, and cleaning facilities; with better cooking equipment, refrigeration, and general sanitation practices. Yet the widespread complaints still dogged the Health Departments, with the result that the Fish and Wildlife Service, intent upon learning the cause or causes, dispatched two of their foremost workers, Joseph F. Puncochar and Samuel R. Pottinger to Crisfield, Maryland to investigate conditions. They were to obtain material which would enable them to set forth sanitary requirements of the handling operations for the production of crabmeat and suggestions for technological improvements. Mr. Puncocher and Mr. Pottinger included in their comprehensive and excellent study the following invaluable phases of production:

1. Destruction of bacteria in crabs by cooking.
2. Contamination of cooked crabs during cooling.
3. Bacteria in commercially prepared crabmeat.
4. Bacteria on cooling platforms.
5. Bacteria on hands of employees.
6. Removal of bacteria from hands by various washing procedures.
7. Bacteria on picking and packing tables.
8. Cleaning of picking and packing tables.
9. Picking utensils used.
10. Bacteria on shovels used for handling crabs and ice.
11. Bacteria in ice.
12. Bacteria on doorknobs.
13. Bacteria in chlorine solution.

Their procedures were similar to those which would be followed by milk sanitarians in checking and seeking to correct a contaminated milk supply.

In 1943, a group of crabmeat producers in Crisfield, Maryland, banded together and hired a bacteriologist to establish a testing laboratory and to advise them in the proper methods of production. Some of the results of this venture included the replacement of steam boxes by steam retorts and better general supervision. By such improvements, seizures and condemnations of crabmeat were eliminated by ninety-eight percent. Since these small beginnings there have been established several such available sources of testing and information.

In 1953, the Health Department of the City of New York indicated that it was considering an amendment to its Sanitary Code which would set forth tolerances for bacterial counts as well as certification of the sanitary conditions under which crabmeat was produced. In July, 1954, the amendment was enacted and was to be made effective as of January 1, 1955. The regulation actually went into force on February 1, 1955. The time between the enactment and the effective date was to allow the industry to meet the physical requirements necessary for the certification of some approved inspection service.

The bacterial requirements were set as follows: not more than one hundred hemolytic staphylococci per gram; not more than one hundred coliform organisms per gram; not more than 1,000 enterococci per gram; and a total bacterial count of not more than 100,000 per gram.

Naturally, such requirements threw the industry into turmoil since only about thirty-eight percent of the production could meet these requirements and a much smaller percentage could meet them consistently. So the leaders of the industry turned to the National Fisheries Institute for assistance. The Institute, after discussing the problems of the industry with the industry members, and the requirements of New York City with the Health Officials, gathered all available work done by the Fish and Wildlife Service and other technologists. They sought advice from the Federal Food and Drug Department and the United States Public Health Service. They collected the governing rules and regulations pertaining to shellfish from the different state health departments and obtained other manuals of information relating to sanitation. After gathering this information, the Institute called together a group of technologists, some from the government, some from private firms, and others from the industry. This group with all the collected material at its disposal succeeded in compiling a *Voluntary Industry Code on Rules and Regulations for the Sanitary Control of the Handling, Packing and Distributing of Crabmeat.* One part of the code included a Sanitation Scoresheet with instructions on how to use it.

The objectives sought through the adoption of the "Voluntary Industry Rules and Regulations" were as follows:

1. To safeguard the health of persons eating crabmeat.

2. To assure uniform inspection of procedures and sanitation standards among the subscribers to this code.

3. To provide for an accredited list of crabmeat packers subscribing to this code.

4. To provide operators of cooked crab establishments and crabmeat plants with an adequate, practicable guide for the construction, equipment, maintenance, and operation of their establishments.

To make the code effective and worth while it was planned to certify the packing plants of those who wished to subscribe to the code after an inspection of the plant by a committee of the National Fisheries Institute or some other acceptable certifying agent. However, when the New York City code became effective, it was apparent that the National Fisheries Code might overlap and actually conflict with the certification requirements of New York City. Thus the National Fisheries Institute Code is available and has been used as a guide by the industry.

Only recently has the crabmeat industry begun to plan for quality standards on a national level. But due to the wide geographical separation of the producing areas of the industry, this cannot be brought about except through the medium of a central agency. It is hoped that through visual educational means such as slides, and pictures coupled with lectures, and perhaps short courses at State Universities, the story of the need for proper supervision can be brought home to the industry and so create a desire to produce the best available products.

The crabmeat industry program is based largely on the sanitation program of the milk industry and is greatly indebted to the dairy industry for its extensive work in sanitation, as nearly all of its ideas of sanitation requirements have come from the dairy field. This is as it should be, as the two industries have much in common, not only in the perishability of the products, but in the fact that today millions of gallons of milk are used annually in conjunction with crabmeat and other seafoods to prepare some of the finest and most delicious dishes that can be consumed. It is hoped that by producing a better product and making it safer to be blended with milk, the seafood industry can repay the milk industry for the many ideas and guides which have been obtained almost exclusively from the work of the milk sanitarians.

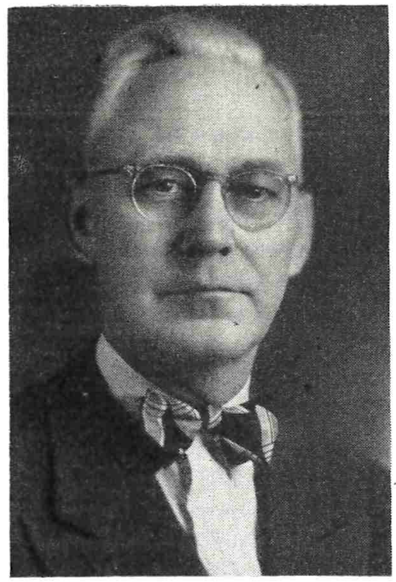
A NEW TYPE HOME PASTEURIZER

Ernest O. Herreid

Illinois Agricultural Experiment Station

(Received for publication September 22, 1955)

The number of recognized cases of human brucellosis is increasing. Persons become infected with this disease by drinking raw milk and eating products from it, handling infected livestock and their carcasses, and eating improperly cooked meat. Pasteurization destroys the bacteria that cause brucellosis. An immersion type two-gallon home pasteurizer is described. It has features that make it possible to properly pasteurize milk in the home. This unit is simple, efficient and easy to operate.



