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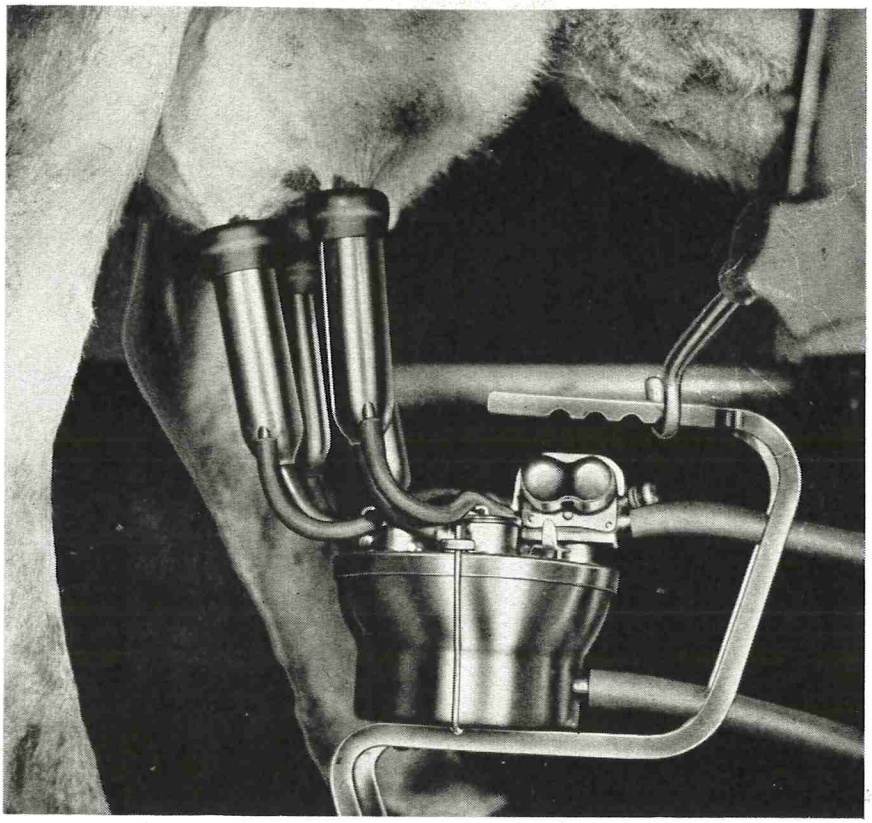

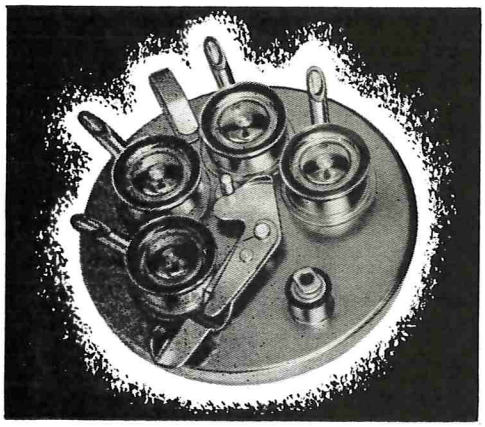

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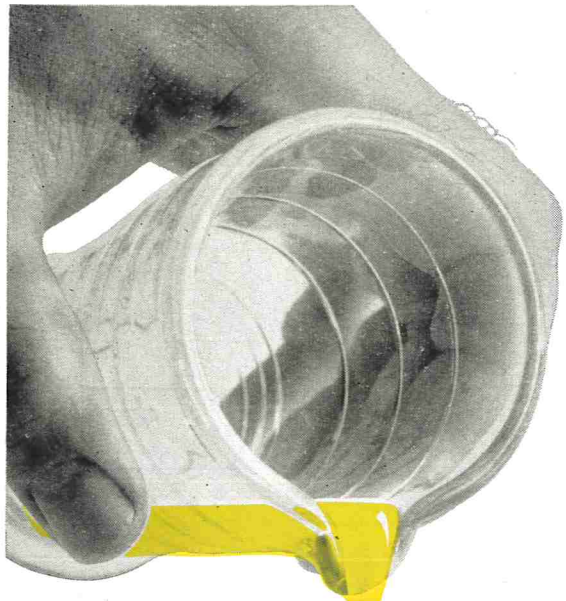

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OBSERVATIONS ON A ONE-DIP NUCLEAR STAINING PROCEDURE FOR THE DIRECT MICROSCOPIC EXAMINATION OF MILK, MILK PRODUCTS AND OTHER FOODS

CHESTER W. ANDERSON

Rockford Health Department, Rockford, Illinois

Editorial Note: The following description and comments relative to a new staining procedure is given to acquaint others with it and to encourage interested individuals to test it and report their findings.

In the present report, a description is given of a chloroform-methyl-alcohol-Azure A (CAA) nuclear staining procedure for the direct microscopic examination of milk. The new method appears to have important advantages over the polychrome methylene blue (PMB) procedure (*1*). A description of the two-dip PMB staining method was given in a previous report (*2*). Although preparation of the stain was not difficult, it required approximately two hours to prepare the staining solution and defatting agent.

In the preparation of the defatting-fixing solution, a combination of two parts chloroform and one part ethyl alcohol containing a small amount of gelatin was originally specified. Subsequently, methyl alcohol, anhydrous, was substituted for ethyl alcohol, since the former gave more satisfactory results. This modification has been described by Mantel (*3*) in a comparison of six staining procedures.

METHYLENE BLUE VERSUS POLYCHROME DYES

The composition of methylene blue is theoretically tetra-methyl thionin (*4*). The dye is so easily oxidized that it is difficult to obtain in a very pure form. Normal oxidation of the dye results in the formation of compounds of lower methylation, such as trimethyl thionin and dimethyl thionin, known respectively as Azure B and Azure A. Since ordinary methylene blue usually contains small quantities of the Azure dyes, it can be considered as a weakly polychromed dye.

The PMB staining solution contains a high proportion of Azure A and B, but the exact composition has not been established. It is a well known fact that Azure A and B have a greater selective staining action than methylene blue. Azure A is generally regarded as more valuable than B. MacNeal (*5*) has reported that Azure A is the most important nuclear staining constituent of polychrome methylene blue.

Scott and French (*6*) have indicated that the important nuclear staining characteristics of ordinary methylene blue dye are due to the normally small amounts of Azure A and B present and that an extremely pure methylene blue is not as satisfactory. These conclusions have been confirmed by Haynes (*7*). Ageing an aqueous solution of methylene blue dye or the addition of a small amount of sodium hydroxide, as in the Loeffler stain formula, tends to increase the Azures present and therefore enhances staining intensity and selectivity.

The relatively inefficient differential staining characteristics of an aqueous methylene blue solution when used for staining bacteria in dried milk films can be largely overcome by using 95% ethyl alcohol as a dye solvent and increasing the dye content. The acid and water free stain (AWF) reported by Levine (*8, 9*) is based upon this principle of increased dye adsorption (*10*) with a suitable dye solvent.

In view of the fact that methylene blue usually contains small amounts and the polychrome stains larger but variable amounts of the lower homologs of methylene blue, depending upon methods of preparation, they do not appear as desirable for wide-scale use as a pure stain with a definite composition. A pure stain can be standardized to give consistent and uniform results if the technique of preparation and staining is carefully carried out.

Since the Azures A, B, and C represent the important staining elements in methylene blue, they were investigated for possible use as a nuclear stain for milk films. After a series of comparative tests Azure A was selected on the basis of superior differential staining qualities.

ONE-DIP STAINS

One-dip staining procedures for milk films have been reported previously but have not proved to be entirely satisfactory. The difficulties associated with the development of a one-dip stain can be attributed mainly to the unpredictable qualities of the dye solvent and the combined defatting agent in their mutual effects upon the dried milk films. Undesirable effects, such as coagulation and distortion of the stained films, may occur in some cases when acids and tetrachlorethane are used as a part of the dye solvent.

To obtain consistently good results, the defatting-fixing-dye solvent solution should be compatible with the whole milk or other product subject to examination. Although the dried milk film is no longer in a liquid condition, it nevertheless contains a small percentage of moisture. A suitable reagent for this pur-

pose should be compatible with the milk solids, defat the film completely and fix the film firmly to the slide. For convenience the combined dye solvent can be referred to as a dye solvent reagent.

DYE SOLVENT REAGENT

The chloroform-alcohol reagent used as a defatting agent in the PMB procedure has proven to be an efficient solvent for this purpose. Since the gelatin incorporated as a fixing agent was undesirable for a dye solvent, a small amount of triethanolamine has been substituted.

A dye solvent reagent of this character offers the advantages of a lower interfacial tension resulting in decreased absorption of stain by the milk solids and increased adsorption by bacteria. The reagent is compatible with milk solids, defats completely and is an excellent fixative.

The dye solvent reagent contains 2.7% water and is free from acids. The exact amount and percentage of triethanolamine should be used. An increase in the percentage of water will cause a darker maximum staining effect on the milk solids.

PREPARATION OF DYE SOLVENT REAGENT AND 0.1% AZURE A STAINING SOLUTION

Measure 650 ml. of chloroform reagent, 320 ml. methyl alcohol, anhydrous, and 30 ml. of 10% triethanolamine, U. S. P., purified, into a liter bottle. Mix by inverting bottle a few times.

To prepare a 0.1% staining solution, dissolve dye in proportion of 0.1 gram Azure A to 100 ml. of the dye solvent reagent. After adding dye to the dye solvent reagent, shake the container occasionally. The dye dissolves within ten minutes and does not require filtration.

ONE DIP NUCLEAR STAIN FOR MILK

Immerse the dried milk films for one minute in the staining solution. Withdraw the slide and allow to drain for 10 to 15 seconds, until most of the solvent evaporates. Rinse the slide in a container of cold tap water by raising the slide up and down five or six times or optionally by shaking vigorously five or six times in flowing tap water. Dry on end on blotting paper.

TWO DIP NUCLEAR STAIN FOR HALF AND HALF, WHIPPING CREAM AND FROZEN DESSERTS (1-1)

Immerse the dried films for one to two minutes in the dye solvent reagent. Dry on end for one minute. Immerse the slide for one minute in the staining solution, then drain, rinse and dry as above for milk films.

In dairy products with a high fat content, it is difficult to extract all of the fat with one treatment. In this procedure most of the fat is removed in the first immersion and the subsequent drying shrinks the film to thinner dimensions. A second extraction removes the remaining fat and stains the film.

Similar results can be obtained by immersing the film one minute in the staining solution, drying one minute and immersing a second time for one minute in the staining solution. If the films are immersed initially in the dye solvent reagent, less fat will accumulate in the staining solution.

Dye solvent reagent can be added to the staining solution when necessary to compensate for a moderate amount of evaporation loss. Replace staining solution whenever it becomes unsuitable due to dissolved fat, foreign material, etc.

Bottles containing the dye solvent reagent and staining solution should be kept tightly stoppered at all times when not in use. Containers for both solutions should have lined screw caps.

USE OF COLOR FILTER

Technicians who devote considerable time to the microscopic examination of milk films may find it highly desirable to use a Corning color filter #3780, Dark Lemon Yellow, 2″ x 2″, mounted in front of the microscope mirror. The color filter sharply accentuates the outline of bacteria and provides increased color differentiation between the bacteria and the lightly stained background of milk solids. The filter will also reduce the eye strain and fatigue associated with prolonged use of the microscope.

COMMENTS

The PMB stain previously reported proved to be a considerable improvement over the older procedures but involved a time-consuming method of preparation. Since the composition of polychrome stains cannot be readily determined, it appeared desirable to use Azure A, the most important nuclear staining component of the polychrome stains. Azure A is a pure stain, of known composition and capable of producing uniform results.

Water solutions of methylene blue and polychrome stains will cause over staining of the milk solids if the films are not removed from the staining solution within a specified time interval. Over-staining does not appear possible with the Azure A staining solution. The bacteria and milk solids are stained to maximum intensity in one minute. Dried films of milk have been immersed in the staining solution for 24 hours with no perceptible difference compared to films stained for one minute.

With the new staining procedure, the milk solids stain more lightly than with the PMB procedure and therefore provide a greater contrast of the deeply stained bacteria and leucocytes against the milk solids' background. Very small diplococci and bacilli are clearly visible.

As a means of testing the fixing qualities of the dye solvent reagent, milk films that had been immersed in the staining solution for periods ranging from one minute to twenty-four hours, then drained and dried fifteen seconds, were subsequently shaken vigorously for one minute in a container of flowing tap water. The films remained fixed to the slides and the bacteria were deeply stained. The only ap-

parent difference after this drastic treatment was a lightened color of the milk solids' background.

The preparation of the PMB staining solution and defatting agent necessitates the use of seven ingredients and requires approximately two hours. The new CAA staining solution and the dye solvent reagent can be prepared with four ingredients and requires approximately fifteen minutes.

A small series of direct microscopic counts were made comparing the results obtained with the new CAA procedure and the PMB procedure. The results indicated that the new staining method gives microscopic counts at least equal to or exceeding those obtained by the PMB method.

The new staining method appears to have a useful application for dairy and food products. Excellent results were obtained with frozen desserts, evaporated condensed milk, creamed cottage cheese, and cultured buttermilk when these products were diluted one to one with sterile distilled water. Very good results were obtained with films prepared from ten percent whole milk powder and ten percent skim milk powder. Ice cream mix requires a dilution of one part to two parts distilled water.

The new method also appears to be suitable for staining films prepared from ten percent solutions of dried egg powder and one to one dilutions of frozen eggs. In both instances, the background of egg solids had a uniformly stained appearance with no evidence of coagulation caused by the dye solvent.

For experimental purposes, films may be prepared from various kinds of liquid, semi-liquid, and emulsified food products to determine the presence of bacteria, molds, etc. Variable time intervals may be required to obtain maximum staining and penetration of films with different ingredients. In many cases dilution to the proper film thickness will be necessary. Additional experience and testing will indicate whether the staining procedure will be suitable for such purposes.

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THE PROBLEM OF ADDED WATER IN MILK, AND ITS DETECTION[1]

DAVID LEVOWITZ

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Milk is defined as the "normal lacteal secretion from healthy cattle"; laws have been interpreted to mean that fluid milk for sale to consumers be neither diluted nor concentrated. Milk is an "oil in water" emulsion, and lends itself readily to accidential or intentional dilution with water.

Defective cooling devices which leak water, and equipment from which rinse water has not been completely removed, account for "accidental" entry of water into milk. At farms, after milking machine inflations are dipped into water or sanitizing solution, they must be drained before the vacuum is turned "on." At plants, the water which lodges in pipelines, filler valves, tanks, etc. must be drained completely before operation begins. Furthermore water can not be removed entirely from some presses.

Intentional addition of water to milk, at processing plants, has been prompted by shortage of milk supplies; at farms, by pressure on shippers to increase milk volume on short notice, and more frequently, by shippers' recognition that the price differential for fat above or below the base is much smaller than the return for the base. The lower the fat test and the greater the volume developed by dilution with water, the larger the return for milk delivered to the receiving station.

