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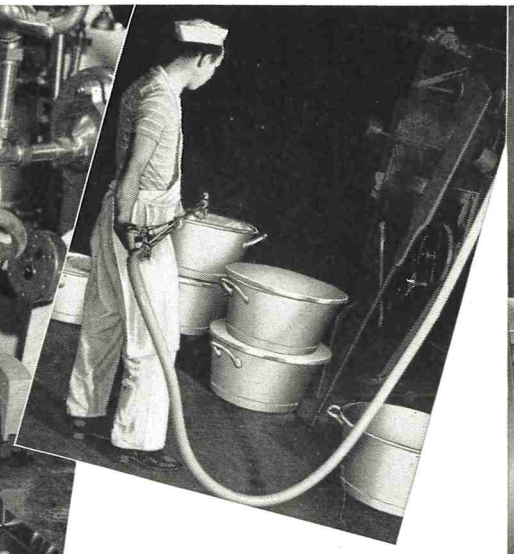

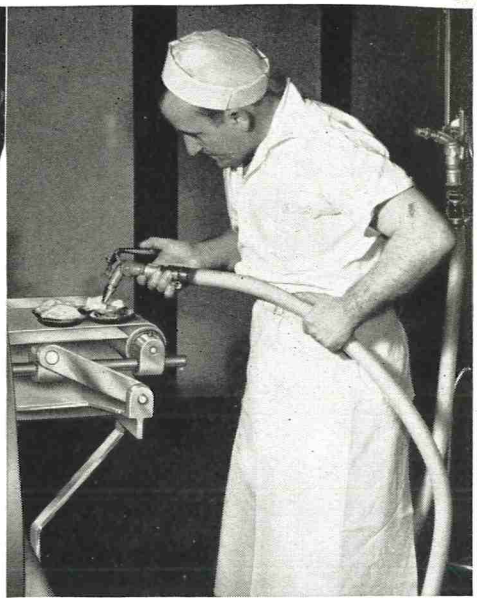

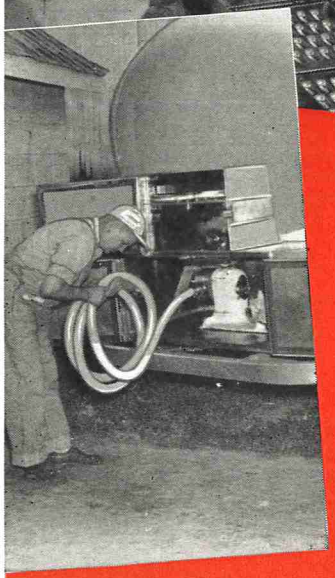

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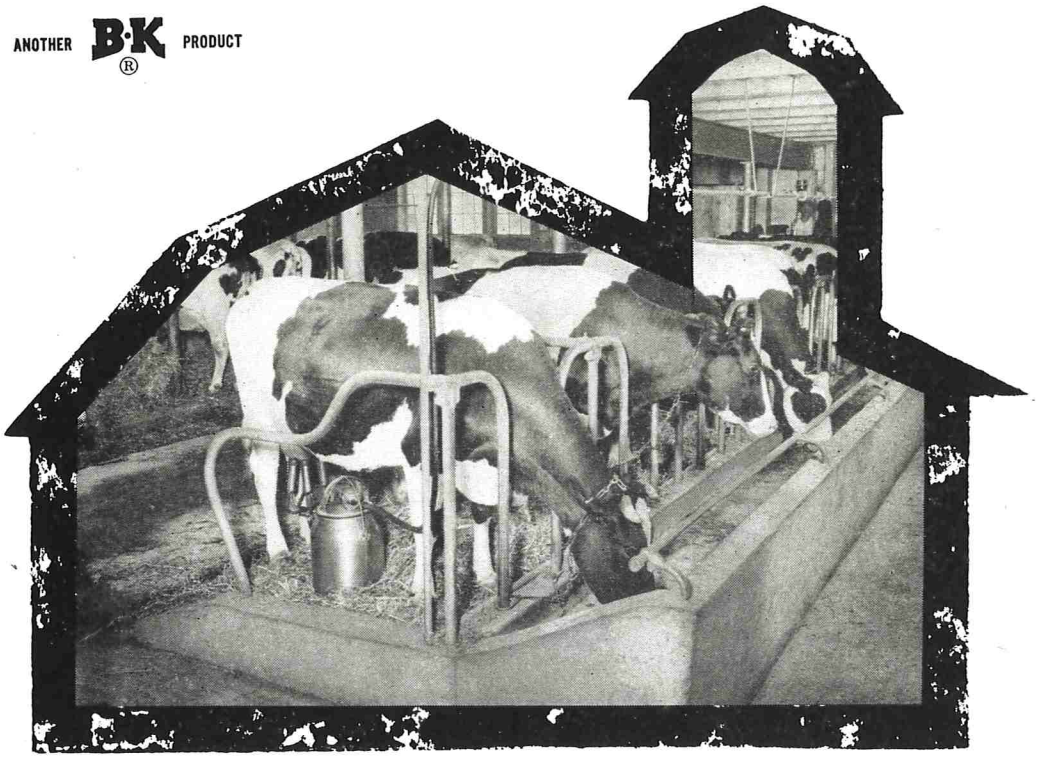

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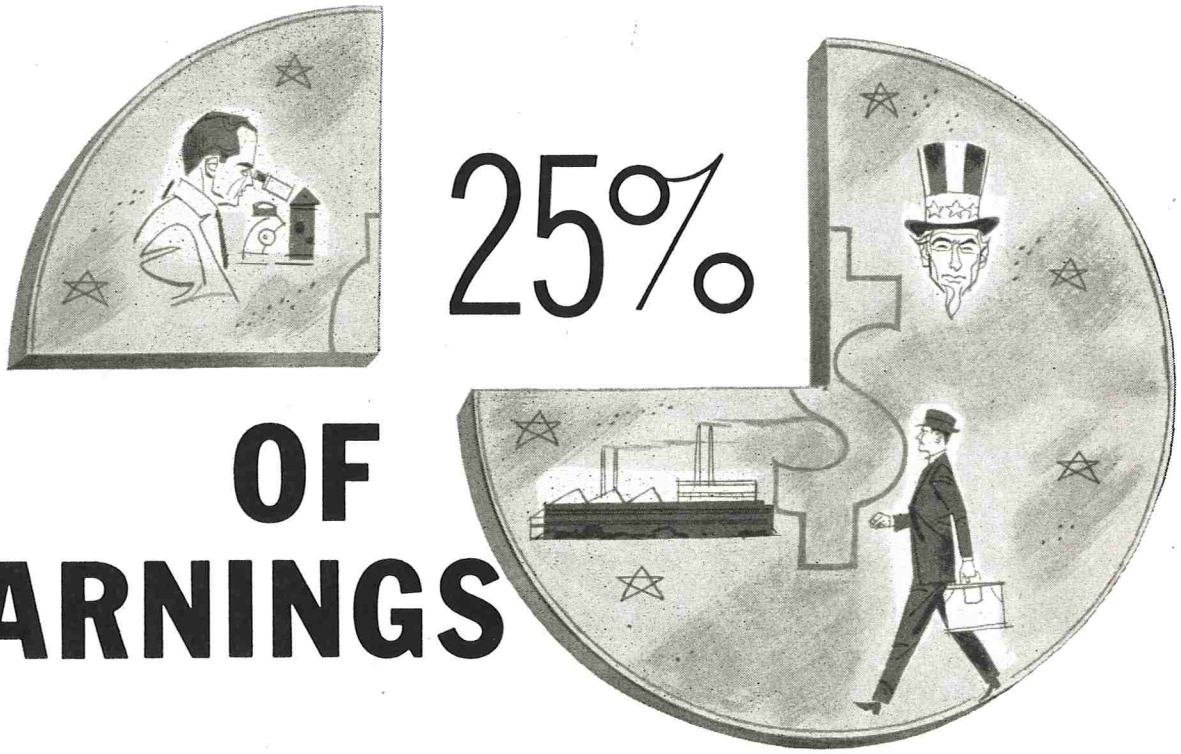

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EDITORIAL

Are We Ready for a Nation-Wide Uniform System of Effective Milk Control?

During the sessions of the 85th and the 86th Congress, a bill, known as the *National Milk Sanitation Act*, was introduced to the United States Senate and to the House of Representatives. The House bill was referred in each instance to the Sub-Committee on Health and Science of the House Committee on Interstate and Foreign Commerce; the Senate bill to the Sub-Committee on Health of the Senate Labor and Public Welfare Committee. Hearings have been held at which testimony, in support as well as in opposition, was presented. To date, neither the House bill nor the Senate bill has reached the floor of the House or Senate, respectively.

In the May 1960 issue of the *Journal*, the provisions of this bill were reviewed by Dr. A. C. Dahlberg. This article should be on the "must" reading list of all sanitarians.

In essence, the *National Milk Sanitation Act* would prevent the *exclusion* of any *Grade A* milk supply from any market in the United States. The term, Grade A, is emphasized, for the Act specifies, in effect, that unrestricted distribution of milk applies only to milk which has been produced and processed in conformance with the current edition of the *Milk Ordinance and Code, Recommendations of the Public Health Service*. The general acceptance and extensive adoption of these "recommendations" throughout the country serve to establish the term, Grade A milk, in the minds of most, as that which meets the requirements of these recommendations.

Perhaps an answer to the question of our readiness for a uniform system of public health milk control, which would provide for the *free-flow* of safe milk, *nation-wide*, may become evident through a brief review of a few significant developments.

Undoubtedly, all would agree that the primary objective for the establishment of regulations pertaining to the sanitary control of production, processing and distribution of milk is to protect the public health. Furthermore, it is obvious that high standards of cleanliness within the industry minimize the hazard of disease transmission through milk, and the distribution of wholesome products enhances the consumption of milk. This is all to the best interests of milk consumers and the dairy industry.

To accomplish these things, regulation is necessary. These began to appear in several eastern cities at about the turn of the century. Most sanitarians are aware of chaotic situations that developed as time went on and other municipalities and states established similar regulations, retaining provisions in effect in other places and adding additional ones. This resulted in a large number of laws and regulations governing the dairy industry and in requirements that differed from one jurisdiction to another. Restrictive clauses appeared in ordinances which became effective trade barriers masquerading under the guise of public health safeguards. Numerous standards were established, some of which had little or no relationship to quality and frequently were costly and confusing to the public, producers and processors as well.

Fortunately, far-seeing individuals from public health agencies (local, state and federal) and from industry recognized this developing problem. They saw the need for uniformity in milk regulation and for providing assistance to municipalities and states. The consequence was the appearance in 1924 of the PHS Milk Ordinance and Code — a most significant development — and since revised twelve times to date.

Of perhaps equal significance was the establishment of the *National Conference on Interstate Milk Shipments*. Since 1950, their program has had tremendous influence in facilitating interstate and intrastate milk shipment. The reader is referred again to past issues of the *Journal* for reports on this program.

In spite of great progress exemplified by the two developments referred to above, we still have ordinances which recognize no reciprocity and contain restrictive provisions which, in effect, hinder and even prevent interstate (in some instances intrastate) distribution of safe milk.

The justification *at one time* for local procurement of milk supplies is recognized. However, reasons for excluding milk from a market based upon quality and public safety considerations are fundamentally untenable today. Technological developments (refrigeration, transportation, processing, sanitation principles) make possible the distribution of wholesome milk to areas of consumption a thousand miles or more away from the location of production.

In light of these developments, the answer to the question posed in the title of these comments seems obvious. Are we ready? Sufficient of the dairy industry and many public health agencies have been ready for a long time! How much longer shall provincial restrictive milk control prevail with all its attending inequities and costliness? Is it not time for progressive sanitarians everywhere to lend their vigorous support in the interest of unimpeded distribution of "*Grade A*" milk? Generally, anything that is economically sound and beneficial will come to pass. Progress is hastened by action. Why wait?

J. C. Olson, Jr.

VARIABLE FACTORS IN THE NEW TEST FOR PENICILLIN IN MILK

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(Received for publication March 6, 1960)

Fluid milk plants throughout the country are now testing producer's milk for the presence of penicillin. The testing procedure in most common use is that of Arret and Kirschbaum (*2*) since this method is the one being employed by the Food and Drug Administration and would be the basis of action by them. As pointed out by Johns (*5*) this testing procedure offers no advantages over the modified Difco method given in *Standard Methods for the Examination of Dairy Products* (*1*) and has several disadvantages. The Arret and Kirschbaum procedure recommends that the test be run at 37°C. and the results read after 2½ hours incubation. This specified temperature is not commensurate with incubators found in most dairy laboratories and while rapid tests are desirable it is usually, unnecessary to know the results this quickly when surveying a producer's milk. It was further recommended that plates be stored for not less than three days nor more than five days before being used to perform the assay. This recommendation would require careful planning ahead by the dairy laboratory to run the test and avoid waste.

Most dairy laboratories must rigorously follow the specifications of any new test since they do not have the time to determine other conditions that might give equivalent results. This study was undertaken in an effort to evaluate the results obtainable by the Arret and Kirschbaum procedure when the temperature for storing plates, time of storing plates, temperature for the test, and time of reading the test were modified.

PROCEDURE

The Arret and Kirschbaum procedure was followed as far as possible, but modified to show the effect of several variable conditions and modified to conform with the manner in which it would normally be run in a dairy control laboratory.

Bacto Antibiotic Medium 1 was used for performing the assay and this same medium plus 0.03 per cent manganese sulfate was used for preparing the spore suspension. The spore suspension was prepared in the prescribed manner using a Bacto Standardized Spore Suspension (0453) of *Bacillus subtilis* ATCC No. 6633 as the inoculum. The spore suspension was initially heat-shocked, although the effect of heat-shocking (to produce a maximum germination of spores) is known to rapidly disappear with storage (*3, 4*). Therefore, the spore suspension was again heat-shocked by adding it to the agar medium as soon as it was melted. The hot seeded agar was allowed to cool for 10 to 15 minutes at room temperature and then the plates were poured. The prepared plates contained between 6 and 10 ml. of agar and glass rather than the recommended porcelain petri dish covers were used. A separate plate was prepared for each combination of variables, which included: (*a*) storage of from one to ten days or used immediately, (*b*) storage at a temperature of 2°, 5°, 10°, or 15°C., (c) temperature for performing the assay of 32°, 35°, or 37°C., and (*d*) reading of the test plates at 2½, 4, or 6 hours. Each plate was spotted with a 0.25 in. disc (Bacto 0.25 in. Sterile Blank Concentration Disks) and a 0.5 in. disc (Schleicher and Schuell #740-E), which had been dipped in a freshly prepared solution of penicillin (Penicillin G-sodium, working standard WO 2171, Eli Lilly) containing 0.1 unit per ml. Preparation of plates for storage and for assay was so arranged that all variables were read at essentially the same time (over a 30-minute period) so that the zones formed could be compared with one another.

RESULTS AND DISCUSSION

Although the variables under which the test for penicillin was run in this study were somewhat interdependent, for the sake of clarity each variable will be considered separately. The results of this study are shown in Table 1.

Temperature of Storage

The reliability of the assay test was relatively independent of the temperature at which the plates were stored. Although faster results appeared to be obtainable on plates stored at 15°C., this storage temperature presented several disadvantages; facilities for storing at this temperature are not normally found in a dairy laboratory and the plates may be kept for only a few days until growth of the test organism is too extensive to permit their use in testing. Of the refrigeration temperatures (2°, 5°, and 10°C.) slightly better results were obtained at the lower temperatures.

Time of Storage

Good results were obtained on plates which were

TABLE 1—EFFECT OF VARIOUS FACTORS ON THE DEVELOPMENT OF READABLE ZONES OF INHIBITION IN A DISC ASSAY PROCEDURE FOR THE QUALITATIVE DETECTION OF PENICILLIN (0.1 UNIT PER ML.). BOTH 0.25 IN. AND 0.5 IN. DISCS WERE TESTED AND GAVE IDENTICAL RESULTS.