Dr. Herreid graduated from S. D. State College in 1927 and received the M. S. degree in 1928 and the Ph. D degree in 1933, both from the University of Minnesota. He held the positions of Assistant, Associate, and Professor of Dairy Manufactures at the University of Vermont from 1936 to 1945 and presently is Professor of Dairy Technology at the University of Illinois.

Milk supplies for public distribution have been pasteurized for about 50 years in this country. These years of experience have shown conclusively that pasteurization is the only practical way to make milk safe for human consumption. Every large city in the United States and many of the smaller ones require compulsory pasteurization of milk supplies. But in spite of this mandatory action of cities to protect the health of people, thousands of farm families in this country are drinking raw milk. This is especially dangerous because of the prevalence of brucellosis. Human brucellosis, frequently called undulant fever, can be contracted from drinking raw milk, handling and contact with infected cattle, swine, and goats, and eating meat that has not been adequately cooked. At present there is no proven cure for brucellosis. The bacteria that cause this disease in cattle, goats, and hogs are very much alike. In fact scientists have found that the swine and goat types produce the most severe infections in man. It has been estimated that 40,000 to 500,000 people have brucellosis each year in the United States. In Illinois, brucellosis is estimated to cost the livestock industry from $4,000,000 to $6,000,000 each year in the loss of animals and food products from animals. The courts (1) in Connecticut have ruled that hired men who contract brucellosis on farms are entitled to compensation and medical expenses from their employer during the period they are not able to work.

In order to establish a code that could be more easily enforced, the United States Public Health Service formulated two standards for pasteurizing milk. The first one, the holder method, specified that milk must be heated to 143°F., and held for 30 minutes. The second one specified that milk must be heated to 161°F., and held for 15 seconds. Both procedures involved the installation of specialized equipment to make certain that every particle of milk would be heated to the proper temperature. Such equipment is expensive and could be justified only in commercial installations. It is the purpose of this paper to describe for home use a small pasteurizer that provides inexpensive safety features which makes it possible to pasteurize milk in the home.

Experimental

In the holder method of pasteurization, the U. S. Public Health Service specified that the pasteurizing vats must be equipped with space heaters which conduct steam through tubes into the space above the milk in the vat in order to heat this area about 5° to 7°F., above that of the milk. This is done to destroy bacteria in the foam on the surface of the milk, to compensate for losses of heat, and to properly pasteurize milk which might be splashed on the underneath surface of the cover of the pasteurizer. Such space heaters would be difficult and expensive to incorporate in a home pasteurizer. The home pasteurizer described (Fig. 1) in this paper is constructed and operated so that the milk and all surfaces with which it comes in contact are heated

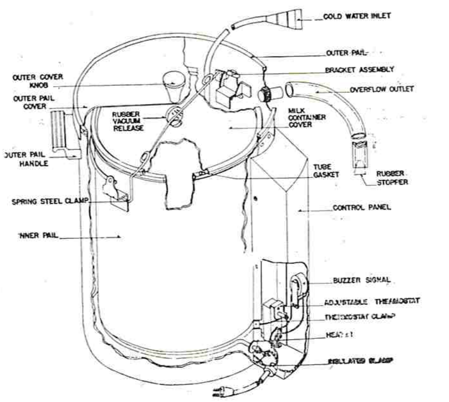


FIGURE 1. New type immersion home pasteurizer.

sufficiently to make it safe for human consumption. The milk is pasteurized in a container which is completely immersed in a water bath. The milk container is closed with a cover that has a grooved rim which holds a round hollow gasket. The entire cover is held on the milk container by a spring steel clamp which is attached to a bracket on each side. The center of the cover has a hole about ⅜ inches in diameter that is closed during pasteurization with a round rubber stopper which is centered through the steel spring clamp. This makes it possible to release the vacuum after the milk has been cooled and it also provides a convenient place for inserting a thermometer to verify the pasteurization temperature.

The water is heated with a 1250 watt immersion heater and is thermostatically controlled by an adjustable and specially attached thermostat. The thermostat opens the electric circuit to the heater in the water bath and a buzzer sounds when the milk has reached the proper temperature. Cooling water flows into the outer pail and is discharged through the overflow outlet which is below the cover. The level of the water can be adjusted below the cover.

Since the temperature at the top of the water bath is always about 10° to 12°F. higher than that of the milk, it is evident that all surfaces of the milk container including such crucial points as its pouring rim, space above the milk line, and underneath surface of the cover, are heated sufficiently to destroy all harmful bacteria that normally might be found in milk. Supporting data will be presented for these and other points of interest.

In preliminary trials, it was found that the temperature of the milk in the container varied from top to bottom, being warmest at the top. Since this pasteurizer does not mechanically agitate the milk, it was necessary to determine the proper temperatures for pasteurization. This was done by heating milk at different temperatures and taking samples with sterile 10 ml. pipettes from about one half inch below the top center and from the extreme bottom of the container. To obtain samples from the bottom of the container, the tip of the pipette, before sterilization, was plugged with cotton which was removed with slight pressure after it had been moved to the bottom center. The pipette was filled by pressure with milk. The samples were taken within 20 seconds after the buzzer sounded and they were cooled in an iced bath. Phosphatase tests were made by the method of Sanders and Sager (2) using a Coleman model 11 spectrophotometer and setting it at 100 per cent transmission with distilled water.

