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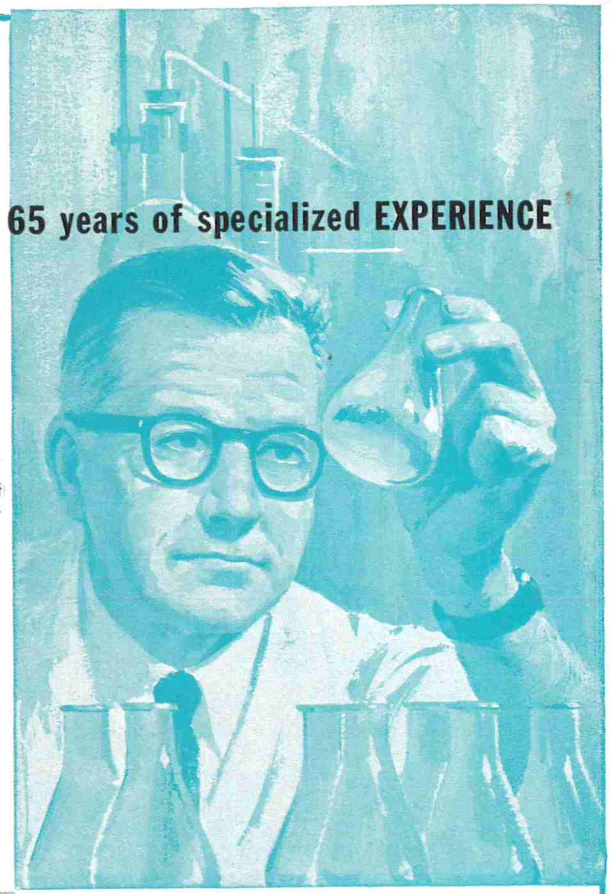

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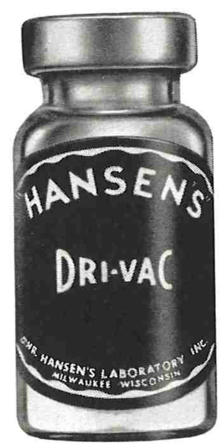

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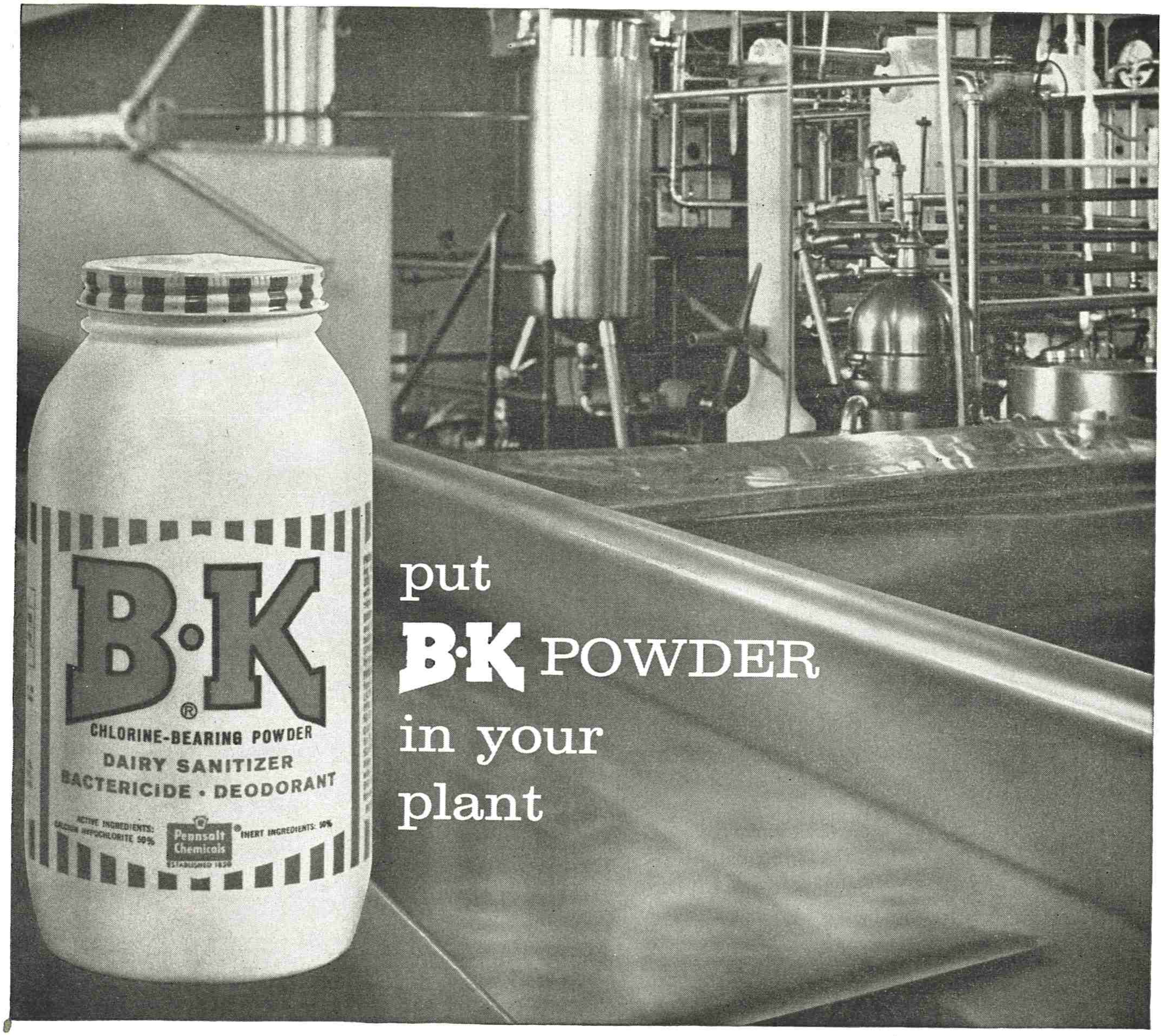

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EDITORIAL

Enforcement and Public Relations

In the performance of his duties, the food sanitarian has for many years, been faced with the problem of deciding when public relations cease and enforcement procedures begin. Of late, in some quarters at least, it would appear that the initiation of enforcement has been de-emphasized while, at the same time, the so-called educational and public relations approach has become the mainstay of the food sanitarian.

One might conclude from this that food sanitarians have found a magic way to achieve compliance with food ordinances without recourse to enforcement procedures. This, unfortunately, is not true. What is true however, is that enforcement is less frequently employed and, by the same token, a noticeable retrogression has occurred in the level of present day food sanitation. One might almost say that violations are condoned since compliance is not the order. Strict and impartial enforcement now seem to have been shelved.

In the past few years the forward progress of many retail food establishment programs has ground to a creaking halt. Perhaps we lack the proper system, but it would appear that this gradual erosion has been aided and abetted by apathy, complacency and over indulgence in public relations. Nevertheless, this erosion appears to exist at all levels from federal down to local.

In a national news magazine of current issue some shocking facts were reported about the sanitary condition of food serving establishments in one of our Northeastern states. Eight hundred and ninety eating and drinking places, or roughly thirteen per cent in the state, were surveyed. Sixty per cent were found using unsatisfactory methods of utensil sanitizing, or, a suitable bactericidal process was entirely lacking. The establishments were placed in five categories according to the population of the communities. Interestingly enough, those that rated first and second in the sanitation rating also rated first and second in the enforcement rating. With a corallary of this kind before us one is prompted to raise the question, "Is the fetish of what we mistakenly call *public relations* an excuse for letting down the bars?"

One aspect of public relations is said to be the art of persuading others to accept your views and followed, subsequently, by some positive action. *Taking positive action,* is the key point. It is nice to find people in general agreement, but if it stops there we fall far short of the mark. When an educational program is nothing more than a program of acquiescence, violations can persist much too long for the public's good.

One proponent of the *acquiescence school,* speaking on the value of this method, stated that it took two years to obtain compliance with one item of his food code, in the case of one proprietor. This, he termed, *good public relations.* This particular item could have been brought into compliance within a thirty day period through reasonable and sensible enforcement methods. And, it should be added, through methods prescribed and entirely legitimate in the very ordinance under his jurisdiction. Public relations must be used with discretion, not abused at the expense of the public health which it is our avowed purpose to protect.

Food sanitarians could do well to take a page from the milk sanitarian's book. The milk sanitarian routinely degrades producers for a variety of legitimate reasons. The producer can be degraded at the farm or he can be degraded if his milk fails to meet acceptable quality standards. True, such a penalty is not pleasant for either side. It is particularly unpleasant for the producer who sustains direct financial loss. But, let us look also at another side of the question. Just how long would this insanitary milk come to market if the so-called public relations approach, and no other were used? Is it not reasonable to postulate that safety in our food supply is just as important as safety in our milk supply?

While the writer has no intention of advocating a *police state* approach to the many complexities of the modern food business he would like to advance a thesis that the old axion, *speak softly and carry a big stick,* still has considerable merit. We cannot accept, without most serious reservation, the views of those who advocate that all food proprietors must like all food sanitarians and vice versa. Unfortunately, the hard facts of life make this quite unrealistic.

How then, does one integrate the good principles of each method. Obviously, each must be tempered with good judgment. To rely on one and never use the other is folly.

But there are some other attributes that are both basic and vitally important. The sanitarian's attitude must be professional. Not aloof, but not patronizing. Friendly yes, but not without authority. He must be impartial in judgment, objective in his work and fair in his dealings. Above all, he must take into account the reason for his being. By whatever legitimate means, his primary objective is protection of the public health. If this objective can be honestly and expeditiously achieved through public relations, well and good. If not, then another tact must be taken through proper enforcement procedures.

Vincent T. Foley
Kansas City Health Department
Kansas City, Missouri

Opinions expressed in this editorial are those of the writer and not necessarily those of this Association.

CHLORINATED HYDROCARBONS DEPOSITED IN BIOLOGICAL MATERIAL [1]

III. SOIL AND LAKES

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Soil may become contaminated with chlorinated hydrocarbons either by direct addition to control a pest harbored in the soil or by chance contamination when crops are treated.