Conditions of storage of plates		Time of incubation of plates (hours)							
		2½			4			6	
Temperature (°C.)	Time (days)	Temperature of incubation of plates (°C.)							
		32	35	37	32	35	37	32	35
15	2	+	+	+	++	++	++	++	++
	1	-	+	-	+	++	+	++	++
10	9	-	-	-	−	−	−	+	++
	8	-	-	-	−	+	+	+	++
	7	-	-	+	+	++	++	++	++
	6	-	-	-	−	−	−	−	++
	5	-	-	-	−	−	−	−	++
	4	-	-	-	−	+	+	+	++
	3	-	-	-	−	−	−	−	++
	2	-	-	-	−	−	−	−	NT
	1	-	-	-	−	−	−	−	++
5	10	-	-	-	−	++	++	++	++
	9	-	-	-	−	−	−	−	++
	8	-	-	-	−	−	−	−	++
	7	-	-	-	+	++	++	++	++
	6	-	-	-	−	+	−	++	++
	5	-	-	-	−	−	+	−	++
	4	-	-	-	++	++	++	++	++
	3	-	-	-	−	−	−	−	++
	2	-	-	-	+	+	−	++	++
	1	-	-	-	++	++	−	++	++
2	6	-	-	-	+	++	++	++	++
	5	-	-	-	−	−	−	−	+
	4	-	+	+	+	++	++	++	++
	3	-	-	-	−	++	−	NT	++
	2	-	-	-	+	++	+	+	++
	1	-	-	-	+	++	++	++	++
No storage	0	-	++	+	+	++	++	++	++

− = No visible growth of Bacillus subtilis—no zone.
+ = Slight growth of Bacillus subtilis—zone difficult to see.
++ = Good growth of Bacillus subtilis—zone easy to see.
NT = Not tested.

used immediately after preparation and there was no evidence to support the "not less than three days" storage recommendation of Arret and Kirschbaum (2).

While the time of storage did not appear to be an important variable there was a definite upper limit of storage primarily dependent upon the degree of dehydration of the plates. Only portions of some of the plates stored for nine days at 10°C. were in satisfactory condition for running the assay due to dehydration of the agar. The upper limit, however, as shown by the results, was not limited to the "not more than five days" recommendation of Arret and Kirschbaum. Plates stored six to ten days gave as satisfactory results as those stored from one to five days. Furthermore, three plates with porcelain covers were stored at 2°C. for 66 days and gave readable positive tests in approximately six hours at 37°C.

Temperature of Incubation

Whether a given incubation temperature for performing the assay was satisfactory or unsatisfactory was dependent upon how rapidly one wished to know the results. Presumably, the most desirable temperature, however, would be that at which plates should be incubated to give a positive zone in the shortest time. The results in Table 1 showed that equally rapid results were obtained at either 35° or 37°C., but that the test was substantially slower at 32°C.

Incubators at 37°C. are not normally found, while incubators at 35°C. are commonly found in dairy laboratories. Since equally satisfactory results were obtained at either temperature, a temperature of 35°C. would seem to be the logical choice of temperature for testing penicillin in milk in the dairy laboratory.

Time of Incubation and Reading of Assay

Arret and Kirschbaum observed that by using their procedure the minimum incubation time at which it was possible to see a zone of inhibition was 2½ hours. The results of this study showed that on only a very few plates spotted with penicillin containing discs was it possible to see a zone of inhibition in this minimum time of 2½ hours incubation. Of the 28 plates assayed at 37°C. only four had sufficient growth of *Bacillus subtilis* in 2½ hours to give a detectable zone. Nine of these plates followed the limitations imposed by the Arret and Kirschbaum procedure and only one of the nine gave a detectable zone in 2½ hours. These same figures held true for plates which were incubated at 35°C. Quite simply, 2½ hours was an insufficient time to recommend reading the plates, although a few were readable in that time of incubation.

After six hours incubation at 32°C. approximately one-half of the plates had readable zones of inhibition, which were roughly comparable to plates incubated for four hours at either 35° or 37°C. Therefore, if the test were to be run at 32°C. a reading time greater than six hours would normally be required. After six hours incubation at 35°C. all of the plates had readable zones of inhibition — this would probably be true of plates incubated for six hours at 37°C., but this was not tested.

After recording the results in Table 1 all of the plates were allowed to remain overnight at room temperature. After this further incubation period all of the plates had easily readable zones of inhibition. Johns and Berzins (*6*) experienced and pointed out that on overnight incubation large surface colonies might obscure the zones when using 0.25 in. discs. In this laboratory no disadvantage was found in incubating plates overnight when 0.25 in. discs impregnated with a penicillin solution containing as little as 0.05 units per ml. were used.

Size of Disc

At the concentration of penicillin used in these tests (0.1 unit per ml.) equivalent positive results were obtained with either 0.25 in. or 0.5 in. discs. The sensitivity of 0.25 in. and 0.5 in. discs, however, was separately tested. The 0.5 in. discs gave positive zones when dipped in samples containing 0.03 unit per ml., but not in samples containing 0.01 unit per ml. of penicillin, while 0.25 in. discs detected samples containing 0.05 unit per ml., but not samples containing 0.03 unit per ml. These results confirmed those of Johns and Berzins (*6*) who reported a greater sensitivity for the 0.5 in. disc. Tests run with the 0.5 in. discs, however, are slightly more expensive and slightly less convenient than the tests using the 0.25 in. discs, since fewer discs can be placed on a single plate. Each dairy technologist might weigh these factors in making his choice of disc size.

Volume of Agar

The greater the depth of agar in a plate the less sensitive the disc assay test becomes and for a given concentration of penicillin the less the zone of inhibition will be. Hence, to assure equivalent zone sizes for equivalent concentrations of penicillin, the agar must be accurately measured into each plate, the plates must have flat bottoms, and the agar must be allowed to harden on a level surface to assure a uniform and constant depth of agar in each plate. The purpose of the disc assay test discussed in this paper, however, is to determine the presence or absence of penicillin in milk samples at a concentration level of 0.05 unit per ml. or higher. To fulfill this purpose the depth of agar in a plate need not be uniform and constant, but it must be small enough to assure a readable zone of inhibition when samples containing 0.05 unit per ml. of penicillin are tested. To observe the limitations of agar depth on this test, 6, 10, 15, and 20 ml. of agar were accurately pipetted into quadruplicate assay test plates observing the above listed precautions. On these plates 0.25 in. discs dipped in samples containing 0.05 unit per ml. of penicillin gave average zones of inhibition of 13, 10, 8, and 0 mm respectively and when dipped in samples containing 0.1 unit per ml. of penicillin the average zone sizes were 16, 13, 10, and 9 mm respectively. Hence, if 10 ml. of agar or less is used per plate the presence or absence of penicillin in samples containing 0.05 unit per ml. or higher can be detected using 0.25 in. discs without undue concern about a lack of uniform depth of agar giving a negative test.

CONCLUSIONS

The penicillin assay test was substantially independent of the refrigeration temperature at which the plates were stored prior to use, although dehydration of the plates was less at lower temperatures.

No evidence was found to support the recommendation that plates be stored at refrigeration temperatures for not less than three days nor more than five days before being used to perform a penicillin assay. Satisfactory results were obtained on plates used immediately after preparation and on plates stored over two months. Plate storage, however, was limited by dehydration.

Equally satisfactory results were obtained with plates incubated at 35°C. or 37°C. Since 37°C. incubators are not normally found in dairy laboratories, 35°C. would be the more realistic temperature to recommend for incubating plates when testing for penicillin in milk.

Zones of inhibition were observed on a very few plates in 2½ hours, on approximately one-half of the plates in four hours, and on all of the plates in six hours when incubated at 35°C. Hence, to assure visible zones of inhibition, plates should be incubated from four to six hours, or until growth is apparent.

The above suggested changes make the Arret and Kirschbaum method less restrictive, more applicable to dairy laboratory procedures, and more likely to detect all positive samples. In fact, these changes, with minor exceptions, renders the method described by them indistinguishable from the modified Difco method suggested in the *Standard Methods for the Examination of Dairy Products.*

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FEDERAL REGULATION IN THE FIELD OF IDENTITY, QUALITY AND SANITARY STANDARDS FOR MILK AND MILK PRODUCTS[1]

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At one time or another most everyone has undertaken to put a jigsaw puzzle together. It is, as a matter of fact, somewhat of a minor satisfaction when, after fitting together a few hundred oddly shaped pieces, there finally emerges an integrated picture. It might be a landscape or pastoral scene or it might be a map of a foreign land, but in any event, the result represents a whole unified pattern.

An investigator who undertakes to assemble the few hundred oddly shaped pieces which represent federal activity in the field of identity, quality and sanitary standards of dairy products will not finish, I can assure you, with any unified integrated pattern – much less a pastoral scene.

This is not to say there is not a good deal of dovetailing between the programs of the several federal agencies involved. As a matter of fact, despite the fact of duplicate authorizations in a number of fields, there has been a large measure of cooperation – both inter-agency and between agencies and industry. This has resulted in less conflict than one would suspect, since the three agencies of the federal government have responsibilities in the field of standards for dairy products.

The subject assigned is of treatise magnitude. In a paper of appropriate length for a meeting such as this it will be attempted to sketch the outlines of the subject matter in three ways. First, to outline the enabling laws; second, to briefly review what has been done under these laws; and third, to discuss some similarities, differences and areas of possible duplication.

It seems to me that the proper starting point is with the federal statutes involved.

Even though three agencies of the federal government are concerned with standards for dairy products, one of the first distinctions which becomes apparent is the different underlying purposes on which the authority is grounded. While it is perhaps an over-simplification, and although there is some overlap, I think it fair to say that standards of identity established pursuant to the Federal Food, Drug and Cosmetic Act are designed to prevent the perpetration of economic fraud upon consumers. The purpose of model ordinances and codes of the Public Health Service is, to be sure, the preservation of the public health. Whereas, the purpose underlying the activity of the Department of Agriculture in the field

[1]Presented at the 13th Annual Meeting of the Dairy Products Improvement Institute, Inc., Hotel Governor Clinton, New York City, February 18, 1960.

of standards is to improve the orderly marketing of dairy products.

Turning to the statutes themselves, two of the laws may be passed over quickly. These are laws which by their own terms establish statutory standards of identity for butter (*1*) and nonfat dry milk (*2*). Both of these brief laws recite that the standards which they establish are for the purposes of the Food and Drug Act. As a matter of practice, however, as *standards of identity,* they are accepted as such by all other federal agencies which have something to do with butter and nonfat dry milk, as we shall see when we speak of the Department of Agriculture's and Public Health Service's involvement with nonfat dry milk.

The responsibility of the Public Health Service in the field of its model code and ordinance activity, as well as the Voluntary Program for the Certification of Interstate Milk Shippers, derives mainly from an amendment (*3*) to the basic Public Health Service Act, which recites that the Surgeon General shall assist the states and their political subdivisions in the prevention and suppression of communicable diseases, shall aid State and local authorities in the enforcement of their quarantine and other health regulations, and in carrying out the purposes specified in Section 246 of this title, and shall advise the several states on maters relating to the preservation and improvement of public health.

The PHS regulation of milk on interstate carriers derives from Sec. 264 of Title 42 of the U. S. Code which authorizes the Surgeon General to make and enforce regulations to prevent the introduction, transmission or spread of communicable disease between states.

The principal thrust of the Federal Food, Drug and Cosmetic Act passed in 1938 and importantly amended in 1954 and 1958 by the addition, respectively, of the so-called pesticides and food additives amendments, is the prohibition of interstate traffic in adulterated and misbranded foods, drugs and cosmetics.

Pertinent to our present review are the definitions and standards of identity for a number of dairy products which have been established under Sec. 401 of the statute.

Briefly condensed for our present purpose this section of the Food and Drug Act provides that "Whenever in the judgment of the Secretary (that would of course be the Secretary of Health, Education and Welfare), such action will promote honesty and fair dealing in the interest of consumers, he shall promulgate regulations fixing and establishing for any food, under its common or usual name so far as practicable, a reasonable definition and standard of identity, a reasonable standard of quality, and/or reasonable standards of fill of container."

Standards promulgated under the Food and Drug Act are primarily concerned, as has been said, with preventing economic fraud by prescribing minimum amounts of valuable characterizing ingredients in food, and by excluding or limiting those ingredients or constituents where it is found that their unlimited use would not promote honesty and fair dealing in the consumers interest. The standards of identity themselves, are not generally concerned with quality or sanitary requirements. These considerations are, however, involved in other provisions of the Food and Drug law.

For example, a food shall be deemed to be adulterated regardless of whether or not it meets the requirements of the standard, if it has been prepared, packed or held under insanitary conditions whereby it may have become contaminated with filth or may have been rendered injurious to health (*4*).

Or take the matter of antibiotic or pesticide residues. At the recently held Dairy Industry Conference at Cornell, M. R. Stephens, Director of the Bureau of Enforcement, Food and Drug Administration, put the position of the Administration tersely when he said:

> "Since there is no legal tolerance for any pesticide residue in milk, the interstate shipment of milk containing such a residue is illegal under the Act and the milk itself is subject to seizure . . . . . Residues of antibiotics in any amount also are illegal in milk. Such residues result from a failure, through ignorance or through deliberation, to reject milk from treated animals."

A dairy product for which a standard has been established, if contaminated by the presence of an antibiotic or pesticide residue, would be unlawful on two grounds. It would violate the standard and it would also be deemed adulterated because of the presence of the antiobiotic or pesticide residue, as the case may be, in violation of those specific provisions of the law which prohibit unsafe pesticides or unsafe food additives.

The authority of the U. S. Department of Agriculture in the field of standards for grades of dairy products derives from the Agricultural Marketing Act of 1946 (U. S. C. 1621 et seq.). While it is true that the statutes from which authority flows to PHS, FDA and USDA ultimately are grounded in the consumers interest, there is a special rationale supporting USDA activity in the field of standards.

Congress, in enacting the Marketing Act as the popular name of the statute, suggests, was interested in the improvement in the marketability of agricultural products through differentations of products on the basis of quality. Such differentiations and universal acceptance of the grades have been a great boon

in the orderly marketing of the graded products.

The Agricultural Marketing Act contains an extreme broad declaration of Congressional purpose reciting, among other things, that a prosperous agriculture is indispensable to the maintenance of full employment and to the welfare, prosperity and health of the Nation. The declaration of purpose also admonishes the Secretary in carrying out the Act to cooperate with producers and industry organizations in the development of programs. An admonition, I might add, which has been scrupulously heeded by the present Director of the Dairy Division, Agricultural Marketing Service, who acts for the Secretary in the administration of the program.

The specific provisions of the Act which bear on our subject are three in number (5). First, the Secretary is directed and authorized to develop and improve standards of quality, quantity, grade and packaging, and recommend and demonstrate such standards in order to encourage uniformity and consistency in commercial practices. Second, the Secretary is authorized and directed to inspect, certify and identify the class, quality, quantity and condition of agricultural products on a voluntary basis. Such service to be financed by reasonable fees. Third, the Secretary is authorized to develop and promulgate, for the use and at the request of any Federal agency or State, procurement specifications for agricultural products.

One further word about the function of the department under the Marketing Act should be mentioned. This is the directive of Congress to conduct, assist, foster and direct studies and informational programs designed to eliminate artificial barriers to the free movement of agricultural products (6).

The second phase of the subject has to do with the programs of the several agencies under the statutes. I shall confine my remarks, as far as the subject matter permits, to responsibilities directly related to standards although each agency is engaged in closely related activities. I have in mind here, research, educational programs, information activities and the like.

Turning first to the programs of the Public Health Service. We are interested in two activities, with which I am sure you are familiar. It is nevertheless desirable to sketch them briefly because of their relationship and contrasts with activities of the other agencies.

A significant part of the PHS milk sanitation program is the development and periodic revision of model ordinances and codes, and the other recommended program guides, for use by states and municipalities. Among those developed to date are the "Milk Ordinance and Code" (12th ed.); "Frozen Desserts Ordinance and Code"; and "Recommended Sanitary Standards for Dry Milks Used in Grade 'A' Pasteurized Fluid Milk Products." An example of the manner in which states and municipalities utilize these model ordinances is indicated by the fact that the provisions of the "Milk Ordinance and Code" have been incorporated into the laws or regulations of 36 states and have been adopted by more than 1900 counties and municipalities.

PHS participates with the states in the conduct of a voluntary program for the certification of interstate milk shippers. This program was initiated by PHS on the basis of requests from the Association of State and Territorial Health Officers. The basic objective of this activity is to assist the state and local health authorities in milk shortage areas to obtain reliable data on the sanitary quality of fluid milk shipped into their jurisdictions from out-of-state sources, thus eliminating the necessity of inspections by one state of a milk source existing in another state.