It is evident from Table 1 that the temperature range in the bottom of the container for properly pasteurizing milk was somewhere between 148.5° to 149.3°F. For subsequent trials it was decided to set the thermostat to control the temperature in the milk about one inch below the surface at 160° F., which could be reproduced to ± 0.3°F., (Table 2). This would give a margin of safety as phosphatase tests above 4 gamma of liberated phenol per ml. of milk indicates inadequate heating by the method of Sanders and Sager (2). The phosphatase test is the criterion used for determining proper pasteurization in this work.

The heating rates for the milk and water in the top and bottom, respectively, in the containers are shown in Figure 2. They were obtained with thermocouples on the same lot of milk. The differences in temperature between the top and bottom of the water bath were small, except for variations of as much as 7 degrees for periods of 3 to 5 minutes during heating. The differences in the milk were about 6 degrees from top to bottom in the range of tem-

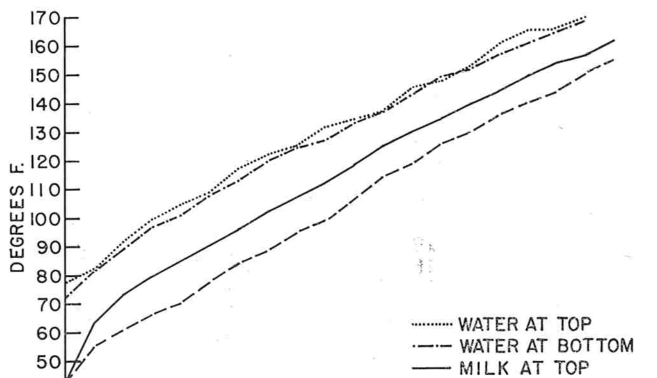


FIGURE 2. Relation between rates of heating In The Top

TABLE 1 – THE TEMPERATURES NEAR TOP AND EXTREME BOTTOM OF MILK CONTAINER AND PHOSPHATASE TESTS OF THE MILK

	Top		Bottom	
Trial	°F.	Phosphatase (gamma/ml.)	°F.	Phosphatase (gamma/ml.)
1	150.9	a	140.3	a
2	151.2	a	141.7	a
3	151.6	a	141.3	a
4	151.7	a	141.9	a
5	152.6	6.2	142.1	a
6	155.3	1.2	148.5	4.7
7	155.8	1.0	149.3	2.6
8	156.9	0.7	150.9	2.1
9	158.0	0.8	152.0	0.4
10	158.9	0.9	152.9	0.6
11	159.9	0.4	153.9	0.5
12	160.7	0.3	154.2	0.3
13	161.1	0.0	154.4	0.2
14	161.7	0.0	155.2	0.0

[a]Too blue to measure

peratures where satisfactory phosphatase tests were obtained (Table 1).

The efficency of the home pasteurizer was determined by pasteurizing 15 lots of raw milk and four of cream from different milk plants. Total and coliform counts were made of the raw and pasteurized milk according to Standard Methods (3). Phosphatase tests also were made of each lot of mixed pasteurized milk.

TABLE 2 - THE TEMPERATURE OF THE MILK NEAR THE TOP AND EXTREME BOTTOM OF THE CONTAINER WITH THE SAME THERMOSTAT SETTING

	Milk Temperature		
Trial	Top	Bottom	Difference
	(°F.)	(°F.)	(°F.)
1	160.4	154.3	6.1
2	159.7	153.8	5.9
3	160.0	153.5	6.5
4	160.1	153.7	6.4
5	159.9	153.6	6.3
6	160.1	153.6	6.5
7	160.3	154.2	6.1
8	160.3	154.1	6.2
9	159.7	154.3	5.4
10	159.9	153.6	6.3
	av. 160.0 ± 0.3		

The results in Table 3 indicate the extent of destruction of bacteria that might be expected when raw milks and creams from different sources were pasteurized. It can be concluded that the home pasteurizer set to control the temperature at 160° ± 0.3° F. will properly pasteurize milk. The phosphatase tests of the milks in trials 10, 12, and 15 were lower than their boiled controls. This apparent inconsistency occurred because the calculations were made from light transmission percentages that were on the edge of the sensitivity of the spectrophotometer. The other milks had either low or zero phosphatase values.

People who have been drinking raw milk become used to its natural flavor and are sensitive to flavors that result from heating milk above temperatures required to make it safe. Some farm people also prefer a pasteurizer that saves as much as possible of the creaming ability of milk because they use cream for cereals, coffee, fruits etc. Flavor and cream volume studies were made of milk pasteurized in the home pasteurizer.

The changes in flavor scores (Table 4) of the raw and its pasteurized milk are not significant. In seven trials feed flavors were found in the raw milks and in the same pasteurized milks. This is inevitable as these flavors and odors cannot escape easily during pasteurization because the milk container is closed. To avoid feed flavors in milk the cows should be milked before they are given succulent feeds such as the various ensilages. Feed flavors and odors always will appear in milk if the cows are given these feeds immediately before milking.

The creaming ability (Table 4) of milk pasteurized in the home pasteurizer was reduced about 25 per cent which would be greater than milk commercially pasteurized and not homogenized. The creaming observations were made from milk in 100-ml.-graduated cylinders, held at 40° to 45° F.

This pasteurizer is constructed to hold some pressure over the surface of the milk as the cover is fitted with a hollow gasket and both are held on to the milk container with a spring steel clamp. To determine the amount of pressure in the milk container during the heating period, a small manometer was attached to a specially made opening in the cover. The pressure was observed during the heating period.

The results from two trials in Table 5 revealed that the pressure increased to 17.0 and 17.5 mm. when the milk was heated to 160°F., and 161°F., respectively, and when the temperatures were obtained from the top of the milk container. This is not the total pressure as water vapor escapes from around the edges of the cover during the heating period. Bubbles can be seen escaping into the water as the temperature of the milk increases in the milk container. It is evident that the pressure within the milk container is greater than that outside of it and for this reason there is no danger of water flowing into the milk during pasteurization.

Since the cover of the container is tight enough to hold some pressure, then it would be expected that the milk would be below athmospheric pressure during the cooling period. A manometer was attached to the cover the same as was done previously and the pressure was determined by cooling pasteurized milk to 56°F. with water.