Example: at $5.00 per 100 lb., for 3.5% milk, with a 4c differential per 0.1% of fat, 100 lb. of 4% milk yields $5.20. Note the yields on addition of varying percentages of water, to lower fat tests, as shown below:

% Fat Mix	Added Water %	Mix Yield Lbs.	Fat Differ. ± $	$ Yield 100 lb.	$ Yield Mix
4.00	0	100	+ .20	$5.20	$5.20
3.90	2.56	102.56	+ .16	5.16	5.29
3.80	5.26	105.26	+ .12	5.12	5.39
3.70	8.11	108.11	+ .08	5.08	5.49
3.60	11.11	111.11	+ .04	5.04	5.60
3.50	14.28	114.28	O	5.00	5.71
3.40	17.64	117.64	− .04	4.96	5.83
3.30	21.21	121.21	− .08	4.92	5.96

A milk's taste is deteriorated, as it is progressively "watered;" its flavor is perceptibly "flat" when 10% of water has been added. Unfortunately, it is impractical to taste milks as they arrive at receiving stations. If this were done, it would be found that frequently, single cans demonstrate as much as 20% of added water. A shipper once explained that an unfilled can floats, in a water-filled cooling tank, and was more readily handled if water was added to permit it to settle!

Serum solids concentrations, as well as fat, are reduced by water additions; the low yields obtained from many batches of cheese, condensed and powdered products, have been traced to the original milks' adulteration by water.

Lactometers will detect milks which have been grossly watered, but are not critical enough to show the presence of less than 10% of added water. The "copper serum" and "sour serum" methods, listed in early editions of Official Methods of Analysis of the AOAC, to detect water in milk, have been abandoned because of their questionable accuracy.

The freezing point range of milk, like that of blood (from which it is formed in the mammary gland) is narrow, excepting only in unusual circumstances (5). When water is added to milk or blood, the freezing point shifts toward "0". That the freezing point method is an accurate one for determining the presence of added water in milk was established almost a century ago. The data developed before 1921, however, is not readily utilizable, since earlier investigators' technics varied widely.

THE CRYOSCOPIC METHOD

The freezing point of pure water is, by definition, 0°C. Ice can, of course, be brought to lower temperatures. Fahrenheit, in 1714, first enumerated the principles underlying freezing point determination. A solution does not freeze as soon as it is cooled to its freezing point, or just below. It remains in a "supercooled" state, while its molecules rearrange themselves into crystallization nuclei. After a sufficient number of these have been formed, the solution freezes spontaneously (2).

The freezing of a super-cooled solution may be induced by vibration, which rapidly rearranges the solution's molecules into the crystal lattice, or by seeding with isomorphic particles, which function similarly. The greater the super-cooling, the more rapid the freezing, but the temperatures of the freshly frozen solution will not truly reflect its freezing point whenever super-cooling is more than slight.

[1]Presented at the "Annual Minnesota Dairy Products Institute, Sanitarians' Conference," Department of Dairy Industries, University of Minnesota, September 17, 1959.

A lower temperature will be registered if more energy, in the form of refrigeration, is available than is needed for the conversion from liquid to solid state. The super-cooling must be controlled and terminated uniformly to replicate freezing points accurately.

In 1921, Hortvet (*4*) sought to standardize the cryoscopic technic applied to milk to determine the presence and percentage of added water. The equipment and procedure he recommended has been AOAC "official" since the Second Edition (1925) of its "Methods of Analysis." Ether is evaporated to cool alcohol, to super-cool milk, in Hortvet's test; crystallization is initiated by "seeding" with ice. The temperature at this point is observed on a limited range thermometer, calibrated by the operator before use, against solutions prepared from sugar purchased from the U. S. Bureau of Standards.

The ranges of rates of freezing, sample stirring and thermometer tapping, which Hortvet specified, were themselves found to result in variable data. In 1953 Shipe, Dahlberg and Herrington (*7*) assembled a "semi automatic" Hortvet unit in which all these operations were performed mechanically and uniformly, rather than manually and erratically.

The mercury thermometer is still the source of the Hortvet method's weakness. The mercury, chilled in "super-cooling" takes time to react to crystallization temperature; the mass of mercury, large in comparison to sample, affects the end result. The bulb, 65 mm long x 25 mm diameter, "senses" temperatures not at one point, but at many. The mercury, which must be observed under magnification, continually rises and falls. While the "official" instruction (*1*) states the temperature is not to be read "until top of mercury column remains stationary at least one minute," this condition is never reached. Shipe (*6*) showed that the thermometer readings plot into a curve; thus, the reading is taken at a point of least change of slope.

Since the Hortvet scale, by specification, is 30 cm long for 3°C., the smallest graduated interval, 0.01° C., is 1.0 mm long. Estimating to 0.001°C., with the mercury bouncing around, is not as definite as would be desired. With the precalibration and postcalibration required, determining the freezing point of a single sample, even with a semi-automatic unit, is a time consuming chore — and not one leading to satisfaction when qualified, careful technicians, using the same instrument and sample, do not replicate each others' readings.

What was needed to make cryoscopy more critical was a device which could accurately measure minute temperature changes at single points, with the speed of electrical response. In 1939, tiny elements made of fused metal oxides, developed by Bell Telephone Research Laboratories, and called "themisters," did just that when connected into appropriate Wheatstone Bridge circuits. Units made by Fiske Associates, Danvers, Mass., for medical research on osmotic pressure of blood were adapted by the manufacturer for use in determining the percentage of added water in milk (*3*). In all probability, other instruments will ultimately be available from other sources; this discussion below, however, is limited to apparatus made by Fiske Associates, marketed through Advanced Instruments, Inc., Newton Highlands, Mass.

THE THERMISTER CRYOSCOPE

The apparatus and detailed procedure will not be reviewed here, since this information will appear in the forthcoming 11th Edition of Standard Methods for the Examination of Dairy Products, of the American Public Health Association. They are merely indicated below.

The unit is calibrated by means of sugar (or salt) solutions so that its readings are direct and exact without correction to a reproducible accuracy of 0.001°C. — the smallest graduated interval of the control dial. A 2 ml. sample is mechanically stirred while cooled by a thermostatically controlled freezing solution. The progress of cooling is observed on the scale of a sensitive galvanometer. When super-cooling is achieved (a constant below the original dial setting) crystallization is induced by standardized vibration. The temperature rises to the freezing point, which remains constant for fully 90 seconds. At the beginning of this interval, the galvanometer scale is adjusted to "0" by turning the calibrated dial. The entire operation may be observed by all in the vicinity of the instrument. The dial is then read to detail the sample's actual freezing point to the nearest 0.001°C.

The dial is initially set at -0.545°C., on the assumption that the sample is "normal." If the first test establishes that it is not, the dial is left at the reading obtained, to insure that the super-cooling "constant" will be proper for the second trial. The results of the second and third tests will replicate each other to within 0.001°C. on abnormal samples, or on the first and second on normal ones (these latter do not require any more, but will continue to replicate themselves, if retested).

By keeping the test tubes containing the 2 ml. samples in a "precooling" ice-water bath, the time taken per trial will average 2 minutes. It is thus possible to screen hundreds of milk samples per day per unit — with full accuracy, no eye-strain, and corroboration of data by all who are willing to watch.

Whereas it was necessary to take a sedative before

tackling the job of standardizing a Hortvet before performing a single test by that method, a technician will gracefully accept the task of running a hundred samples by the thermister unit — and will report data which is completely reproducible and positive.

Since it is not always possible to obtain "control" samples of milks produced hundreds of miles away, official agencies routinely employing thermister cryoscopes are adhering to the 3% tolerance advocated by AOAC. It has been most impressive, however, that freezing points of policed supplies are soon brought to where they regularly demonstrate completely normal values.

The data from samples taken at some receiving stations (and from some plants) have established that watering, accidental and intentional, has not been as uncommon as some might believe. The particular advantage of the thermister cryoscope is that it takes so little time to perform a test and obtain an accurate figure, that there is no longer any point to just worrying about the possibility of adulteration with water.

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THE LENGTHENING REACH OF THE PUBLIC HEALTH OFFICIAL

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Anyone who looks at the public health field as a whole today can see that the responsibilities of public health people are increasing by leaps and bounds. The developments in industrial chemistry alone have brought on huge new problems in air and water pollution. The atomic revolution, still in its early stages, has already shown that it is going to create unprecedented problems in the handling of atomic wastes and radiation generally. And other technological, industrial and social changes are also bringing a rich crop of problems.

At the same time health officials are adding, as they historically have in the past, to their own concepts of the ground that their departments must cover. As Wesley Gilbertson of the U. S. Public Health Service has pointed out, more than six times as many departments are now concerned with accident prevention as were 15 years ago. And work in the mental health field, control of swimming pools and regulations of homes for chronically ill old people are only a few of the other new activities coming to be regarded as regular health department responsibilities.

But such basic services as food and dairy inspection, water supply and waste disposal, must be strongly maintained. The demand for public health services had its origin in the dangers in these fields that affect large segments of the population — and the guard against these dangers must be kept up.

This combination of pressures, new and old, means a great opportunity for all health officials to grow in stature and importance in both their profession and their community. It also means that the problem of enforcement is considerably more difficult than it used to be. No longer does the public health officer have the time to stand over people to make sure they follow the rules. In all probability he never did have that much time, even when his responsibility covered far fewer areas, but he certainly does not have it now.

This being the case, it should be interesting to see some of the ways in which various health officers and their departments have solved the problem of enforcement. A number have come to our attention in the course of our work for the Public Health Committee of the Paper Cup and Container Institute, and particularly in connection with the gathering of information for the Annual Samuel J. Crumbine Awards.

The most important single thing the Institute has observed is that enforcement is generally easiest when the public health officer has created an environment where the following conditions exist: First, operators want to cooperate, because they themselves have helped to make the rules and know they are

sound, and because they recognize the dollars and cents value *to them* of these rules. Second, outside pressure has been enlisted to help secure enforcement.

How has this taken place in various communities?

THE CRUMBINE WINNERS' SECRET

In the entries received from health departments for the annual Crumbine Awards, the most successful health departments, varied though their activities may be, almost always have one characteristic in common. And many less successful departments do not. It seems almost to rank as one secret of success. This characteristic is the habit of informing the public early about the department's activities. Witness the failures that many school boards have had recently in getting school bonds approved.

Although a formal citizens' vote may not be taken on a specific public health project, the people in the area will offer it equally little support unless they have been shown how it will help them or protect them.

Some officials never make a public report until an irksome defeat makes them take their program to the public. Others report only at the end of the year or after the completion of a project. Statements of this sort *are* helpful. They at least assure one telling of what has been done.

But the department that announces the start of a new project makes the whole project move more easily. Taking advantage of the public's natural interest in anything that is new, an advance story clears the air of doubts and questions while establishing the project as an accepted community activity.

And it doesn't hurt to make interim reports as well. In fact, many a keen health officer has found that it helps to have fairly complete reports of all the department's work in the newspapers and on the air with some regularity and particularly in the months immediately ahead of the approval of a new annual departmental budget.

DELEGATION TO THE CITIZENS

Another procedure used by successful men in many fields shows up very clearly in the Crumbine Award entries. That is the trick of lengthening one's own reach by getting others to do a part of the work. This delegation of work to others is an old story in offices, of course. Getting outside groups to work for you is sometimes more complicated, but often extremely powerful in its effects.

Hundreds of public health departments have sought the cooperation of the industry involved in drawing up codes when either one of these two conditions has existed:

1. Where new technical considerations, as in the regulation of the mechanized dairy industry, required new information, and the industry itself was in a position to furnish valuable material, or
2. Where nothing else would work.

These techniques of cooperation — now used mostly in special situations — can be extended to many other areas of health department work. Relatively new groups such as the mobile industrial caterers, vending operators, and fun spot owners are flattered to be recognized as industries of rising importance, and cooperation by older groups can likewise be strengthened by getting them to make your cause their cause.

Max Kleiner, partner in the Food Consultant Sanitation Service Company, which provides professional advise for many restaurants and restaurant associations, points out that the cooperation between the industry and government has risen sharply in the 1950's. Teamwork is a popular idea these days and should be considered as one excellent way for a man to extend his reach.

Another kind of group, if carefully chosen, can help in this direction. These are the local power groups. Not outside regulatory or volunteer agencies, but people with roots in the area who are leaders at various levels of the community.

Rochester, New York, solved an old problem by appeal to local groups. It had long been obvious to health officials there that a stronger program could be conducted if the county and city health departments were combined, but the City Fathers could not see the advantages.

The health officials recognized that they needed additional help. They drew up a list of influential groups with a potential interest in one aspect or another of their proposal. They told their story to the county medical society; they enlisted the interest of the visiting nurses association; they even discussed their problem with the University of Rochester. And, of course, they included the service clubs, chamber of commerce and other groups dedicated to civic improvement.

The result was that a strengthened and streamlined city-county department was voted. Services have been greatly improved, the state provides greater aid for the area than ever before, and the department has a stature that it never previously attained. All this by letting others help extend the effectiveness of the health department's naked efforts!

MORE POWER IN WORKING WITH INDIVIDUALS

These techniques have helped others to make rapid progress in broad areas. If you are going to lengthen

your reach to the fullest, you must be on the lookout for ways of speeding your work with the individuals covered by your various programs. Here again major savings in time and labor can sometimes be made through an improvement in methods.

One sanitarian in a slum district got bogged down in 167 court cases in one year. His successor, approaching the same people in a different way, was able to get better compliance and more corrections in the following year, and yet had to resort to court only once.

Sometimes health men come to feel that food operators really don't want to cooperate.

On the other hand, Donald Greenaway, Executive Vice President of the National Restaurant Association, in a speech prepared for presentation at Glenwood Springs last August, gave this analysis of the feeling of some restaurant operators:

> At the heart of the thinking of many small business men today, there is the thought that the government is pushing too deeply into the private lives and the undertakings of business men.
>
> But the business men in the restaurant industry in the last 30 years have slowly but surely abandoned this idea as they recognize that a business operates in a social as well as a purely economic climate.
>
> Some of the opposition and the troubles that you people have had in dealing with men in our industry arise out of this simple psychological factor.

He also pointed out that smaller operators and those who see their businesses dropping away from them — either through obsolescence or through changes in business patterns — may actually be in a corner financially where it seems dangerous to put further money into improved procedures.

FIRMNESS STILL NECESSARY

Many food and dairy operators still need to be followed up whether they like it or not. Without firm action, it is doubtful that San Diego, for example, could have gotten 1,841 restaurants out of 1,915 up to standards meeting "A" card requirements. In carrying out their inspection program, however, San Diego officers took four steps to make it more palatable to operators and thus make the inspections more productive and faster. They developed their regulations in cooperation with the operators; they saw to it that their new sanitarians got enough training to command operators' respect before going out; they told the public through newspapers and broadcasts the advantages of going to well managed restaurants; and they topped the program off by bringing in State Health Department officials to make an independent evaluation of the progress the restaurants were making. By these means they eliminated many of the little frictions between personalities that are likely to slow down any far-reaching inspection program.