Routine inspections and laboratory control of interstate milk shippers are performed by the state and municipalities in which the supply is located, using the "Milk Ordinance and Code" and the rating method developed by the PHS as uniform criteria for evaluation. The states report to PHS those shippers whose products and plants have been rated by them in accordance with agreed upon sanitary requirements. PHS functions and responsibilities include:

(*a*) Comprehensive evaluation of the program of each participating state including appraisal of rating methods and adequacy of laboratory procedures.

(*b*) Endorsement of satisfactory state programs.

(*c*) Quarterly publication of a list of certified interstate milk shippers.

(*d*) Periodic spot checks of certified shippers in order to validate the sanitation compliance ratings submitted by the states.

At present 36 states and approximately 700 shippers participate in this voluntary program. These shippers obtain their supplies from an estimated 100,000 Grade "A" dairy farms.

I cannot leave my discussion of the PHS program without saying that I am continuously impressed with the competency of John Faulkner and his small staff in the discharge of their responsibilities in the field of milk sanitation.

The program of the Food and Drug Administration in the field of standards, tied as it is to enforcement proceedings of a criminal and civil nature, involves formal administrative proceedings which distinguishes the activities from the other two agencies.

Shortly after the 1938 Act was passed the Food and Drug Administration began its program of establishing standards of identity for dairy products. The first

of these was the standard for evaporated milk promulgated more than 20 years ago. Incidentally, the Food and Drug Administration has not established a standard of identity of "milk" as such. Wherever the necessity of defining milk in the standards for dairy products arises the statement is simply, "The word milk means cows milk." FDA has also defined and established standards of identity for cream, light cream or coffee cream, light and heavy whipping cream. Standards exist for concentrated milk and sweetened condensed milk including condensed milk which contains corn syrup solids. In the field of cheese standards there has been more or less continuing action involving numerous amendments over the past 15 years.

There are 65 separate standards for cheeses and cheese products ranging alphabetically from "A" – Asiago, an Italian-type cheese – to "W"–Washed curd cheese.

I hesitate to mention ice cream standards but a statement on FDA's activities in the area of dairy products standards would not be complete without doing so. Hearings on standards for ice cream and related products began in January 1942. It appeared that they may have been promulgated in the forties, except that the War Food Administration, because of its War Food Order No. 8, intervened with a request to FDA that they be held up. Nothing further was done until January 1951, when a second hearing commenced which ran intermitently for 2 years, adjourning on New Years' Eve 1952 – more than 7 years ago. While many forecasts have been made over this period as to when the final order establishing standards will be promulgated, there is good reason to believe that the final order will be published in the very near future. The most recent obstacles to the conclusion of the matter has been the general workload imposed upon FDA by the Food Additives amendment, but also involved is the particular application of the food additives amendment to several of the emulsifiers which were excluded in the tentative order under the so-called *per se* doctrine but which now appear to be safe food additives under tolerances which may be permitted.

Under the Agricultural Marketing Act of 1946, grades have been published and amendments added for the following products: butter, cheddar cheese, swiss cheese, nonfat dry milk, both spray and roller, dry whole milk, dry buttermilk and dry whey. In connection with the butter grades, a final revision has been published which will become effective on April 1. As supplemental material to the butter grades, is a publication titled "Probable Causes of Certain Characteristics in Butter." This document is not a part of the standards but is intended primarily for the information of butter makers. It spells out the causes for some 25 flavor defects in butter and is an extremely valuable tool to assist in upgrading butter. Dairy products processed and packaged in an approved plant shall be graded and/or inspected and may be identified with official inspection or grade labels including the USDA seal. The familiar AA grade butter is such a product. Closely associated with the grades established for the dairy products mentioned is the "Minimum Specifications for Approved Plants Manufacturing, Processing and Packaging Dairy Products," the enabling statute authorizing this which I previously mentioned.

The Dairy Division also has a responsibility delegated to it by the General Services Administration under which it develops and publishes, after extensive collaboration with the federal purchasing agencies and consultation with the affected industries, Federal Specifications for Dairy Products which are purchased by the several government procurement agencies. Ed Small, who under Herb Forest, does a remarkably fine job in this field had occasion at the time the Cottage Cheese specifications were under development stated:

> "In developing a Federal Specification or revision thereof we consult and obtain data from various agencies and industry groups as considered necessary. With respect to industry contacts it has been our policy to work with and through trade associations and their committees on research, quality specifications and packaging.
>
> "Federal Specifications are designed solely for the purpose of product procurement by Federal civilian and military agencies, other than Commodity Credit Corporation. They have no application to any operation other than the selling or offering of products for sale to such agencies."

Specifications for some 15 dairy products purchased by government agencies are presently involved; many of them are in the process of revision. Among these are milk itself, cottage cheese, liquid skim or defatted milk, chocolate milk and chocolate drink, cultured buttermilk, sour cream, half and half, ice cream, butter, cheddar cheese, swiss cheese, process American cheese. Many of these specifications are in various stages of revision.

At the outset, I indicated that I would discuss some similarities, differences and areas of possible duplication in the programs. In this connection, I would mention–first, that the tendency, purpose or effect of at least parts of the programs of each of the three federal agencies is the elimination of trade barriers. In the famous Dean Milk Company case (7) involving the milk ordinance of the City of Madison, the value of the model ordinance and code in overcoming interstate barriers is reflected by the Supreme Court which held that a provision of a Madison ordinance imposing a 5-mile limit on the location of pasteurization plants selling milk in that city was unconstitu-

tional in that it unreasonably discriminated against interstate commerce. In support of its holding, the Court pointed out that, in lieu of the 5-mile limitation, Madison could avail itself of reasonable nondiscriminatory alternatives adequate to protect the health and safety of its people, such as the provisions of the milk ordinance developed by the Public Health Service.

With respect to the Interstate Milk Shipments Program of PHS, it can be said that although there is no requirement that a would-be importing state must accept milk from another jurisdiction which has been certified under the program, the increasing use of the program has had an important tendency in the direction of the free flow of milk between the states.

So far as the Department of Agriculture's contribution to the demolition of trade barriers, I have previously quoted the directive of Congress concerning trade barriers. In the case of standards of identity under the Food and Drug Act, the impact on trade barriers derives from the application of the legal doctrine of Federal occupation of the field or preemption. This matter is one which has been receiving particular attention recently in view of the long expected and soon to be promulgated standards for ice cream and related products.

As counsel for the International Association of Ice Cream Manufacturers, I was asked for an opinion on the question of whether or not an importing state whose standard of identity for ice cream was different from the Federal standard, could exclude a product produced in another state conforming to the Federal standards. A higher butterfat requirement in the importing state would present the question. My opinion, based on a number of decided cases presenting similar situations, was to the effect that the importing state could not exclude such a product. The general counsel of the Food and Drug Administration has expressed the same view in responding to inquiries presented.

A question which I believe is somewhat perplexing to the Department of Agriculture has to do with the absence from its standards for grades of some of the requirements of the Food and Drug Act. For example, the standards for grades do not provide for zero tolerances for antibiotics and pesticide residues. All of the USDA grades provide, "that compliance with these standards does not excuse failure to comply with the provisions of the Federal Food, Drug and Cosmetic Act." It seems to me that such a provision is all that is necessary in the public interest.

Since, in prosecutions under the Food and Drug Act, there is taken into account, in appropriate cases, the terms of the USDA grades, in addition to the specific requirements of the Food and Drug Act itself; there is ample protection for the buyers of such graded products.

Concluding, let me say—as I am sure you have noted—I have really only scratched the surface of the subject assigned. I am impressed by two facts, however; (*a*) despite all of the activity in the field of Federal standards there is surprisingly little real conflict, and (*b*) in political matters it becomes clearer every day that we are necessarily having to make policy and take action because the nations are living in one world. So in the field which we have been discussing, it appears that the regulatory trend is necessarily taking cognizance of the fact that we are living in one country.

REFERENCES

The following citations found in the body of the paper (except the Dean Milk Case) refer to titles and sections of the United States Code relating to the jurisdiction and authority of the Food and Drug Administration, the United States Public Health Service, and the United States Department of Agriculture:

(1) 21 U.S.C. 6, 32 (a)
(2) 21 U.S.C. 321 (c)
(3) 42 U.S.C. 243
(4) Sec. 402 (a) (4)
(5) 7 U.S.C. 1622 (c) (h) (1)
(6) 7 U.S.C. 1622 (d)
(7) Dean Milk Co. v. City of Madison, 340 U. S. 349

REHABILITATION AND RENOVATING OF THE EVANSVILLE-VANDERBURGH COUNTY FOOD HANDLING ESTABLISHMENTS[1]

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Evansville-Vanderburgh County Health Department

Evansville, Indiana

Reasons which demanded the rehabilitating of the food handling establishments throughout Evansville and Vanderburgh County, Indiana, are presented. In addition, the approach and methods used by the Evansville-Vanderburgh County Health Department in obtaining this rehabilitation are given. Also discussed are the problems which developed during the enforcement of this program and the solutions to these problems.

The Evansville-Vanderburgh County Food Inspection Program originated in its present form during the later part of 1948. This program consisted of routine inspections of eating and drinking establishments throughout the area conducted under the authority of the Indiana State Health Department Regulation and the Evansville Restaurant Ordinance No. 1770. For all practical purposes, these are the same except that the City Ordinance requires an annual chest x-ray for all food handlers.

Late in 1951, the department initiated a retail grocery inspection program and in the years since 1951, practically all food handling establishments throughout Vanderburgh County have come under the inspection program. The types of establisments now inspected, other than eating, drinking, and retail groceries, are poultry and fish eviscerating plants, bakeries, candy manufacturers, and nursing home kitchens.

Considerable improvement has been obtained in all of these establishments since 1948. These improvements have been attained by concentration of effort on those items in each establishment which had the greatest public health significance from the standpoint of disease prevention.

The items referred to are toilet and lavatory facilities, water supplies, refrigeration, dish washing and sanitizing, storage and handling of food, storage and handling of utensils, wholesomeness of all types of food and drink, construction of utensils and equipment, cleaning of utensils and equipment, disposal of waste, both solid and liquid, display of food and drink, and cleanliness of employees.

However, throughout these years, the program more or less overlooked some of the items on the inspection report. These items were floors, walls, ceilings, lighting, ventilation, and rat-proofing. All but one of the above are normally classified as structural items.

The impression should not be left that the program overlooked these items completely. Naturally, cleanliness was insisted upon. In the past it was our policy to require them to be kept as clean as possible, but without giving much thought to the fact that it was nearly, if not entirely impossible, to clean premises satisfactorily when construction was poor. Therefore, in reality as far as good construction was concerned these items were overlooked or given only cursory consideration.

Consequently, over a period of ten years, these had deteriorated to a new low and thus presented a problem. It is likely that our position regarding these items is not much different than that of other departments. How many times have you heard health representatives make the statement, "these structural items are minor"? How many times has it been stated by health representatives that, "floors are not important; people don't eat off of them." While structural items may be minor compared with food wholesomeness and refrigeration, it is our conviction that sanitary operation must include floors, walls and ceilings, constructed of material which is smooth, washable and easily-cleanable.

REVIEW OF RESULTS

Upon reviewing our survey results of the last ten years, it was obvious that in sections of the program where effort was concentrated, considerable improvement had been made. For example, early in 1955 and mainly due to the 1954 rating survey report, a program was initiated to obtain proper dish washing and sanitizing in all eating and drinking establishments. The 1954 survey showed 34% in violation of this item.

From this it was determined that the majority of violations existed due to the fact that two compartment sinks were not being used properly. This, in many cases, was due to an inability to maintain the water temperature at 170°F. throughout the entire dish washing period.

[1]Presented at the Ninth Annual Meeting of the Indiana Association of Sanitarians, June 9-11, 1959, Indianapolis, Indiana.

With the existing situation in mind, each operator was allowed six months to provide some approved method. In those cases where two compartment sinks were used, it was required that the operator prove conclusively that hot water of the proper temperature could be obtained and maintained throughout the entire dish washing period.

While approving or disapproving these facilities, it was determined that water, entering a cold sink at 200°F. from the tap, will dissipate at least 15 to 20 degrees before the first dish is placed in the sink. After a load of dishes is put into this water, the temperature will dissipate another 15 to 20 degrees. Therefore, on this basis, one might be able to sanitize one load of dishes at 170°F. even though the temperature of the water received at the tap is 200°F. Hence, the problem of temperature maintenance in a two compartemnt sink presented real difficulty. At the end of six months, we had very few two compartment sinks in operation. The remaining few were located in small establishments where it was only necessary to wash and sanitize one load of dishes per meal.

The effectiveness of this program was demonstrated during our next survey where only 12% of establishments were in violation. This was a reduction of 20% on this one item alone.

Since that time, additional programs regarding items other than structural have been started for the purpose of obtaining a higher degree of sanitation in our establishments. However, those items known as the structural items, which were considered as minor up to this time, suffered considerably on our surveys.

FURTHER SURVEY EVALUATION

In many areas other than the State of Indiana, regulations and ordinances provide separate penalties for establishments which do not provide properly constructed floors, walls, ceilings, lighting, ventilation, and the miscellaneous items. This is under a grading program. However, in Indiana, since the State Law does not provide for a grading program and does not exempt establishments from meeting these requirements, it is then necessary for the purpose of obtaining an effective program, to insist that all items under the State Law be complied with whether they are structural or operational.

Our survey ratings throughout the last ten years have progressively improved over the preceding survey, except our last survey which was conducted late in 1956. At this time, we experienced a drop of 3.3% from our 1954 survey. At first, the easy way was taken on the premise that this drop was due to the 5% differential permitted between surveying officers.

As the survey results were reviewed further, it was noticed that several item defects were reported quite regularly. These items were floors, walls, ceilings, lighting, ventilation, toilet facilities, lavatory facilities, and rat-proofing. As this problem was studied and the past survey results analyzed, we became more convinced that a program to obtain the correction of these items was necessary.

Figure 1. New ventilation hood with easily removable grease filters, adequate easily removable light fixtures, and easily cleanable walls behind permanent equipment.

First, it was decided that we must assure ourselves that everyone concerned, including the food sanitarian, the supervisor, and the writer were in accord in thinking as to what would be acceptable. Therefore, it was necessary to hold staff meetings for the purpose of obtaining uniformity. For the next three months, we met at least eight working hours per week to discuss problems and solutions.

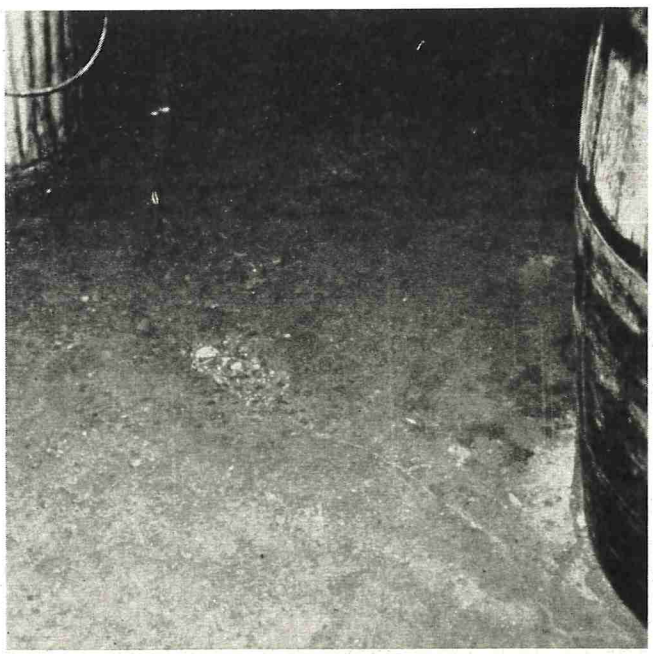

Figure 2. A "before" picture showing a concrete floor in an establishment which is far beyond repair. It is not smooth nor easily cleanable.