The persistance of DDT in soil was investigated by Fleming and Maines *(23)*. The average per cent of insecticide retained by soil after an initial treatment of 25 lb per acre was as follows: after 1 year, 97%; 2 years, 90%; 3 years, 79%; 4 years, 64%; 6 years, 56%; and 8 years, 44%. The insecticide was most persistent in sand and least in muck. The pH within a range of 4.0 to 7.5 appeared to have no effect on DDT persistence in soil. Soil under apple trees which had been sprayed with DDT for 7 years contained an average of 62.2 lb insecticide per acre while soil from between trees contained 35.5 lb per acre *(32)*.

Other studies on DDT residues in orchard soils were conducted by Chisholm, *et al. (12)*. They tested soils from apple orchards located in Indiana, New Jersey and Washington. Orchards in Indiana were sprayed for 5 years prior to the tests. Debris on the surface of soil contained from 96.8 to 176.8 ppm insecticide while the upper 3 inches of soil contained 13.0 ppm and the next 3 inches had 5.6 ppm. New Jersey orchards were sprayed from 2 to 4 years. Residues of DDT in the upper 3 inches of soil ranged from 23.5 to 47.0 ppm and in the next 3 inches from 5.0 to 9.0 ppm. The upper 3 inches of soils from Washington orchards, sprayed for 3 years, contained from 4.0 to 90.6 ppm DDT.

Soils from peach orchards in New Jersey and New York were tested. New Jersey orchards sprayed for 2 or 3 years contained from 18.0 to 37.5 ppm DDT in the upper 3 inches of soil. The next 3 inches contained from 7.0 to 10.5 ppm. After 5 years of spraying, soil from New York peach orchards contained 105 to 116 ppm in the upper 3 inches.

DDT residues in vineyard soils were investigated by Taschenberg, *et al. (86)*. A gravelly-loam vineyard had been sprayed with insecticide at the rate of about 6 lb per acre per year for 12 years. The upper 3 inches of soil sampled from along rows contained 31.4 ppm or 26.9 lb per acre of DDT and 5.4 ppm or 4.4 lb per acre of DDE. The next 3 inches of soil along rows contained 1.5 ppm or 1.5 lb per acre of DDT and 0.05 ppm or 0.05 lb per acre of DDE. Samples of soil taken from the upper 3 inches between rows (where a spray was not applied directly) contained 24.4 ppm or 17.5 lb per acre of DDT and 4.5 ppm or 3.5 lb per acre of DDE. No decomposition products of DDT other than DDE were detected.

Analyses showed soil from fields in which potato crops were grown and sprayed with DDT for an 8 year period contained 12.2 lb insecticide per acre. Similar results were obtained from tests on soils in which treated corn was grown for 3-6 years *(32)*. Ginsburg and Reed *(33)* found most DDT in orchard soils to be located in the upper 4 inches. Less was found in the next 4 inches and still less in the 8-12 inch depths. Cranberry bogs were found to contain 34.5 lb DDT per acre of which 32 lb was in the upper 4 inches of soil. Corn soils contained an average of 11 lb DDT per acre and potato soils an average of 7 lb per acre. Similar data were also reported by Lichtenstein in 1957 *(54)*. Investigations on other insecticides showed that benzene hexachloride, toxaphene, chlordane, aldrin and dieldrin persisted in sandy loam for at least 3 years although toxaphene and benzene hexachloride appeared to lose a large portion of their toxicity during this period *(87)*.

Lichtenstein applied aldrin and lindane to silt loam and muck soils *(56)*. Seventeen months later 84 to 96% of the insecticides were found in the upper 3-inch layer of loam soil, 4-12% in the next 3 inches and up to 5% in the 6-9-inch layer. Muck soil showed leaching to a somewhat greater degree. Both aldrin and lindane, under non-leaching conditions, moved from treated to untreated soils. Laboratory tests *(59)* showed lindane was broken down into a non-toxic compound 2 weeks after application to soil. The non-toxic compound was detected by colorimetric lindane tests but not by a bioassay. An average of 26% of heptachlor applied to four different soils (sandy, silt and clay loams, muck) was found present after 21 months *(96)*.

Various chlorinated hydrocarbon insecticides have been used to control Japanese beetle grubs. Tests

[1]Last of a series of three review papers on this subject. For the first and second of the series see, J. Milk and Food Technol., **25**: P. 36, P. 72. 1961.

on persistence of these compounds in soil showed an average of 15% of applied chlordane to be present 12 years after treatment *(58)*. Eleven years after treatment, 41% of added benzene hexachloride was recovered by chemical tests but only 8% with a bioassay procedure. No heptachlor was recovered from soils treated with it 9 years earlier when chemical tests were used. A bioassay procedure indicated the presence of 4-5% of the applied toxicant. This was found to be heptachlor epoxide. Most of the aldrin disappeared during a 4-year period. About 8-10% of the applied dosage was recovered as dieldrin.

Factors affecting loss of chlorinated hydrocarbons from soil have been studied by different investigators *(61, 63, 71, 72)*. DDT, endrin and aldrin were applied to soil at the rates of 20, 4.8 and 18 lb per acre respectively *(72)*. Temperatures of the soil surface during the test on aldrin ranged from 52°F at night to 140°F at noon and during the test on DDT and endrin from about 38°F to 125°F. A loss in DDT of 38%, in endrin of 70% and in aldrin of 57% occurred during the first 48 hours after treatment, according to gnat bioassay procedures. A mosquito larvae bioassay procedure showed lower losses of DDT and aldrin but a greater loss of endrin during the same time period.

Laboratory studies by Mulla *(71)* on stability of insecticides in sandy soil held at 88°F with 11-12% moisture showed no loss in activity of DDT, endrin or lindane after 9 months of storage. No loss of dieldrin was noted after 12 months. After 3 months of storage, 53% and after 9 months, 77% of aldrin had disappeared.

Lichtenstein, *et al.* *(63)* and Lichtenstein and Schulz *(61)* studied the persistence of DDT, aldrin and lindane in different soils. General observations made were: *(a)* DDT was most persistent and aldrin least, *(b)* insecticides persisted longer in muck soils than in loams, *(c)* loams of Ohio and Wisconsin retained insecticides to a greater extent than those in Kansas, and *(d)* insecticides disappeared from soils most rapidly during the first 6 months after treatment. Soil temperature was found to be an important factor affecting persistence of insecticides *(61)*. No loss was found in frozen soils. At a temperature of 6°C, 16 to 27% of aldrin and heptachlor were lost during 56 days. When the temperature was increased to 46°C, losses of 86 to 98% were noted for these two chemicals.

Aldrin and heptachlor in soil have both been found to epoxidize *(5, 7, 25)*. The first is converted to dieldrin and the second to heptachlor epoxide. Such conversions may be of interest since the compounds produced are more persistent than the parent materials. Other studies conducted on these conversions *(60)* showed when aldrin was applied to quartz sand, Plainfield sand, Carrington loam and muck soils it was readily transformed into dieldrin in loam but less rapidly in muck soil. The quantities of aldrin and dieldrin recovered from loams were equal 3.3 months after treatment under laboratory conditions (soil held at 37°C) and after 16 months under field conditions. Conversion of aldrin to dieldrin was small in soils with low numbers of microorganisms (Plainfield sand) or with a low moisture content. When heptachlor was applied to loam, it persisted slightly longer than aldrin but the amount of heptachlor-epoxide formed was smaller than that of dieldrin.

Laboratory experiments *(59)* indicated no dieldrin was formed in aldrin-treated loam when soil was held at 7°C for two weeks. In soils held at 26°C or 46°C, 4-8% of recovered insecticide proved to be dieldrin. The peak of dieldrin formation was reached 56 days after treatment after which a decrease was noted.

Several investigators have shown that insecticides will be deposited in crops grown on contaminated soils *(53, 55, 62, 87)*. Heptachlor was found deposited in potatoes grown in soil the same year it was treated. Aldrin appeared in potatoes for 2 years, chlordane and dieldrin for 3 years after soil was treated *(87)*.

When carrots were grown in lindane treated Miami silt loam, 7.7 times more insecticide was found in the edible part of the carrot (13.9 ppm) than in soil (1.8 ppm). Other crops contained less than soil in which they grew. Tomato fruits contained the smallest amount of lindane. Peas grown in Miami silt loam contained 18 times more lindane in their vines than in their pods. Lindane was absorbed by crops to a greater extent from sandy soils than from soils high in organic matter although the insecticide persisted longer in the latter type.

When different crops were grown in aldrin or heptachlor-treated soils, it was noted that very little, if any, of the two insecticides appeared in onions or seeds of beans or peas. Highest levels (15.9% of aldrin and 31.7% of heptachlor residues in soil) were found in carrots. Carrots were followed in descending order by potatoes, radishes, lettuce, beets, cucumbers and alfalfa *(55)*.

Kenland red clover was grown in clay and silt loams treated with 0.1, 1.0, 10 and 100 ppm of benzene hexachloride *(9)*. Analyses of soils and clovers showed residues in soils, in the sequence listed above, of 0.08, 0.16, 0.91 and 13.84 ppm. Clover grown in the soils contained benzene hexachloride residues of 0.10, 0.24, 2.07 and 14.53 ppm respectively. Dosages up to 200 ppm in soil did not affect germination of clover.

As little as one ppm of crude benzene hexachloride or 8 oz of the gamma isomer per acre in white sand was sufficient to incite root malformation in

Norway pine seedlings *(82)*. The addition of 2.4% of organic matter to white sand offset the phytotoxic effect of benzene hexachloride. Chlordane was non-toxic to conifers at dosages as high as 100 lb per acre in Plainfield sand.

Since soil-borne insecticides have been found to influence growth of plants it was thought they might exert an influence on microorganisms in the soil. Kiigemagi, *et al.* *(50)* found aldrin and dieldrin contributed little to changes in numbers of soil microorganisms and that soil microorganisms had little effect on the break-down of these two chemicals. Benzene hexachloride, when applied at the rate of one lb gamma isomer per acre, reduced the frequency with which Norway pine seedlings became infected by the damping-off fungus *(81)*. Chlordane had no effect on the fungus. Benzene hexachloride or chlordane had no effect on nodulation of black locust seedlings when chemicals were added to soil at the rates of one and 10 lb per acre, respectively.

The fungitoxicity of lindane (gamma isomer of benzene hexachloride) has been explained by its high solubility in water *(77)*. Chlordane, aldrin and heptachlor are also toxic to fungi and this results from their high vapor point. The low vapor point and the relative insolubility in water of methoxychlor, dieldrin and endrin make them relatively non-toxic to fungi.