MEETING THE OTHER MAN'S INTEREST

Excellent results can often be obtained by trying to see things from the operator's point of view and helping him with things that are important to him. This is obviously a more appealing approach and, far from interfering with getting compliance, it speeds it.

Dr. Joseph Smith, head of the Providence, R. I. Health Department, has had striking success with operators in his area by showing them *how good crowds go with good sanitation.*

Although there are, naturally, professional limits that a health officer should not exceed, there are a host of things related to sanitation that will help operators to make their businesses more efficient and more profitable. For example, one sanitarian has found that he can render a valuable service to operators by informing them where they can see particularly effective new layouts and equipment in restaurants in the area. This is flattering to the operator who has made the improvements, in addition to being helpful to others who may wish to consider making similar innovations.

If the operator is well financed, he is often interested in machinery that will give him efficient quantity production without the use of human hands. He may also want ideas about the continuous processing of food, automatic time and temperature controls, use of non-rusting easy-to-clean alloys in his kitchen and the other techniques that the sanitarian has seen during his well run operations.

The beauty of this kind of thing is that it helps the restaurateur to operate better, at the same time it advances the cause of sanitation.

With smaller operators where money is tight or even almost non-esistent, similar progress can often be made with ideas scaled to their needs. Introduction of disposable paper service can save them all kinds of labor and equipment costs and may help them to add services such as take-out that can mean a difference of life and death to the success of their businesses.

Best-selling casserole-type dishes can be served for take-out in plastic-coated paper containers for reheating in the housewife's oven. In many restaurants, particularly specialty operations, this has increased volume and profits 30 percent or more.

Another way to help operators to raise volume is by increasing the speed with which customers can be served. Suggest to operators that they preportion condiments, salads, vegetables, dressings, seafood

and fruit salads in pleated portion cups of the appropriate sizes, holding them on trays in the refrigerator until needed. Left-overs, too, can be economically saved for later use by refrigerating or freezing them in wax or plastic-coated paper containers.

An excellent sanitation technique that also saves staff time is to use paper cups for water. A small stack of cups (upside-down with a napkin underneath) and a water pitcher can be put on each table so customers can serve themselves.

If this kind of idea appears to be useful in talking to restaurant and other operators, it should not be hard for each sanitarian to build a broad inventory of ideas of all kinds from his own observations once he starts to keep an eye out for them.

This technique was pointed up by the featured speaker at a convention of advertising experts who make their living by getting people to buy things by mail. He was heckled with one piercing question: "What *single thing* can I say to sell more goods?"

Without a moment's hesitation, the speaker flashed back: "Don't tell people how good your goods are. Tell them how good your goods make them." To this man who had sold millions of dollars worth of merchandise this was the strongest action-getting approach that can be devised.

Although sanitarians are not in the direct mail business, there is a lot to be learned from this homely anecdote because it shows how anyone can increase his effectiveness – lengthen his reach – by spending additional time thinking how to help the people he deals with to be as good as they want to be.

This is the finest kind of enforcement – and the strongest in the long run.

FURTHER STUDIES ON THE SELECTIVITY OF VIOLET RED BILE AGAR[1] [2]

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Direct plating on selective media is the method of choice for the routine enumeration of coliform bacteria in most frozen foods (*4, 8*), yet little is known regarding the selectivity of these media under various conditions of use. It is often desirable, and sometimes essential, to know what types of bacteria are being counted when the red colonies on a plate are being tallied. The problem becomes more acute when only a few colonies per plate can raise serious questions regarding the sanitary history of the product.

During the course of a recent project[2], opportunity was afforded to study factors which influenced the coliform count of several different types of frozen foods. Some pertinent data are reported here to serve as a basis for a better understanding of the meaning of the coliform count of frozen foods determined on Violet Red Bile (VRB) Agar.

MATERIALS AND METHODS

The plating procedures have been described previously (*5*). Pie samples were taken from the contents only, unless specific mention was made that crust was included. Purplish-red colonies 1 mm. or more in diameter were termed "typical" colonies (*3*), while purplish-red colonies of less than 1 mm. diameter were called "small" colonies. The results would not have differed materially had an arbitrary colony size of 0.5 mm. diameter (*11, 12*) been used, since a considerable proportion of the small colonies were less than 0.5 mm. in diameter. Isolated colonies were streaked on Eosin Methylene Blue Agar, then the plates were incubated for 24 hours at 37C. This method had been found to be about 90% effective for presumptive identification of *Escherichia* from VRB Agar when compared with isolation followed by IMVIC tests (*5*).

RESULTS AND DISCUSSION

Some previously reported results obtained on chicken pies (*5*) are included in Part A of Table 1 for comparative purposes. Approximately 67% of the typical colonies and 35% of the small colonies were identified as *Escherichia* when the sample was devoid of crust. When a representative portion of crust was included in the samples (B, Table 1), only 33% of the typical and 13% of the small colonies from chicken pies were confirmed as *Escherichia.* Lesser proportions of the typical colonies from turkey and beef pies were confirmed as *Escherichia*, but the pro-

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[2]This investigation was supported (in part) by research grant No. E-1141 from the Institute of Allergy and Infectious Diseases of the National Institute of Health, Public Health Service.

TABLE 1—PRESUMPTIVE IDENTIFICATION OF *Escherichia* FROM COLONIES ON VIOLET RED BILE AGAR PLATES.

Product	"Typical"			"Small"		
	No. Tested	No. Pos.	% Pos.	No. Tested	No. Pos.	% Pos.
A. Chicken pies, no crust[a]	61[b]	41	67	51	18	35
B. Chicken pies, with crust	40	13	33	103	13	13
Turkey pies, with crust	20	5	25	87	11	13
Beef pies, with crust	22	4	18	83	8	10
Total, pies with crust	82	22	27	273	32	12
Crust only	25	0	0	52	7	14
C. Dinners – meat, gravy	30	9	30	13	5	38
Dinners – vegetables	23	13	57	27	8	30
Macaroni-cheese	23	12	52	19	12	63
Cream pies	49	9	18	37	8	22
Raw milk*	42	4	10	0	–	–

[a]Data from reference 5.
[b]Includes 31 colonies from VRB Agar plates and 30 colonies from deoxycholate agar plates.

portion of small colonies which proved to be *Escherichia* did not vary with the type of pie. When crust alone was plated, none of 25 typical colonies examined were *Escherichia*, but 14% of the small colonies gave characteristic *Escherichia* reactions on EMB agar. Ingredients used in formulating the crust were examined in an effort to determine whether the small colonies arose from bacteria which were incorporated into the dough or from bacterial contamination of the exterior of the pie. Samples of flour obtained from a processor contained bacteria, including *Escherichia*, which formed small colonies on VRB agar.

The influence of crusts on the coliform counts obtained was determined on 6 brands of pies, some of which were purchased through retail channels. Total counts (Trypticase Soy Agar, 2 days at 32 C.) and enterococcus counts (Thallous Acetate Agar, 2 days at 37 C.) were included in Table 2 in order to demonstrate relative effects on these bacterial populations. Each pie was subjected to a dual sampling procedure whereby a representative portion of crust was included in one sample, while a companion sample was essentially free of crust. The data are arranged so that parallel counts occupy adjacent horizontal locations in Table 2.

Inclusion of the crust material in the sample resulted in a substantial (5 to 10 fold) increase in the apparent coliform count, while total and enterococcus counts were not materially affected (Table 2). In another brand of chicken pie (not shown in Table 2), only 1 colony was found when 24 samples were analyzed without crust. When crust was included as part of the sample, coliforms were recovered from 12 pies in quantities which ranged from 5 to 325 per gm. A third brand of pie yielded only 8 of 24 positive samples, all of which had coliform counts of less than 10 per gm when analyzed without crust. When crust was included as part of the samples, coliforms were recovered from 20 of the samples; 10 of the samples contained 10 or more coliforms per gram. These results indicate that quality control must include examination of the constituents used in the formulation of crusts for pot pies and similar frozen foods. Apparently some processors are not cognizant of this fact.

As shown in Table 2, the "crust count" obscured the coliform content of the interior of the products in many brands and lots of pies. Thus, if the coliform count is used as an indication of the sanitary history of the food, and therefore, the possible presence of enteric pathogens which might endanger the consumer, then the intended objective has not been attained in many laboratories. Gram negative organisms which remained after cooking (2), or after even gross undercooking, would most likely be present in only the central portions of the product. It would be wise to exclude crust material from the sample taken, therefore, in order to gain more knowledge of the coliform content of the interior of the pie, or to plate crust and contents separately.

Reference to the data in Table 1, and especially to Section C of the table, brings to light several points which are worthy of discussion. The vegetable portion of frozen dinners yielded a higher percentage of confirmed typical colonies and about the same percentage of confirmed small colonies than the meat portion of the same dinners. In macaroni-cheese

plates, a considerable portion of both typical and small colonies were *Escherichia*. There was a low confirmation of *Escherichia* from cream pies: about 20%, whether or not the crust was included in the sample. (It is of interest to note that two types of the cream pies examined were of the thaw and serve variety.) In contrast, a low percentage of typical colonies from samples of raw milk were confirmed as *Escherichia* (5). These data clearly demonstrate that the proportions of *Escherichia* included in the coliform count can differ greatly, depending upon the food examined and the conditions of estimation.

As stated previously (5), "it would appear that the term 'coliform count' when applied to frozen pot pies and related products falls within the definition of 'coliform count' as accepted by the dairy bacteriologists," however, one must not lose sight of the product being examined. Recently, Kereluk and Gunderson (8) stated, "Whether or not it is necessary to determine if foods are contaminated with fecal or nonfecal strains of coliform bacteria, the presence of coliform bacteria in frozen foods might indicate whether the foods had been cooked insufficiently or that they were contaminated after cooking or during processing prior to freezing." Until nonfecal coliforms are shown to indicate contamination from a "dangerous source" there is no reason to believe that these types of coliform bacteria, just because they form a colony on VRB Agar, should be considered any less desirable in pot pies than other innocuous microorganisms. Huber *et al.* (7) noted that accompanying a higher total count, greater quantities of coliforms, enterococci and coagulase positive staphylococci could be found in chicken pies. Hartman (unpublished data) found correlations between coliform and total counts and, especially, between enterococcus and total counts in commercial samples which were plated within a short period of production. The coliform-total correlation no longer existed in samples purchased through retail channels (*see also refs. 1, 4*). The coliform count is obviously of little value when performed on samples of unknown history of storage. Litsky *et al.* (9) have commented on some of the other short-comings of coliforms as indicators of pollution. A question then arises. Does the coliform count, or any other

TABLE 2—BACTERIAL COUNTS ON BRAND B WHEN SAMPLED WITH AND WITHOUT CRUSTS.

Count Per Gram of Sample					
With Crusts			Without Crusts		
Coliforms	Enterococci	Total Count	Coliforms	Enterococci	Total Count
5	140	4,200	0	140	8,400
65	260	8,800	9	75	2,400
30	110	2,300	0	130	9,700
140	270	3,800	0	630	7,600
40	610	5,800	10	290	4,600
30	290	2,200	0	370	7,200
80	140	3,700	0	300	1,800
35	400	3,500	0	220	3,600
80	3,000	11,000	0	390	3,800
130	58	2,300	8	280	3,800
30	55	3,600	0	260	4,500
65	340	3,300	0	40	1,900
88	1,200	12,000	0	—	9,800
62	270	5,500	0	120	3,100
30	350	8,000	14	2,200	5,800
17	2,000	7,800	0	770	6,400
60	2,700	10,000	15	290	7,300
15	220	2,000	0	280	2,100
150	120	5,100	8	250	6,000
25	310	2,500	0	120	1,300
65	210	3,600	13	410	10,000
8	170	28,000	0	130	4,600
72	20	1,900	13	120	1,800
32	110	2,000	0[a]	160	1,400
57	560	6,000	4	350	5,000

[a]less than 3.

selective count, yield additional information of value for routine purposes than that already obtained by the total count? An increasing body of evidence which is accumulating indicates that once the total count is reduced to a satisfactory level, the other counts seem to fall in line. When simplicity of analysis is sacrificed, as it must be in confirmation of coliform type or determination of coagulase reaction, then the import of the information obtained should justify the effort expended. Sample to sample variations in all counts are such that, in general, effort might better be expended in analyzing many samples for total counts, rather than fewer samples for selected groups of microorganisms.

More information also should be known about the influence of various factors affecting the test (*13*) and modifications in formula on the efficacy of the medium. For example, Thomas *et al.* (*13*) reported that VRB Agar can be stored in prepared form (steamed) for up to 3 weeks before use, but no reports have appeared on the effect of storage at room temperature on the efficacy of autoclave sterilized medium. Furthermore, the specificity of the medium, thus the import of the coliform content of various non-dairy foods, might be increased by utilizing a medium similar to that described by Mossel (*10*), yet modified further (*6*), in order to retard growth of a major portion of the less significant gram negative bacteria.

SUMMARY

The colony count of frozen pot pies on Violet Red Bile (VRB) Agar was influenced greatly by inclusion of crust in the sample or omission therefrom. The proportions of *Escherichia spp.* included in the VRB agar counts differed greatly, depending upon the food tested and upon the conditions of use of the medium. The significance of these results was discussed in the light of the product being examined.

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PRESENT PROBLEMS IN HIGH-HEAT PASTEURIZATION PROCESSES[1]

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Pasteurization of milk on a commercial scale originated in the early part of this century as a continuous flow process in which milk was brought to pasteurization temperature during passage through heating equipment and then promptly cooled. The process was introduced primarily as a means of enhancing the keeping quality of milk and, for the most part, was rejected as a public health measure because of insufficient information on the thermal destruction of pathogenic microorganisms in the temperature ranges of the process and because no controls were available which would assure a continuous and consistent process temperature. Consequently, as the public health benefits of pasteurization were recognized, early emphasis was placed on holding methods of pasteurization which could be based on the observed thermal death times of pathogens and which were readily controllable by manual means.

The desire of the dairy industry for faster, more efficient, and less space-consuming equipment for pasteurizing milk was met in part during the early 1930's with the development and acceptance of high-temperature short-time pasteurization at 160°F. for 15 seconds (now 161°F. for 15 seconds). Acceptance was predicated on an increased knowledge of thermal destruction characteristics of milkborne pathogens, on technological advances in the design of control instruments and processing equipment, and on plant level studies on destruction of *Mycobacterium tuberculosis*. Controls had been designed which would maintain product temperature within rather narrow limits and which could be interlocked with a pump which would stop operating if the temperature should drop below the point at which the control was set. In addition, pumps had been developed which were acceptable under contemporary standards of sanitary construction and which would deliver milk at a reasonably uniform rate so that a holding time could be provided under flow conditions. The HTST method of pasteurization has gained wide acceptance, has been subject to much improvement insofar as equipment and controls are concerned, and is the method employed for most of the milk now pasteurized in the United States.