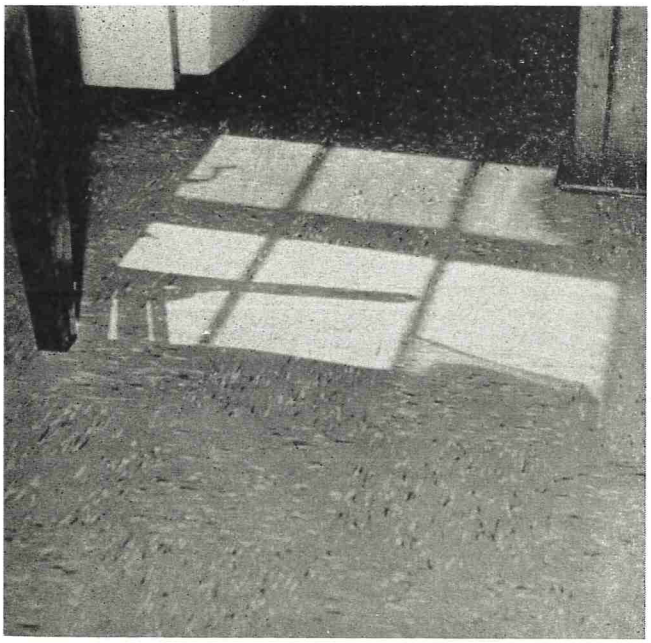

Figure 3. This floor has been re-constructed so it is smooth, and easily cleanable. It is an "after" picture to contrast with Figure 2.

Sanitarians would bring in different structural problems encountered in different establishments and we would begin analyzing these individually. The group would then determine what would be accepted as being smooth, washable, and easily-cleanable. (See Figures 2 and 3).

Upon determining what was acceptable, a memo was written and each sanitarian given a copy so there would be no future misunderstanding on this particular item. All other items involved were attacked the same way and a group decision made.

Since that time, the sanitarian's memo manual contains 50 to 75 memorandums. It was necessary for awhile for the sanitarian to carry his manual with him and take time out during the inspection to review the manual to obtain answers to questions. This, however, was not a deterrent and proved to be such a satisfactory way to handle these seven items, that we continued to discuss the entire inspection program on an item by item basis. The answer was agreed upon and a memo was prepared. Even though we have over twelve months of this structural program under way, the majority of sanitarians will refer to the memo manual numerous times during each working week.

As stated earlier, these decisions were made strictly by the majority of our sanitarians after a thorough discussion period. In some cases, it necessitated taking a vote to determine how we would approach the matter. In a few cases, mistakes were made and it has been necessary to revise our program on those particular items.

Information was obtained from the National Sanitation Foundation, the Indiana State Board of Health, The U. S. Public Health Service, and other agencies regarding usuable material in establishing this program.

However, in the majority of cases, it was necessary to work out our own problems and make our own decision as to what we were going to accept. In addition, it was necessary to decide upon other items such as approved methods of venting toilet rooms, rat-proofing of buildings, adequate lighting, and ventilation of food preparation areas.

VENTILATION SYSTEMS STUDIED

Much effort was put forth by all concerned to obtain information regarding the proper design of ventilation systems, including hoods, filters, duct work, and fans to serve the food preparation areas. To obtain information regarding these items many meetings were held and we finally developed a design sheet for determining the size of hoods, filters, duct work, and fans.

Contrary to some opinion, it doesn't take a ventilation engineer to design a system of this type in the majority of cases. However, there are instances where it would necessitate the service of an engineer. But, as sanitarians, we can provide a much needed service to food service operators if we are capable of designing simple ventilating systems. The value of a good ventilation system in a food preparation area is most significant both for the purpose of removing the cooking odors before they enter the serving areas and for removing grease and condensate before these collect on floors, walls, ceilings, utensils, equipment, fixtures, and the like. In adition, cost in maintaining these facilities in a clean condition is reduced. Another asset is that good ventilation provides comfort to the operator and his employees whose work is carried on in these areas (See Figure 1).

STRUCTURAL NEEDS MAY DIFFER

After determining what material would be acceptable, when installed properly, it was then necessary to decide if all areas of a food establishment needed to meet the same requirements. For example, would the floor in a storage room where only bottled beverages are stored, have to meet the same requirements as a food preparation area where food is actually prepared? This particular problem would similarly exist when dealing with all the other structural items. Upon gathering all of this necessary information and feeling that our men were uniform in their thinking regarding these seven items, the next step was to determine how to approach this problem with the operator.

RELATIONSHIP WITH OPERATORS

After several discussions, it was decided that this program should consist of at least three phases with a maximum length of time consisting of six months in each phase.

The first step was to devise some way of preventing buildings not suitable for the housing of a food handling establishment, due to structural defects, from being opened by a new owner or operator. This portion of the program dealt with buildings that, at this time, were not housing food establishments, but at one time or another had housed such an establishment.

A letter was prepared and sent to the owners of these buildings notifying them that the building in its present state did not meet the minimum structural requirements of the state and local regulations and ordinances governing food handling establishments. Therefore, before this building would be approved for use as a food establishment, certain structural items would have to be corrected and approved by the department.

In a period of three or four months, over 330 letters of this type went to different owners. A few owners called asking what should be done. In such cases, an appointment was made and the sanitarian would meet with the owner at the site of the establishment. He then explained to him what needed to be done to make the building acceptable for a food establishment.

This was a very important part of this entire program. This was done as a preventive measure since it was not legally possible for us to deal with the owner of a building unless he was also the operator of the establishment. But, by having records we could show that the owner had been notified and that this specific building would not be approved. It was felt that the operator might have some legal recourse against the owner when we ordered the operator to cease operation due to the fact that the premises did not meet with the minimum requirements.

Thus far, all owners have accepted the fact that their building is not satisfactory. Therefore, they have not leased or rented them for food handling establishments. This then allowed us to proceed with phase one of our program.

This phase consisted of sending a form letter to the owner of each building where structural defects existed. This letter informed the owner that defects existing would prevent his property from complying with all of the state and local regulations and ordinances governing food handling establishments. In addition, we solicited his cooperation in helping to eliminate these defects within six months from the date of notification. We again encouraged the owners to contact the department for an appointment whereby these items could be discussed individually with him at the site of his establishment.

To the amazement of the department, 35% of more than 500 establishments falling under phase one were corrected by the owner within a six months period. We believe the operators of these establishments were highly pleased with the approach taken by the department. However, in doing this again, one change in this phase would be made. This would be to send a copy of the same letter to the operator as well.

Six months from the date of our first letter involving those establishments where the structural defects had not been corrected to our satisfaction, phase two of the program was started.

This phase consisted of a form letter to the operator with a copy to the owner of those establishments where defects still existed. The letter informed the operator that due to these defects his establishment did not comply with the regulations and ordinances. In addition, we solicited his immediate cooperation in correcting these items within six months from the date of the letter. It was pointed out that should he decide to rent, lease or sell his business to another operator, the establishment would be ordered closed until such time as all of the structural defects had been corrected and approved by the department. This eliminated the shuffling of an establishment from one operator to another and thereby nullifying the procedure which had been initiated with the original operator.

At this stage, we solicited the cooperation of the local newspapers. A news release was published every thirty days for four or five months warning potential owners or buyers of food handling establishments to check with the Health Department before purchase of an establishment. By doing so, they could be assured the establishment met with the approval of the department. In addition, the Indiana Alcoholic Beverage Commission was contacted with the request that the department be furnished a list of establishments whose licenses were to expire in the succeding three weeks.

Whenever a license was to be transferred, we notified the new operator that these defects would need to be corrected before we would approve this transfer to the Alcoholic Beverage Commission. In addition, before an approval for a new Alcoholic Beverage Commission License was granted by this department, whether for a new or an old operator, all structural defects had to be corrected.

This phase has been very effective. Now, both the owner and the operator realize that each has been notified that there are certain conditions which must be corrected.

SHARING THE COST

We started to receive calls at the beginning of this phase from both the owner and the operator asking the department whose responsibility it was to pay for these corrections. The standard recommendation was to encourage both the owner and the operator to join together and accomplish this for the benefit of each. This was the right approach due to the fact that if the operator decided that he couldn't afford to make these corrections and was forced to stop operating, then the owner would receive a "close letter" stating that his building could not be used by a new operator until corrections had been made. This then, would put the entire cost on the owner if he desired to rent or lease the building for food service purposes.

PROGRAM EFFECTIVENESS

To show the effectiveness of the program at this stage, it is pertinent to quote some figures. At the start of phase one, we were dealing with 954 food handling establishments throughout Vanderburgh County. Of that total, 419 received letters regarding improperly constructed floors. As of January 1, 1960[2], 358 floors were corrected in a manner meeting approval. This means that 85% of the floors in violation at the start of the program had been corrected. It also means that the total establishments which now have properly constructed floors is 94% compared to a low of 56% as of July 1958.

Of the total number of establishments, 378 letters were sent regarding poorly constructed walls. As of January 1, 1960, 341 of these have been corrected which is 90% of those that had defects. This means that 96% of our establishments have properly constructed walls compared with 60.5% at the beginning (See Figures 4 and 5).

Of the total number of establishments, 308 letters were sent out regarding poorly constructed ceilings, As of January 1, 1960, 289 had been corrected. This is an increase of 93% of those in violation. Therefore, we now have 98% of our total establishments with approved ceilings compared to the original 68%.

Of the total number of establishments, 113 letters were sent out regarding improper toilet facilities. As of April 1, 1959, 126 have been corrected. This shows 13 more corrections than letters sent out. This was due to the fact that our sanitarians sold the correction of 13 of these defects without a letter of notification. Toilet facilities now are close to 100%, as far as proper construction is concerned.

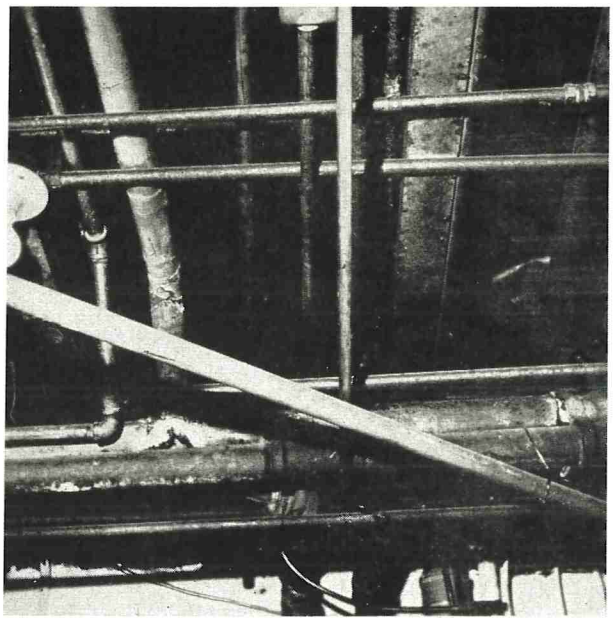

Figure 4. A "before" picture showing a very poor ceiling and wall area directly over a food preparation area.

Of the total number of establishments, 189 letters went out regarding rat-proofing. As of January 1, 1960, 178 of these have been corrected, which is 94% of those that were in violation. Therefore, 99% of our establishments comply on this item instead of the original 80%.

Since July 1, of 1958, 249 new ventilation systems have been installed. This particular item was not in-

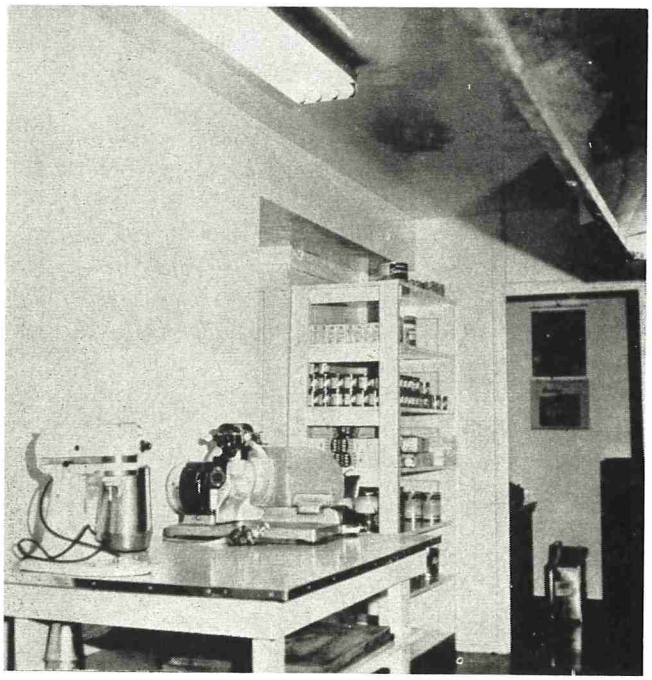

Figure 5. An "after" picture showing improvement in contrast to the unsatisfactory condition shown in Figure 4. Walls and ceiling of this food preparation area are now in good condition for ease of maintenance.

[2]Since this paper was presented before the Indiana Association of Sanitarians in June of 1959, revisions have been made to January 1, 1960, for publication purposes.

cluded in our letters because it was felt that we could sell this item without correspondence. The results bear this out. Our sanitarians have done an outstanding job in selling proper ventilation. Our records show that remarkable progress has been made. In no instance has legal action been necessary.

FEW ESTABLISHMENTS CLOSED

The reader might assume the closing of the majority of establishments. This is not the case. Since June 1, 1958, 76 establishments have closed. Of these 76, our sanitarians were able to determine from the operator that 16 closed due to poor business, 14 due to illness or death, 7 by fire, 6 by destruction of the building, 5 for new locations, and two for martial trouble. This leaves only 16 of the 76 which closed for reasons unknown. In addition to this, since June 1, 1958, we have had 40 new establishments open for business. Therefore, there has been a loss of but 36 establishments which on a percentage basis is actually lower than the years before the start of this program.

The writer believes that if a thorough investigation was conducted at this time, it would be shown that all but about 5 per cent of the establishments now have sound construction. It is the department's aim to obtain corrections in 99 per cent of the cases by the end of the entire program. This will leave but 1 per cent where legal action is necessary. In figures this would be 10 establishments.

THIRD PHASE FOLLOW-UP

Now phase three of the overall program is in operation. This phase will consist of a written order to the operator pointing out each individual violation with a copy to the owner. This order will allow the operator six months to correct the defects and will state that if these defects are not corrected at the end of that time, the case will be forwarded to the city attorney and the county prosecuting attorney's office for legal action.

BASIC SOUND STRUCTURE

This program has proved conclusively that the starting point for good sanitary control of any food handling establishment is a good sound, easily-cleanable, rodent and insect proof structure. Only after having obtained proper structural conditions, can one consider his program as being effective. Operational procedures are of course highly important, but the foundation stone is good structure.

EDUCATION OF UTMOST IMPORTANCE

In approaching a program of this size, one must be aware of the fact that better than a thousand different people are involved. Thus, unless this program is sold on an educational basis, in a fair and impartial manner, this large number of people can be agitated to the point where they will join together and fight the entire plan.

A situation of this type developed in the early months of the plan and there was considerable opposition from a minority of the operators and owners. However, the department started immediately to sell the program to community and civic organizations. Within less than six weeks, this opposition had been overcome. We now have as nearly complete harmony as possible among the industry and this department and our purpose of assuring safe and sanitary food handling establishments to serve the citizens of Evansville and Vanderburgh County is well on its way.

A SIMPLE AND RAPID RESAZURIN REDUCTION METHOD WITH *STREPTOCOCCUS THERMOPHILUS* FOR THE DETECTION OF INHIBITORY SUBSTANCES IN MILK[1]

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Several workers (*7-10*) have shown that *Streptococcus thermophilus* is sensitive to penicillin at levels of 0.01 unit per milliliter. Berridge (*4*) used S. *thermophilus* as the test organism in determining the presence of penicillin in milk. Bromcresol purple was added to the milk, after which it was inoculated with the test culture and periodic observations made for color changes associated with acid development. Using a culture maintained in the logarithmic phase of growth he was able to demonstrate the growth inhibiting effect of penicillin at the level of 0.0037 units per ml. of milk. He found the sensitivity of the test to vary inversely with the size of the inoculum. Collins (*5*) described a method, using S. *thermophilus*, for detecting inhibitory substances in milk. Following pasteurization of the samples at 143°F. for 30 minutes they were inoculated with a milk culture of the test organism and incubated at 104°F. for 16 hours. Samples that were not coagulated at the conclusion of the incubation period were considered to contain inhibitory substances. Penicillin G potassium was detected by this method at the level of 0.02 units per ml. of milk. Aureomycin HCl, Dihydrostreptomycin sulfate, Terramycin HCl and Tetracyn HCl were detectable at levels of 0.50, 6.50, 0.70 and 0.90 gamma per ml. of milk respectively.