Eno *(19)* reviewed effects of different chlorinated hydrocarbons on soil microorganisms. His discussion of DDT indicated: *(a)* CO_2 evolution and dextrose decomposition in soil were not reduced by addition of 137.5 lb DDT per acre, *(b)* applications of 20 lb DDT per acre had no harmful effect on soil microorganisms in various loams, *(c)* 103 lb DDT per acre increased rod length and frequency with which gram positive cells of *Rhizobium leguminosarum* appeared in root nodules of the common bean, *(d)* number of nodules per plant (common bean) was depressed by 103 lb DDT per acre, *(e)* 0.01 to 0.001% DDT was not toxic to nitrifiers, ammonifiers or sulfur oxidizing microorganisms although high insecticide concentrations caused injury to nitrifiers and ammonifiers, and *(f)* DDT in sandy soil (up to 120 ppm) resulted in significant increases in numbers of bacteria, actinomycetes and fungi but increases were not proportional to amount of DDT added.

A summary of information about benzene hexachloride indicated: *(a)* the gamma isomer increased numbers of bacteria but inhibited *Streptomyces*, *(b)* delta and gamma isomers increased molds in dextrose enriched soils while alpha and beta forms depressed them, *(c)* delta and gamma isomers increased ammonification of peptone; beta and gamma isomers increased nitrification, *(d)* numbers of *Azotobacter* were reduced by 4 lb of 20% benzene hexachloride per acre and *(e)* nodulation on red clover, soybeans, alfalfa and hairy vetch was seriously inhibited by 30 ppm of benzene hexachloride. Chlordane had no significant effect on ammonification and nitrification when 200 ppm were in soil but it did increase numbers of bacteria and reduce numbers of fungi when 50 ppm were present. Concentrations of aldrin as low as 25 ppm depressed nitrogen transformations in soil. In several soils 200 and 1,000 ppm had a stimulatory effect on total numbers of microorganisms. No appreciable effects were noted on microorganisms when toxaphene, dieldrin or heptachlor were added to soil.

Alexander *(1)*, in his recent book on soil microbiology, summarizes the effect of insecticides on soil microorganisms when he says: "Little or no inhibition (of soil microorganisms) is found as a result of using DDT, benzene hexachloride, chlordane, aldrin, parathion and toxaphene. Among the more sensitive processes to such compounds are nitrification and legume nodulation; where damage is noted, it is usually upon one or both of these two. However, it is unlikely that the inhibitions would materially affect crop production, particularly when weighed against benefits accruing from proper usage of the pesticides."

Lakes may become contaminated with chlorinated hydrocarbons through surface run-off from treated soils or through direct application to control a particular pest. A fresh water lake in California was treated with DDD in 1949, 1954 and 1957 to control gnats *(44)*. Studies on specimens from the lake were begun in March of 1958 and showed: *(a)* all fish, bird and frog samples analyzed contained DDD, *(b)* the amount of DDD found in flesh samples was greater than that in lake water on a ppm basis, *(c)* flesh samples of largemouth bass and Sacramento blackfish hatched 7 to 9 months after the last DDD application contained 22 to 25 ppm and 7-9 ppm DDD, respectively and *(d)* all areas of the lake contained fish contaminated with DDD. Analysis of visceral fat from apparently healthy largemouth bass and white catfish indicated accumulations of DDD at levels as high as 2,275 ppm and 1,700 ppm respectively. Grebes apparently could not tolerate the same high concentration of insecticide since many died of chronic DDD poisoning.

SUMMARY

Chlorinated hydrocarbons may be deposited in a variety of plant tissue after spraying or dusting treatments. Additional deposition may result if plants grow in previously contaminated soils. Vegetables, fruits, nuts, wheat and tobacco are crops used for human consumption which have been found to contain chlorinated hydrocarbon residues. Pastures, hay crops, and silages may contain insecticide residues

which are ingested by cattle when the crop is consumed. Many plants appear able to convert aldrin into dieldrin and heptachlor into heptachlor epoxide.

Livestock may be exposed to chlorinated hydrocarbons through spray and dust treatments or through ingestion of contaminated feed. The insecticides appear in both milk and meat of dairy cattle. Residues in meat are generally greater in these cuts with a high proportion of fat. High-fat dairy products made from contaminated milk contain substantial quantities of insecticides. The tissues (primarily fatty) of swine, sheep and poultry have also been found to contain various levels of insecticides after animals had been previously exposed to the compounds.

Chlorinated hydrocarbons have been deposited in eggs by hens after ingesting insecticides. Highest residue levels occurred in the yolk portion of eggs. Soils may become contaminated with insecticides either by chance when plants are treated or directly when the compound is added to control some soil-borne pest. Chlorinated hydrocarbons in soil persist for many years and, during that time, may be absorbed, in part, by various crops. Aldrin and heptachlor appear to epoxidize in soil and form dieldrin and heptachlor epoxide, respectively.

A study on use of DDD to control gnats around a fresh water lake indicated the compound was absorbed and retained by tissues of fish and frogs. Fatty tissue from certain fish contained unusually high levels of insecticide while chronic poisoning of others was observed.

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MEASUREMENT CHARACTERISTICS OF THE FARM MILK TANK [1]

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For the purpose of this discussion, farm milk tanks will be considered only as measuring devices. The operational elements that affect measurement seem divisible into four principal phases: (*a*) design and construction, (*b*) installation, (*c*) gaging, and (*d*) use. The official test, when it is conducted, is an overall look at all four of these phases. Before exploring measurement in detail, a look at the farm tank's history is revealing.

When the tank first became a factor in the commercial measurement of raw milk, its accuracy was of no more than passing interest, probably because of the other advantages offered, and perhaps even because of the novelty of this method of milk handling.

As time has passed, the measurement function of the tank has received increasing attention, and, as a result, a further look seems now warranted.

The first bulk milk route was established in 1936 in the Oakland, California, milk shed. Growth was quite slow at first; in fact, as late as 1954 there were only 13,000 tanks in the United States, with more than 40% of these located in California, Oregon, and Washington. In the six years between July 1, 1954, and July 1, 1960, more than 139,000 new tanks were installed, an average of 23,000 per year. This rate, according to the National Association of Dairy Equipment Manufacturers, is being maintained.

As routes were established in California, the county weights and measures officials decided that the tank was a commercial measuring device and accepted legal responsibility for accuracy. A practice was founded then that still prevails in a few States—the practice by the weights and measures official of actually gaging (or, as some term it, calibrating) the tanks.

Soon the number of milk tanks in California increased to such an extent as to demand attention from the State Department of Agriculture, and a performance code was written, this code having statewide authority.

By 1952 the use of farm milk tanks had spread east and their accuracy was becoming a matter of concern to regulatory authorities in many States. It was at this time that the attention of the National Bureau of Standards was officially drawn to this new method of milk handling.

In this connection, the role of the Bureau probably should be delineated. As is generally known, the National Bureau of Standards is responsible for the basic units and the national standards of measurement. Among its duties are the refinement of measurement throughout the Nation and the cooperation with the States toward uniformity of weights and measures laws and methods of inspection. Examples of the Bureau's contributions in the weights and measures area are the calibration of State standards, the development of testing equipment and procedures and of specifications and tolerances for devices, the solution of special measurement problems, the preparation of model laws and regulations, and the conduct of technical training for State and local officials. In addition, the Bureau sponsors the National Conference on Weights and Measures—an organization of weights and measures officials that meets annually in Washington to consider model laws and regulations and to hear and participate in discussions on technical matters. The Conference-adopted codes of specifications, tolerances, and regulations for commercial weighing and measuring devices are published by the Bureau as a handbook and recommended to all States for official promulgation.

By the year 1953 a tentative code for farm milk tanks was presented to the Conference, and in June of 1954 the final version of the code was formally adopted. This series of design and performance requirements now has been given legal status in a great majority of the States and thus has provided positive guidelines in measurement characteristics to manufacturers of farm milk tanks. (This is not, of course, to say that all tanks are designed, manufactured, or installed in compliance with code requirements.)

An examination of the tank as a measuring device will point up certain weaknesses. The precision of gaging, testing, and reading is a direct function of the horizontal cross-sectional area of the tank at the point the reading is made. For example, with tanks of current design, the greatest precision one can expect in the measurement of the product is to about 1/3 gal on a 150-gal tank, 2/5 gal on a 300-gal tank, and 1 1/5 gal on a 1,000-gal tank. In the language of the milk processor, with his 8.6 lb-per-gallon conversion factor, this would be about 2.9 lb on the 150-gal tank, 3.4 lbs on the 300-gal tank, and 10.3 lbs on the 1,000-gal tank. Now, when one assumes additionally the inaccuracies introduced by out-of-level, imprecise gaging, cold or unclean rod, and

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careless reading, it is easy to conclude that the modern farm milk tank is a very poor measuring device.

Experience seems to indicate that the contrary is true. One happy trait of uninfluenced errors is their tendency to fall into a random pattern. It is frequently found, for example, that plus errors tend to cancel minus errors. Inventory control records of processing plants seem to reveal that farm-tank measurement is quite good. Tolerances legally established in most States at individual points on the gage rod range from 0.2% to about 0.5%; whereas similarly established tolerances on the milk-intake scale may range from 0.1% on loads over 1,000 lb up to 1% on small loads, depending upon the weight value of the minimum graduated interval on the indicating element of the scale.

Returning now to the four phases that affect measurement, these can be subdivided in an orderly arrangement, and the interrelations then can more clearly be seen.

Design and construction.

Rigidity. Obviously any distortion in the bottom or walls of a tank will adversely affect its measurement characteristics.

Horizontal cross-sectional area. The greater the horizontal section of the tank, the lower the order of precision of measurement.

Design of measurement gage elements. The gage rod must be straight, rigid, and easily readable. It should have a dull surface. The graduations must be straight, clean, and fine. An empirical numbering system is preferred to an inch-and-binary subdivision system. The gage bracket should be rigidly and firmly attached and should provide a positive seat for the gage.

Location of gage. The nearer the center of the tank the gage is located, the less the inaccuracy caused by any out-of-level condition of the tank.