The results in Table 6 reveal that the pressure in two trials was reduced to 16.5 and 18 inches, respectively, when the milk was cooled to 56°F. Since the pressure within the milk container is below atmospheric pressure, then it is important that the milk container should not be completely covered with water during cooling as some water might be sucked into the milk or contaminate the pouring edge of the milk container. This is prevented by the over flow below the cover. It was found that a cover equipped with a flat gasket allowed seepage of water into the milk container which was completely immersed in cold water. This was demonstrated by adding to the water, a blue dye, traces of which were found above the milk line on the inner surface of the milk container after cooling the milk.

SUMMARY AND CONCLUSIONS

The complete immersion type two gallon home pasteurizer described in this paper fulfills the requirements for a unit that is simple, efficient, and easy to clean. It embodies some of the principles for thorough and positive heating of milk that are found in the commercial units. It meets the farm demands for a unit that preserves and maintains the natural flavor of milk as well as much of its natural creaming ability. Since the milk is heated in this pasteurizer in a tightly closed container, it is evident that any feed or other off flavors present in the raw milk cannot easily escape during the heating process and they will remain in the pasteurized milk. Therefore, it is important that the raw milk should be free from off flavors before it is pasteurized.

Because properly pasteurized milk will remain fresh in the refrigerator for at least one week, this two gallon home pasteurizer fulfills the needs of any family, large or small.

TABLE 3 - THE PASTEURIZATION EFFICIENCY OF THE HOME PASTEURIZER

	Bacterial counts of:				
	Raw milk		Pasteurized milk		
Trial	Standard plate count	Coliform count	Standard plate count	Coliform count	Phosphatase
					(gamma/ml)
1	25,000	30	400	3	0.5
2	110,000	17	880	0	0.6
3	200,000	6	17,000	1	0.8
4	1,200,00	120	650	0	0.4
5	890,000	17	300	0	0.0
6	1,900,000	300	12,000	4	0.5
7	210,000	31	190	0	0.0
8	28,000	8	90	0	0.6
9	17,000	3	120	0	0.0
10	240,000	79	400	0	–0.0
11	1,000,000	56	22,000	0	0.8
12	880,000	110	3,200	0	–0.0
13	110,000	22	90	0	0.1
14	3,200,000	61	94,000	0	0.3
15	12,000	10	80	0	–0.0
16[a]	160,000	42	2,200	0	1.2
17[a]	390,000	33	3,100	0	1.5
18[b]	1,200,000	800	22,000	0	1.3
19[c]	190,000	72	2,100	0	1.6

[a]30 percent cream; [b]22 percent cream; [c]43 percent cream.

TABLE 4- THE EFFECT OF PASTEURIZING MILK IN THE HOME PASTEURIZER ON ITS FLAVOR AND CREAM VOLUME

	Cream	Volume	Flavor	
Trial	Raw milk	Past. Milk	Raw Milk	Past. milk
	(ml.)	(ml.)		
1	15.0	11.0	38 feed	39 feed
2	14.0	10.5	37 feed	37 feed
3	14.0	11.0	36 feed	36.5 feed
4	13.1	8.0	40	39.5 heated
5	12.3	10.2	39 feed	39.5 feed
6	16.0	12.1	38.5 feed	38.0 feed
7	15.5	12.5	39.5 feed	40.0
8	13.5	11.0	40.0	39.5 heated
9	13.0	9.5	40.0	40.0
10	15.1	10.0	38.0 feed	37.0 feed
av.	14.1	10.6		
%	100	74.8		

TABLE 5 — THE PRESSURES ABOVE ATMOSPHERIC WITHIN THE MILK CONTAINER DURING PASTEURIZATION

Trial 1		Trial 2	
Temperature	Pressure	Temperature	Pressure
(°F.)	(mm. Hg.)	(°F.)	(mm. Hg.)
100	2.0	98	1.9
130	7.5	118	4.0
143	12.0	135	9.0
150	17.0	146	12.5
161	17.5	160	17.0

TABLE 6 — PRESSURES BELOW ATMOSPHERIC IN THE MILK CONTAINER DURING COOLING

Trial 1		Trial 2	
Minutes	Vacuum	Minutes	Vacuum
	(in. Hg.)		(in. Hg.)
0	0	0	0
4	2.8	10	9.9
7	4.8	5	6.8
11	9.6	15	11.7
15	11.9	20	15.5
21	16.0	25	18.0
25	16.5		

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3. Standard Methods for the Examination of Dairy Products. 9th ed. Amer Publ. Health Assn., N. Y. 1948.

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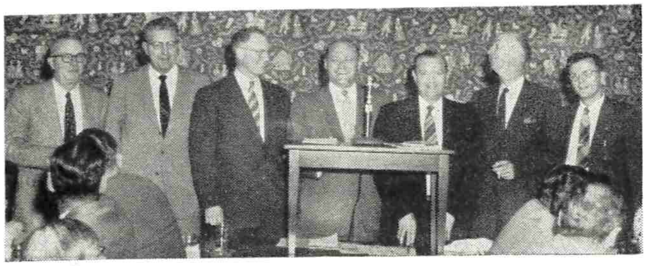
FIFTH ANNUAL MEETING

The Rocky Mountain Association of Milk and Food Sanitarians held their Fifth Annual Meeting December 14, 1955 at the Coach & Four Restaurant in Denver. This "get together" as usual followed the Annual Western States Dairy Convention December 11-13.

Outstanding speakers in their field gave excellent papers that were of interest to all. Dr. Merle P. Baker, Associate Professor, Dairy Industry, Iowa State College discussed the "Uses and Limitations of Various Sanitizers on the Market." Dr. Ken Weckel, Professor of Dairy & Food Industry, Wisconsin Alumni Research Foundation, spoke on "Food Addi-



tives in Foods". Dr. James C. White, Professor of Dairy Industry, Cornell University, discussed "Public Health Significance of Objectional Flavors and Odors in Milk and Dairy Products". Mr. Paul V. Shank, Colorado-Wyoming Restaurant Association spoke on "The Activities and History of Progress of the Food Industry on a National Scale". Mr. H. L. "Red" Thomasson, Executive-Secretary, IAMFS gave "Investigation Techniques used in Tracing Food Borne Outbreaks". In the afternoon a symposium and panel discussion by the above experts on "Today's Sanitation Problems" proved to be an interesting "highlight of the meeting.