Neal and Calbert (*11*) used S. *thermophilus* as the test organism in the TTC (2, 3, 5-triphenyltetrazolium chloride) method for determining antibiotics in milk. Parks and Doan (*12*) found, that by using S. *thermophilus* as the test organism in the TTC method, it was possible to detect penicillin G at the level of 0.006 units per ml. of milk.

Leber (*9*) used a resazurin reduction method for determining the activity of starter cultures. Angevine (*2*) adapted this test for the detection of inhibiting substances in milk.

Arret and Kirschbaum (*3*) described a disc bioassay method designed to detect penicillin in concentrations as low as 0.05 units per ml. of milk, following an incubation period of 2½ hours. The Food and Drug Administration has given this method wide publicity. Johns (*8*) presented a critical discussion of the method described by Arret and Kirschbaum.

This paper describes a screening method for detecting inhibiting substances in milk with emphasis on penicillin. The method uses the resazurin reduction technique with S. *thermophilus* as the test organism. This method requires a minimum of equipment, most of which usually is found in a dairy plant laboratory. Such equipment includes (*a*) a thermostatically controlled water bath, (*b*) screw capped test tubes or vials into which approximately 10.0 ml. of milk can be dispensed without the use of a pipette, (*c*) test tube racks, (*d*) pipettes of a convenient capacity (5-10 ml.) graduated in milliliters, and (*e*) screw capped prescription type flasks or the usual laboratory type flasks for preparing a milk culture of S. *thermophilus*. It is assumed that dairy plant laboratories are equipped with an autoclave and an Arnold steamer. In the absence of an Arnold steamer, facilities for this purpose can be readily improvised using a gas burner or hot plate and a covered rectangular pan.

The procedure for carrying out the test is as follows:

1. After thoroughly mixing the sample it is poured into a 3-dram screw capped vial containing 0.05 mg. of dry resazurin as described by Golding (*6*). The preparation is further described in U. S. Patent 2,609,-275. A vial of the same type as used with the Golding modification, but charged with 1.0 ml. of the standard resazurin solution (*1*), is equally satisfactory. Fill the vial to within ⅛ inch of the neck. This will be at approximately the 10 ml. level. Screw capped test tubes graduated at the 10.0 ml. mark can be used. It is not necessary to replace the screw caps until after the next operation, thus saving time.

2. Heat the filled vials in flowing steam for 5 to 10 minutes and cool at once to 100°F. or lower. Heating inactivates the native flora and the leucocytes of the milk, which otherwise might exert reducing action during the subsequent incubation period. Little or no deterioration of penicillin results from this heat treatment.

3. Inoculate the vials with a culture of S. *thermo-*

[1]Work was conducted under Project 1499. Washington Agricultural Experiment Station, Pullman.

philus. Prepare a milk culture by incubating freshly inoculated sterile non-fat milk overnight at 37-38°C. The resulting culture should be coagulated. It will be difficult to pipette with accuracy and to overcome this, mix 60 parts of the culture with 40 parts of sterile water. Inoculate the samples with 1.0-ml. portions of the culture-water mixture. This rate of inoculation has proved adequate to induce complete reduction of resazurin in penicillin-free milk during the 2-hour incubation period. When numerous samples are being examined the use of a 10.0-ml. graduated pipette serves to speed the operation. The screw caps are replaced following this operation.

4. Place the tubes in a thermostatically controlled water bath adjusted to a temperature of 102-104°F. and incubate for two hours. Since a slight decrease in the temperature of incubation will retard the rate of resazurin reduction, care should be exercised to maintain the temperature within the specified range. Mix the contents of the vials thoroughly at the start and several times during the last 30-40 minutes of the incubation period. Observe the degree and time of reduction as indicated by the color change from pink to white.

5. *Controls.* Prepare control samples of milk with known amounts of penicillin, namely 0.03, 0.02 and 0.01 units per milliliter. These may be prepared by accurately weighing the desired amount of pure sodium penicillin G, dissolving it in a phosphate buffer solution (dibasic potassium phosphate 2 gm., monobasic potassium phosphate 8 gm., distilled water 1000 ml., pH 6.0), and then diluting it with milk to obtain the desired concentrations. The usual volumetric pipettes and volumetric flasks are required for this operation.

These standard milk-penicillin preparations can be placed in vials, frozen, and stored until ready for use. They are treated in the same manner as the test samples. A sample of known penicillin-free milk should be included as a negative control. When numerous samples are being examined it is very likely that negative samples always will be present.

6. *Intrepretations.* Samples that contain no inhibiting substances usually will show complete reduction to white after two hours of incubation, indicating that the test organism has grown actively. Samples that remain pink after two hours indicate the presence of inhibiting substances. Since *S. thermophilus* is highly sensitive to penicillin the control samples, particularly the levels of 0.03 and 0.02 units per ml., will remain pink even on extended incubation. At the 0.01 unit level resazurin reduction usually is delayed.

The presence of any inhibitory substance is considered to be undesirable. In order to show that penicillin is involved an additional sample of the milk will need to be treated with penicillinase and examined in the same manner as before.

The operator should run several preliminary trials with adequate controls, to acquaint himself with the characteristics of the culture and to test the sensivity of the resazurin available to him.

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STANDARD METHODS FOR THE EXAMINATION OF DAIRY PRODUCTS

PRINCIPAL CHANGES IN THE ELEVENTH EDITION

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The Subcommittee on Standard Methods which prepared the 11th edition, to be published in the fall of 1960, is comprised of nine reference committees of three or four members each, with each committee responsible for reviewing trends and changes in certain areas and for revision of related chapters. The following summary itemizes the principal changes they have made in the 11th edition of *Standard Methods for the Examination of Dairy Products*. In addition to review by subcommittee members, all material has ben reviewed by members of the APHA Coordinating Committee on Laboratory Methods and by other individuals having an interest in special fields. Upon recommendation of the Coordinating Committee on Laboratory Methods and the Committee on Evaluation and Standards, the Governing Council approved publication of the 11th edition as an official report of the American Public Health Association. This review has been prepared for general information.

The general format of the 11th edition will be identical with that of the 10th, except that the applications and interpretations now collected in Chapter 1 have been incorporated in the respective chapters on analytical procedures. This has resulted in a shorter introductory chapter which considers basic public health concepts for the sanitary quality of dairy products, inspection, laboratory control, screening tests, and the relative accuracy of methods of measuring sanitary quality. New materials include a discussion of radioactivity in relation to milk, recent applications of split sample tests, and the need for new quality tests for use by either official agencies or industry.

The collection of samples of milk and cream has been discussed in a separate chapter. Special attention has been given to new material on collecting samples from large tanks and vats, and enroute samples from bulk farm tanks.

Bacteriological Methods

No major changes have been made in the agar plate count procedure. Although previous editions described a test to detect possible toxicity of buffered phosphate dilution water, no test was provided for determining whether distilled water is free from toxic substances. Consequently a recently developed microbiological test for detection of growth inhibition or stimulation in distilled water will be included in the 11th edition. By adding small amounts of individual chemicals to separate portions of distilled water and inoculating with selected cultures of microorganisms, it is possible to determine whether the water contains excess amounts of nitrogen, carbon, toxic metals, etc.

Theoretical comparisons indicate that the 3-out-of-4 method of averaging bacterial counts is considerably more stringent than the logarithmic average in grading the bacterial quality of milk. Recent studies have shown that the 3-out-of-5 method agrees more closely with logarithmic averages and this will be included in the 11th edition.

The direct microscopic count method has been entirely rewritten and will appear in a separate chapter. The polychrome methylene blue stains in the 10th edition will be replaced by the Levowitz-Weber modification of the Newman-Lampert stain. The importance of adequate illumination is emphasized and the 11th edition will stipulate use of a better microscope lamp, preferably research type, equivalent to at least 100 watts illumination and having a reflector, condensing system and iris diaphragm.

Little change has been made in dye reduction tests which are regrouped in a separate chapter. Although the resazurin "triple-reading" test will be retained, the "one-hour" resazurin reduction test in the 10th edition will not be included in the 11th edition. As with the direct microscopic method, areas which have changed to bulk farm tanks and mechanical refrigeration report that reduction tests are less useful than in the past.

Accordingly a chapter on miscellaneous microbiological methods will include several simplified viable count methods suitable for examination of grade A raw milk for pasteurization. One method consists of transferring with a platinum loop 0.001 ml of milk to an oval tube containing 3 to 4 ml of melted agar, mixing, laying the tube flat until the agar solidi-

[1]Chairman, Subcommittee on Standard Methods for the Examination of Dairy Products of the Coordinating Committee on Laboratory Methods, American Public Health Association.

fies, incubating for 48 hours and counting the resulting colonies. Another is a modification of the Frost little plate method consisting of spreading mixtures of 0.01 ml of milk and 0.02 ml of agar over circular 1 sq cm areas on a glass slide, and incubating in a moist chamber at 32 or 35°C for 12 to 20 hours. The micro plates are dried, stained, and counted using 100X magnification. Systematic studies based on average counts obtained with these two viable count methods, prepared in duplicate from the same milk in comparison with agar plate counts, revealed that results essentially identical with standard plate counts can be obtained by each method.

Although the tests in the 10th edition for detection of antibiotics and other bacterial growth inhibitors in milk are not as simple as desired, no major changes in improved methodology have been brought to the committee's attention. The basic disc assay in the 10th edition of Standard Methods is still the recommended procedure. There will be some slight modification of this procedure in the 11th edition of Standard Methods—the discs need not be sterile, control lots of spores should be titrated to control optimum concentration (normally 1 to 5 dilution) and since positive samples may be less than 1%, much time may be saved by applying the heat treatment and penicillinase test only to samples positive on the initial assay, thus making a second assay necessary only for all positive samples. Incubation suggested is at 35°C until growth becomes apparent—usually 5-7 hours, or incubated at 32°C for 14 to 24 hours. It is noted there is sufficient surface moisture on freshly poured agar plates to saturate reference discs and, in any event, they should not be dipped in water, which may leach out part of the standard.

The 11th edition also will provide an optional short incubation procedure, limited to penicillin seed agar only, with the spores heat shocked again at 70°C for 15 minutes (or 80°C for 10 minutes) just before pouring plates. The plates are inverted and incubated at 37°C until growth becomes apparent—normally observations may be made after 2½-3 hours. Three "Screening Tests" will be described, a reverse-phase disc assay, the FDA rapid disc assay, and a triphenyl tetrazolium chloride reduction test.

Specific Bacterial Groups

The material on the coliform group has been rewritten and rearranged in a separate chapter. Since organisms other than coliforms may ferment formate ricinoleate broth to yield gas, this medium has been omitted in the 11th edition. Provision is made for optional incubation at 32° as well as at 35°C. Although the general experience has been that solid media yield maximum information with the least material and labor, for those preferring a multiple tube (MPN) procedure a new table has been prepared giving Confidence Limits for Most Probable Number estimates. Since differential media are used initially in testing for coliform organisms in milk, the standard test is more specific than usual "presumptive" tests. Accordingly this terminology will not be used in the 11th edition, but provision is made that any doubtful colonies may be "verified" by inoculating into brilliant green bile broth or violet red bile or desoxycholate agar, or "completed" tests may be made if necessary under conditions which are outlined.

The scattered material in the 10th edition on thermoduric and thermophilic bacteria has been brought together in a chapter to which has been added new material on psychrophilic bacteria. In addition to psychrophilic plate counts incubated at low temperatures, a "storage quality test" of products at low temperature is also provided for those wishing to use such procedures.

The material on detection of pathogens previously scattered through Standard Methods has been brought together in one chapter, with methods brought up to date and entirely rewritten and rearranged. New material has been added on staphylococci and streptococci. Since the bovine rickettsial infection (*Coxiella burnetti*) apparently occurs in all parts of the United States, methods are given for its detection in milk. The capillary tube agglutination test is the method of choice for testing milk specimens and is ideally suited for rapid screening of cow's milk or pooled milk of entire herds.

Specific Dairy Products

Methods for the examination of milk products formerly appearing in the section on ingredients used in frozen dairy foods has been placed in a separate chapter devoted to concentrated milk and cultured products. Inasmuch as dilution blanks prepared with lithium hydroxide have been shown to be toxic, sodium citrate has been substituted wherever milk powders are insoluble in standard diluent. Cultured milk products are now controlled operations in most dairy plants, so methods and standards have been included for the coliform group and yeasts and molds, which are applicable to buttermilk, sour cream, yogurt, and acidophilus products.

Revision of the chapter on microbiological methods for butter has included addition of a proteolytic count and a test for coliforms. In the chapter on microbiological methods for cheese, provision has been made for examination of cottage cheese for coliforms, and for a membrane filter test for psychrophilic bacteria.

Only minor changes have been made in the chap-

ters on ingredients of ice cream and related products, and on ice cream and related frozen products.

SANITATION TESTS

In the chapter on sediment in fluid milk, extensive revisions have been made to include sediment tests of bulk farm tanks and off-the-bottom samples.

Minor changes have been made in the chapter on tests for sanitization of equipment and containers, such as optional use of sodium alginate swabs in place of cotton. Although the membrane filter method has not been found suitable for total and coliform counts of milk, it can be used to advantage in filtering large quantities of sterile waters used to rinse pipelines cleaned-in-place, or other equipment or containers. Accordingly its use is described in this chapter.

A new chapter has been prepared on tests for suitability of dairy farm and plant water and air supplies. Water of suitable sanitary quality may still contain small numbers of psychrophilic bacteria which grow under prolonged refrigeration during storage of milk and milk products and may result in off-flavors, odors, or deterioration of the manufactured products with which it comes in intimate contact, as in rinsing butter and cottage cheese. For detection of low numbers of such organisms a plate count and membrane filter procedure are provided. Since some psychrophiles are very difficult to isolate unless special enrichment procedures are employed, a screening test is included for this purpose.

The use of atmospheric air, water vapor and other gases in processing of milk and milk products by direct incorporation as in mixing and indirectly by application to containers and equipment is becoming increasingly prevalent. Accordingly methods have been included in the 11th edition for the collection of suitable air samples and for microbiological analyses. The sedimentation test has been retained and the U. S. Public Health Service liquid impinger has been adapted to aerobiological tests. The Anderson aerosol sampler is suggested for use, and other recognized methods such as the air centrifuge, slit impinger, and electrostatic precipitator are permitted.

CHEMICAL METHODS

In addition to miscellaneous chemical methods formerly included in the 10th edition of Standard Methods, the 11th edition will contain methods for the radio-chemical analysis of milk suitable for use by state and local health departments for surveillance purposes. In the past cryoscopic determinations of added water in milk have been laborious, time consuming and consequently expensive. Recent equipment substituting thermistors instead of thermometers for the freezing point measurements permit use of small samples whose temperatures are readily kept uniform and thus the reading at freezing remains constant for a comparatively long period. New equipment complete with refrigeration system, automatic agitation, and automatic controls has greatly simplified detection of added water, and appropriate methods for use will be included in the 11th edition.

The Gerber test for butterfat is generally used in the world except in the United States where the Babcock method has been standard for many years. The Gerber test has, however, been used officially by several states in this country and in accuracy it agrees closely with official ether-extraction methods. Accordingly the Gerber test has been included for milk, cream, and chocolate milk and drinks. It will also replace the Babcock modifications for fat in frozen dairy foods, but since stabilizers and emulsifiers in ice cream may slightly reduce its accuracy, applications to ice cream will still be regarded as a screening test.

The material on phosphatase methods to determine pasteurization has been reorganized to provide more detailed information on necessary controls for the rapid test as well as clarified directions regarding its applicability to a variety of milk products. The rapid test generally is used as a laboratory procedure and the revised directions are predicated on this usage. Reference is made to modifications that may be made for use as a field procedure. One of the principal difficulties in reading results of phosphatase tests seems to be inadequate illumination. Accordingly the 11th edition will require that this chemical test be read under proper uniform illumination such as a single 14-22-watt daylight-type fluorescent light as used in a dental x-ray film viewer.

The last chapter will consist of Chemical Methods quoted from the ninth edition (1960) of *Official Methods of Analysis of the Association of Official Agricultural Chemists*, by permission of that Association.

MEDIA APPENDIX

The formulas for all Culture Media mentioned in the several chapters, and directions for making and using media have been included in an Appendix in which media are listed alphabetically and numbered for appropriate reference.