Level-indicating means. Farm milk tanks are required to be so designed as to facilitate the reading of the level condition of the tank. This requirement can be met by providing one or more spirit levels or a plumb-bob or by having the top edges of the tank constructed as a level "base." Particularly on a tank with the gage located at the end, this level-indicating means must be sensitive and accurate.

Installation.

Foundation. If a tank is to provide repeatable accuracy, it must be installed on a floor that is firm and that provides proper support.

Level. On a 300-gal tank an out-of-level condition of only 1° may cause an error in reading of as much as 7 gal, or as much as 60 lb. Whether the tank is gaged at the factory or on the farm, the level is critical.

Illumination. Obviously there must be sufficient light to insure accurate reading of the milk level.

Tank gaging.

Standards used. Any liquid measures used in the gaging of farm milk tanks should be of proper design and should be tested and certified. On a 300-gal tank, for example, a 5-gal measure is filled and emptied 60 times. An error in the measure of only 5 cubic inches—less than one-fortieth of a gal—would result in an inaccuracy in the tank chart of approximately 1 1/3 gal at tank capacity.

Procedures. A tank should be gaged according to accepted methods and with extreme care. The surface of the liquid in the tank must be perfectly still when a reading is taken. If two individuals are involved in the gaging process, their readings should be taken independently and any difference reconciled before more liquid is added to or taken from the tank.

The gage rod. During the gaging operation, the rod must be absolutely clean, it must be approximately at the temperature of the surrounding air, and an appropriate dusting powder should be used to ease the reading of the water line. Even this dusting compound must be selected with care, since certain dusting compounds have been found to falsify the liquid level.

The use of the tank as a measuring device.

Level. The tank must be in level when a reading of the liquid level is taken.

The gage rod. For accurate measurement, the gage rod must be clean and dry and must not be colder than the surrounding atmosphere.

The reading. The liquid level line on the gage rod must be read only when the surface of the milk is completely quiet and read with considerable care. The chart should be referred to immediately following the reading and the chart value recorded at that time.

In spite of the advances made in the farm milk tank and its use, several problem areas still exist. Principal among these is the level condition of the tank.

The States have taken two diametrically opposite views in connection with the maintenance of level of a tank. One group, undoubtedly a minority, rules that the tank legs must be firmly and permanently cemented to the milkhouse floor. The second group, accepting the recommendation of the National Conference on Weights and Measures and the National Bureau of Standards, permits the legs of the tank to be free, but requires that the tank be equipped with a sensitive level-indicating means and be maintained in level. With floor-settling and frost-heaving, the latter view seems the sounder, but it does impose on the producer and the pickup driver the responsibility of checking the level condition and at times correcting an out-of-level condition.

Of major concern to measurement experts are three matters involving the gage rod and values obtained from it. In the early design of the rod, it was quite reasonable for manufacturers to graduate in inches and binary subdivisions (halves, quarters, eighths, sixteenths, and thirty-seconds), because the rod was considered simply a linear measure. However, since dimensional length in customary units has absolutely no relation to level-of-liquid readings, it was suggested a number of years ago that the evenly spaced graduations on the gage be numbered empirically — 1, 2, 3, etc. — in order to reduce errors in reading and recording the values. (One is less likely to err in reading and recording a whole number as, for example, 285, than a number and fraction such as 17 13/16.) There seems to be little progress along this line.

A serious problem was encountered and identified when a large Chicago processor noted inventory shortages in farm-tank pickups. A study at the National Bureau of Standards determined that condensation on a steel rod, cooled to milk temperature and then exposed to a warmer atmosphere, would cause high liquid-level reading (greater gallonage) in the order of one to two graduations. This is exactly what happens when the air in a milkhouse is humid and is warmer than the milk in the tank. The rod is removed from its bracket, wiped dry, reinserted for a liquid-level determination, and then removed for the reading. Between the time the rod is wiped dry and the time it is reinserted in the milk, the moisture in the air condenses on the steel surface and causes the high reading.

The National Conference Code for Farm Milk Tanks was amended in 1956 to require that a gage rod be stored outside the tank until it is inserted in the milk for a measurement. It appears that, except in the States of Maryland and Pennslyvania, this requirement is being generally ignored for any of a number of reasons. The inevitable result is inaccuracy.

The third problem involving measurement is one that technically is very easily solved, but that is in many States unsolved, apparently because of tradition. Since the farm milk tank is a liquid-measuring device and not a weighing scale, weights and measures officials have generally agreed that it would be inappropriate to certify the accuracy of a tank-gage-chart combination in terms of pounds. On the other hand, milk producers and processors have maintained the position that raw milk has been marketed by weight and that, with an 8.6 lb-per-gal conversion factor, it is quite proper and more convenient to continue to use the pound as the unit of exchange.

The Model Code of the National Conference on Weights and Measures provides that the chart "shall show gallonage values only," so, where the code is being enforced, there will be found in the milkhouse two charts—one the official chart with values in gallons, the other the chart that actually is used, with values in pounds. In certain other areas charts will be found with both gallon and pound values. In the third group of States (representing probably the majority), there will be no gallon values at all.

It does seem a bit peculiar that an industry that has accepted an entirely new system of handling its basic raw material refuses to accept a change basic to accuracy in measuring this material. Raw milk does vary in specific gravity and, accordingly, in pounds per gallon. Surely it must be conceded that, if the total transition to volumetric marketing could be accomplished, there would be far less confusion and even greater precision in the measurement and payment for the product.

Another reason that has been given for holding to the marketing by weight is that butterfat determinations and evaluations must be made gravimetrically. This, of course, is not the case, since the butterfat test results in a percentage, and percents of gallons can be taken just as easily as can percents of pounds.

There remains to be explored one other aspect of the measurement picture of farm milk tanks today. This is the control of the devices by the various regulatory officials who enfore weights and measures laws.

In this connection, the States can be divided into four distinct groups: *(a)* those who exercise complete control; *(b)* those who control by a sampling technique; *(c)* those who provide a referee service; and *(d)* those who disregard the farm tank as a measure.

Those States that exercise complete control over farm milk tanks go so far, even, as to gage the tanks and prepare the charts. The weaknesses of this approach are the cost to the public and the unanswered question, "If the official gages the tank, who is going to check his work?"

What seems now to be the most efficient method of official control is exercised by the second group where the tanks are expected to be installed with an accurate chart by the manufacturer or his agent and maintained properly by the owner. The official, on a predetermined, but unannounced, schedule, carefully tests tanks on a sample basis. If trouble is found in tanks from one manufacturer, concentrated effort is directed to his tanks.

The third group operates on the premise that the farm milk tank is a more or less "private" measuring device, involving only one seller and one buyer. The public has no general interest. So long as the producer and the processor to whom the milk is sold are satisfied, no official attention is given. If difficulties arise, the official is available as a referee and may, if the situation so indicates, test a tank. In this case, the code requirements are applied and the tank is approved or rejected on the basis of conformance or nonconformance to code requirements.

In the last group of States, the weights and measures officials say that the farm tank is a device for measurement in fulfillment of the terms of a private contract and thus has no official status and is of no concern to the public. The farm tank is, in effect, ignored officially.

That, briefly, is the situation today. What about the future? Undoubtedly, the most significant advance in farm-tank measurement would be the development of a liquid meter designed for truck mounting and sufficiently accurate to meet legal requirements. The regular, periodic, official testing of such a meter would be a simple matter, and the total costs involved should be substantially less than the cost of the gage, gage bracket, gaging chart preparation, and official testing of the many tanks serviced by one pickup truck.

The engineering problems faced by a meter manufacturer are formidable. In the case of each measurement—that is, milk from each farm tank—the delivery must start with an air-filled line and must remove all the milk from the tank and the line. The positive-displacement liquid meter in use throughout commerce today registers the passage of air just as it registers the passage of liquid. So, one major problem is the separation and elimination of both free air and air that is entrapped in the fluid milk. A second problem relates to sanitary requirements and is outside the purview of this discussion.

One meter manufacturer claims to have overcome the difficulties and is said to be offering a meter for service on farm-tank pickup trucks. This meter, it is believed, has not been submitted for official test to any weights and measures agency.

Whether it is this manufacturer or another who succeeds, it reasonably can be assumed that meters will be developed and will lead to less expensive and probably more accurate measurement of the milk on the farm.

One rather serious problem in farm-tank measurement has recently arisen. Milk processors, in an effort to exercise more precise control over their raw material, have weighed, either over a vehicle scale or through the intake scale, or have measured through an in-line meter, the tank-truck loads of milk picked up from farm tanks and compared these results with the totals derived from gage-rod measurements. Discrepancies thus have been discovered. Too frequently the immediate conclusion has been that the gage-rod measurements on the farms were inaccurate. It is probable that such a conclusion is not warranted.

In the case of actual vehicle-scale or intake-scale weighing versus farm-tank measurement, there must be considered the permitted errors in the tanks and in the scales and, in addition, the fact that a weight-per-gal of the milk is being assumed. The total possibility of legitimate difference here is quite large.

Even in meter versus farm-tank measurements, permissible errors can accumulate to a substantial total difference.

Legally and philosophically, it is generally agreed that, so long as the measurement at the farm is the last point at which individual milk can be identified, the transaction must be concluded on the basis of that measurement.

The farm milk tank has brought about an almost complete transition in handling, measuring, and merchandising a very vital farm product. Its progress has been remarkable. That there have not been many more serious measurement problems is surprising and is complimentary to milk producers, milk processors, equipment manufacturers, educators, and public officials.

A STUDY OF THE ACCURACY OF TESTING MILK FOR BUTTER FAT USING SAMPLES WITH AND WITHOUT CHEMICAL PRESERVATIVES[1]

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The accuracy of various sampling methods in raw whole milk received at a milk processing plant from dairy farms was compared. Milk samples were collected daily during four 30-day periods representing approximately the four seasons of the year. The Babcock test for butterfat was applied to the following: daily samples, 6-day composite samples without added preservative, seven and 15-day preserved composite samples and periodic samples taken three, four and five times per month. The preservatives, Milkeep and mercuric chloride, were compared in the seven and 15-day composite sample. The daily test, recognized for its accuracy, was used in statistical comparison with the test results from the other samples. When the tests from each sampling method were averaged for the four seasons, no significant differences were found. Tests from the 6-day composite samples and the periodic samples taken five times per month were identical to the daily test. Tests from composite samples preserved with Milkeep averaged closer to the daily test than did those preserved with mercuric chloride in both the seven and 15-day composite samples.