Dr. William Hoskisson, Superintendent of Quality Control, Arden Sunfreeze Creameries, Salt Lake City, President-Elect, assumed the Presidency and will serve until the next annual meeting. Other officers of the Association are: Wayne W. Stell, (President-Elect), Albuquerque Health Department, Albuquerque, New Mexico; William E. Polzen, (1st Vice- President), Colorado Department of Agriculture, Denver, Colorado; Carl B. Rasmussen, (2nd Vice-President), Wyoming State Department of Public Health, Sheridan, Wyoming; John E. Guinn, (Secretary-Treasurer), Wyoming State Department of Public Health, Cheyenne, Wyoming; Carl J. Yeager, (Auditor), Beatrice Foods Co., Greeley, Colorado; and Paul Frebarin, (Auditor), Salt Lake City Health Department, Salt Lake City, Utah.

DR. DONALD R. JACOBSON MADE ASSISTANT PROFESSOR

Dr. Donald R. Jacobson on February 1st assumed the duties of assistant professor in Dairy Husbandry at the University of Kentucky. He will be in charge of dairy cattle nutrition and physiology research and will teach classes in dairy husbandry at both undergraducate and graduate level.

Dr. Jacobson received both the Bachelor and Master of Science degrees at Kansas State College. He was granted the PhD degree at the University of Maryland and served on the staff there for the last 3½ years.

As senior author, Dr. Jacobson has published several papers concerning the factors involved in feed-lot bloat. He is also co-author of an article about the relatively new use of tracers in perfusion experiments on milk secretion.

As a member of the American Dairy Science Association, he has presented papers before that organization. Dr. Jacobson is also a member of the American Society of Animal Production and Alpha Zeta.

The position being filled by Dr. Jacobson is the vacancy caused by the resignation of Dr. Charles A. Lassiter who recently joined the dairy husbandry staff at Michigan State University.

DAIRY REMEMBRANCE FUND GRADUATE ASSISTANCE GRANT AVAILABLE

Dairy Remembrance Fund, Inc. has one $500 Graduate Student Assistance Grant available for a promising and worthy student pursuing graduate study in the Dairy Production or Manufacturing fields. Department heads and professors who have students who are in particular need of supplementary funds for the completion of degree work are requested to write the Chairman of the Allocations Committee, W. A. Wentworth, The Borden Company, 350 Madison Avenue, New York 17, N. Y. for further information and application forms.

NEW SPARTA "VIKING" PAIL BRUSH

After long research and development work, Sparta announces its new Swiss creamery style No. 43 "Viking" Pail Brush. A special feature of the brush is the new "exclusive" Sparta plastic block which the manufacturers claim will withstand virtually all types of shock and stress. The block is non-brittle and will not chip or crack throughout the life of the brush. The plastic material, while solid and firm, retains a certain amount of resiliency which is proof against chipping or cracking even when dropped or thrown on tile or concrete floors or against other hard objects. The resiliency of the plastic material also permits special "deep anchoring" of the tufts which, when once anchored into the block, will not loosen or "stray" out. The material holds the tuft under permanent tension and also keeps the bristles upright because a slightly smaller hole can be used than normally necessary to accommodate the tuft. More tufts are also used in each pail brush than in ordinary similar brushes thus providing greater water holding ability and more scrubbing capacity. The No. 43 Viking Pail Brush is filled with DuPont "Tynex" white nylon stiff bristles and the combination of this top grade nylon with the Sparta exclusive plastic block gives the brush a long extended life far beyond that ordinarily expected from the usual pail brush. The handle of this new "Viking" has been smoothly contour shaped to properly fit the hand and permit vigorous scrubbing with less hand and arm fatigue. Corners have been smoothly rounded and a hole in the end of the block has also been provided so that the brush may be hung up for drying and storage without damage to the bristles. Complete information may be had by writing to Sparta Brush Co., Inc., Sparta, Wisconsin.

HELPFUL INFORMATION

Editorial Note: Sources of information in a variety of subjects are listed below. Requests for any of the material listed may be sent by letter or postcard to the source indicated.

Atomic energy in pharmacology: Industrial and legal aspects. A booklet describing domestic and foreign pharmacological investigations with carbon 14, and related literature references. Government regulation of radio active isotope use is discussed. New York Committee on Atomic Information, Inc., 61 Broadway, Suite 704, New York 6, N. Y.

Dry whole milk - Proceedings of Symposium. Available without charge to those engaged in research. Quartermaster Food and Container Institute, 1819 W. Pershing Rd., Chicago 9, Ill.

A new treatise on pies. A book, 80 pages, $2.50. 1955. Technical Serivce Dept., American Maize Products Co., 250 Park Ave., New York 17, N. Y.

Bottling and Canning of Beer. D. G. Ruff and Kurt Becker. A book, 209 pages, $10.00. 1955. Siebel Publishing Co., 4055 W. Peterson Ave., Chicago 30, Ill.

The prevention of occupational skin diseases. A booklet, 40 pages, no charge. 1955. Association of Soap and Glycerine Producers, Inc., 295 Madison Ave., New York, N. Y.

Dairy plant sanitation. A booklet. Klenzade Products, Inc., Beloit, Wisc.

Evaporated milk and condensed milk high temperature cleaning techniques. A booklet. Klenzade Products, Inc., Beloit, Wisc.

High temperature recirculation methods, O-R system; In-place cleaning. A booklet. Klenzade Products, Inc., Beloit, Wisc.