The pasteurization processes which are now emerging employ higher temperatures than the 161°F. specified for the HTST method and employ holding times of the order of only one second. Advocates of these higher heat processes claim numerous advantages, including better kill of the natural milk flora, better product keeping quality, and improvement of flavor. They also state that these processes require less space within the plant.

Problems associated with the acceptance of these processes for pasteurization by health officials, for the most part, are the same as those which had to be resolved for both the 30-minute holding and high-temperature short-time methods. They vary substantially, however, in range and degree. In essence, the problems are: (*a*) establishment of an operating standard of time and temperature for effective pasteurization in the high heat range; (*b*) development of specifications for equipment and controls which will assure conformance with the standard during all phases of operation and under conditions of credible failure; and (*c*) assessment of the processes and equipment for side effects which might be deleterious to the product or to the public health.

THE OPERATING STANDARD

The Public Health Service has not as yet included in its recommended sanitation ordinances and codes for milk, milk products, and frozen desserts, (*12, 13, 14*) temperature standards for pasteurization with holding times of the order of one second. Current standards for pasteurization are 145°F.[2] for 30 minutes or 161°F. for 15 seconds for milk, and 155°F. for 30 minutes and 175°F. for 25 seconds for frozen desserts. The higher temperatures prescribed for frozen desserts are in recognition of the protective action of higher solids in the destruction of bacteria by heat. Both definitions include a proviso that nothing contained in the definition shall be construed as barring

[1]Presented at the 46th Annual Meeting of the *International Association of Milk and Food Sanitarians, Inc.*, Glenwood Springs, Colorado, August 25-28, 1959.

[2]The cited temperature of 145°F. for 30-minute pasteruization by the vat method is in accordance with a memorandum to State and Territorial milk control authorities and others concerned, dated July 16, 1956, from Dr. Otis L. Anderson, Chief, Bureau of State Services, Public Health Service, U. S. Department of Health, Education, and Welfare, a copy of which appears in the third printing of the *Milk Ordinance and Code—1953 Recommendations of the Public Health Service.*

any other process which has been demonstrated to be equally efficient and which is approved by the State health authority.

Accordingly, the definitions do not preclude processes using higher temperatures and shorter holding times.

In the past the Public Health Service has, in response to requests from States, expressed opinions concerning the adequacy of specific pasteurization processes. One such process appeared to be satisfactory when operating with appropriate controls at 194°F. In this process the time during which the product remains at 194°F. is not affected significantly by operating variables; therefore, no time requirement was stated. In another case, an opinion was given that a process using 200°F. with a calculated hold of three seconds appeared to be adequate for the pasteurization of frozen desserts. These opinions were based on experimental data from studies with the equipment concerned and calculations therefrom.

In 1943 Ball (*1*) described a method for calculating equivalence of different time and temperature combinations for the destruction of microorganisms. To use the method one needs to know the slope of the thermal death curves of the organisms concerned and their position with reference to time and temperature required for the desired degree of bacterial destruction. The problem in the use of this method for computing pasteurization temperatures above 190°F. is the lack of information on the thermal destruction of pathogens in this range. Extensive extrapolation of low temperature range data does not appear to be justifiable.

Another approach to the problem has been the use of test organisms which are not completely destroyed by conventional pasteurization. By measuring the degree of destruction at various temperatures it is possible to compute the equivalence of a proposed time-temperature combination with accepted pasteurization standards. Studies by this method (*2, 6, 9, 10, 11*) have, by and large, indicated that temperatures of 192°F.-194°F. for one second provide the same degree of kill of the test organism (MS102, an unidentified micrococcus was used in most of the studies) in ice cream mix as does pasteurization at 155°F. for 30 minutes. This method is subject to the limitation that the test organism may have a different slope from milkborne pathogens. However, a study by Read, Hankinson, and Litsky (*5*) of the thermal destruction characteristics of *Escherichia coli* and several pathogens of significance showed that these organisms were destroyed in milk at temperatures below 175°F. with a holding time of 0.05 second and a heating time above 135°F. of 0.25 second. In addition, some investigators have used the slope of the thermal destruction curve for *M. tuberculosis*, as determined from studies in lower temperature ranges, to compute pasteurization equivalents in the 190°F. range (*5, 9*).

In presenting their data, some investigators have calculated the lethality of the heat-up period in terms of holding time at the terminal temperature. Others have not done so, limiting their reporting to observations at various temperatures with a given piece of equipment. This is a very significant point in interpreting results and in establishing an operating standard for pasteurization. Lethality during heat-up in 30-minute holding pasteurization is insignificant in relation to that provided during the holding period. At temperatures around 190°F., however, lethality during heating may exceed considerably that provided during the short ensuing holding period. Obviously, the amount of lethality during heating will vary inversely with the time required to bring the product to pasteurizing temperature, and it would follow that for equivalent results, slower heating processes would require lower terminal temperatures. Conceivably, each type and size of pasteurization equipment may have its own precise point of equivalence with pasteurization by accepted methods.

Traditionally, pasteurization standards have been expressed in terms of a single temperature for a specified time interval. The data referenced above would support such a standard for pasteurization of frozen dessert mixes. A temperature of 192-194°F. for holding times of the order of one second would appear to provide an adequate basic standard for pasteurization of frozen dessert mixes with present types of equipment. More information is needed, however, to define a similar standard for milk if a lower temperature is needed and to establish the extent of the safety factor inherent in such a standard.

INSTRUMENTATION AND CONTROLS

A basic standard of the type mentioned above would be valid as an operating standard only if it incorporated a sufficient margin of safety to compensate for the limitations of commercial controls and equipment. In 1927, Frank *et al.* (*4*) pointed out the need to consider every particle of product in standards for pasteurization and to include the term "every particle" in definitions of the process. Therefore, unless equipment and controls are available which will prevent the forward flow of any subtemperature milk, the standard must be adjusted to compensate for the limitations of equipment and controls that are available. It then becomes necessary to determine whether available controls and equipment will prevent milk from going forward at a tem-

perature below that needed for effective pasteurization, and to prescribe the adjustments in the standard if such are necessary.

The type of control instrumentation for the new high-heat treatments is substantially the same as that required for HTST pasteurization. The essential differences in instrumentation requirements from those described in the *Milk Ordinance and Code* recommended by the Public Health Service and in the 3-A Accepted Practices covering HTST equipment (*8*) are with respect to speed of response of the control instrument and the temperature range in which it must operate and maintain accuracy. The temperature controls consist of a thermostatic device to control product temperature and a flow-stop to stop or divert the forward flow of product if minimum temperature is not maintained. The instrument lag and speed of valve response specifications of the *Milk Ordinance and Code* are predicated on needs associated with conventional HTST pasteurization. Weber (*15*) analyzed the limitations of the temperature control on such systems and estimated that, under extreme conditions of equipment failure, milk as much as 1.75°F. less than the set point of the controller might pass the flow diversion valve before the valve diverted. He felt, however, that this drop was well within the safety factor of the HTST standard. The potential temperature drop of milk that can pass the flow diversion valve under adverse conditions in these new processes is readily computable if the following are known: (*a*) the thermometric lag of the control instrument; (*b*) the response time of the flow diversion valve; (*c*) the distance between the sensing bulb and the flow diversion valve; (*d*) the rate of product flow in feet per second; and (*e*) the maximum rate of product temperature drop in the pasteurization equipment. With this information one can compute the length of time that milk will continue to flow past the flow diversion valve after milk below required temperature has contacted the sensing bulb. This time multiplied by the rate of temperature drop permits calculation of the lowest temperature of milk that will pass the flow diversion valve.

To illustrate the above point, a unit is assumed having the following characteristics: (*a*) the lag of the controller is five seconds; (*b*) the response time of the flow diversion valve is one second; (*c*) the sensing bulb is located 18 inches upstream from the flow diversion valve; (*d*) the flow rate through the tube between the sensing bulb and the flow diversion valve is 1½ feet or 18 inches per second; and (*e*) the maximum rate of product temperature drop has been determined as one degree per second. Under these conditions milk would flow for five seconds past the sensing bulb before the temperature change was registered, and for an additional second before the flow diversion valve could pass from the forward flow to the diverted flow position. The sensing bulb is, however, one second flow time upstream from the valve, which would leave a net of five seconds flow of subtemperature milk past the flow diversion valve. The rate of temperature drop has been assumed as 1° per second, and, assuming linearity of temperature drop, milk entering the valve at the time of diversion would be 5 times 1.0, or 5.0° below the set point.

This, of course, is a hypothetical example and there are measures that can and are being taken to reduce the differential between the set point and the temperature of milk or milk product that may go forward. In practice, instruments and valves are being provided with shorter lags than those currently specified in the *Milk Ordinance and Code*. Also, the flow time between the sensing bulb and the valve can be varied to more nearly approximate the lag of the controller and valve. The purpose of this example has been to illustrate that a significant differential can exist and the reason why it is necessary to consider the time of instrument and valve response in the derivation of time and temperature requirements for these new pasteurization processes. It is significant that process deviations of time and temperature which might be considered inconsequential where a 15-second hold is concerned become highly significant when rapid heating and only a one-second hold is provided.

As mentioned above, faster instruments are now being provided for use with the high-heat process (studies on one unit (*3*) showed a drop of only 0.35° F. below set point at the time of diversion) and supplemental controls are available which provide further safeguards against forward flow of subtemperature milk. Some installations employ a pressure switch on the steam supply which renders the unit inoperative whenever the steam pressure falls below that required for proper operation. Thus, the technical know-how is available to provide adequate controls for pasteurization in the higher temperature ranges. The problem is to reduce the variables to simple terms that are easily understood and applied, and to agree upon standard specifications for instruments and equipment which may be incorporated into an operating standard.

ASSESSMENT OF SIDE EFFECTS OF NEW PASTEURIZATION PROCESSES

Shift in pasteurization temperatures to higher ranges may well be attended by differences in the degree of change in other characteristics of the product. Also, the means of heating may introduce new

variables requiring public health control. It is proposed to discuss here one such change, namely, the use of direct steam introduction for product heating.

During the past few years, there has been a marked increase in the use of equipment which employs direct steam for product heating. By and large, this use of steam has been in connection with vacuum flavor control devices which bring about a removal of volatile flavor components. However, some pasteurizers depend on direct steam introduction to bring the product to pasteurization temperature. Whether the intended use is flavor control or pasteurization is not significant insofar as the problem to be discussed is concerned.

When introduced into the product, some steam will be condensed and unless removed in equal volume by vacuum, a diluted and, in the case of milk, adulterated product will result. If there were no heat loss from the system and only pure steam was introduced, removal by vacuum of the same amount of heat as was added by the steam would provide an undiluted product. However, heat loss from the equipment and, perhaps, entrained water droplets in steam require a temperature drop in the final vacuum chamber somewhat greater than the temperature rise resulting from introduction of steam, if dilution is to be avoided. In most cases, the temperature differential between incoming and outgoing milk is around 8 or 10°F., but will vary with the size of the units and other factors. Therefore, the differential needed to maintain an undiluted product should be established for each installation by comparison of the solids content of incoming and outgoing product. Automatic controls are available which will maintain a preset temperature differential.

Steam in contact with milk and milk products also poses another problem. Theoretically, steam is H_2O in the vapor phase. Practically, steam may be this vapor plus water droplets and other substances. The other substances may include scale and rust particles, obviously undesirable, and chemicals used in boiler water treatment. None of these "other substances" should be present in steam which is introduced into milk and milk products. Keeping them out breaks down to proper installation, operation, and maintenance of steam equipment and proper selection of boiler water and chemicals used for its treatment.

Requirements for process steam have been discussed by Thomsen (*7*), and there is in preparation a report by a committee of the National Association of Dairy Equipment Manufacturers which will set forth guidelines for production of culinary steam. Essential points insofar as installation and operation are concerned are: (*a*) observance of boiler manufacturer's directions with respect to water level and blowdown; (*b*) provision of sufficient radiation line to remove superheat from steam; (*c*) provision of sufficient strainers, purifiers and traps to remove detritus and condensed moisture prior to introduction of steam into processing equipment; and (*d*) selection of suitable feed water which is, or is so treated as to be, free of organic materials which may cause foaming and priming in the boiler with resultant carryover into the steam distribution system.

There are a number of different chemicals that are commonly employed in boiler water treatment. These include sodium triphosphate, sodium hexametaphosphate, sodium hydroxide, sodium sulfite, sodium silicate, sodium aluminate, and sodium alginate, all of which are nonvolatile. Accordingly, there would be no objection to these compounds when they are properly used and the boiler is properly operated. Tannin is also frequently added to boiler water to facilitate sludge removal during boiler blowdown. This product, while essentially nonvolatile, has been reported to give rise to odor problems, and for this reason should be used with caution.

The above compounds are used to prevent corrosion and scale in boilers or to facilitate removal of sludge. There are other compounds, namely, cyclohexylamine, morpholine, and octadecylamine, which are volatile and which are used to prevent corrosion in condensate return lines. Cyclohexylamine and morpholine are not regarded as hazardous in concentrations of less than 10 p.p.m. in steam used in direct contact with foods other than milk. However, because of the importance of milk in the diets of infants and children, these compounds should not be added to boiler feed waters when the steam is introduced into milk. The use of octadecylamine in steam contacting food of any type has not been sanctioned by the Food and Drug Administration, and any approval in the future depends upon the presentation of proper application and information under the new food additives amendment of the Federal Food, Drug, and Cosmetic Act.

Introduction of steam into milk and milk products for heating and for flavor control poses a new problem in the sanitary control of these products. The problem is not insurmountable, but requires recognition and attention by both plant personnel and sanitarians. Careful selection of boiler water treatment compounds and periodic analysis of condensate samples is recommended.

SUMMARY

In summary, the present problems in pasteurization of milk and milk products at temperatures above 190°F. with holding times of the order of one second are: (*a*) a need for further research on the thermal

destruction of significant microorganisms in this temperature range to define the limits of safety inherent in the process; (*b*) a need for development of specifications for equipment and controls which will assure proper pasteurization under all conditions of operation, including those resulting from abrupt failure of primary heat and power; and (*c*) recognition and control of related problems such as those presented by use of direct steam heating.

The greatest need appears to be one of bringing together available information and deriving therefrom standards for the design, construction and operation of these pasteurizers and procedures for sanitary control by official agencies.

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PRECOOKED FROZEN FOODS AND THE NEW HANDLING CODE[1]

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The origin of and membership in the Association of Food and Drug Officials of the United States is described. The formation in 1956 and the objectives of the Joint Committee on Frozen Foods in the above Association with representatives of the National Association of Frozen Food Packers is explained. The Committee was directed to prepare a model processing and handling code for uniform guidance of both industry and public servants.

Industry has surveyed operations, including bacterial determinations on products at different stages of processing in several precooked frozen food processing plants. Any product consisting in part of meat, poultry, gravy, sauce or stuffing is readily subject initially to plant mishandling and should be processed with minimal delay.

Sanitarians are urged to be practical, understanding, cautious and conservative when using the new tools in the recommended code; nevertheless, industry's familiarity with and early use of it will do much to maintain frozen food quality at a high level.