ON THE TRAINING OF MILK PLANT OPERATORS AND ADMINISTRATIVE PERSONNEL[1]

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During the past 35 years, pasteurization of milk has been accepted as the primary answer to the milk-borne diseases problem; and many persons consider the achievement of milk control objectives as a *fait accompli.* However, there are now new techniques of pasteurization and problems of time-temperature relationships which make it impossible to be complacent about the gains which have been made in the reduction of milk-borne diseases. In the study of certain milk-borne disease outbreaks, it has been found that the human factor is often implicated as the primary cause of the outbreak.

The March, 1956, issue of the *American Journal of Public Health* (***46***: 345-346) contained an editorial entitled "Some Important Lessons from the Lancaster, Pennsylvania, Paratyphoid Fever Epidemic," which stated that "The present trend toward 'automation' does not necessarily entail the complete protection which it may seem to imply." It further pointed out that actual operating practices involve a number of hazards to health, including the human elements which enter into such procedures as inspections and manual adjustments. Additional hazards to public health include cross-connections, lack of leak-proof valves, unapproved water supply, and normal failure of automatic equipment.

The editorial also stated that "This occurrence must have a salutary effect on the attitude of many health officers toward the continuing need for the protection of milk supplies to safeguard the public health. This particular barrier against disease may have reached a maintenance level, but still requires our attention, our interest and adequate legal authority to act before as well as after misfortune occurs."

Recent studies on Q Fever have pointed out that our present methods of pasteurization are not sufficient to inactivate all organisms of public health importance. This finding, plus problems accruing from the new developments in pasteurization equipment, increases the need for continuous dissemination of up-to-date information to persons having responsibility for control of the quality of milk. The effectiveness of the dissemination of this information is complicated by indifference, educational deficiencies, and turnovers in personnel, and by divided responsibilities among milk plant operators.

Both milk control administrators of the public service agencies and management personnel of the milk industry realize that their sanitarians and the key men of the present highly mechanized milk processing plants must be men trained in proper techniques and principles. It is no longer the desire of these administrators to employ an inspector — a reporter of violations and "wielder of the big stick." Both the sanitarian and the plant operator must be grounded in the basic principles governing the production, processing, and distribution to the consumer of clean, high quality, safe milk and milk products.

The work of the sanitarian must be closely allied with the work of the pasteurization-plant operator. Both must be thoroughly familiar with the regulations which have been adopted as a guide for reaching the ultimate goal of a safe and acceptable product. These persons must not only be familiar with these regulations, but they must be "sold" on their necessity. Then, and only then, will the plant operator carry out the provisions of the regulations without constant surveillance of the sanitarian.

In most instances, the sanitarian and his superiors have recognized their responsibility to protect the health of the consumer. In many instances, these protectors of the public health have performed their duty in the face of unjust criticism which may have arisen from a group of uniformed milk plant operators who resent regimentation and regulation. On the other hand, this criticism may be warranted because some untrained public servant is "wielding the big stick." As trained sanitarians and operators are employed, this just and unjust criticism will decrease proportionately.

Consumer prejudice existing today against pasteurized milk is not, in most instances, the result of the industry's failure to meet the regulations. It is primarily due to the plant operator's limited knowledge as to the proper methods of handling milk. Such phrases as "cooked milk," "cardboard milk," and

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[1]Presented February 12, 1960, at the Milk Sanitation-Administration course, Communicable Disease Center, Public Health Service, Atlanta, Georgia.

"pasteurized milk rots before it sours" are all indictments against the operator. These statements hurt his industry, and a decrease in milk consumption lowers the vitality of the nation. Americans consume large quantities of milk and will continue to do so if a clean, wholesome, palatable, safe product is delivered to the consumer.

In the training of the pasteurization plant operator, the word *quality* must be impressed on his mind. The bottle of milk he produces must be uniform in taste and appearance from day to day. The operator must first know the fundamental elements of a quality product. To achieve quality, the operator must have a conscious understanding of the approved sanitary precautions required to produce acceptable raw milk. He must assist the producer to eliminate off-flavors and odors. The off-flavors and their quality-reducing factors not only decrease the consumption of milk, but they may cause serious processing difficulties. The ability to recognize these milk detriments is a requirement in the selection of quality milk for pasteurization.

The transmission of the diseases of cattle, although the diseases in themselves may not cause the health of the consumer any serious trouble, should be understood. The plant operator must appreciate the fact that breaks in the pasteurization process will allow certain animal diseases to reach the consumer.

The laboratory training in milk bacteriology and the physical and chemical testing of milk offered by schools of agriculture are essential. The routine examinations, as conducted by the plant personnel and public service agencies, must be interpreted correctly and in such a manner as to improve the product constantly. The ability of the operator to make practical application of results from chemical tests, physical tests, and bacteriological examinations of his raw and finished products cannot be over emphasized. These tests are useful in controlling his milk-production problems.

It is highly important that the plant operator have the knowledge necessary for the most proficient operation of his equipment and for the selection of the proper equipment to get the best results. The handling of this equipment to do a specific job satisfactorily may spell the difference between success and failure. The quality of the finished product depends upon selecting a high quality raw milk; transferring this milk into properly protected receiving vats; processing the milk by the use of adequate, mechanically sufficient pasteurizing equipment; and timing the bottle filler to assure proper cooling of the milk in the bottle. All this requires constant planning. The correlation of the equipment speed to demands fluctuating during the day should be constantly studied. The safeguarding of the milk from all possible contamination, particularly after pasteurization, is dependent upon the choice and maintenance of adequate and properly constructed equipment.

The regulations of most communities and states provide equipment safeguards to assure a safe product. These regulations apply to such safeguards as temperature controls, engineering design of equipment, protective devices, and acceptable methods of operation. The operator should know these regulations and the public health reasoning underlying the formulation of each regulation. In addition, he must know the construction and placement of valves in the lines, the type of pump needed, and the best temperatures at which to pump milk. The maintenance of sanitary piping, agitation of the milk during pasteurization, efficient cooling, and speed of the bottling machine affect the uniformity of the final product. This is true for the quality factors of taste and odors, as well as for the appearance, cream line, and bacteria count.

The knowledge of how to wash milk equipment properly and to treat it bactericidally is of utmost importance. These items are covered in milk ordinances by a description of the results desired, but the methods of attaining these standards depend entirely upon the operator. The selection of the proper detergent to do a particular job may be accomplished by the trial-and-error method, but a knowledge of the chemical aspects of water hardness and of the composition of the material to be cleaned may save many costly experiments in the selection of a proper detergent. Water hardness variations in different parts of the country may play an important part in the selection of proper methods and agents to effect bactericidal treatment.

The pasteurization plant operator who does not understand the public health reasoning underlying the pasteurization of milk, as well as the theory and practice of the correct procedures involved, is a potential menace to the industry and to the consumer. The most important single factor in the protection of the health of the milk consumer is the process of pasteurization. Knowledge of the fundamental public health reasons for the pasteurization of milk will lead to an understanding not only of the importance of pasteurization but also of protecting the pasteurized milk adequately against any possible contamination until it reaches the consumer. Many milk-borne epidemics are caused by the plant operator who does not realize the potential dangers of manipulating holding time or temperature, or who fails to place every safeguard around the milk during and after pasteurization.

A review of the important details of a 1945 epidemiological problem in an outbreak of acute enteritis will illustrate this point. The epidemic occurred in a city of 10,000 population. There were 409 cases

and eight deaths in adults. Of twenty-four infant cases, nine died. All cases were directly traced to the users of milk from a spasmodically inspected milk processing plant. A summation of the problem revealed that "No measures were used to control flies or fly breeding; screen doors were propped open, hog wallows were within ten to fifty yards of the plant; a rag was observed wound around a water pipe, with water dripping directly into the pasteurized milk just before bottling." The description went on to name other similar factors involved, and then related that "The pasteurization plant operator stated that recording thermometers, foam heaters, covers for milk coolers, sterilization of bottles and hand washing facilities were not specifically required. The statement was made, "The City Ordinance doesn't require such things, so why do it?" Such a statement could come only from an untrained operator. This epidemic is referred to in order to show the need for adequately trained plant operators.

The milk industry is full of strange and wondrous things. The great strides made in methods of milk production, in engineering feats of design and economy, and in the science of the ways and means of controlling quality and safety may be nullified by lack of knowledge. The industry has many honest workers, but, because of improper training, these remarkable developments fall short of attaining the goal of providing clean, safe milk to the consumer.

There are several sources of training which may provide industry with capable men. The universities and colleges offer a variety of courses ranging from a two-day "in-service" refresher course to post-graduate courses. Many universities have a full four-year program in Dairy Technology. A review of these courses will reveal that "public health reasoning" is closely integrated with the theory and practice.

The courses provided by universities fall into three distinct types of training: courses for the plant operator, technical and theoretical courses for the technologist, and courses to meet special needs of the persons involved.

The courses for operators vary from two weeks up to a year in length. These may offer extensive studies in the basic fundamentals of milk production, receiving of milk at the plant, operation of the pasteurization plant, quality control, and certain administrative and legal requirements of the control agencies. Courses of practical chemistry and related subjects may be given to meet the plant operators' needs. In some instances highly specialized training might be offered.

The schools and universities in several states provide a four-year course of study leading to a Bachelor of Science degree with majors in milk production, plant operation, and quality control. The curriculum provides information on milk distribution, manufacture of dairy equipment, supplies, and machinery; sales promotion of dairy products; and laboratory control of milk and milk products. An essential part of the course is the practical application of theory to the field conditions found in industry. The student receives a broad education which equips him to go into the field of production, processing, distribution, and accounting.

In such a four-year course a person is taught all phases of the manufacture of dairy products. Teaching is geared to production, manufacturing and operational problems of a creamery, cheese factory, milk plant, ice cream plant, and condensery. A large percentage of some states' milk control personnel come from this university trained group.

Further review of the university courses leading to a degree in dairy industry will reveal subjects dealing with the various branches of the dairy industry as to their administrative organization and with the composition and analysis of the dairy products as they are related to nutrition and the economics of the industry. In addition to study of nutritional values, time is devoted to a study of the part that its relationship to public health plays in the milk industry. Studies are made of the regulatory agencies, the structure of their organization, and their legal powers. Considerable stress is placed on the sanitary methods of inspection of milk supplies, the tests used, the limitation of these tests, and field work in milk plant inspection and operation.

The third type of course may include special topics, such as the composition and processing of market milk and related products, dairy plant engineering, and courses in related mechanics. The subjects covered may include air and water purification, steam generation, and the use of metals and electricity.

In some states the Department of Vocational Education sponsors training programs wherein subject matter is presented through lectures, demonstrations, and visual aids. These classes are generally held at night for the convenience of persons who work during the day. Certificates may be awarded to those industrial and control personnel who complete the training. Another method of inducing workers to obtain needed training is to provide wage increases after they have completed the course of instruction.

It is felt that in order to achieve the ultimate goal of elimination of milk-borne diseases, training must be provided for all levels of public health and milk-control personnel. The level of training must vary according to educational and experience qualifications of persons being taught. In this training, it is essential to reach top-level administrators so they may more fully understand the problems and give their support to training of control personnel and to opera-

tion of control programs under their jurisdiction.

The Training Branch, CDC, has organized in-service field training programs for public health and related personnel including milk plant operators. Training given by the Environmental Health Training Section, Training Branch, CDC, is in the fields of milk and food sanitation, water supply sanitation, housing hygiene, and general sanitation. Courses are planned to meet the needs of three broad groups of personnel: (*a*) epidemiology and control courses for the public health administrators; (*b*) administrative courses for persons who have direct responsibilities for administrating control programs; and (*c*) courses for control and operational personnel. Examples of the types of courses offered in milk sanitation are: (*a*) Epidemiology and Control of Milk-Borne Diseases; (*b*) Milk Sanitation—Administration; and (*c*) Milk Pasteurization Tests and Controls. The objectives of these courses are:

1. To teach the use of proper epidemiological methods applicable to the study of outbreaks of milk-borne diseases.

2. To provide administrators of milk programs with up-to-date information that can be used in preventing disease outbreaks or in bringing them under control as soon as possible.

3. To teach control procedures applicable to equipment of old or new design.

The CDC training program for milk-control and pasteurization-plant personnel had its beginning in the mid-forties in Savannah, Georgia. The plan at that time was to provide a practical "learn-by-doing" approach for these persons. It was realized early in this training that these people had little or no opportunity to gain a workable intimate knowledge of the controls used in the automation of milk-processing plants. A recorder-controller and water-temperature-indicator controller were purchased so that they might gain this knowledge in the training given. In the latter 1940's, pasteurization equipment was purchased to use at two field training stations.

Restrictions on out-of-state travel created a demand for decentralized training programs, and in the early 1950's one HTST unit was installed in a van-type truck for transportation to the training sites. It became a very important training tool because most universities did not have pasteurization control equipment which could be used strictly for training purposes.

In 1955, Cherry-Burrell Corporation loaned a Vacreator to the Training Branch, CDC. This equipment plus a HTST unit was mounted on a fifteen ton semi-trailer. In a two-and-a half-year period (1955-58), these up-to-date heating units were demonstrated at many locations throughout the United States. From July, 1958, to the present, opportunities were further provided for this truck to return to any of the 48 states for use in training programs. Although this ambulatory program was designed for training of official milk control personnel, it has been given to many pasteurization-plant operators, students in dairy technology, and others. It is estimated that 3500 persons have attended training programs which utilized the two mobile milk-pasteurization units (van-type truck and semi-trailer).

This program of training in Milk Pasteurization Plant Controls and Tests has met an expressed need for state and local personnel. The complex details of testing intricate controls are better impressed in the minds of individuals when the written word is translated into physical action. The actual operation and manipulation of equipment in the Mobile Milk Pasteurization Training Unit have provided a medium of training heretofore not readily available to the employees of control agencies. Furthermore, the presentation of this subject material has encouraged universities and state-control agencies to include the subject of milk pasteurization controls and tests in collegiate and other training programs. This has encouraged and brought about closer supervision of the pasteurization process. The dissemination of knowledge of new developments by industry has enabled control agencies to acquaint themselves with necessary control techniques in time to prepare for the installation of such new equipment within their jurisdiction. This acquisition of skills and knowledge has brought about a better understanding of each other and an improved working relation between control agencies and industry.

The accomplishments in the training of a large number of milk control personnel and of a few pasteurization plant operators can further be realized by the proper training of all pasteurization plant operators. Such a program should logically be conducted by and within a state, with the use of resources available therein. Materials for teaching have been prepared by the Training Branch, CDC. This material is flexible enough so that it may be altered to meet local needs. It is emphasized, however, that actual plant facilities should be utilized for portions of this training and should provide for the "learning-by-doing" process.

In summary, the danger of becoming complacent about the control of milk-borne diseases must be reiterated. The disease potential is still very much with us; and, with the continuous change of equipment and techniques, it is essential in the interest of public health protection that regulatory and key personnel be kept current with new developments.

Schools and universities are assisting in the task of providing trained industrial and official control personnel. Those who have interest in this field must

realize, however, that the task of training is tremendous and that all resources must be mustered to do the job. This can be done by securing the interest and cooperation of both official and industry organizations. Such training should be aimed at all strata of the operating agencies and industry, starting at the top administrative level and working down to the plant operator. Training at each of these levels cannot be overstressed, nor can the fact that the pasteurization plant operator is still a very important link in the control of milk-borne diseases.

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NEWS AND EVENTS

HIGH SCHOOL SCIENCE COURSE IMPROVEMENT PLANNED

One of the most constructive things that has happened in education in the past few years has been the active interest taken by senior scientists in efforts to improve high school science and mathematics courses. A greatly improved course in physics will be available for any high school that wants to use it in the fall of 1960. The Physical Science Study Committee at Massachusetts Institute of Technology, with the help of physicists and high school teachers of physics, has provided texts, supplementary reading material, films, demonstrations, teacher's guides, and laboratory experiments. Improved courses in mathematics are being tried in a large number of schools. Similar work in chemistry and biology is not quite so far along, but promises to provide much better courses in those fields. On several occasions during the past few years, the Board of Directors has discussed the feasibility of a broader attack on the whole question of elementary and secondary school science instruction. There are a number of questions to consider: What science instruction do or should pupils have in the elementary grades? What is the role and proper grade location of a course in general science, or should there be such a course? Are the traditional courses in biology, chemistry, and physics enough, or should there be other courses — either more advanced courses in these fields or courses in other fields, such as in the earth sciences? Discussion of

some of these problems with representatives of the groups responsible for the new courses in physics, chemistry, and biology, with teachers and with officers of the National Science Foundation has resulted in agreement that someone should take a broader look at the whole question of elementary and secondary school science instruction. No one knows just how things will develop, but as a start, the Board of Directors and the National Science Foundation have agreed that it would be desirable to hold a series of relatively small regional conferences of scientists and elementary school teachers and supervisors. The conferences will be under the direction of John Mayor, the AAAS Director of Education, and will provide the basis for a decision sometime next year as to how scientists can best extend their efforts to improve science education.