Flour for man's bread. A series of articles on the history of milling and baking. Vitamin Division, Hoffman-LaRoche, Inc., Nutely 10 New Jersey or 286 St. Paul St. W., Montreal, Quebec, Canada.

The coloring or degreening of mature citrus fruits with ethylene. Agricultural Service Circular 961, U. S. Dept. of Agriculture. A circular, 10 cents. Superintendent of Documents, Washington 25, D. C.

Home care of dairy foods. A bulletin. American Dairy Association, 20 N. Wacker Drive, Chicago 6, Ill.

Vacuum packaging of dairy and food products. A 14 minute movie showing application of vacuum packaging methods. Dewey and Almy Chemical Co., Division of W. R. Grace and Co., Cambridge 40, Mass.

Instruments for measurement and control. A book, 371 pages, $10.00. 1955. Deals with industrial instruments for remote reading or remote automatic action. Includes general principles, illustrated by characteristics and details of typical instruments. Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Practical small scale making and testing of candy. A 16 mm. movie, 20 minutes, sound and color. Editor, Chemmunique, Atlas Powder Co., Wilminton, Del.

Handbook of official grain standards of the United States. 102 pages, 25 cents. Gives standards for wheat, corn, barley, oats, feed-oats, mixed feed-oats, rye, grain sorghums, flaxseed, soybeans and mixed grain standards. Also included are important features of grain inspection. Superintendent of Documents, Washington 25, D. C.

The house fly, how to control it. 5 cents. Tells how to control the housefly around the home and farm. Includes instructions on preparation of poisoned bait. Superintendent of Documents, Washington 5, D. C.

Established optimum conditions for storage and handling of semi-perishable subsistence items. A book, 130 pages, no charge. Quartermaster food and Container Institute, 1819 W. Pershing Rd., Chicago 9, Ill.

Know your packaging materials. A book, 123 pages, $1.75. American Management Association, New York 36, N. Y.

Units of weight and measure, definitions and tables of equivalents. A bulletin, 64 pages, 40 cents. U. S. Government Printing Office, Washington, D. C.

Bulletins of plans for control of disasters: (a) Before disaster strikes; (b) Fire control; (c) Panic and its control. 10 cents each. Association of Casualty and Surety Companies, 60 John St., New York 38, N. Y.

Recombined milk. Foreign Agricultural Report No. 84, U. S. Dept. of Agriculture, Foreign Agricultural Service, Washington 25, D. C.

Cleaning and sanitizing farm milk utensils. Farmer's Bulletin No. 2078, U. S. Dept. of Agriculture. 10 cents. Superintendent of Documents, Washington 25, D. C.

Pesticide official publication and condensed data on pesticide chemicals. A book, $3.00. 1955. Association of American Pesticide Control Officials, Inc., Box H. H., University P. O. College Park, Md.

Plant maintenance cleaning guide. A bulletin. Oakite Products Co., 21 Rector St., New York 6, N. Y.

Experimental cookery from the chemical and physical standpoint. Belle Lowe. A book, 573 pages, $7.50. John Wiley and Son's Inc, 440 Fourth Ave., New York 16, N. Y.

PAPERS PRESENTED AT AFFILIATE ASSOCIATION MEETINGS

Editorial Note: The following listing of subjects presented at meetings of Affiliate Associations is provided as a service to the Association membership. Anyone who may desire information on any subject is encouraged to write to the speaker or to the Secretary of the Affiliate Association concerned for the address of the speaker if it is not given in the program. A copy of the paper presented may be available for the asking.

CONNECTICUT ASSOCIATION OF DAIRY AND FOOD SANITARIANS

(Thirty-first Annual Meeting, January 11, 1956)

H. C. Goslee, *Sec.*, Dept. of Agriculture, State Office Building, Hartford, Conn.

Conn. Milk Industry Comm. for Civil Defense 1955 *Experiences.* Curtis W. Chaffee, Chairman

State Food Control Work During Disaster Periods. Harold Clark

50 *Years of Progress Under the* 1906 *Pure Food and Drug Act.* F. Leslie Hart

Is Total Distruction the only Safe Way of Handling Contaminated Food? Leo H. Lusby

Reports of Standing Committees: (1) Dairy Industry, (2) Laboratory Procedure, (3) Farm Practices, (4) Food Industry.

Cleaning-In-Place of Milk Plant Equipment including Tanks both Mobile and Stationary. – A panel discussion. S. C. Mizak, F. M. Skelton, Fred E. A. Smith and Archie B. Freeman

CALIFORNIA ASSOCIATION OF DAIRY AND MILK SANITARIANS

(37th Annual Meeting, October 17, 18, 19, 1955)

Mel Herspring, *Sec.-Treas.*, 1072 Clarendon Cresent, Oakland, Caif.

Forgotten Fundementals of Dairy Bacteriology. Dr. C. S. Mudge

Dairy Inspection Past and Present. Dr. C. L. Roadhouse

The Bovine Tuberculosis Testing Program. Dr. E. F. Chastian

Milk Inspection – The Producer's View. "Skip" Claudius, Consolidated Milk Producer's Assoc., San Francisco, Calif.

Milk Inspection as the Distributor Sees It. A. W. Hayes, Foremost Golden State Co., San Francisco, Calif.

The Milk Sanitation Program of the Public Health Service. L. H. Male

The Interstate Milk Shipment Program. L. S. Houser.

National Trends in the Milk Industry. H. Robinson Chief, Milk Sanitation Section, Milk and Food Program, Division of Sanitary Engineering Services, Public Health Service, Washington 25, D. C.

Progress in Milk Sanitation. – A panel discussion O. A. Ghiggoile, moderator.

(1) *3-A Sanitation Standards and Progress Made in Design of Equipment.* M. Howlett, Jr., L. A. City Health Dept., and H. S. Christianson.

(2) *Esonomic Factors Affecting Milk Distribution.*

Dr. D. Clark, Gianini Foundation, U. C. Berkeley, Calif.

Milk Flavors. Dr. Walter Dunkley, Dept. of Dairy Industry, U. C., Berkeley, Calif.