Will you keep in mind 1956, the half-century mark after passage of the 1906 Federal Food and Drug Act. At the commemorative meeting sponsored by the Association of Food and Drug Officials of the United States, hereinafter called AFDOUS, the National Association of Frozen Food Packers (NAFFP) offered to cooperate with the former in preparation of a model frozen food processing and handling code. Parts of the code are complete except for final editing.

Both prior and subsequent to 1956, many sanitarians had found certain lots of precooked and ready-to-eat frozen foods with bacterial counts in the millions and some containing coagulase positive staphylococci. The conditions of processing influence the bacterial content of frozen food before freezing. The temperature during warehousing, transportation and retailing and the manner of refrigeration and preparation in public eating places and in homes influence the subsequent growth of microorganisms. From the quick freeze stage until processed by the consumer, the internal product temperature should not exceed 0°F.

At one time it was thought that bacterial tests on retail samples might differ from those on the same food immediately after quick freezing or as delivered at warehouses. In May 1958 Abrahamson *et al*, on different sets of samples (Quart. Bull. Assoc. Food & Drug Officials, **23:** 63. 1959) showed no distinctively higher trend among counts on retail samples than among those on warehouse samples. This means that plant sanitation and quick freezing are of first importance. Storage at 0°F. will not permit growth of coagulase positive staphylococci. Gunderson has shown that occasionally off-flavor producing organisms will grow slowly at surprisingly low temperatures approaching 0°F. Conditions conducive to bacterial growth are enhanced as the amount of free water increases when frozen foods begin to thaw. Hence, the need to keep frozen foods at not over 0°F. is obvious. The same principle of keeping perishable foods refrigerated applies equally to all commercial types of non-frozen foods. It also applies to perishable types prepared and stored in the home.

DEVELOPMENT AND ACTIVITIES OF AFDOUS

What is AFDOUS? AFDOUS was born ten years before enactment of the 1906 Federal Food and Drug Act. Its official membership consists of federal, state, county and municipal workers charged with enforcing the food, drug and cosmetic laws. Annual conferences of AFDOUS membership serve as opportunities to present formal papers, progress reports and open discussions, to explore the best thinking on food handling and to secure uniform regulatory policies.

AFDOUS is blessed with a companion group of Associate Members from the food, drug and cosmetic industries, which meets jointly with it during open sessions. When needs arise, such as the absence of a uniform guide for processing and handling of frozen foods, AFDOUS appoints a committee chairman, who selects qualified members, explores the subject and makes recommendations for appropriate action. Carroll S. Brinsfield and Herman P. Schmitt, from AFDOUS and NAFFP respectively, are co-chairmen of the joint task Committee on Frozen Foods. Representatives from the Federal Food and Drug Administration, the U. S. Public Health Service, the Meat Inspection Branch, the new Poultry Inspection Branch and the Western Utilization Re-

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search Branch Laboratories of the U. S. Department of Agriculture, the Bureau of Commercial Fisheries, Marine and Rail Transport Association, the American Trucking Association, the Refrigeration Research Foundation, etc., have participated in one or more meetings of the Committee on Processed, Canned and Frozen Foods in cooperation with the National Association of Frozen Food Packers.

AFDOUS has no authority for enforcement. However, each enforcement agency, – national, state, county or municipal, – may have its own laws and codes enabling each to enforce uniform regulations. Wherever there is misunderstanding about regulations, conferences with industry will be most helpful to processors, warehousemen, distributors and retailers. Industry sponsored personnel training schools are helpful also. Conferences might be extended to include housewives at question and answer sessions.

PROGRESS IN THE DEVELOPMENT OF FROZEN FOOD CODE

Before 1956 some cities and states had some form of a frozen food handling code. In 1955, one legislature gave authority to draft regulations. Another state was enforcing regulations for processing crab meat. New York City was gathering information and enforcing certain frozen food handling requirements. Even in 1946 Nassau County Health Department on Long Island had proposed a frozen food handling code. Obviously if each state acted independently, industry would face multiple codes and multiple interpretations of conformance. To avoid such confusion and to present new information on frozen food handling practices, representatives from the National Association of Frozen Food Packers with others having related interests met in May 1956 with the AFDOUS committee, Chairmaned by Milton P. Duffy, California Department of Health.

Following this conference, industry through NAFFP has surveyed routine procedures in plants preparing precooked frozen foods so as to measure mishandling practcies in terms of bacterial count trends. Gail M. Dack from the University of Chicago has guided the plant surveys and has actively participated in many of them.

Early in 1958 a separate survey was conducted in 34 states and the District of Columbia jointly by industry and by regulatory workers to determine the temperatures of the food and of the air in display cabinets and of frozen food storage practices in 3,063 stores. Carroll S. Brinfield, Chief, Division of Food Control, at Baltimore, summarized this record on March 4, 1958, at the National Association of Frozen Food Packers Convention. Management in about two-thirds of the stores inspected requested a copy of the summarized record for guidance of their operations. Because of misunderstanding in a few instances, management abused the inspector.

Of first importance in the basic survey was the selection of bacterial tests which were informative and practicable so that any reasonably well equipped industrial or control laboratory may assess the bacterial conformance of frozen foods in terms of good commercial processing. Representatives from industry, certain state and city health laboratories, the Canadian Food and Drug Directorate, the U. S. Public Health Service, the Federal Food and Drug Administration and others have aided in the development of methodology for measuring sanitation in handling frozen foods. Tests selected were total counts by the agar plate method, coliforms by MPN method and the determination of the number of coagulase positive staphylococci. The significance of such tests need no explanation. If need arises for supplemental tests control laboratories should apply them with discretion. Information on methodology is available on request at NAFFP, 919 at 18th Street, N. W., Washington 6, D. C.

Quoting from the committee report at Boston, the record of progress is as follows:

"At the May 1959 conference of NAFFP and AFDOUS in New York considerable time was spent reviewing all the data accumulated on the bacterial content of precooked frozen foods. It was decided to suggest bacterial standards for pot pies and dinners at that time. Major discussions ranged from 50,000 to 100,000 per ml. We did not have the time to set recommended sampling procedures and make some practical changes in methodology to shorten the laboratory work. However, the greatest amount of discussion came when we tried to get a tentative agreement on staphylococci and coliform counts. The majority present realized the ideal counts for staphylococci and fecal coliforms should be zero. They also agreed that setting our sights at the above mentioned figure was unrealistic at this time. After a lengthy debate it was agreed to set an MPN of not more than 100 for total coliform and staphylococci. Several of us were not satisfied with those figures, believing they were too liberal. Finally it was decided to reopen the coliform and staph tentative standards at our next meeting which will be on October 15 and 16, 1959, in Washington. This will provide time to evaluate all data and correlate coliform and staphylococcus counts with sanitary conditions and practices observed in the plants sampled."

Tests suitable for precooked frozen foods are probably applicable to cream filled pies, cakes and puffs, crab and fish cakes, chicken a la king, poultry stuffing, chili con carne, chopped liver, shrimp and lobster in thickened sauces, etc. However, due to differences in the growth medium and lower pH values, the above tests may not be applicable to most frozen fruits, fruit juices, fruit juice concentrates, and frozen vegetables.

FROZEN FOOD SANITATION PRINCIPLES

Food sanitation starts with the location and construction of the building. Next comes interior wall surfaces, floor materials, drainage, absence of litter and refuse, and the abundance of and ready access to running water for all line employees. Floor plans should prevent persons from handling alternately cooked meats and the raw products on the dressing and preparation lines. In plants where employees must handle both cooked and raw foods, operations should be continuous and rapid and cooked products should be handled only after employees have thoroughly scrubbed their arms and hands and changed their protective garments. If live animals and poultry are slaughtered, a separate receiving dock should be provided.

The ready access to and an abundance of running water for washing and water at 180°F. for sterilizing instruments and equipment is an absolute essential. As determined by the accumulation of refuse and the failure of equipment to be maintained reasonably free from residues, plants should be shut down for clean ups as needed at 3 to 6 hour intervals.

Some ingredients such as dried eggs, dried yolks, frozen eggs, frozen yolks, powdered skim milk, flours, starches, spices, broths, batters, sauces and gravies may contain many bacteria and mold spores. It is surprising how grossly contaminated some dry products may be. Some perishable ingredients, when prepared in large amounts, may be held too long (as much as 10 days in some cases) at ordinary refrigerator temperatures before the last of a batch is used.

New processing equipment and attempts at automation have not always prevented the introduction and growth of bacteria. In some instances, the construction of the equipment has prevented or restricted proper cleaning. Dough mixers, holding and mixing tanks, powder and flour blenders, dicers, slicers, cutters, butting boards, valves, pumps, pipeline fittings, etc., are included in the poorly designed equipment in which residues accumulate and often are not completely removed by cleaning. The selection of metals for equipment and the character of their surfaces determine their suitability. Unshielded air driven motors may drive contaminated air into the food.

Improvements can be made in conveyor belts so that they collapse or telescope sufficiently to dislodge residues when exposed to thorough cleaning treatments. Mesh belts ordinarily do not permit adequate cleansing. CIP cleaning for piping must follow precise CIP directions with no options or shortcuts. Permanent joints should be butt-welded, not lap-welded. Interior corners of containers should be constructed so as to enhance good drainage and cleanability. From the above, it is apparent that proper frozen food processing equipment differs relatively little in construction from that identified by 3A sanitary standards for the dairy industry and that in the sanitary standards developed by the baking industry.

In some plants poor operational planning, breakdowns in equipment, etc., may cause extended delays and in-line products are allowed to pile up without refrigeration. If the food is kept under 45° or above 160°F., microbial growth rates are held reasonably in check. On some occasions, as a breakdown in quick freeze operations, the delay may be for several hours. Here and there several packages may be set aside accidentially until some observing eye sees them. The sanitarian seldom sees these delays which may account for unexplained high bacterial counts in individual packages.

Quick freezing is next. Freezing methods differ and therefore only the method best suited for freezing a certain food should be used. Use of some older types of freezers and packaging in wholesale size containers before freezing often delays the internal temperature drop to 0°F. for as much as 48 hours.

Warehouse storage of frozen foods is usually satisfactory. Break-up rooms often may not be maintained at 0°F. It is well to watch for this failure because some lots of foods may remain in the break-up area much longer than the owner thinks they do. Air temperature and internal product temperature should be recorded.

Rail transportation of frozen foods at not over 0°F. has improved appreciably in the last decade. Delays often occur during loading. Use of covered conveyors direct from storage to car aid in rapid handling of foods. Some frozen foods are palleted direct to the cars. Despite all controls, it is well to check, enroute and at destination, the temperature of representative cases and in particular those near car doors.

Truck transportation at not over 0°F. is improving. The American Trucking Association has recognized that it has been slow in programming for suitable trucks. The Association aims to replace trucks so that by 1964 or 1965 all trucks for frozen foods will be equipped to operate enroute at not over 0°F. Rapid transfer of frozen foods to precooled trucks is an essential also. It is well to check temperatures on cases near the doors on trucks enroute and at destination.

Some distributors and retailers still do not differentiate between freezing, as water freezes at just under 32°F., and the need to keep frozen foods at 0°F. Back-room storage at 0°F. is not always provided. Products are frequently displayed in cabinets above

the product load-line. Dial type thermometers with probe tips are suitable for determining internal product temperatures.

In 1956, a representative from the Refrigerated and Frozen Products Research Advisory Committee and the National Frozen Food Distributors Association alleged that the weakest link in the distribution chain is at retail, where the frozen foods often may be treated as dry groceries and not like ice cream. He blames high pressure sales tactics of some organizations for the skimping and corner-cutting sometimes practiced in distribution. If a distributor can get by with two trips a week instead of three, he will load the retailer with frozen foods beyond the latter's capacity for storage at not over 0°F.

Results of the first large scale comparative studies to measure quality chemically and organoleptically on separate packages from the same pack were reported in 1956 from the U. S. Western Utilization Research Branch Laboratories at Albany, California. These studies, still continuing, show that the rate of quality deterioration doubles with each 10° rise above 0°F. The observations included exposure of replicate samples at 5°, 10°, 15° and 20°F. for intervals of 5, 10, 15 and 20 days by varying both the order of temperature changes and the order of time intervals. Each panel judge was shielded from other judges and the food lighted dimly so its color would not influence flavor judgements when rating the degree of quality change. On request, reprints of many of the separate studies at WURB Laboratories are available. Off-flavored or discolored foods do not encourage a customer to come back for more. The above facts are summarized to fortify your advice to retailers who want repeat sales.

Let us look at how foods are preserved in general. Each consumer package of frozen foods is surrounded by a protective coating and is then preserved by quick freezing and holding at 0°F. Consumer packages of canned goods are enclosed in a sealed container and are then preserved by heat in retorts. Some fresh fruits and vegetables have their own protective covering.

Loose talk and suggestive thinking lead to confusion because frozen foods begin to deteriorate quality-wise once preservation by proper freezing ceases. Other foods are perishable as soon as that shell which protects them is broken. Perishability is suddenly translated into terms of spoilage. Spoilage is then translated into terms of decomposition. Then decomposition implies food poisoning.

Following a recent request for transcripts of proven cases of illness caused solely by commercial frozen foods as purchased, the Epidemological Division of the U. S. Public Health Service furnished one record on frozen turkey. It was prepared by thawing about 7 hours after removal from freezer, and then roasted, cooled and sliced before placing for 5 to 12 hours in refrigerated storage before serving. During cooling and after slicing the meat was covered with a cloth. The local health department in a densly populated area reported that of about 300 guests eating at a private establishment, 41 ate poritons of the suspected food. Despite circumstantial evidence, several facts remain unanswered to prove conclusively that the illness of 40 among the 41 eating the turkey was caused solely by a condition of the turkeys as purchased. Among these is the absence of other recorded cases of illness caused elsewhere by eating turkeys with the same warehouse lot identity. The record did not show whether bacterial tests were made on stuffings, gravies, etc., served with the sliced meat or on other frozen turkeys of the same lot in local storage. It did show that specimens from 12 of 19 food handlers at the establishment were positive.

Some of the above investigations may have been overlooked and some may have been completed but not reported. Please do not misunderstand the remarks as condoning plant insanitation or the practice of refreezing defrosted foods if data show that such things may have occurred. Emphasis is placed on the need for thorough investigations before deducing conclusions which may lead to false allegations.

When foods are maintained at 0°F., it assures that bacterial growth is practically halted and, if so held, the terms spoilage and decomposition ordinarily do not apply unless the food is grossly mishandled. Such gross mishandling usually furnishes sufficient evidence for condemnation with no hesitation by any segment of the industry. It is equally conceivable that non-frozen foods and those prepared in our homes occasionally may be grossly mishandled.

The sale of precooked and ready-to-eat prepared frozen foods is expanding and new personnel in the business need guidance. In 1957 the U. S. Department of Agriculture listed more than 200 prepared frozen foods, which is exclusive of the long list of frozen fruits and vegetables. Any product consisting in part of meat, poultry, gravy, sauce or stuffing is readily subject initially to plant contamination and should be processed, including the quick freeze stage, with minimal delay. In case of defrosting, each case must be judged very carefully before a decision is made on safety, because spoilage is apt to develop rapidly in these foods. Because of perishability, decisions often can not be delayed.