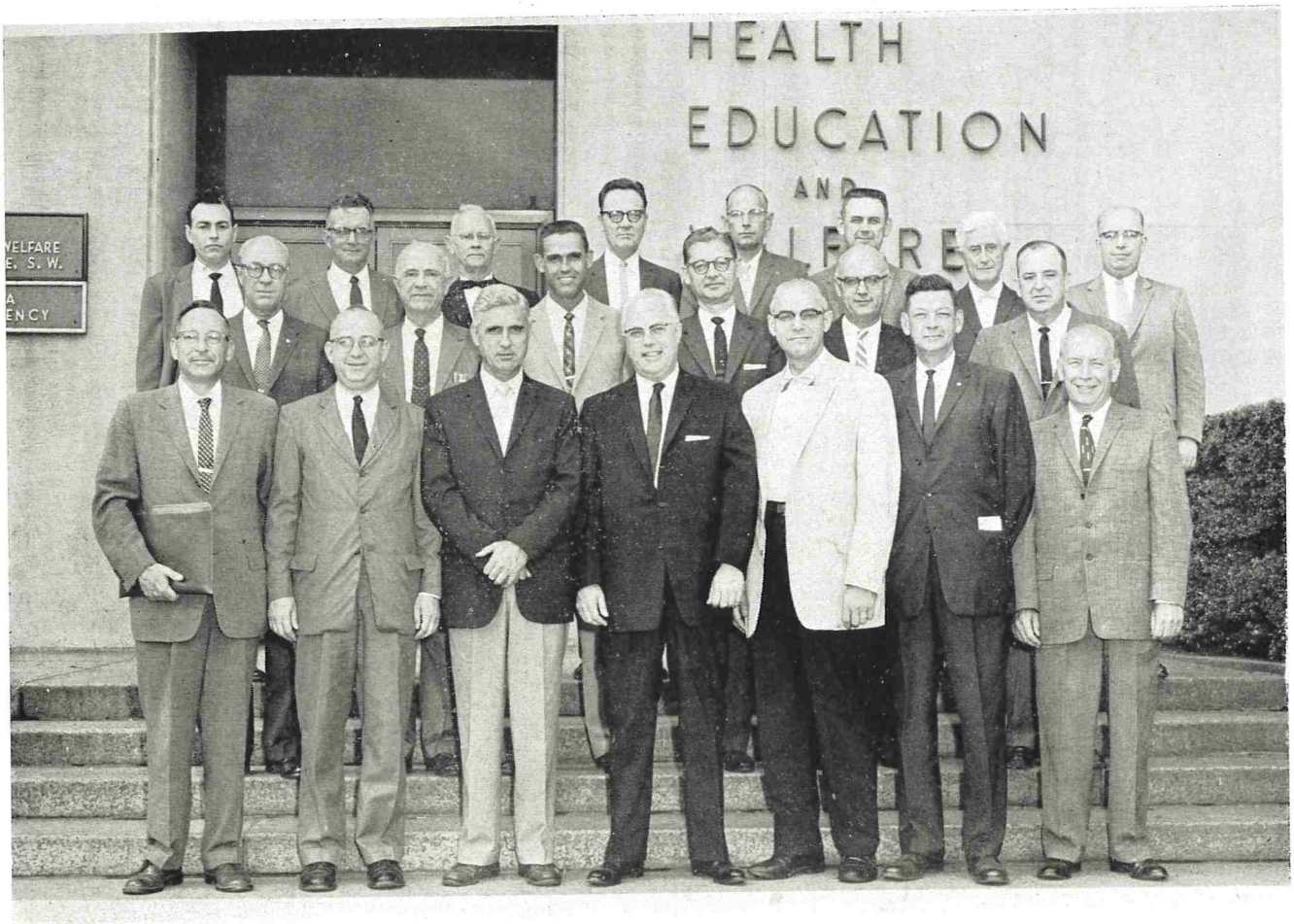
FOOD SANITATION ADVISORY COMMITTEE MEETS IN WASHINGTON

The Public Health Service's Food Establishment Sanitation Advisory Committee met during the week of June 13, in Washington. The Committee is composed of representatives from national public health and sanitation organizations, the hotel, restaurant and beverage industries, state and local health departments and educational institutions.

The task before the Committee is to assist the Service with the revision of the 1943 edition of the Ordinance and Code Regulatory Eating and Drinking Establishments.

The June meeting was called to review and consider comments and recommendations made by state and local health departments based upon a prelim-

PHS FOOD ESTABLISHMENT SANITATION ADVISORY COMMITTEE



First row: Dr. A. Harry Bliss, Dr. Morris A. Shiffman, Dr. Mack I. Shanholtz, Mr. Donald Greenaway, Mr. S. A. Coleman, Prof. H. S. Adams, Mr. J. J. Donovan; Second row: Mr. W. V. Hickey, Mr. A. W. Fuchs, Mr. L. J. Gordon, Mr. C. L. Kegler, Mr. H. J. Dunsmore, Mr. John D. Faulkner; Third row: Mr. George E. Prime, Mr. Chas. E. Senn, Mr. A. H. Fletcher, Mr. J. H. Fritz, Mr. John Andrews, Mr. William C. Miller, Jr., Dr. W. L. Mallmann, and Dr. Keith H. Lewis.

inary draft of the new document furnished them earlier.

Each section of the new recommended ordinance was reviewed carefully and critically. Painstaking effort was expended to phrase requirements and compliance section to state clearly the intended meaning to promote uniformity of interpretation.

The new ordinance and code incorporates much more detailed information on food care and protection than was carried in the 1943 edition. Based upon research done at the Robert A. Taft Sanitary Engineering Center, the Committee had at its disposal recent laboratory findings in relation to the growth of certain common food poisoning organisms.

Time and temperature relationships for both the holding of hot and cold foods were considered in detail. The new document calls for more emphasis on food storage and holding temperatures as a means of reducing excessive bacterial multiplication so frequently associated with outbreaks of food poisoning.

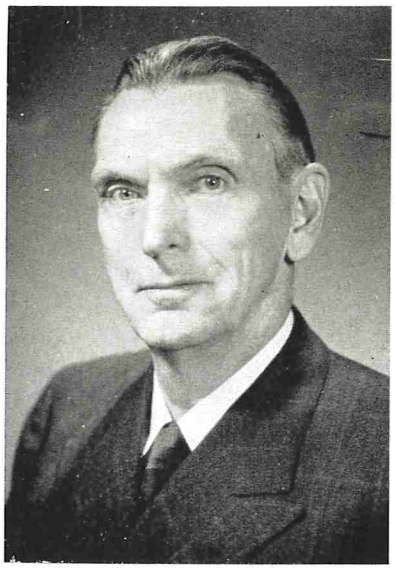
The new ordinance will give considerable attention to the administrative phases of food control. It will point up the need for well executed and effective programs under qualified supervision and with a competent field staff. The need for close liaison and cooperation with the food and beverage industries will be stressed. While the new document, like the earlier edition, will be recommended for adoption by state and local departments, certain supplementary suggestions will be made to emphasis the necessity for effective administration and a technical approach to food control.

At the Committee meeting considerable discussion centered around the subject of awards for superior performance on the part of the industries. The ramifications of an award system of this nature are many and varied and the development of such a plan presents considerable difficulty. While numerous communities operate under a grading system, it was felt by the Committee generally that the present grading system should be subject to careful evaluation and scrutiny.

The obvious need for rather complete appendix material was evident throughout the deliberations. The large number of technical aspects included in the ordinance and code do not lend themselves to full explanation in the body of the document. However, to give needed guidance to food control personnel and industry, explanatory matter is highly desirable. It may be necessary to follow release of the ordinance and code with a separate publication as appendices. A final decision on this matter will be made at a later date.

Currently the staff of the PHS Food and Milk Section is reworking those sections which were considered in detail by the Committee. Taking into consideration the many viewpoints expressed by state and local health personnel and with those of the Advisory Committee, the task of setting forth requirements and composing the explanatory text in the best possible manner is not a simple task. Progress is, however, being made.

ROBERTS EVERETT RETIRES FROM DISA



After forty-one years with the Dairy Industries Supply Association, Roberts Everett, Executive Vice President, retired on June 30, 1960.

Bob Everett joined the Dairy Industries Supply Association long before it became the influential trade association it is today. In fact, in 1919 when he joined the organization it was known as the National Association of Ice Cream Supply Men. At that time it was primarily a salesman's club which met occasionally and cooperated with the National Association of Ice Cream Manufacturers in the exposition which they held in connection with their annual convention.

Bob Everett received his education at Oberlin College and later at the Columbia University School of Journalism. After graduation from Columbia in 1915 he was on the editorial staff of two New York dailies-the New York World and the New York Tribune. World War I intervened and he received his lieutenant's commission and his wings just prior to the cessation of hostilities.

In the early days the Association's headquarters were at 1328 Broadway, New York City and it was not until 1942 that Washington, D. C., became the central office.

In 1925 the Association widened its scope to cover

the servicing of the entire dairy processing field as the Ice Cream Supply Men merged with the American Dairy Machinery and Supply Association to form the Dairy and Ice Cream Machinery and Suppliers Association, with Bob Everett continuing to head their headquarters staff. This name with no change in the organization set up was shortened in 1939 to Dairy Industries Supply Association and the label DISA came into common use.

The mid-thirties saw another pioneering effort — The Three-A Sanitary Standards program to bring order out of the chaos of conflicting opinions and regulations as to what made a piece of dairy equipment sanitary. DISA took a leading role in the three-way collaboration — between the manufacturer, the user and the regulator of dairy equipment — in formulating broadly-agreed upon standards. The three "A's" were the three associations which inaugurated the program: DISA, what is now Milk Industry Foundation and what is now the International Association of Milk and Food Sanitarians and the U. S. Public Health Service. Participation has since widened, but DISA's activity, through a maze of technical committees and sub-committees, has continued to be a major corner-stone of the activity.

The credit for much of the progress of DISA can be directly credited to the industry, foresight and administrative acumen of Bob Everett. In his retirement he leaves a strong active trade association serving well the varied needs and challenges of today's dairy industry.

Many in International have had the privilege of knowing and working with Bob. His host of friends and colleagues wish him well, with many pleasant and productive years ahead.

SOME CURRENT STATEMENTS ON STRONTIUM 90

Eighty per cent more Strontium 90 per gram of calcium was found in non-fat foods of teen aged diets studied. The study covered a well balanced diet for teen agers collected over a two week period in 24 U. S. cities and one in Canada.

From Consumer's Union of the U. S. Inc.

Populations in rice eating countries, such as Japan, are consuming more Strontium 90 in their diets than milk drinking nations.

From the book, FALL OUT, *published by Basic Books, April 1960.*

Eminent scientists representing the National Academy of Sciences, report to the public that only a fraction of man-made radiation comes from fall-out, far more comes from medical radiation. A higher total of fall-out (from bomb testing to date) is expected than had previously been estimated, but less genetic damage because it is now known chronic doses of low level radiation cause less human damage than had been supposed. Levels of fall-out in food have increased in the past few years but *they remain well below these that need to be considered cause for alarm.*

From: Report to the Public, National Academy of Science, May 4, 1960.

Said, *Science News Letter* of July 2, "The 1960 spring rains besides bringing out the flowers, brought down from the high atmosphere considerably less radioactive strontium 90 than in 1959. The 1959 spring rains held the greatest amount of strontium 90 on record, Dr. Lester Machta of the U. S. Weather Bureau told the American Meteorological Society in Washington, D. C. He believes the maximum exposure to whatever hazards strontium 90 presents has already occurred. The radioactivity from this fallout product is now disappearing (decaying) at almost the same rate as it is being precipitated on the earth's surface as rain or snow."

GUIDE TO FOOD ADDITIVES AVAILABLE

A manufacturers guide to legal and technical considerations presented by the Food Additives Amendment of 1958 has been published by the Manufacturing Chemists' Association.

Entitled "How to Proceed Under the Food Additives Amendment," the 12-page booklet is the first published section of a seven-part manual on food additives.

A food additive is defined by law as any substance that voluntarily or otherwise is introduced into a food product. This includes preservatives, emulsifiers and flavoring agents, for example, as well as some packaging materials "migrating" to food.

Experts from government, industry and the sciences have asserted that it would be virtually impossible to adequately feed our largely urban population today without the use of food additives. Most additives have been developed through the years to fulfill a specific need. Many others such as salt, sugar, baking powder and vinegar — all of which are chemical in nature and are classed as food additives — have been in use through much of history.

The Food Additives Amendment was passed on Sept. 6, 1958 after eight years of discussion in Congress. Iits major contribution was to make the pretesting of food additives a legal requirement. Previously, it was not necessary to submit test data to the Food & Drug Administration before using a substance in food. The burden of proof as to whether a substance was wholesome was on the FDA.

The MCA booklet explains in detail how to comply

with the Amendment. Through a question-and-answer format the publication tells how to determine whether a substance should be classified as a food additive. Other sections then describe procedures for filing petitions for approval, for filing objections to regulations and for filing petitions for the U. S. Circuit Court of Appeals.

Although manufacturers generally tested food additives adequately in the past, the chemical industry endorsed the Amendment publicly as a further step to insure the convenience, safety and wholesomeness of our food supply.

Under the Amendment, a manufacturer must petition the FDA for a special regulation permitting the use of a substance as a food additive. Once government scientists are satisfied that a proposed additive has been tested adequately to prove its safety, an order will be issued permitting its use within certain prescribed limitations, such as amount and condition of use.

The MCA's new booklet is published as an activity of the Association's Food Additives Committee.

Copies are available from the Manufacturing Chemists Association at 50 cents each. Address: 1825 Connecticut Ave., N. W., Washington 9, D. C.

Index To Advertisers

U. S. AND CANADIAN HEALTH AUTHORITIES REFUTE ATTACKS ON WATER FLUORIDATION

America's "battle royal" in some cities on the addition of fluorides to public water supplies that are too low in fluoride content to permit the normal development of decay-resistant, healthy teeth in children has moved into the international arena. The new turn in the controversy comes in the form of an attack from a poorly informed Australian, Dr. Philip R. N. Sutton, on the key studies completed in the United States and Canada that firmly established the case for fluoridation.

U. S. and Canadian medical and dental authorities dismiss the scientific significance of Dr. Sutton's arguments, but deplore the propaganda weapon his outburst, dignified superficially by being published in book form, has given the cultists and quacks who have been attempting to slow the introduction of water fluoridation. The boost given those attacking the fluoridation program by Dr. Sutton's bizarre book should "weight heavily on his conscience," Dr. D. J. Galagan of the U. S. Public Health Service states. The practical impact of the Australian's publication, he adds, may doom "many thousands . . . of children needlessly (to) develop dental caries and suffer . . . the pains of toothache and infection," as well as teeth lost forever.

A factual rebuttal to Dr. Sutton's misleading assertions was written by Dr. James M. Dunning of the Harvard School of Dental Medicine in Nutrition Reviews, the official journal of the Nutrition Foundation. The Foundation has for some time vigorously advocated adding fluorides to drinking water in order to reduce tooth decay. The organization's Executive Director, Dr. C. G. King, has emphasized the "wisdom and safety" of fluoridation, declaring that fluoridated water has been clearly demonstrated to strengthen the teeth against decay if furnished while the teeth are being formed. The gain is permanent.

Four studies were used as the Australian dentist's targets. Each of the studies compared rates of dental decay in a city in which water fluoridation had been introduced with the decay rates in a "control" community which during the course of the 10-year investigations did not have fluoridated water. The "protected cities" were Grand Rapids, Michigan, Evanston, Illinois, Brandford, Ontario, and Newburgh, New York. The "controls" with which they were matched were Muskegon, Michigan, Oak Park, Illinois, Sarnia, Ontario and Kingston, New York.