Milk plant operators buy milk from dairy farmers at a price which usually varies according to the fat content of the milk. The per cent fat is determined at the milk plant laboratory by a suitable method such as the Babcock test. In order to save on the cost of testing milk at each delivery, a composite or periodic sampling technique is commonly used. By these methods, only one sample is tested over a period of time, as compared to the necessity of testing a sample at each delivery.

A composite sample is made by taking a sample from each delivery and placing it in a sealed container. The daily samples are combined with the portions from the previous deliveries. The composite sample may cover a period from 5 to 15 days. The per cent fat in the composite sample is applied to the total amount of milk delivered during the period. A periodic sample is one that is taken on designated days and usually tested the same day. These methods, therefore, have been popular from economic, labor-saving standpoints.

Preservative chemicals may be used in the composite sample to retard or prevent microbiological deterioration during storage. In recent years, however, more extensive use of refrigeration and new preservatives has indicated that the accuracy and efficiency of sampling methods may be improved.

Early reports on the accuracy of composite samples were by Farrington *(6)* and Cooke and Hills *(3)*. Judkins *(9)* and Farrington *(6)* found that composite samples tested higher than daily samples. Others *(2, 4, 5, 7, 8, 10, 12, 13, 14, 15, 16)* have found that the fat test of composite samples were generally lower than the daily test. Many of the earlier reports lacked a statistical treatment of the data and adequate control or inclusion of certain experimental variables. For example, there is a lack of published information comparing the accuracy of testing by using composite samples stored with and without preservatives and periodic tests.

This study was designed to evaluate the relative accuracy and precision of the Babcock test for butterfat in raw whole milk received at a milk processing plant from a dairy farm. The fat test was applied to composite samples with and without added preservatives and results were compared with those obtained by daily analysis. Results from these were also compared to periodic tests taken at intervals of three, four and five times per month.

Methods

In this study, milk samples were collected daily during four 30-day sampling periods representing approximately four seasons of the year. The periods were February 20 through March 21, April 14 through May 13, June 13 through July 12 and September 20 through October 19. Ten producers of Grade A raw milk were randomly selected from the Salt River Valley (Arizona) milkshed. Using approved commercial procedure, the tank truck driver collected the samples daily from the farm bulk tank of each producer. The samples were then placed under refrigeration in shaved ice and shipped via milk transport to the milk plant in Tucson. They were then taken to the University of Arizona for testing in duplicate by the standard Babcock method *(1)*. Each daily sample was analyzed for butterfat on arrival at the University.

A 9-ml portion of the daily sample was used to prepare each of the composite samples which con-

[1]A grant from the Arizona Dairymen's League aided in the financial support of this project. In Januray, 1960, a merger of the Arizona Milk Producers and the Arizona Dairymen's League brought about a new organization which is now called the United Dairymen of Arizona.

sisted of two 7-day preserved composite samples, two 15-day preserved composite samples and one 6-day composite sample without a preservative. The composite samples were placed in glass 8-oz plastic screw cap containers and were kept at 35-38°F.

The preservatives compared were Milkeep[2] and mercuric chloride. The mercuric chloride used contained 45.9% bichloride of mercury and the Milkeep contained 100% active ingredient by the manufacturers' labels. In the 7-day preserved composite samples, one tablet of mercuric chloride and one tablet of Milkeep was used in the appropriate containers. In the 15-day composite samples, two tablets were used. The labels indicated that the mercuric chloride and Milkeep tablets weighed 356 and 325 milligrams, respectively.

For comparison with the daily and composite tests, periodic tests were used at intervals of three, four and five times per month. The daily tests corresponding to the appropriate days were used. For three periodic tests a month, the tenth, twentieth and thirtieth days were used. In the case of four periodic tests, the days used were the seventh, fourteenth, twenty-first and twenty-eighth. For five per month, the sixth, twelfth, eighteenth, twenty-fourth and thirtieth days were used.

Daily milk weights were taken by the tank truck driver at the farm bulk tank. The manufacturer supplied an individual stainless steel measuring rod and calibration chart for each tank.

RESULTS AND DISCUSSION

The results of this study are summarized in Table 1. To make a comparison of the various methods for all seasons a column of averages is included. Statistical analysis using the Multiple Range Test to group means with unequal number of replications *(11)* indicates no significant difference among the averages of the five sampling and testing methods. It was observed that the variance of the fall sampling period was greater than the variance of the other sampling periods. This is possibly due to the fact, that, in Arizona, many cows freshen in the fall of the year. During the first two weeks of the lactation period, milk has a characteristically higher per cent fat than during the rest of the lactation period.

Small variations were evident within the seasonal sampling periods. In comparing the tests from 7-day composite samples taken during the summer sampling period, the mercuric chloride sample was found to have a significantly lower test than either the Milkeep sample or the daily sample. During the same period

TABLE 1—AVERAGE PERCENT BUTTERFAT FOR COMPOSITE SAMPLING WITH AND WITHOUT PRESERVATIVES COMPARED TO PERIODIC AND DAILY SAMPLING

Type of sample	Sampling period				
	Fall	Winter	Spring	Summer	Average
	(%)	(%)	(%)	(%)	(%)
7-day preserved composite ($HgCl_2$)	3.72	3.64	3.61	3.79[a]	3.69
7-day preserved composite (Milkeep)	3.75	3.63	3.62	3.84	3.71
Daily	3.74	3.63	3.63	3.85	3.71
15-day preserved composite ($HgCl_2$)	3.70	3.62	3.59	3.82	3.68
15-day preserved composite (Milkeep)	3.74	3.61	3.61	3.85	3.70
Daily	3.75	3.63	3.63	3.85	3.72
6-day composite (Not preserved)	3.74	3.65	3.66	3.81[b]	3.72
Daily	3.75	3.63	3.63	3.85	3.72
Periodic taken:					
3 per month	3.82	3.65	3.63	3.84	3.74
4 per month	3.80	3.64	3.61	3.91[c]	3.74
5 per month	3.78	3.62	3.64	3.85	3.72
Daily	3.75	3.63	3.63	3.85	3.72

[a]Significantly lower than the other two values at the 1% level.
[b]Significantly lower then the daily sample at the 1% level.
[c]Significantly higher than the other three values at the 1% level.

the 6-day composite sample stored without preservative tested significantly lower than the daily sample. The periodic sample taken four times per month showed a significantly higher test than the periodic sample taken either three or five times per month in the summer sampling period. The variations that occurred in the summer sampling period only might be explained from the standpoint of higher environmental temperature. Many times this temperature was 90°F or higher. There were indications that during shipment the ice did not last long enough to keep the samples from warming to the point of partial fat churning. When this phenomenon occurred particles of churned fat clung to the sides of the sample bottle. Even by using recommended procedures of sample preparation it was difficult to bring the fat into complete, uniform suspension.

From the results it appears that, under normal conditions, the most economical method would be by periodic sampling and testing three times per month. Since accuracy as well as economy of testing is a factor, both the periodic samples taken five times per month and the six-day fresh composite samples most closely approximated the true per cent fat obtained by daily analysis. While there is no difference in the number of actual tests needed, there is a difference in sampling time required due to the procedure. With the composite method, a sample must be collected and placed into a container,

[2]The chemical composition of this preservative is reported to be disodium phosphate-3, 5-dimethyl tetrahydro-1, 3, 5, 2H-thiadiazine-2 thione.

agitated and refrigerated each day for a period of six days and then tested. This involves a certain amount of labor in taking and handling the samples. The five times per month periodic method requires sampling and testing every sixth day only. A comparison of the 6-day composite samples and the periodic samples taken five times per month shows quite readily that, from the cost and convenience standpoint, the periodic sample taken five times per month would be more favorable.

CONCLUSIONS

In this study, fat tests were compared using daily samples, 6-day composite samples without preservative, seven and 15-day preserved composite samples and periodic samples taken three, four and five times per month. The results show that:

1. There was greater variability in the summer sampling period than during other sampling periods. In the summer sampling period the average test of the 7-day composite samples preserved with mercuric chloride was significantly lower than either the 7-day composite sample preserved with Milkeep or the daily sample. Also in the summer sampling period, the average of the 6-day composite samples without preservative tested significantly lower than the daily samples. The periodic samples taken four times per month tested significantly higher than the daily sample in the summer sampling period.

2. There were no significant differences between various values in the fall, winter or spring period.

3. The larger variance found in the fall sampling period is thought to be due to the freshening of a larger number of cows than is the case during the other periods of the year in Arizona.

4. In averages taken from the four sampling periods, none of the differences were large enough to be significant.

5. The tests from daily samples were consistently higher than the tests from both the seven and the 15-day preserved composite samples in all sampling periods.

6. Seven and 15-day composite samples preserved with Milkeep consistently tested higher than seven and 15-day composite samples preserved with mercuric chloride.

7. Average tests from 6-day composite samples without added preservative agreed exactly with tests from daily samples.

8. Periodic samples taken both three and four times per month tested consistently higher than daily samples in all sampling periods.

9. The average test from the periodic samples taken five times per month were identical to the average test of the daily samples.

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DAIRY WATER HEATING[1]

By O. C. Lange

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For many years it was sufficient to base the size of the water heater in the milk house on the size of the herd. The rule of thumb was:

50-gallon size up to 25 cows
66-gallon size for 26 to 35 cows
80-gallon size for 36 to 50 cows

This rule can still be applied with a fair degree of adequacy to dairy farms that operate with conventional milker units and can type coolers. When a change is made to bulk handling of milk (bulk cooler & pipeline) these standards will no longer assure an adequate supply of hot water. Automatic washing of modern bulk tanks and pipeline milkers requires a dependable supply of hot water in varying amounts based on the type of equipment.

Hot water requirements should be calculated for each pipeline and bulk tank installation. For example, the amounts of hot water to wash a bulk tank can vary from 2½ gallons of 160° water to 24 gallons depending on the size and type of tank (vacuum or atmospheric) and the method employed in washing the tank. The requirements for washing a pipeline milker can vary considerably. The type of washing system (slug or flood), number of cleaning cycles, type of equipment all are factors affecting the quantities of hot water required.