Pipeline Milking. – A panel discussion, G. McFarland, moderator, L. A. Co. Health Dept., R. Toschi, San Francisco Health Dept., R. Fausel, Los Angeles City Health Dept., Dr. W. Dunkley, University of Calif., Davis and E. Harder, Calif. State Dept. of Agriculture.

H.T.S.T. Pasteurization Controls and Procedures. (Slides), H. E. Eagan, Sanitary Training Section, Training Branch, Communicable Disease Center, Atlanta, Ga.

Testing Milk Pasteurization Electronic Controls. H. E. Eagen

MINNESOTA MILK SANITARIANS ASSOCIATION

(Annual Meeting, Sept. 23, 1955)

G. S. Steele, *Sec.-Treas.*, Minn. Dept. of Agriculture State Office Building, St. Paul, Minn.

What is it like on the other side? Dr. S. T. Coulter, Dept. of Dairy Husbandry, U. of M. St. Paul, Minn.

Practical considerations in the control of corrosion as affected by cleaning and sanitizing solutions. R. B. Barrett, Director, Klenzade Products, Inc., Beloit, Wisc.

A report of comparative studies in the bacteriological evaluation of raw milk. Dr. J. J. Jezeski, Dept. of Dairy Husbandry, U. of M., St. Paul, Minn.

Integration of laboratory and field service departments. W. L. Lawton. Mpls. and St. Paul Quality Control Laboratory, 2274 W. Como Ave., St. Paul Minn.

Rancidity – a problem of farm milk supplies. Dr. J. C. Olson, Jr., Dept. of Dairy Husbandry, U. of M., St. Paul, Minn.

What does it cost to produce Grade A milk? C. H. Mattson, Land O'Lakes Creameries, Inc., Minneapolis, Minn.

ASSOCIATED ILLINOIS MILK SANITARIANS

(Fall Conference, Dec. 12, 1955)

P. E. Riley, *Sec.-Treas.*, 1800 W. Filmore St., Chicago, Illinois

Progress Report on Compliance with Illinois Grade A Law on Brucellosis. Dr. L. R. Davenport, Illinois Department of Public Health

Quality Improvement Resulting from Bulk Milk Handling on Dairy Farms. Dr. Willard J. Corbett

Economic Considerations in Converting to Bulk Handling. Karl Shoemaker

Calibrating Farm Bulk Tanks. – A panel discussion, Lowell D. Oranger, moderator, L. T. Gustafson, Dewey Bond and William Mair

Report on the November Meeting of The 3-A Sanitary Standards Committee. James A. Meany

PENNSYLVANIA DAIRY SANITARIANS ASSOCIATION

(Second Annual Meeting, July 13 and 14, 1955)

William H. Boyd, *Sec.*, Box 80, Huntington, Pennsylvania

The State Government and the Dairy Farmer. Lee H. Bull

Classification Pricing and Milk Utilization. C. W. Pierce

Experiences and Problems with Bulk Handling. Emerson Sartain

Cow Feeds and Milk Flavors. Perry R. Ellsworth

Problems of Pipe Line Milkers. George W. Watrous, Jr.

Protecting Farm Water Supplies. – A panel discussion. H. L. Ragsdale, Thomas P. Lynch and Paul E. Boehm

Personality of Farm Animals. E. B. Hale

Economics of Dairy Farm Operation. J. K. Pasto

Uniform Milk Production. W. F. Greenwalt

Sterility and Breeding Problems. J. O. Almquist

Report on Experiment Station Activities. M. A. Farrell

Reports of Committees on: Sediment Testing, Refrigeration for Cold Wall Tanks, Water Supplies and Sewage Code, Mastitis, Farm Score Card Analysis

KANSAS ASSOCIATION OF MILK SANITARIANS

(28th Annual Meeting, January 19 and 20, 1955)

F. L. Kelley, *Sec.-Treas.*, Kansas State Board of Health, Topeka, Kan.

Swab Tests. Richard Ripper

New Tests for Brucellosis. Dr. Hunter

Detergent Tests for Butter Fat. E. W. Larson

Brucellosis. A. G. Pickett

What I Like and Yhat I Dislike about the Farm Bulk Milk Tank. George Washburn

The Cream Program. Brace Rowley

Procurement of Milk for the Army in Austria. Col. Don Dean

Milk Solids-not-Fat Content of Milk. Dr. Rutz

Scholarship Fund; Model Registration Law in the State for Sanitarians; Council Committees. H. L. Thomasson, Ex.-Sec., International Association of Milk and Food Sanitarians, Inc.

The Elimination of Coliform in Milk Plants. Milton Held

Farm Bulk Tank and Truck Tank Cleaning. C. A. Abele

ROCKY MOUNTAIN ASSOCIATION OF MILK AND FOOD SANITARIANS

(Fifth Annual Meeting, December 14, 1955)

P. G. Stevenson. *Sec.-Treas.*, 3298 S. Holly St., Denver, Colorado

Practical Application of Sanitizers Used in the Food Industry. Dr. Merle P. Baker

Investigation Techniques Used in Tracing Food-Borne Outbreaks. H. L. Thomasson

Public Health Significance of Objectional Flavors and Odors in Milk and Dairy Products. Dr. James C. White

History and Activities of the Food Industry on a National Scale. Paul V. Shank

Food Additives. Dr. K. G. Weckel

Today's Sanitation Problems - Symposium and Panel Discussion. Dr. M. P. Baker, H. L. Thomasson Dr. James White, Mr. Paul Shank and Dr. K. G. Weckel.

ORKIN EXPOSITIONS MANAGEMENT ANNOUNCES FIRST INTERNATIONAL SANITATION MAINTENANCE SHOW AND CONFERENCE, SET FOR NEW YORK COLISEUM, OCTOBER 14-16, 1956

The first International Sanitation Maintenance Show and Conference sponsored by the Industrial Sanitation Management Association, the Association of Food Industry Sanitarians, and the National Association of Bakery Sanitarians, has been announced by William S. Orkin, Managing Director of Orkin Expositions Management, New York exposition producers. The Show and Conference will be held at the New York Coliseum, October 14-16th, inclusive.