Parts of the recommended code for warehousing, transporting and retailing were approved in 1959 and are multilithed now for the timely guidance of

both industry and public servants. As soon as certain data can be re-examined, AFDOUS – NAFFP aim to recommend bacterial standards by which good manufacturing practices can be judged. Among other incomplete parts are recommendations for locating, constructing, equipping and operating processing plants. When complete, it is expected that the edited code will be applicable to all commercial frozen foods.

After proper processing, insistance that internal product temperatures of frozen foods be not over 0°F. is the least costly way for sanitarians and industry to guarantee quality. If temperatures are maintained properly, such records should satisfy 95 percent of the regulatory efforts to assure both safety and quality. The cost of routine bacterial tests by regulatory agencies is prohibitive. Bacterial tests may be required to establish facts in individual cases.

How many of you require in food processing plants and in retail stores that they have a detailed set of operational directions? Without a set, how does the management know in case of sickness, vacations, emergencies, etc., that someone will not be pushed on a job that he knows relatively little about? Because no set of general directions will apply industry-wide, would it not be better for each management, possibly with general guidance from NAFFP in case of frozen foods, to write its own directions in words that are understandable and explanable to employees.

Copies of such directions could be filed with sanitarians' reports on inspections. Placards bearing appropriate instructions can be placed above or near processing lines wherever they are needed most to remind employees and thus prevent errors due to neglect or failing memory. Attention was directed recently to one business where an employee had a card on which he recorded the completion of certain duties, such as clean-up jobs. When performed, he had the foreman examine the job and then initial and date the report. To be sure, this would not be satisfactory for all jobs but it could be tried out on some.

Just let me quote from the transmittal letter on June 24, 1959, by Carroll S. Brinsfield concerning the code:

"In my humble opinion, there should be no attempt to enforce these handling sections until a year after they are formally adopted by your agency. . However, I think it is wise for both industry and enforcement agencies to start planning for the day that such regulations become effective. If everyone starts practicing their part in fulfilling their obligations to the code – whether they be in industry or enforcement – they will approach the effective date with a minimum of problems."

"The use of these sections of the code will materially aid in up-grading frozen foods. Yet, these sections are new tools and must be handled with extreme care. You must be practical, understanding, cautious, and conservative in their application."

"Educating all segments of industry effected by these sections as to the 'hows' and 'whys' will improve public relations. Let tolerance be your motto on violations until those conscientious members of industry have had a chance to solve their problems."

"In addition to approving the frozen food handling code, AFDOUS also approved an administrative tolerance on 0°F. for the warehousing, retailing and transportation sections. Those states that are considering the possibility of adopting a regulation on frozen food handling may obtain a copy of this tolerance on request to this (meaning Mr. Brinsfield's) office. Needless to say, the tolerance is known only to regulatory officials."

In this discussion your attention has been directed to the code in the interests of establishing uniform policies, of preventing insanitation and of preserving frozen foods qualitywise. Only as the result of many conferences has it been possible to bring this timely information to you. All credit goes to the chairmen and members of the committees for their persevering work. Each sanitarian is a share-holder in the big job of assuring safety and of maintaining quality of commercially frozen foods.

NEWS AND EVENTS

QUESTIONS AND ANSWERS

Note: Question of technical nature may be submitted to the Editorial Office of the Journal. A question in your mind may be in the minds of many others. Send your questions in and we will attempt to answer them.

QUESTION:

Is the current official procedure for making counts of psychrophiles in milk satisfactory?

ANSWER:

The current official procedure calls for incubating plates at 41°F. for 7 days. The temperature is considered too low, since some organisms responsible for spoilage grow well at 45°F, but slowly at 41°F. If the incubation period is prolonged for an extra two or three days, counts for some samples show startling increases. Consequently, the next edition of Standard Methods for the Examination of Dairy Products will call for incubation at 45°F. for 10 days.

QUESTION:

How much information is obtained from the Standard Plate Count on pasteurized products?

ANSWER:

Not very much. Except where gross re-contamination occurs, the S. P. C. merely indicates the level of thermoduric bacteria in the raw milk. This is of value since it reflects the degree of neglect by milk producers, particularly of milking machines. It does not indicate the safety or shelf life of the product. More useful information regarding post-pasteurization re-contamination and probable shelf life can be obtained by holding samples at 45°F. for 5 days, then plating out. This storage period encourages the growth of bacteria (psychrophiles) able to develop at storage temperatures; contamination with small numbers of psychrophiles often results in counts in the tens of millions after this treatment. This procedure, developed by Moseley Laboratories, Indianapolis, in 1950, has proven much simpler and more useful than making psychrophilic counts on the freshly taken sample. It is a more sensitive indicator of re-contamination than is the coliform test on the fresh sample.

QUESTION:

If hypochlorite is added to milk as a preservative, how can it be detected?

ANSWER:

Some people are able to detect concentrations of 50 p.p.m. AV. Cl. by smell; others fail to detect 400 p.p.m. Most people can detect 50 p.p.m. by taste. Concentrations as low as 20 p.p.m. may be detected by the Rupp test, described on p. 281 of the 10th edition of Standard Methods for the Examination of Dairy products. While this test is not absolutely specific for chlorine (copper, for example, will give a false positive reaction) any milk giving a reaction should be regarded as suspicious.

QUESTION:

What is the status of the proposal to add a marker dye to antibiotic preparations for treating mastitis?

ANSWER:

The Food and Drug Administration have yet to give approval to this procedure. There is a reluctance to approve the use of a fluorescein product (such as recommended by the U.S.D.A.) because some of the related compounds are suspected of being carcinogenic. This is most unfortunate since the traces of fluorescein that might be present would appear to present less of a hazard to health than the significant amounts of penicillin shown to be present in milk.

ANALYSIS OF OVER 1500 DIFFERENT CHEMICAL SPECIALTIES NOW AVAILABLE

The Chemical Specialties Research Laboratories announces the availability of their 1960 catalogue listing reports on over 1500 trade-name chemical specialties. Included are reports on cleaners of all types, cosmetic preparations, detergents, waxes, bleaches, polishes and many other household and industrial items.

Chemical Specialty manufacturers who do not have the facilities for making their own analyses obtain these prepared reports inexpensively. Those who do have laboratories use them for crosschecking. A price list and catalogue of items reported may be obtained by writing directly to the Chemical Specialties Research Laboratories, Box 33, Ansonia Station, New York 23, New York.

In addition, a monthly service which provides five new analyses each month is offered on a subscription basis. Each analytical report provides the subscriber with complete quantitative and qualitative data and an interpretation in terms of commercial ingredients. Through this service subscribers are kept abreast of many new products on the market.

LETTER TO THE EDITOR

Dr. J. C. Olson, Jr.
Department of Dairy Husbandry
University of Minnesota
St. Paul 1, Minnesota

Dear Joe:

I note with interest in the current November issue of Milk & Food Technology an article reprinted from the Journal of the American Medical Association, Volume 177—#1, Sept. 5, 1959.

I read this thing pretty carefully Joe, and who was sleeping at the switch here. I am sure that a great many instances of penicillin contamination in milk supplies are coming indirectly from necessary use by veterinarians with a needle for treatment of other than Mastitic infection.

I don't know who missed this in this thing, but certainly the subject should be discussed because I would think from reading this article that every bit of the contamination comes from farmers putting penicillin into the udders and I know this is not true.

If they are going to do anything about withholding milk for 72 hours, they have also got to instruct the

veterinarian that any time they treat the animal in any amount of penicillin, or other antibiotics, this milk should also be withheld the same length of time.

I think you are in a better position to make some constructive remarks about this than I am, but something ought to be done to clarify this thinking.

Respectfully yours,
LAZARUS LABORATORIES, INC.
H. G. Ellsworth
Midwest Div. Sales Manager

Editor's Note:

Mr. Ellsworth is quite correct. The article, Penicillin and Other Antibiotics in Milk, Journal of Milk and Food Technology, Vol. 22:11 did convey the thought that most penicillin found in milk was a result of udder infusion. Articles in recent issues of Veterinary Journals have stressed the fact that intramuscular injections and the use of antibiotics in feed may also be a source of antibiotics in milk. As a matter of fact, in some therapy, slow acting antibiotics may be used so the recommended 72 hour period for exclusion of the milk may not be sufficiently long. We appreciate Mr. Ellsworth's comments and for bringing this matter to the attention of our readers.

1960 ANNUAL MEETING PLANNING UNDERWAY

The program and general arrangements for the 1960 Annual Meeting of the IAMFS were topics of discussion at a December meeting of the IAMFS Program Committee and representatives from the Local Arrangements Committee of the Illinois Association in Chicago. The Illinois Association will be host to the 1960 Annual Meeting, which will be held at the Morrison Hotel in Chicago, October 26-29, 1960. The Annual Meeting will occur during the week immediately preceding the Dairy Industries Exposition which also will be held in Chicago. This will afford a convenient opportunity for many of our members who attend our Annual Meeting, also to attend the world famous Dairy Industries Exposition.

J. C. McCaffrey, representing the local arrangements committee, reports that necessary arrangements with the Morrison Hotel are almost completely finalized. One feature which should be appealing to Association members is that reservations at the Morrison will be extended into the following week for those who attend the Annual Meeting and wish to stay over for the Dairy Industry Exposition. With Hotel accommodations at a premium, this is a very attractive arrangement. McCaffrey also reported that many special events for members as well as the ladies, are being planned.

The general program is rapidly being completed according to Dr. J. J. Sheuring, Chairman of the Program Committee. An extensive and informative meeting is planned which will contain topics of interest to all engaged in Milk, food and environmental sanitation. Mark the dates of October 26-29 on your calendar now and plan to attend. Further reports on progress of plans for the Annual Meeting will appear in this section of the Journal. Watch for them, but above all make plans *now* to attend.

GOOD DECTECTIVE WORK TRACES NEW ENGLAND TYPHOID OUTBREAK

On November 16, physicians at the Elliot Community Hospital, Keene, N. H., began to realize that something new had entered the usual medical picture. There were now 13 patients, ranging from a six-year-old child to a 55-year-old adult, who presented a puzzling variety of symptoms — colds, nosebleeds, constipation, diarrhea, and headaches. Regional lymphoid enteritis was found by laparotomy performed on one patient.

Diagnosis was further complicated by the fact that many cases of grippe with intestinal complications had occurred in preceding weeks. But routine tests, made shortly after several of the 13 had been admitted, gave support for a "high index of suspicion," according to Dr. Thomas Lacey, Chairman of the City Health Board.

The suspicion? Typhoid fever.

By Sunday, November 22, the suspicion had been officially confirmed. Dr. Lacey alerted Evan C. White, City Health Officer, and Dr. Edward Colby, State Health Officer.

Dr. Colby immediately sent Dr. William Prince, Head of the Communicable Disease Division of the State Department of Public Health, to Keene, where he was subsequently joined by Dr. Alvin Novack, an epidemiologist from the U. S. Public Health Service office in Syracuse, N. Y.

With Dr. Howard Oliver of Keene as pathologist, Drs. Prince and Novack plunged into the job of trying to pinpoint the source of infection.

Meanwhile, the hospital's Infection Committee, originally established to control hospital staphylococcus, was also alerted and advised individual physicians on the care of acutely ill typhoid patients.

The regimen was chloramphenicol for a minimum of seven to 10 days, to be followed after 48 hours by daily stool and urine cultures and for a month thereafter by weekly cultures. If there was a positive culture after treatment was stopped, the entire course was to be repeated, the Committee decided.

Keene has a population of 45,000. The public was notified and kept informed of every step of the investigation in calm and factual reports released regularly by the officials' spokesman. "People almost got

bored with it," Dr. Lacey says. "It got to be like the weather report."

Food handlers, dairies, seeping cesspools, were carefully checked. There was one clear clue. All of the 13 patients lived in the southeastern part of Keene. Their homes were supplied by water from one main.

Only One Case Per Family

Studies also showed that none of the affected families had more than one case of the disease, and there was no evidence that the patients had eaten food from the same source.

In a sense, the implication of the water supply clouded the epidemiologic quest further, Dr. Lacey said. Keene is set in rugged country, ideal for hunting and fishing, with much logging activity in the forested areas. There are dozens of small streams and ponds in the watershed, and the area is frequently visited by hunters, fishermen, campers, and tourists.

Then, on November 26, White learned that two loggers were living in a shack 10 miles away in an isolated woodland area near some of the streams that feed the city reservoir. He was told that the shack was on a slope near Roaring Brook, an important feeder stream for the reservoir.

Dry Brook Flooded

White and Dr. Lacey sped to the area and found the two loggers. There were also two Percheron horses. Near the shack, they found a pile of both human and animal excreta. Below the shack, and the excreta, had been a dry brook. During the rains of October and November, this brook had been flooded, and together with the excreta had fed into Roaring Brook.

Subsequent tests revealed that one of the loggers was the typhoid carrier. In giving his medical history, the logger said that he did not recall having been seriously ill since 1918, when he "hauled people from their homes to their graves." During that influenza epidemic, he said, he had chills and a relapsing fever, which he now thought might have been typhoid fever.

The carrier has agreed to cooperate with any medical measure required to make him a safe resident of the area and is now under study for the possible removal of his gallbladder. All 13 patients are recovering.

The next steps, according to Dr. Lacey, will include permanent chlorination of the water supply, protective measures to keep trespassers out of areas in which the water supply might be contaminated, and a careful follow-up on the known patients and their contacts.

Reprinted from *Scope Weekly* Dec. 23, 1959.

FOOD PRESERVATION BY IRRADIATION GETS SECOND LOOK

The U. S. Army's recent decision to "defer" action on the use of atomic irradiation as a food preservative has focused new attention on the way in which the peaceful atom may someday figure in everyday nutrition.

Wary because of damage seemingly done to laboratory animals fed irradiated foods, the Army put a damper on the program and cancelled construction of the 7.5 million dollar plant in Stockton, California, which was to employ the atomic-preservation method. Warning signs went up, Army officials reported, when laboratory dogs on an irradiated diet began to bear smaller litters. Rats fed similar rations also seemed to suffer some ill effect, although their symtoms (circulatory disease) could possibly be attributed to other causes.

The use of human subjects in research into irradiated food consumption was halted in the Fall of 1958. The Army emphasized that the subjects, approximately 100 conscientious objectors, had not been given sufficient quantities of the food to endanger them in any way. Confidence had once run so high that a luncheon of irradiated foods was served in the Pentagon to ranking officers and civilian officials. The atomically preserved foods on the menu included shrimp cocktail, chicken, vegetables, strawberries and date-nut bread.

Dr. H. E. Robinson, of Swift & Company's Research Department, has also made a recent report on the promises and problems of irradiated foods. Writing in the journal, *Nutrition Reviews*, Dr. Robinson is unconvinced that irradiated foods, even in their early stages of development, offer any danger. He suggests that the level of irradiation used is "so low as to have no significance" when compared to (1) "radioactive atoms normal to the human diet," (2) ionizing radiation regularly encountered in therapeutic and diagnostic X-rays and (3) the constant bombardment of the earth and its inhabitants by cosmic rays."