Figuring the amount of hot water that a heater will have to supply for the various cleaning operations is not difficult. For example, let it be assumed that 40 head of cattle are housed conventionally in stalls. A 225 foot pipeline is cleaned requiring 25 gallons of water for each of four cleaning cycles; a 600 gallon bulk tank is installed requiring 12 gallons of 160° water for washing; and 1/5 of gallon of 160° water is allowed for washing the udder of each cow. The amount of hot water at 160° to be supplied by the heater for these operations can be calculated as follows:

(1) Calculate the amount of 160° water required for blending with 50° water (temperature of incoming cold water) to make up 25 gallons of sanitizing solution at 90° —

$$\frac{90 - 50}{160 - 50} = \frac{40}{110} \text{ X } 25 = 9.1 \text{ gallons of } 160° \text{ water}$$

(2 & 3) Calculate the amount of 160° water required for blending with 50° water to make up 25 gallons of 90° tepid water for each of the pre-rinse and final rinse —

Pre-rinse $\frac{90 - 50}{160 - 50} = \frac{40}{110} \text{ X } 25 = 9.1$ gallons of 160° water

Final rinse $\frac{90 - 50}{160 - 50} = \frac{40}{110} \text{ X } 25 = 9.1$ gallons of 160° water

(4) Since the washing cycle of the pipeline is done with 160° water, 25 gallons must be supplied by the water heater.

(5) Calculate the number of gallons of 160° water required for washing the bulk tank allowing 2 gallons of 160° water for each 100 gallons of tank capacity = 12 gallons.

(6) Also allow 2 gallons of 160° water for rinsing the bulk tank when the milk is collected = 2 gallons.

(7) Calculate the number of gallons of 160° water required for udder washing allowing 1/5 of a gallon per cow = 8 gallons for milking.

The amount of hot water at 160° required at this farm for each milking and cleanup period would be —

Sanitizing pipeline with 90° solution	- 9.1 gallons
Pre-rinsing of pipeline with 90° water	- 9.1 gallons
Washing pipeline with 160° water	- 25 gallons
Final rinse of pipeline with 90° water	- 9.1 gallons
Rinsing bulk tank	- 2.0 gallons
Washing bulk tank	- 12.0 gallons
Washing udders	- 8.0 gallons
	74.3 gallons

To assure an adequate supply of hot water for all uses an 82-gallon water heater should be recommended for this *farm*.

Electric Water Heating Equipment

Generally, a conventional 82-gallon electric water heater will meet the needs of most dairymen. However, there will be cases when this conventional (referred to by the industry as NEMA Standard) water heater will not supply the requirements. In these cases, alternatives exist. A second heater can be placed in series with the first or a quick recovery heater may be installed. A quick recovery heater is the same as any other electric water heater, with the exception of the heating elements. A quick recovery heater of any capacity may have two 4500 watt heating elements compared with heating elements of 1500 watts and 1000 watts in a 50-gallon conventional heater and 2500 watt and 1500 watt elements in the 82-standard gallon tank. A quick recovery heater will raise 18 gallons of water 100 degrees in one hour. Considering a two-hour period for milking and final cleanup time, this water heater will recover a total of 36 gallons of hot water during this period, therefore, the capacity of either the 80 or 50 gallon tank is greatly increased. A farmer should check with his individual power supplier before installing a quick-recovery water heater. Rates and regulations may vary from those stipulated for water heaters of the conventional type.

[1]Presented at the Dairy Fieldmen's Conference at the Pennsylvania State University, University Park, July 12 and 13, 1961.

ELECTRIC MILK HOUSE HEATING[1]

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Heating of the milk house and milking parlor is often required to keep ice from forming on the floor, to keep water pipes and other equipment from freezing and for operator comfort. When a dairyman converts to bulk tank cooling, the requirement for supplemental heat becomes more urgent. Most compressor units are remotely located and therefore the heat removed from the milk is no longer available for space heating purposes. Of course, if permitted, it is possible to direct some of the heat developed by the condensing unit back into the milk house. The amount of heat gained by this method is limited and generally not sufficient to keep the milk house at the desired temperature.

Many types of electrical heating sources are available for heating the milk house or milking parlor. Heating cable can be placed in the floor areas, infrared heat (bulb and tube type) may be mounted over the work areas for operator comfort, radiant panels can be mounted on the walls, or a convection heater (resistance heating element with fan) can be placed at any desired location.

[1]Presented at the Dairy Fieldmen's Conference at the Pennsylvania State University, University Park, July 12 and 13, 1961.

The type of heating equipment will depend on the task to be performed. A guide for the selection of the best type of electrical heating device to perform a given task is presented. In this guide reference is made to several Tables and Figures (Tables 1, 2, 3 and Figures 1, 2, 3).

Table 3 has been prepared for determining the size space heater required in a milk house. It's use will eliminate the necessity of computing the heat loss in order to determine the size heater required to maintain a desired temperature.

Insulation

To keep heat losses and cost of operation to a minimum, it is important that the milk house be insulated as well as possible and doors and windows be tight fitting. The heat requirements and cost of operation can be reduced by as much as 50% if the building is properly insulated. The ceiling area should contain a minimum of 3 inches of insulation either of the batt type or loose fill. Normally 30% of the heat loss will be through the ceiling. The walls in frame construction should have at least 3 inches of the batt type insulation. In concrete lock construction the heat loss through the block will be reduced by 50% if the cores are filled with a loose fill

Table 1—Types of Heating Cables—For Under-Floor Heating

Type cable	Insulation	Standard lengths	Watts load	Voltage[1]	Approx. cost
Plastic	Plastic vinyl	20 ft	100 W[2]	110 V	$ 5.00
		30	150	110	6.00
		40	200	110	7.50
		60	300	110	10.00
Plastic (Self-protecting)	Plastic vinyl	20 ft	140 W[3]	110 V	$ 8.00
		30	210	110	10.00
		40	280	110	11.00
		60	420	110	15.00
		120	720	230	10.00
Rubber covered	Silicone rubber	50 ft[4]	500 W[4]	115 V	$ 0.15 per ft
		100	1,000	230	$ 0.15 per ft
Lead covered Flamenol jacket[6]	Varnished cambric	60 ft[5]	420 W[5]	115 V	$ 0.20 per ft
		120	840	230	$ 0.20 per ft

[1]OK for nominal voltages of 110 to 120 V.
[3]Rated 5 watts per ft of 2 conductor "tape" or "cable."
[3]Rated 7 watts per ft of "tape" or "cable" (Self-protecting).
[4]Rated 10 watts per ft of 1 conductor cable.
1 conductor cable forms loop of 1/2 length given
[5]Rated 7 watts per ft of 1 conductor cable — otherwise same as Note 4.
[6]If lead covered cable used without Flamenol Jacket, for burial in concrete, carefully coat entire lead surface with insulating barnish such as GE Co. "Glyptal."

A Guide To Electric Heating Equipment For Milk Houses & Milking Parlors

Type of heating equip.	Where installed	Task performed	Installed capacity	Operational features	Controls	Installation
Heating cable	Floors of milk houses	Keeps floor dry and ice free	30 watts/sq. ft. See Figure 2	Will add some comfort heating to the milk house, but it should be installed primarily to keep floor dry.	Time clock and manual - Operation should be from start of milking to one or two hours after.	Use cable with proper type covering for burial. Do not install cable under heavy equipment. Do not cross cable over itself. Do not shorten standard cable lengths. Keep cable 6 in from pipes and drains. (See Tables 1 and 2 and Figure 3)
	Milking parlor pits	Keeps floor dry and free of ice	Same as for milk house	Will add some comfort by keeping operators' feet warm.	Time clock and manual - One hour before milking until one or two hours after depending on time to dry floor.	Same as for milk house.
	Walk ways	Keeps walk ways, inside and out, free of ice	40 watts/sq. ft. See Figure 2	Used only as needed.	Manual	Same as for milk house.
	Water pipes	Keeps water flowing during cold weather	See Table 2 and Figure 3	Will supply 5 to 10 watts per foot depending on type of cable.	Thermostat	See Table 2 and Figure 3
Heat lamps 250 watts	Over work areas in milk house	Comfort of operator	4 lamps over each work area in milk house	Will only heat the operator and objects that will absorb infrared energy. Will not heat the air.	Manual	Mount lamps in swivel sockets located on the corners of a wooden frame attached to the ceiling and large enough to cover the work area.
	Over operator pit in milking parlor.	Comfort of operator	3 per stall in Herringbone Parlor 5 per stall in walk through stall	Will keep operator warm but will not heat air. Therefore cows are not subject to radical changes in temperature from inside to outside.	Manual	Install one row of lamps for each row of stalls. Mount lamps one foot out from stalls and 12 inches above tallest operator. Lamps should be mounted on strip or channel. Suspend channel from ceiling with chains so that the height can be easily adjusted - with 5 lamps per stall, connect No. 1, No. 3 & No. 5 in one circuit. No. 2 & No. 4 in a different circuit. Then you have a choice of 2, 3 or 5 per stall. In the Herringbone system connect 2 lamps of each stall in one circuit.
Tube type infrared (can be obtained in 750 to 4000 watt sizes).	Milking parlor	Operator comfort	15 watts per sq. ft. of floor area.	Similar to common heat lamp. Heating is confined to a local area and accomplished by direct infrared radiation.	Manual	Mounting height not to exceed 9 feet - Mounted perpendicular to the length of the milking pit.
Space heater with fan (Convector heater)	Milk house	Keeps temperature of milk house at desired level	See Table 3	Resistant-type heater. Fan will circulate and direct warm air.	Thermostat. Usually placed on the heater housing with selection dial. Can be remotely located.	Can be mounted permanently or can be used as a portable heater and moved as desired.
Glass panel	Milk house	Keeps temperature of milk house at desired level	See Table 3	Radiant-type heater. Radiant energy is absorbed by walls, equipment, etc. and reflected into room.	Thermostat - attached to heater or remotely located.	Install opposite blank wall - not opposite windows.