Dr. Sutton's attack centered on the adequacy of the sampling techniques used to measure fluoridation effectiveness and the validity of some of the comparisons ebtween fluoride-using and "control" communities. Weighed by nearly all U. S. scientists who have studied the literature or conducted tests, the points cited by Sutton have been found "minor or irrelevant" and show "no attempt to appraise the large, positive accomplishments" of U. S. fluoridation, according to Harvard's Dr. Dunning.

A bone of contention in the Newburgh-Kingston study is the fact that "starting point" data for the control city of Kingston was collected a year after the initial survey of Newburgh. That time lapse, Dr. Sutton claimed, impaired valid comparison of the "starting point" data from the two cities.

Not so, according to Dr. David B. Ast, Director of the Bureau of Dental Health of the New York State Department of Health and widely recognized as a top authority in the field. "I can't believe," he says, "that Sutton really believes this to be a valid criticism." All of the direct oral examinations in both cities were made by the same examiner, Dr. Ast points out. The results were practically identical. The Decayed-Missing-Filled ratio of the 6 to 12 year-olds tested at the outset of the study in Kingston was 20.8 per 100 permanent teeth. A year later, in Newburgh,

(Continued on page 262)

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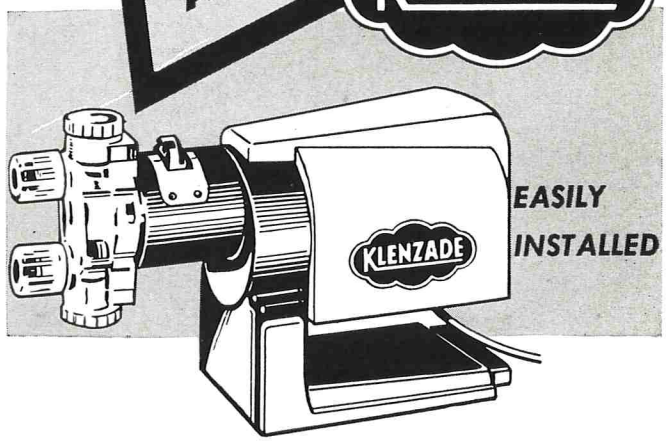

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(Continued from page 260

the starting point examination showed a DMF rate of 21.0 per 100. The difference of only 1/50th of 1% demonstrates the validity of comparing the two test cities. In view of the results, the New York dental authority asks: "Could Sutton really believe that the (rates) . . . could have been significantly different if both examinations were made exactly at the same time? This type of criticism," Dr. Ast adds, "questions not the research but the professional acumen of the critic."

The sampling technique was questioned by Dr. Sutton in the Evanston-Oak Park study. He was critical of the fact that Negro children in Evanston schools were not included in the Evanston sample that was compared with the all-white group being checked in Oak Park. The U. S. reaction is a suspicion that Dr. Sutton "has a fixation on the subject of random sampling, and is not familiar with the principle of stratified sampling designed to handle situations where randomization alone could produce biased results." Evanston whites were compared to Oak Park whites, it is explained, because Negroes have different cavity development rates than do white people. "The randomization Sutton suggests," the U. S. authorities state, "would . . . have introduced errors instead of having corrected them."

Turnover within the teams of examiners over the course of the 10-year test period, Dr. Sutton has charged, jeopardized the constancy of data obtained from the Grand-Rapids-Muskegon study. The U. S. authorities respond that apparently "nothing will satisfy (Dr. Sutton) except the continuous employment of a very small number of examiners for the entire 10-year period of study. It seems to mean nothing to him that the studies were under continuous supervision and, if examiners changed, the new ones were oriented and standardized by the supervisor."

A real indication of the conformity of the data can be taken from the fact that one of the working examiners, out of the full team strength of four, did stay with the study for the entire 10-year span, Dr. F. A. Arnold, Jr., Director of the National Institute of Dental Research and principal investigator at Grand Rapids points out. Moreover, two others, he reports, were on the job for the last seven consecutive years of the project.

Minor errors that do not jeopardize the four fluoridation studies, on the other hand, are readily achnowledged by Dr. R. M. Grainger of the University of Toronto, another member of the special symposium presented in Nutrition Reviews. The studies are not, he concedes, "flawless of scientific literature." Even so, he states that the Australian is "not correct if he implies that the slips in arithmetic, typographical errors . . . minor inconsistencies between preliminary and final reports or between observer teams, which he has unearthed, throw any serious doubt on the corroborative conclusions of the after-fluoridation experiments or on the public health value of the procedure."

Emphasizing the same point, Dr. Dunning deplores the fact that the Australian's "destructive criticism" will give new ammunition to those who have fought the demontsrated benefits of fluoridation. "The tragedy is that his work will be read by a public often unable to appreciate its defects . . . Worst of all," Dr. Dunning concludes, "the (Sutton charges) will be used by unprincipled agitators to arouse fear in citizens' groups where fluoridation is up for community decision."

In addition to the Nutrition Foundation, most of the nation's leading health and scientific organizations have consistently urged water fluoridation as a practical, thoroughly safe means of protecting the nation's youngsters from about 50% of the current rate of tooth decay. Those endorsing the anti-cavity program include the American Medical Association, the American Dental Association, the U. S. Public Health Service and the National Institute of Dental Research.

ANTIBIOTIC FIELD TEST KITS DEVELOPED

Successful development of field test kits for detecting penicillin and other antibiotics in milk was announced at the recent meeting of the American Dairy Science Association.

Prof. Frank V. Kosikowski and R. A. Ledford of the New York State College of Agriculture at Cornell University reported the development based on research conducted over the past decade.

The Cornell dairy industry scientist said the field kits are simple enough for a farmer, with care, to test his own cows, sensitive to a point of detecting .05 I. U. penicillin per milliliter of milk and versatile as to be carried about without refrigeration. It is expected, however, that their greatest value will be in the hands of regulatory officials and dairy field supervisors. The General Ionics Corporation of Pittsburgh, Pa., is now producing commercial kits of the type developed at Cornell.

Performance of the test depends upon highly antibiotic-sensitive bacteria such as *Bacillus subtilis* and *Sarcina lutea*, resting in an agar bed, reacting with milk applied to the surface of the agar by paper discs wetted with the milk in question. If the wetted discs contain penicillin, a clear halo will show around them in three hours at the best growing temperature

for the test bacteria. Such a halo effect usually means the presence of penicillin.

True field test kits can be carried about at normal outside temperatures without refrigeration. This was accomplished by filling single service plastic dishes with non-nutrient agar and test organisms and enclosing the dishes in air-tight aluminum pouches. The antibiotic-sensitive bacteria remain dormant in the foodless agar until specially treated paper discs packed with concentrated nutrients are wetted with the milk under test and applied to the agar surface. Leaching of the nutrients from the discs enables the dormant antibiotic-sensitive bacteria to grow and activates the test.

Other field kit designs include controlling test bacteria residing in nutrient agar by removing completely all air from the pouch followed by gassing. In this second design the mere opening of the pouch activates the field test.

The ready availability of such kits, with individual capacity for testing 34 milks, should do much to pick out and practically eliminate the relatively few milk supplies containing traces of antibiotics, Professor Kosikowski reported.

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Klenzade Products, Inc., Beloit, Wisconsin, is offering a new bulletin on a fully pre-engineered system of automation cleaning for milk tank trucks. The "packaged" system can easily be installed by any dairy maintenance man. The control panel is pre-wired and pre-piped for electrical and air connections, and the "package" contains everything required for a complete installation, except simple connections to plant utilities. A typical installation is illustrated with diagrams and photographs showing the hook-up of the various components. The entire installation occupies a space of only 5 feet long by 2 feet wide, and can generally be located in the tanker unloading room. The complete cleaning cycle normally requires only 15 minutes from start to finish. Interested executives are invited to write for bulletin EQMT/6.

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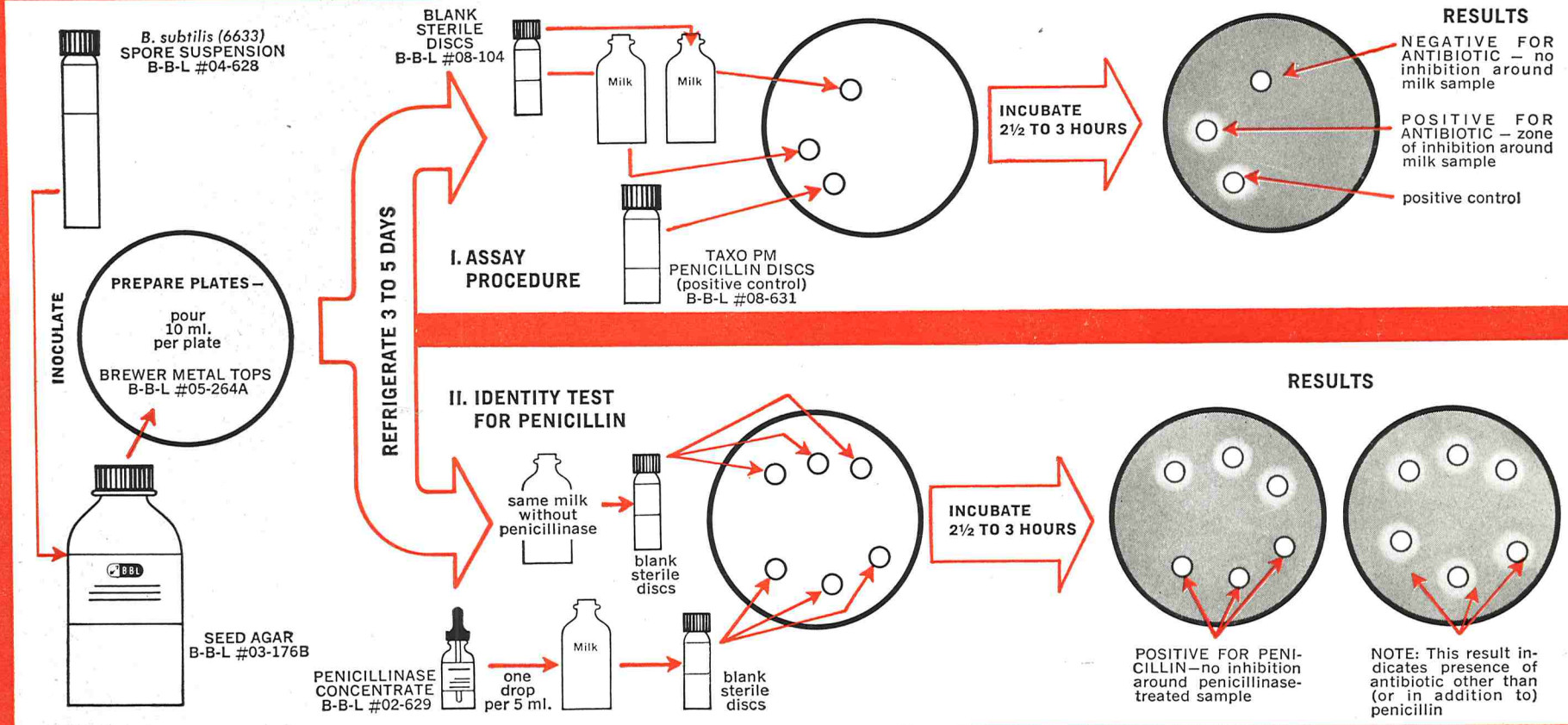

The presence of antibiotics in milk following mastitis therapy in cows has created serious public health problems and caused technical difficulties within the dairy industry. A rapid, practical laboratory procedure to assist regulatory agencies and the dairy industry in solving these problems was described by Arret and Kirshbaum.* This procedure employs rapid growth of a sensitive strain of *B. subtilis* for assaying the presence of antibiotics in milk and for determining its identity with penicillin. Inhibition of growth by the presence of as little as 0.05 unit of penicillin per ml. of milk sample is detectable within 2½ hours.

In answer to many requests for information about the availability of B-B-L products for this simplified procedure, the B-B-L Development Laboratory has prepared this TECHNICHART. It graphically illustrates the basic procedure, showing the materials necessary—**all of which are available from B-B-L.** A complete brochure with detailed technique and product listing is available upon request.

*Arret, B., and Kirshbaum, A.: J. Milk and Food Technol. 22:329, 1959.

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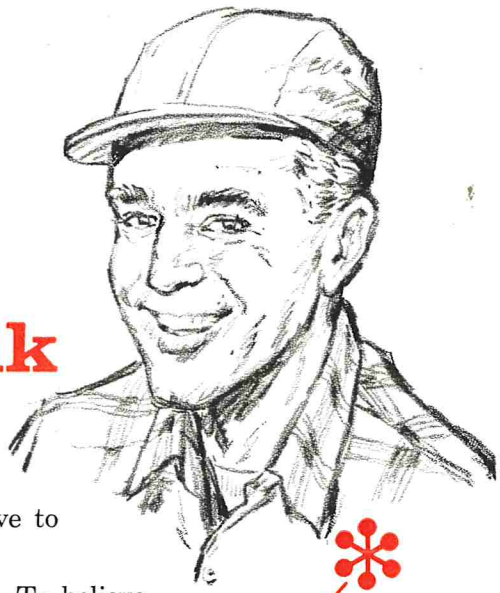

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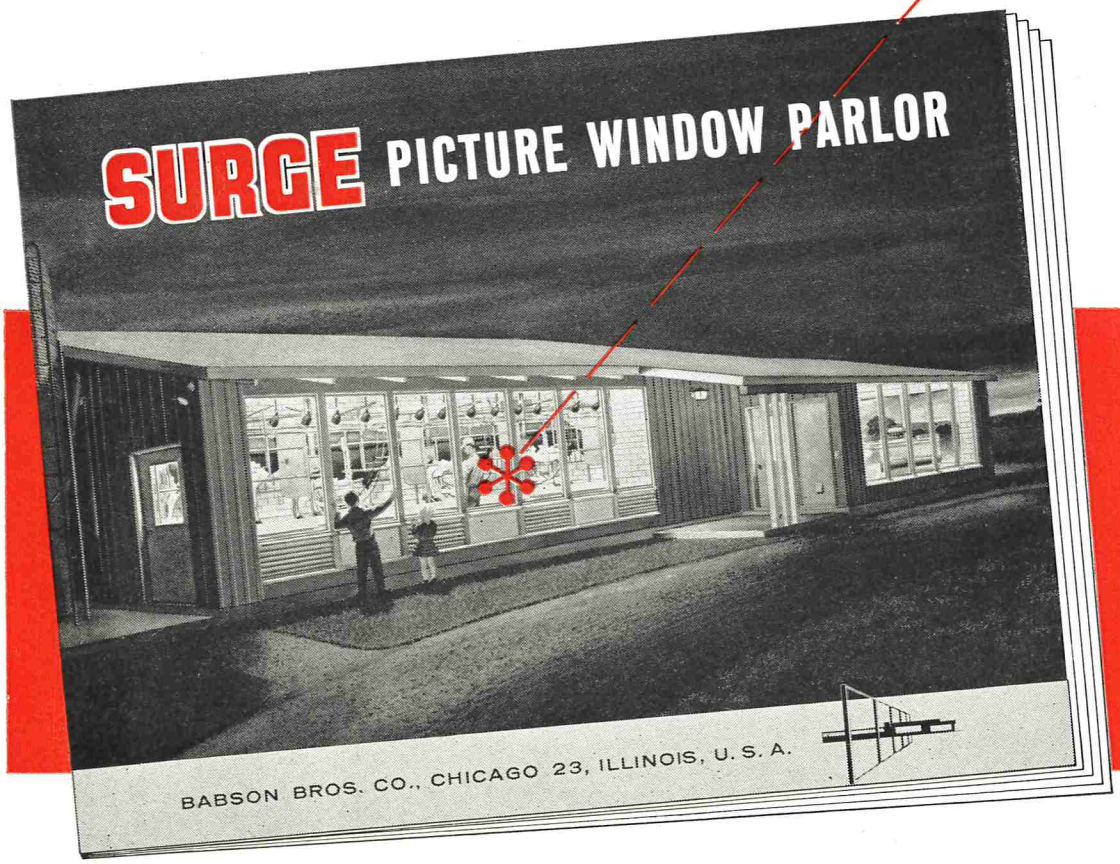

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