But even if food irradiation is eventually found to be safe—and the Army is continuing its research into the question — Dr. Robinson concedes that the atomic process will still have to overcome a number of other problems.

One of these is the way irradiation impairs flavor. Thus, while the taste of oysters and shrimp is un-

changed, irradiated beef ordinarily develops a strong off-flavor. Research at the University of Michigan suggests, however, that compounds derived from the tomato may be added to irradiated beef to assure true flavor.

The taste question is particularly tricky, Dr. Robinson notes, because an inexpert person will not on first exposure detect impairment. It comes with time, however, and "once a sensitivity . . . has been developed, the off-flavor becomes objectionable."

It is also apparent that irradiation is not, in itself, a complete answer to the question of food preservation. In "sterilizing," for instance, irradiation doses do not stop enzymes. Due to the unchecked enzyme action, irradiated foods continue to reveal changes in flavor and appearance, just as any food normally does in time.

Food irradiation is measured in terms of the amount of radiation energy absorbed by the food. The unit of measurement is the "rad," which indicates an energy absorption of 100 ergs per gram of food. It has been found that as many as 4.8 million rads ("a large amount of radiation") are necessary to destroy the micro-organism that causes botulism, while only 7,000 are needed to inhibit sprouting on potatoes.

While valuable progress has been made in harnessing atomic energy for food preservation, Dr. Robinson notes, only a beginning has been made. "It is clear that much more basic research needs to be done in order to establish radiation preservation as a workable food process," he concludes.

Reprinted from Nutrition Items, Vol. II, No. 31.

FORECASTING FOOD IN THE SIXTIES

The year 1960 will be the most prosperous to date in the history of the food industry. Moreover, it will usher in a decade of growth unsurpassed by even the phenomenal revolution in food buying that followed World War II. And, in terms of value received, the consumer will be getting more for her food dollar than ever before.

Food supplies generally will be plentiful. Dairy products will be in abundant supply, with prices comparable to 1959. According to industry forecasts, milk production will increase about one-quarter of a percent. Although per capita consumpition of dairy products will likely remain at around 690 pounds (in terms of whole milk), total consumpition can be expected to gain about 1.7%, with the estimated volume of 1960 milk production going into Government surplus as manufactured products lower than it has been in several years. In keeping with the postwar trend, lower per capita consumpition of such high fat products as butter and heavy cream only can be expected. However, ice cream consumption should increase. There should be a sharp advance in per capita consumption of buttermilk, cottage cheese, and other skim milk products. A slight gain in the use of fresh fluid milk is forecast, with about half the 125 billion pounds of milk produced next year consumed in this form. The sales increase will particularly benefit the dairy farmers, who receive the highest price for milk used in this manner. Because of the better balance between production and consumption and an abundance of relatively low cost feeds, dairying promises to be the most profitable area of agriculture in the current year.

For the food industry as a whole, 1960 will be a year that will see the introduction of a vast array of new and improved products, particularly of the instant and convenience variety, but few of a radical nature. Companies will concentrate their research and development efforts on major modifications of existing products, to make them faster and easier to prepare in the home. There will be greater emphasis on development of packaging and processing machinery, to improve quality, flavor and keeping ability of products, and in an effort to hold down rising production costs. The industry will offer existing products in an even greater variety of package sizes, particularly larger ones, a move that got strongly underway in 1959.

There will be, however, no radical change in the conduct of the food industry — in the next year or next decade. As in the past, it will be tied to the two factors that have always principally controlled its growth: population increase, and rising consumer income. At no period in the nation's history, however, have the two combined to move ahead so much so fast. Our population is gaining at the rate of 1.8 per cent a year, or 3.2 million new customers per year alone. As the base widens, the numerical increase each year becomes greater. More important, the "population mix" — the distribution of population by age groups — is changing sharply. In the next ten years, for example, the number of persons between 15 and 19 — the "teen-age" group — will increase, according to one estimate, by almost 63 per cent. And teen-agers consume about 20 per cent more calories than normally active adults. So the total volume of food consumption can be expected to rise at a faster rate than the population, accompanied by a further switch in types of foods consumed, with greater emphasis on proteins. Also, the teen-age group will be making more "buying decisions" in 1960 and the next decade — two girls in three are married in their teens and forming households. Bet-

ter education, more venturesome, more pressed for time, these new housewives tend to buy a greater variety of the more costly, highly processed foods.

And they, along with their older counterparts, will have the money to spend. Two-fifths of all families now have an income of more than $4,000 a year — the point at which discretionary spending begins. A fifth of all families earns more than $7,500 a year. Although incomes have been rising faster than the cost of food, families have made no significant change in the percentage of their after-tax income going for food. It has remained constant at about 22 per cent for the past two decades. With the average family's volume of purchases remaining relatively stable, more of its food dollar is going toward the purchase of more highly processed products with "built-in" services, more "exotic" and luxury foods. And, through better education, we can expect a continuing move in the direction of more nutritious foods. According to Government estimates, about one-third of the population in the 1930's was poorly fed by nutrient standards at the time; today, by the same standards, the figure is 10 per cent, and that more through ignorance than need. In the past 20 years the consumption of high-protein animal foods has increased per capita by 100 pounds. This trend is likely to continue, with a notable effect on the dollar volume of food purchases. Total food expenditures, 73 billion in 1959, are expected to rise another $3 billion in 1960, and may reach the incredible total of $115 billion a year by 1970.

To equip itself to produce the goods the public will demand, the food industry will invest more than $600 million in new and modernized plants and equipment in 1960. Much of this expenditure will go toward stepping up capacity, rather than for replacement. The result will be not only a greater volume of output, but an increased efficiency that will enable manufacturers to hold down prices while maintaining already-narrow profit margins.

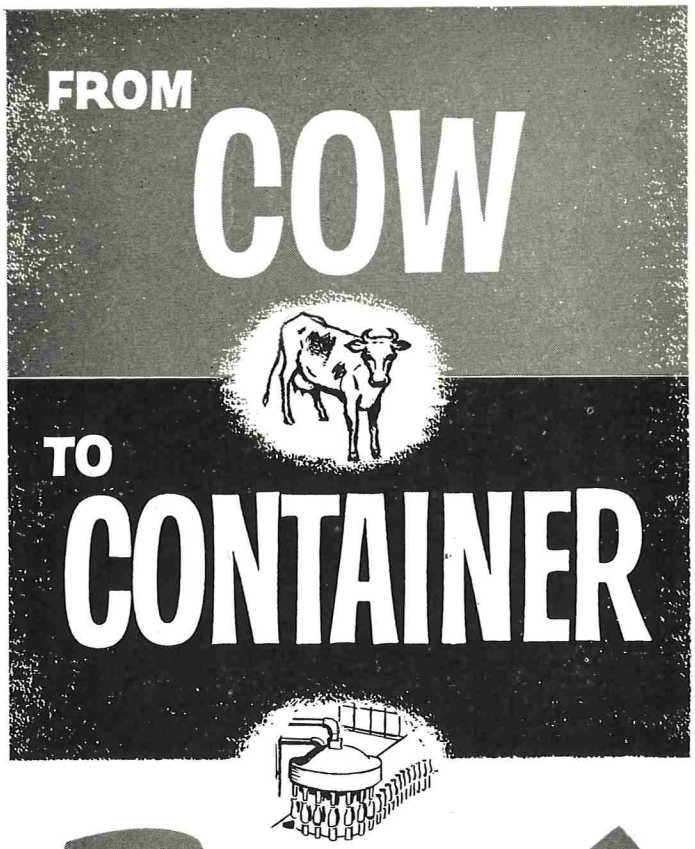
From an address by Harold W. Comfort, President, The Borden Company.

22ND DAIRY INDUSTRIES EXPOSITION, SET FOR FALL OF 1960 IN CHICAGO

The 22nd Dairy Industries Exposition will be held October 31-November 5, 1960, at the International Amphitheatre in Chicago, Illinois, under the sponsorship of Dairy Industries Supply Association.

To date, eight other dairy industry organizations have announced plans to hold annual meetings during, or just before, the biennial staging of the latest advances in dairy industrial supplies and equipment. They are:

International Association of Milk and Food Sanitarians, which will hold its 47th annual meeting October 26-29 at the Hotel Morrison.



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Dairy Society International, which will hold its 14th annual meeting October 30 at the LaSalle Hotel.

Dairy Suppliers' Foundation, which will meet October 31-November 1.

International Association of Ice Cream Manufacturers, which will hold its 56th annual convention October 31-November 2 at the Conrad Hilton Hotel.

Evaporated Milk Association, which will meet November 2 at the Knickerbocker Hotel.

National Ice Cream Mix Association, which will hold its meeting November 2 at the LaSalle Hotel.

Milk Industry Foundation, which will hold its 53rd annual convention November 2-4 at the Palmer House.

National Association of Retail Ice Cream Manufacturers, which will hold its 27th annual meeting November 2-4 at the Conrad Hilton Hotel.

Close to 25,000 dairy industry men and women are expected to attend the Exposition and Conventions. Chicago hotels are under contract not to accept reservations except on official forms to be issued, at a later date, by all associations.

KENTUCKY HOLDS SUCCESSFUL DAIRY MANUFACTURING CONFERENCE

The seventh annual dairy manufacturing conference was held the latter part of November at the University of Kentucky. The conference was sponsored by the Kentucky Dairy Products Association and the Dairy Section of the University.

A large number of timely subjects were discussed by outstanding dairy scientists. In discussing the ice cream industry, Dr. P. H. Tracy, Professor Emeritus of Dairy Technology, University of Illinois stated that, "To keep in competition with other foods, the ice cream industry will be compelled to increase output per man hour to 200 gallons to be at an advantage economically." He compared production in various plants throughout the country indicating the range currently is from 28 to 120 gallons per man hour.

In his discussion of bacteriophage, Dr. F. E. Nelson, Iowa State College, stated that too frequently starter troubles are blamed on antibiotics. He emphasized that starter troubles can be caused by bacteriophage whose origin may be in the plant.

Dr. J. J. Sheuring, University of Georgia, and President-Elect of IAMFS, discussed cottage cheese problems and pointed to the need for improved quality if consumption is to be increased.

Quality standards for milk going into manufactured products were given attention by three speakers on the program. From the USDA, John Blum discussed quality standards for manufactured milk, followed by Professor J. M. Jensen, Michigan State University, and Dr. W. S. LaGrange of the University of Kentucky.

The conference was well attended by a number of public health and other regulatory officials from state and local agencies in Kentucky.

TESTING MILK FOR ANTIBIOTICS AND PESTICIDES URGED BY IOWA ASSOCIATION

As a result of recent investigations conducted by the Federal Food and Drug Administration it has been concluded that despite past educational efforts, antibiotic and pesticide residues in fluid market milk are still a problem. Because of these investigations, the Administration is initiating a regulatory program to deal with these problems. If antibiotic or pesticide residues are found in milk there is no doubt that some shipments will be confiscated by the Federal Food and Drug Administration.

In view of the foregoing, it is recommended that immediate action be taken to set up procedures for the testing and eliminating of milk containing antibiotic residues. Steps are underway to get a laboratory training course started so people wanting additional training in the detection of antibiotics and pesticides may have the opportunity. As this develops those interested will be notified. In the meantime, Dr. Robert Morris, State Hygienic Laboratory, Iowa City, reports that his laboratory is open to anyone needing help to get started.

Contacts made around the state indicate that a number of health departments and some dairies have been running antibiotic tests on raw and pasteurized milk for some time. This is gratifying to know, and is apparently paying off. Reports this past week have indicated that the Federal Food and Drug inspectors have already tested several sources of raw milk in Iowa, and that the milk was apparently negative as far as antibiotics are concerned.

Those health departments and dairies not testing milk for antibiotics should begin at once to do so, and to advise the producers of the proper methods for eliminating antibiotics and pesticides in milk. It is sincerely hoped that a situation similar to what happened with the cranberry growers can be avoided in the dairy industry.

Reprinted from December 1959, Newsletter of the Iowa Association of Milk Sanitarians.

ERRATA

The following correction should be made in the article "Statistical Comparison of Logarithmic-Average, 3-out-of-4, and 3-out-of-5 Methods for Grading Milk by Plate Counts" by E. K. Harris, L. A. Black, and C. E. Zimmer, which appeared in the J. Milk and Food Technol. 21: 276-279, October 1958.

In Table 1 of this paper, theoretical probabilities of violation of the 200,000/ml. grade limit under three grading methods are listed. The values given for the log-average method are incorrect, a fact pointed out to the senior author by Mr. N. Mantel, mathematical statistician of the National Cancer Institute. The probabilities given for the 3-out-of-4 and 3-out-of-5 methods are correct. The mistake in the log-average column lies in misconceiving the area of integration associated with the transform introduced in the Appendix. Fortunately, during the past year, new tables of areas under the bivariate normal distribution (*1*) have become readily available, thereby eliminating the need for any transformations. Table 1[1] below gives the correct probabilities under the log-average method and also, for comparison, the probabilities under the proposed 3-out-of-5 method, recopied from the original table.

It is clear now that the two methods agree very closely on a theoretical basis, as they had been shown to agree when applied to many series of observed plate counts. Hence, in this case at least, theory and practice have been reconciled.

TABLE 1[1]—THEORETICAL PROBABILITIES OF VIOLATION OF 200,00/ML. GRADE LIMIT UNDER LOG-AVERAGE AND 3-OUT-OF-5 GRADING METHODS

Geometric mean count/ml.	Log-average	3-out-of-5
80,000	.033	.043
100,000	.069	.083
120,000	.116	.131
140,000	.169	.184
160,000	.224	.239
180,000	.280	.292
200,000	.333	.344
220,000	.384	.392
240,000	.430	.437
260,000	.473	.478
280,000	.512	.515
300,000	.548	.549

REFERENCES

1. Tables of the Bivariate Normal Distribution Function and Related Functions. National Bureau of Standards, Applied Mathematics Series 50. U. S. Govt. Printing Office, Washington, D. C. June, 1959.

RADIOSTRONTIUM REDUCED IN MILK BY ION EXCHANGE

A simple, inexpensive method of removing 80 per cent of radioactive strontium from milk, with no perceptible change of flavor, was announced by Dr. Wallace D. Armstrong and Leon Singer, Ph.D., chairman and associate professor in the Department of Physiological Chemistry at the University of Minnesota.

The technique utilizes the constant exchange of ionized calcium between bones and body fluid.

Animal bones are defatted, washed with a calcium and alkaline solution, and ground to a fine powder. Twenty grams is used to fill a glass column 22 cm. long, with an inside diameter of 1.2 cm. and a glass-wool filter at one end. The filter can be heated to 200°F., thus maintaining continued sterilization of the milk being filtered through.

As strontium-contaminated milk flows through the column, the scientists say, strontium ions in the milk are captured by the bone powder while harmless calcium ions from the powder are released into the milk in an ion exchange.