J. Lloyd Barron, Manager of the Sanitation Department of National Biscuit Company of New York, is Chairman of the Program Committee for the Conference. Albert J. Burner, Supervisor of Cleaning Standards for the Central Maintenance Division of the Port of New York Authority, and Sydney Brierley, Assistant Department Head of Inside Cleaning for Eastman Kodak Company, Rochester, who is president of the Industrial Sanitation Management Association, are also on the committee which will set up the program for the conference.

According to Mr. Orkin, a program of interest to all phases of the industrial and institutional sanitation field is being arranged. Tentative subjects to be covered in the conference program panel discussion and forums are:

1. "The Elements of Industrial and Institutional Sanitation," including Structural Maintenance, Cleaning Maintenance, Pest Control, Safety and Industrial Hygiene, and Personal Facilities.
2. "Mutual Aid in Purchasing Sanitation Supplies" by Purchasing Agents and Sanitation Directors.
3. "Analysis of Sanitation Labor Costs," to include Food Plants, Heavy Industry, and Institutions.
4. "Mechanical Aids to Sanitation Maintenance," to include Power Machines, Industrial Washing Equipment, and Elevated Work Platforms.

In addition to the Conference program, said Mr. Orkin, "The First International Sanitation Maintenance Show will offer the greatest array of sanitation and maintenance equipment and products ever assembled for a single showing. We will offer an unusual opportunity for manufacturers to display their newest and best products before an audience of sanitation maintenance professionals from all walks of the industry who purchase or influence purchases of equipment and products."

In a statement in connection with the announcement by Mr. Orkin, Prescott R. Lloyd, President of the Association of Food Industry Sanitarians, said that the Show and Conference is an important milestone toward the recognition of Sanitation Maintenance as a professional field.

"Perhaps this will be the start that will finally produce a professional society composed of sanitarians from industrial, enforcement, and public health groups, and also result in the creation of a National Sanitation Council, similar to the National Safety Council."

"It is important that everyone interested in sanitation and maintenance participate to the fullest in order that the first International Sanitation Maintenance Show and Conference be a successful one."

Orkin Expositions Management is the nation's foremost exhibition producing firm, specializing in trade shows and expositions for more than 20 years. Mr.

Orkin, who will personally supervise the First International Sanitation Maintenance Show and Conference, is the president of Exposition Management Association, an organization of the leading exposition producers in this country. He is also producer of the Armory Furniture Shows and the forthcoming International Housewares Show, co-producer of the National Electrical Industries Show, and originator of the popular Do-It-Yourself Shows produced in many major cities of the nation under his format and banner.

"The International Sanitation Maintenance Show and Conference will be of interest to an unusually large segment of international industry," said Mr. Orkin. "We expect representatives from a wide cross-section of business, commercial and industrial activities, including: Hotels, Resturants, Hospitals, Schools, Theaters, Retailing Outlets, Architects and Designers, Building Construction, Automotive and Aeronautical industries, Food Processing and Service Fields, Freezing, Packing, Bottling, Baking, Dairy, Ice Cream, Meat, Confectioner, and others too numerous to list."

ANNOUNCEMENT OF A SECOND CONFERENCE ON PROBLEMS OF EXTRANEOUS MATTER IN FOODS

The Department of Plant Sciences held a conference on extraneous matter in January, 1952, at which time a great deal of interest was shown in the problems faced by the food sanitarian and the food microanalyst. A second conference will be held at Syracuse University on April 16, 1956. The speakers and their topics will be:

Mr. John E. Despaul, Laboratory Director, Quartermaster Subsistance Testing Laboratory, Quartermaster Inspection Service Command, Chicago Quartermaster Purchasing Center, U. S. Army, Chicago, Illinois.

Penetration of Protective Coverings by Insects

Mr. Ralph Fogler, Assistant Laboratory Manager, General Laboratory, Libby, McNeil and Libby. Blue Isand, Illinois.

The Sap Beetle — Its Habits and Possible Control Measures in Sweet Corn

Mr. Kenton L. Harris,. Assoc. Chief, Microanalytical Branch, Division of Microbiology, Food and Drug Administration, Washington, D. C.

The Role of Microscopic Analysis in Food and Drug Control

Mr. Fred B. Jacobson, Director, Industrial Sanitation Consultants, Division of Vogel-Ritt, Inc., Philadelphia, Pennsylvania.

Experience and Modification in the Application of A. O. A. C. Methods for Extraneous Material in Chocolate and Candy Manufacturing

Dr. F. S. Thatcher, Head, Microbiology Section, Food and Drug Directorate, Department of National Health and Welfare, Ottowa, Ontario, Canada.

The Recovery of Insect Fragments from Flour: A Modification Useful for Survey Purposes, and Some Correllation with Other Factors

A paper prepared by Mr. Ross Cory of General Mills, Inc. San Francisco, Calif. will be read by Mr. Jack Monier of General Mills, Inc., Buffalo, N. Y. The title of the paper will be *"The Use of Semi-Permanent Mounts in Sanitation Collaborative Work"*.

The meeting has been arranged as a public service to food industry sanitarians, laboratory microanalysts and others engaged in the protection of foods.

Those planning to attend should notify Dr. J. D. Wildman, Department of Plant Sciences, 209 Lyman Hall, Syracuse University.

CORRECTION NOTICE

The name of H. Clifford Goslee, Director, Dairy and Food Products Div., State Department of Agriculture, Hartford, Conn., was inadvertantly omitted from the Committee on Sanitary Procedure membership list. Also, the name of Edward Small, Agricultural Marketing Service, U.S. Department of Agriculture, Washington, D.C. was omitted from the membership list of the Committee on Ordinances and Regulations Pertaining to Milk and Dairy Products. Members of these committees, please, correct your list accordingly.

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