TABLE 2—ANTI-FREEZE CABLE FOR WATER PIPE

TYPES OF CABLES

Description	Watts per ft.	Standard lengths
Plastic (Vinyl-Glass Insulation)	5.0 & 7.0	12, 20, 30, 40 & 60 ft
Lead covered (Asbestos & VC insulation)	6.0 & 6.7	30, 60, 120 ft
Silicone rubber, copper braid	7.0 & 10.0	60, 120 ft
Flamenol jacket over lead[1]	10.0	50, 100 ft

CABLE WATTAGE REQUIRED

		Watts per ft of pipe required		
Pipe size	Min. temp.	Bare pipe no wind	Pipe in wind & covered[2]	1-in insul. on pipe
1/2 in	-10°F	8.0 w.	4.0 w.	2.5 w.
	+10°	4.5	2.5	1.25
3/4 in	-10°	10.0	5.0	3.0
	+10°	5.5	2.5	1.75
1 in	-10°	12.25	6.0	3.5
	+10°	6.75	3.5	2.0
1-1/4 in	-10°	15.5	8.0	4.75
	+10°	9.0	4.5	2.75

[1]Recommended if exposed to severe mechanical abuse. Can be obtained in other length on special order.

[2]Pipe and cable to be covered if outdoors; or indoor subject to wind or draft. Use this column if covering is less than equivalent to 1-in insulation.

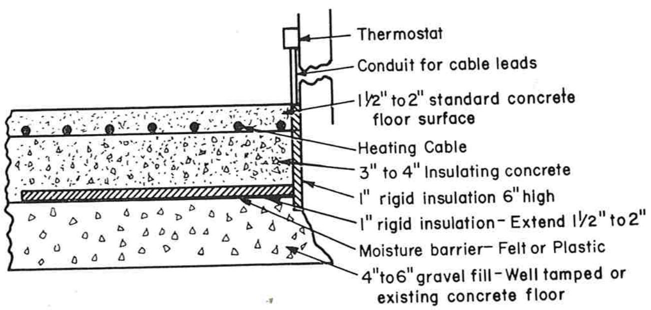

Figure 1. Construction details for heating cable in floor (side view).

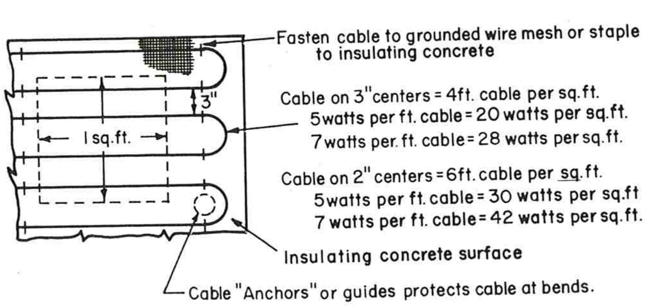

Figure 2. Construction details for heating calbe in floor (top view).

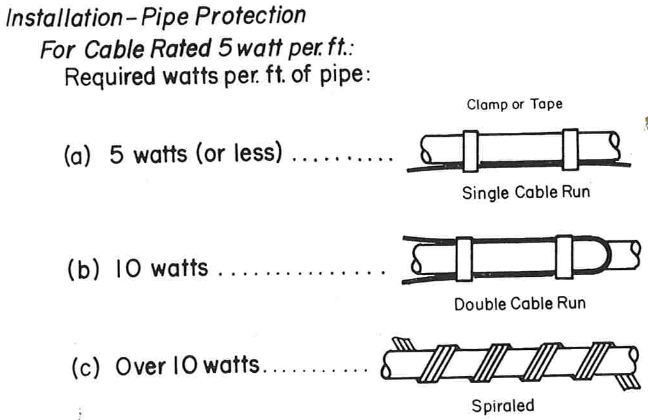

Figure 3. Number of spirals or turns (Cable rated at 5 watts per foot)

(Per Ft of Pipe)

15 watts per ft	3/4 in pipe	11.0 turns
	1 in pipe	9.0 turns
	1-1/4 in pipe	7.0 turns

For cables rated 6 to 10 w per ft: Reduce length of cable on pipe or number of spirals to 5/6, 5/7, 5/10, etc.

TABLE 3—HOW TO ESTIMATE SPACE HEATING REQUIREMENTS FOR MILKHOUSE-PROCESSING ROOM AND FARM SHOP

Resistance Type Space Heater (Radiant and/or Convection)

Advantages

1. Gives operator working comfort.
2. Low first costs - $30 to $100.
3. Low operating costs - 3c to 6c per hr.
4. Flameless and safe.

Calculation

Multiply the cubic footage of the room by the proper factor selected from the table below.

Expected outside lowest temperature	Inside temperature desired					
	Uninsulated buildings			Insulated buildings		
	(40°)	(50°)	(60°)	(40°)	(50°)	(60°)
+30°	0.5	1.0	1.5	0.3	0.6	0.9
+20°	1.0	1.5	2.0	0.6	0.9	1.2
+10°	1.5	2.0	2.5	0.9	1.2	1.5
0°	2.0	2.5	3.0	1.2	1.5	1.8
-10°	2.5	3.0	3.5	1.5	1.8	2.1
-20°	3.0	3.5	4.0	1.8	2.1	2.4

Example—To maintain a 40° temperature in an uninsulated milkhouse, 10 ft wide, 12 ft long and 8 ft high. Lowest outside temperature expected is -20°F.

Solution—Volume (Cu ft) of room = 10 x 12 x 8 = 960 cu ft. Multiplying factor (from table) for -20°F outside temperature, uninsulated building, and 40°F inside temperature = 3. Required wattage = 960 x 3 = 2880 watts (Use 3000 W. heater).

$$\text{Kilowatt Hour Usage} = \frac{\text{KW x degree days x 18.5}}{\text{Maximum design temperature}}$$

(40°, 50° or 60°)

type of insulation that is moisture-resistant. Storm sash and doors will also help reduce heat loss.

To prevent the insulation from becoming saturated with moisture, thus reducing its efficiency, a vapor barrier of polyethylene or similar material should be installed on the warm wall side of the insulation. In the case of loose fill in the cores of concrete block, no vapor barrier will be necessary if the material is impervious to moisture.

GABLE VENTILATION

Properly designed venting should be provided above the ceiling area.

When a vapor barrier is used allow one square foot of inlet area and one square foot of outlet area for each 600 square feet of ceiling area.

When no vapor barrier is used, allow one square foot of inlet area and one square foot of outlet area for each 300 square feet of ceiling area.

49th ANNUAL MEETING

OCTOBER 24, 25, 26, 27, 1962

Ben Franklin Hotel
Philadelphia, Pa.

THE ENUMERATION OF STAPHYLOCOCCUS AUREUS ON SEVERAL TELLURITE-GLYCINE MEDIA [1 2]

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(Received for publication November 19, 1961)

A study of 50 coagulase-positive staphylococcus cultures on four Tellurite-glycine formulas shows some inhibition of these organisms by the media. This inhibition can be removed partially by altering and enriching the nitrogen source, increasing mannitol and yeast extract contents and lowering the glycine concentration. Tellurite formulas that showed the greatest inhibition with pure cultures behaved similarly when coagulase-positive staphylococci were determined from raw milk.

Dairy products have been implicated from time to time in staphylococcal food intoxications *(1, 3, 7, 8)*. Thus far the enterotoxigenic strains of staphylococci causing these outbreaks have not been shown to differ from other pathogenic members of the species in any feature that would allow for their selection from a mixed flora. The coagulation of blood plasma is regarded by many authorities as the most reliable "in vitro" criterion for potential pathogenicity *(2, 5, 6)*. Evans and Niven *(4)* reported that most enterotoxigenic staphylococci were members of the coagulase-positive group. Consequently in this investigation, coagulase activity was regarded as a suitable characteristic for selection of potentially enterotoxigenic strains. Tellurite-glycine Agar, among the several media devised for the selection of staphylococci, was designed especially for the selection of coagulase-positive staphylococci *(9)*. Thus, in an investigation concerning the enumeration and incidence of these organisms, this was the medium of choice.

Materials and Methods

All of the cultures tested were isolated from Grade A raw milk of producers in the Iowa State University milkshed during the period January through April, 1960. The isolations were made from the four Tellurite-glycine media employed in this investigation.

The composition of these media is listed in Table I. The media were autoclaved at 15 pounds pressure for 20 minutes and cooled to approximately 50°C. Twenty ml of a sterile 1-% aqueous stock solution of potassium tellurite (Baltimore Biological Laboratory) were added aseptically to 1000 ml of medium. The agar was poured into petri dishes in approximately 15-ml amounts. The surface of the solidified agar was dried by overnight incubation at 37°C in an inverted position.

Table 1—Tellurite-glycine Media[a]

A	g/liter
Trypticase	10.0
Yeast extract	5.0
d-Mannitol	5.0
Glycine	10.0
Lithium chloride	5.0
Dipotassium phosphate	5.0
Agar	16.0
pH = 7.2	
B	
Tryptone	10.0
Yeast extract	5.0
d-Mannitol	5.0
Glycine	10.0
Lithium chloride	5.0
Dipotassium phosphate	5.0
Agar	20.0
pH = 7.2	
C	
Soytone	3.5
Tryptone	10.0
Yeast extract	6.5
d-Mannitol	5.0
Glycine	10.0
Dipotassium phosphate	5.0
Lithium chloride	5.0
Agar	17.5
pH = 7.2	
D	
Proteose peptone	10.0
Yeast extract	5.0
d-Mannitol	15.0
Glycine	8.0
Dipotassium phosphate	5.0
Lithium chloride	5.0
Agar	15.0
pH = 7.1	

[a]Twenty ml of sterile aqueous 1-% solution of potassium tellurite added to each 1000 ml of medium

[1]Journal Paper No. J-4230 of the Iowa Agricultural and Home Economics Experiment Station, Ames, Iowa. Project No. 1421.

[2]This investigation was supported by research grant RG-5502, National Advisory Health Council, Public Health Service, Department of Health, Education, and Welfare.

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A surface plating technique was used in which 0.1-ml aliquots were spread uniformly over the agar surface by means of a sterile glass rod bent into the shape of a triangle.

After inoculation, the plates were incubated at 37°C for 48 hours. Coagulase-positive staphylococci produce smooth, convex, jet-black colonies. A few of these colonies were picked from each of the tellurite media to Tryptose-phosphate broth and incubated at 37°C for 18-24 hours. Tube coagulase tests using Warner-Chilcott diagnostic plasma (Warner-Chilcott Laboratory Supply Division) were performed on these broth cultures.