In laboratory tests, Drs. Armstrong and Singer report, quart quantities of milk dosed with strontium[85], which has the same physical properties as strontium[90], have been filtered. Removal of 80 per cent of the strontium has been achieved, with very little calcium loss.

Reprinted from *Scope Weekly*, Dec. 30, 1959.

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SANITARIANS OF WESTERN NEW YORK STATE HAVE ACTIVE ORGANIZATION

The Western Association of Sanitarians, affiliated with the New York State Association of Milk Sanitarians has shown a very healthy growth since its organization in June, 1958. At that time a group of 15 milk and food sanitarians working in the western part of the State met and discussed the need for an association. A committee of six was appointed with Dr. Norman W. Bartz of Buffalo selected as group chairman. Dr. Bartz was later elected as the Association's first president.

From this small beginning, the Association now has a total membership of 230. Membership is open to any person engaged in any of the various phases of sanitary, nutritional or quality control of dairy products or food supplies. At present, membership consists of persons in regulatory work, educational institutions, control laboratories, the dairy and food industries.

Officers serving for 1960 are the following:

President: Wilson Chadderdon of Arcade Farms Co-operative.

Vice-President: V. James Willson of Klenzade Products, Inc.

Recording Secretary: William O'Brien, Erie County Health Dept.

Secretary-Treasurer: George E. Baker, Beck's Guernsey Dairy.

Executive Board (2 year terms):

Nathan Lazarus, Lazarus Laboratories.

Stanley Skelskie, Loblaws, Inc.

Regional groups of a state association are not uncommon, but it would appear that the phenomenal growth of this one in Western New York State is outstanding, again illustrating the fact that professional people with common interests willingly join together under good leadership.

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE FOOD AND DRUG ADMINISTRATION

Standards for artifically sweetened fruit jams and jellies, offered to persons on sugar-restricted diets, have been stayed by objections requiring a public hearing, the Food and Drug Administration announced. In the absence of objections, FDA explained, the standards would have gone into effect today.

The FDA order setting identity standards was based on a proposal by the National Preservers Association and comments received since June 20, 1958, when the proposal was published in the Federal Register.

The stayed order provides that artifically sweetened products contain substantially the same amount of fruit or fruit juice as regular jams and jellies – a minimum of 55 percent of the product and that harmless nonnutritive artificial sweeteners, jelling ingredients, and optional spice flavorings be used. Artificial coloring and flavoring would not be permitted.

In objections to the standards, it was proposed that the minimum required percentage of fruit or fruit juice be lowered from 55 to 45 percent, that a maximum limit be placed on fruit or fruit juice to control the amount of carbohydrates – particularly sugar – that the food would supply, and that artificial coloring should be permitted for use where needed to give the foods an appearance acceptable to consumers. The objection was also made that standards for artifically sweetened fruit jams and jellies would not be in the interest of honesty and fair dealing with consumers.

Notice of a formal hearing on the objections will be published later in the Federal Register. All interested persons will be given an opportunity to present testimony. A decision will be made by the Commissioner of Food and Drugs on the basis of evidence presented at the hearing.

P. R. ELLSWORTH NAMED ASSOCIATE DIRECTOR OF MILK INDUSTRY FOUNDATION

Perry R. Ellsworth, formerly assistant to the Executive Director of the Milk Industry Foundation, has been promoted to Associate Director.

A graduate of Ohio State University in the class of 1942, Mr. Ellsworth served in the United States Army for four years, rising to the rank of Major in the Artillery. After returning from World War II, he managed a farm for a dairy company at Cleveland, Ohio, during 1947, and subsequently became Extension Specialist in Dairy Technology for the Ohio State University at Columbus, Ohio. For five years of this period, he also served as secretary-treasurer of the American Dairy Science Association.

In his position at the Foundation for the last five and a half years, Mr. Ellsworth at one time or another has been responsible for Congressional liaison, the supervision of the Foundation's producer relations program, and the development of the Foundation's plant and fleet accident program, and also has served as assistant convention manager.

ALLEN H. SEED, JR. NAMED VICE PRESIDENT OF KEEP AMERICA BEAUTIFUL, INC.

Allen H. Seed, Jr., assistant director of the National Municipal League for the past 10 years, and former president of the National Association of Civic Secretaries, has been appointed Executive Vice President of Keep America Beautiful, Inc., it was announced by KAB President Cecil F. Dawson.

Keep America Beautiful, Inc., is the national non-profit, non-partisan organiatzion devoted to the preservation and improvement of America's scenic beauty – both urban and rural. It conducts a coordinated program of public education to stimulate individual pride and responsibility in clean, safe, healthful and attractive surroundings, and encourages volunteer citizen groups to work in close cooperation with government officials for the prevention of litter.

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HIGHER SALARIES are being offered to qualified Sanitarians by Public Health Services, Philadelphia Department of Public Health. New employees will start at $5348-liberal fringe benefits. For information call Mr. Mullin at LO 7-0290 or write Room 504, City Hall Annex, Philadelphia 7, Pennsylvania.

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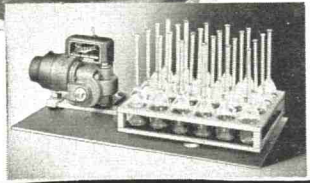

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE FOOD AND DRUG ADMINISTRATION

A new Food and Drug Administration booklet entitled "What Consumers Should Know About Food Additives" has been published to answer the many questions people are asking about food additives and the new law, Commissioner Larrick announced today.

The booklet tells the story of how food additives came to be developed, why and how they are used in food production, why public health safeguards are necessary, and how the new law works. It also gives factual information about many of the more important kinds of food additives and explains how the law controls two special classes of additives, pesticides and coal-tar colors.

"We should not lose sight of the fact that food additives are an integral part of the tremendous progress being made in modern food technology," Commissioner Larrick said, "and that they are being safely used for a host of purposes that are beneficial to the consuming public.

"Our whole system of food production, processing and distribution has undergone profound chanes, and some of these are only partially or incorrectly understood by the public. For example, we now have food preservatives and many other additives that are entirely safe, and some of them are even necessary to health when used in proper amounts. Food additives are being used to increase production, reduce cost, promote cleanliness, prevent spoilage, increase shelf life, and improve the quality, appearance, texture and nutritional value of our foods. All this, I think, needs to be explained to the public."

The booklet is for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. — price, 15 cents.

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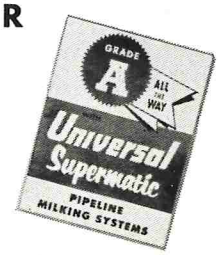

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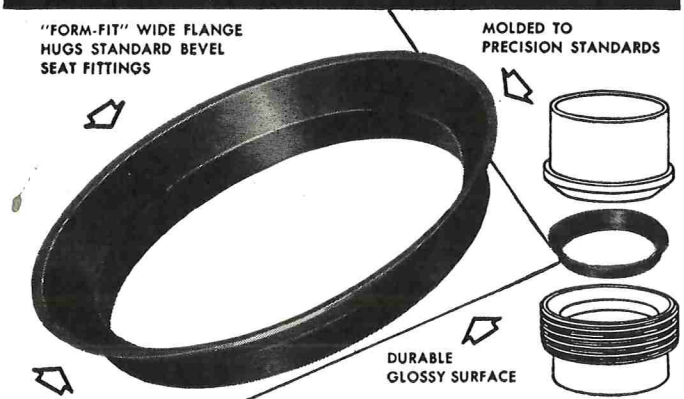

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Some questions and answers about TYGON B44-4 CLEAR PLASTIC MILK HOSE

More and more manufacturers are employing Tygon B44-4, the sanitary milk tubing specifically developed to convey processed milk and milk products, on their processing machines and equipment. To help you get the most efficient service from your Tygon tubing, here are some questions frequently asked about Tygon, followed by our answers and recommendations.

1. Q: Can the same cleaners, sanitizing agents and cleaning methods used on other milk processing equipment also be used for Tygon?

A: Yes. One of the important advantages of Tygon is that it permits the use of all normally used dairy cleaners whether soaps, detergents, chlorine, or acid milkstone cleaners. For best results, of course, it is always wise to follow carefully the instructions of the manufacturers of the cleaning and sanitizing agents you use.

2. Q: Is Tygon abrasion-resistant?

A: Yes. Tygon is made extremely tough and abrasion-resistant to withstand frequent cleaning and gives unusually long wear under rugged service conditions. When handled with reasonable care, this dense, strong plastic will retain its smooth, polished surface throughout its service life. Naturally, it is best to avoid dragging the hose over concrete or sharp objects if maximum clarity is desired.

3. Q: What about clarity? Can you give me any tips on maintaining the transparency of Tygon in use?

A: Here also, with proper care, Tygon will provide the convenience of visual flow inspection throughout its service life. Clarity may be slightly affected on the outside by contact with paint, rubber, grease, or perspiration, and certain strong-colored sanitizers, such as those containing iodine or bromine, may tend to stain the inside. However, these are simply surface discolorations that in no way affect the efficiency of the tubing. And even should it have some slight discoloration, your Tygon tubing still provides a degree of solution visibility that makes it far superior to metal or rubber piping.

A slight cloudiness on the interior surface after exposure to water may be due to moisture. This is a normal occurrence—somewhat like the moisture deposited on eyeglasses when you blow on them. Clarity returns in a short time if the tubing is allowed to dry thoroughly. Should cloudiness persist, it might be well to recheck your cleaning procedure for adequate milkstone removal.

4. Q: Is Tygon suitable for use as cleaned-in-place piping?

A: Yes. In fact, Tygon is particularly ideal for this application on short connecting lines between equipment where flexibility is necessary. It shows the sanitary condition of the line at a glance and can be efficiently cleaned in place by the same cleaning methods applied to other parts of the equipment when pressure, temperature and solution concentrations are held within recommended limits.

5. Q: Why does Tygon seem to become easier to slip on and off a fitting with use?

A: The remarkable flexibility of Tygon is due to the fact that it is a thermoplastic and, like all thermoplastic materials, has a natural tendency to take a slight "set." This really presents no problem in use, however, as a snug fit can always be secured with a tight clamp. Some operators simply trim off the end of the tubing as required.

6. Q: Can you give me any suggestions for proper storage of Tygon?

A: Tygon is simple to store, requiring only the same sanitary care and handling you normally observe with your other milk processing equipment. It is well to expose the tubing to dry storage after cleaning, with ends open to permit thorough drying. It is also good practice to store the tubing loosely coiled (avoid kinking) on a clean, dry shelf.

Please write to us if you would like complete details, or have any questions about the use and care of Tygon B44-4.

Plastics and Synthetics Division

U. S. STONEWARE

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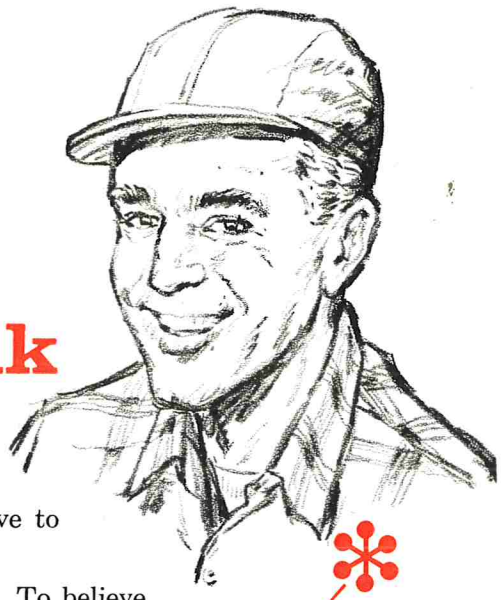
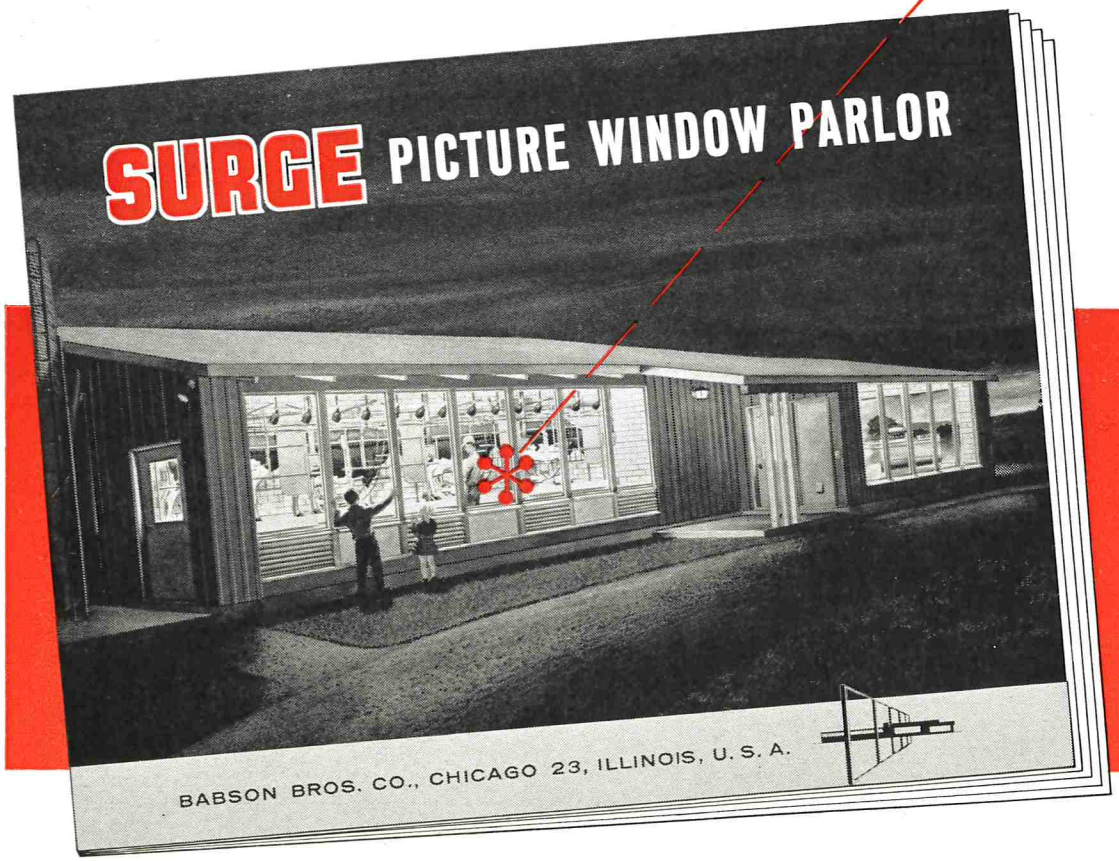
It takes good men to produce good milk



One of the important steps we can take to get the right kind of milk is to make cow milking attractive to the right kind of men.

Good clean milk depends on good cow milking. To believe that dark, dirty, cagelike milking facilities — found on many dairy farms today — will attract the kind of men who will do a good job of milking, is expecting quite a lot.

The Surge Picture Window Parlor is a way to keep our good young men on the job. If we fail to keep the youth interested in the dairy industry — the whole industry will fail —



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