TABLE 2—PURE CULTURE COUNTS[a] OF COAGULASE-POSITIVE STAPHYLOCOCCI

Sample No.	Plate count agar	Tellurite-glycine agars			
		A	B	C	D
1	78	18	68	70	75
2	44	10	39	40	52
3	276	15	211	187	212
4	106	68	92	99	93
5	66	36	45	56	53
6	75	70	59	71	71
7	160	116	127	167	180
8	64	25	50	56	65
9	179	68	80	119	75
10	141	49	59	90	66
11	115	20	20	60	45
12	270	76	119	138	111
13	152	105	109	139	140
14	61	61	74	70	78
15	84	35	49	74	54
16	37	30	33	37	34
17	133	70	99	103	117
18	87	53	41	64	66
19	49	24	35	44	38
20	113	39	65	63	53
21	156	91	132	129	140
22	108	84	94	97	86
23	57	46	48	50	49
24	31	14	21	24	23
25	38	24	29	31	34
26	202	144	181	187	173
27	166	110	136	160	144
28	132	77	119	113	115
29	115	24	44	51	49
30	105	51	60	85	81
31	137	81	124	122	123
32	52	21	42	60	46
33	187	96	132	145	139
34	105	62	75	75	80
35	86	47	61	64	59
36	84	63	68	60	73
37	162	83	124	116	101
38	157	10	111	101	102
39	64	34	53	53	64
40	212	70	113	111	139
41	218	39	82	80	88
42	129	99	86	120	99
43	187	136	171	187	171
44	283	70	121	173	210
45	161	41	107	132	116
46	311	139	185	187	177
47	159	83	115	115	136
48	300	196	225	212	235
49	144	35	58	86	108
50	135	102	117	107	91

[a]All counts x 10^7

Plate Count Agar (Difco) inoculated by surface streaking, was used as a non-selective medium and served as the basis of comparison for all recovery determinations on pure cultures.

RESULTS AND DISCUSSION

Composite counts of the pure culture studies are shown in Table 2 for 50 staphylococcus isolates. The mean counts for the media were as follows: 133.46 for Plate Count Agar, 63.20 for A, 90.16 for B, 99.76 for C and 98.58 for D. Using the count obtained with Plate Count Agar as 100 percent, the percentage recoveries on the various tellurite media were 47.36, 67.56, 74.75, and 73.86 for A, B, C and D, respectively.

Preliminary work with pure cultures of coagulase-positive staphylococci showed considerable inhibition by Tellurite-glycine Agar as employed with medium A. In only three instances did it yield a comparable count to that given by Plate Count Agar. For this work, two counts were considered quantitatively comparable if the number of colonies produced by equal dilutions fell within ± 10 of one another. Medium B differs from A in the nitrogen source and agar concentration; the concentrations of inhibitors are the same. The number of cultures yielding quantitative recovery on this medium compared to the non-selective medium was increased to eight and the degree of inhibition seen with other cultures was considerably less than that obtained with A.

In the hope of modifying these two basic formulas and obtaining a medium that would yield a better recovery with a greater percentage of the cultures and still maintain selectivity, other nitrogen sources and increased concentrations of Trypticase and Tryptone were inserted into the basic formula. Higher concentrations of these compounds did not produce any significant improvement in recovery. The substitution of Proteose peptone in conjunction with the same concentration of inhibitors did not give a medium of greater advantage than Medium B. A decrease in the concentration of potassium tellurite sharply lessened the selectivity and allowed for the growth of coagulase-negative organisms within 24 hr of incubation. On the other hand, decreasing the concentration of another inhibitor, glycine, from 1.0 to 0.8%, while not removing selectivity to any detectable extent did not increase recovery. However, by increasing the concentration of mannitol from 0.5 to 1.5% together with this lower glycine concentration, a greater percentage of the cultures were quantitatively recovered while selectivity against coagulase-negative organisms was maintained.

A newer commercial preparation which became available shortly thereafter also was employed. This preparation, medium C, made use of two nitrogen sources and an increased amount of yeast extract. A comparison of formulas C and D shows that the number of cultures having a quantitative recovery to Plate Count Agar was 18 and 12, respectively.

In no fewer than 32 of the cultures, there was inhibition on all four media that precluded consideration of their counts comparable to those of the non-selective medium by the standard adopted. T-test analyses of each mean on tellurite as compared to the non-selective medium show all of the differences to be highly significant. In the absence of any nutritional studies, the reasons for the varied responses of these cultures to the tellurite cannot be stated with any certainty.

Data for the Grade A milk samples are recorded in Table 3. The formula giving the highest mean yield of coagulase-positive organisms for the 50 samples was C. The percentage yield of the other media expressed in relation to C were 67.17, 83.96, 89.00 for A, B and D, respectively. The use of these media with milk samples, in general, showed the same effects. The same tendency for the lowest number of coagulase-positive organisms on medium A was obtained again, while C produced the highest yield. There was no attempt made to estimate the number of coagulase-positive staphylococci present in each sample by other means, for example, coagulase testing a proportionate number of staphylococcus colonies appearing on a non-selective medium. The efficiency of each tellurite medium for recovery was estimated approximately from pure culture results. We are aware of the limitations to which comparisons can be made and conclusions drawn on such a basis. Consequently, medium C which gave the highest mean yield was taken as the standard against which the other media were compared for recovery of coagulase-positive organisms from milk. On such a basis, the percentage efficiencies of the other tellurite media to C were those stated above. The differences noted among these formulas were shown to be highly significant at the 1% level by analysis of variance tests.

ACKNOWLEDGMENT

The authors express appreciation to Mr. Warren Clark and Dr. George Reinbold of the Dept. of Dairy and Food Industry, Iowa State University, for their assistance in the handling of the manuscript.

TABLE 3—COAGULASE-POSITIVE STAPHYLOCOCCI ISOLATED FROM GRADE A RAW MILK ENUMERATED ON TELLURITE-GLYCINE MEDIA

Sample No.	Coagulase-positive staphylococci per ml			
	A	B	C	D
1	190	840	810	880
2	210	350	470	510
3	410	2,900	2,500	1,200
4	200	390	690	310
5	260	1,400	1,400	410
6	400	1,700	1,500	1,500
7	260	1,400	1,500	1,300
8	280	690	1,300	710
9	180	1,700	2,000	1,700
10	1,500	1,900	3,100	2,500
11	190	300	320	350
12	530	390	670	1,100
13	690	1,400	1,800	1,400
14	450	750	560	660
15	510	1,300	1,300	760
16	2,000	3,500	3,800	2,800
17	200	390	530	400
18	1,400	1,800	2,000	2,000
19	2,500	2,800	2,500	2,800
20	2,000	2,500	2,200	2,500
21	700	420	620	640
22	270	180	450	320
23	810	1,300	750	1,200
24	1,500	720	1,800	1,000
25	1,100	1,000	1,400	1,000
26	600	600	630	720
27	1,300	1,800	2,100	1,900
28	1,900	2,400	3,200	2,100
29	1,500	1,400	2,600	1,500
30	4,900	5,800	8,600	6,700
31	780	960	750	1,000
32	960	900	1,400	1,100
33	1,400	1,800	2,100	1,700
34	600	1,600	1,200	1,100
35	810	840	810	1,000
36	1,900	2,100	2,400	2,600
37	7,900	7,000	9,000	8,100
38	1,300	1,000	960	1,400
39	2,000	2,000	3,100	2,100
40	2,900	3,000	2,600	3,500
41	4,000	2,800	3,000	3,500
42	1,400	1,200	1,400	1,400
43	870	1,400	1,500	1,000
44	2,100	2,800	2,400	2,600
45	1,600	2,100	3,500	2,600
46	900	1,600	1,500	1,100
47	11,000	11,000	14,000	14,000
48	1,300	1,100	2,000	1,800
49	1,700	2,100	3,600	2,800
50	2,300	4,500	3,800	4,300

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NEWS AND EVENTS

NOTICE

The announcement of the Sanitarian's Award and the rules of eligibility as shown in the January 1962 issue of the Journal contained two points which appear to have caused some confusion. We hope the following will clarify them.

1. Any sanitarian employed by a local official regulatory agency within the United States or Canada is eligible. The sanitarian may be engaged in a general, milk, or food program.

2. A good basic criterion to determine whether or not the sanitarian is employed by a local agency will be its source of revenue. If 51% or more of its financial support comes from local tax money, it may be considered local. If 51% or more of its tax money comes from State or Federal sources, it would not be considered as local for purposes of this award. In Canada, the same rule would be applied, with predominantly Provincial and Federal Government financial support being considered non-local.

If there is some worthy sanitarian you would like to nominate, don't delay obtaining entry forms and submitting them for consideration. Closing date of the competition is June 1, 1962.

Committee on Recognition and Awards

MICHIGAN ASSOCIATION HOLDS SUCCESSFUL MEETING

Michigan Association of Milk and Food Sanitarians held its annual meeting on the Campus of Michigan State University, March 6 and 7, 1962. Programs and arrangements were in charge of Dr. Frank Peabody of the Department of Microbiology and Public Health of the University, and Armin Roth, President of the Michigan Association.

Mr. Phil Shirley of the Ingham County Health Department was selected as Sanitarian of the Year for his outstanding contributions and leadership in securing adequate public health protection for residents of Ingham County and for his devotion in raising the quality and quantity of sanitation services in this county.

A year's subscription to the Journal of Milk and Food Technology was presented to the following 1962 recipients of the Kaufmann-Peabody Award: The names are Zelmer Bothic, Jr., Detroit Department of Health; Kenneth Cotter, Detroit Department of Health; John Robinson, Barry County Health Department; Peter Hrit, Detroit Department of Health; Robert Anan, Grand Rapids Health Department; and Pembleton Cochran, Detroit Department of Health.

A special session was held at Kellogg Center with the guest speaker Mr. George Blincoe, Office of Civil Defense, Battle Creek, Michigan. Mr. Blincoe gave a very stimulating talk on the radiological decontamination and related techniques. The roll of the sanitarian in the event of this type of disaster was also discussed.

New officers of the Michigan Association of Sanitarians elected were: Ralph Florio, Pontiac City Health Department, President; Dr. Frank Peabody, Department of Microbiology, Michigan State University, 1st Vice President; Edward Wykes, Grand Rapids City Health Department, 2nd Vice President; Robert Lyons, Ingham County Health Department, Secretary-Treasurer; and Charles G. Pheil, Department of Food Science, Michigan State University, Recording Secretary.

Armin Roth of the Wyandotte Chemical Company (right) presents the Outstanding Sanitarian of the Year Award to Mr. Phil Shirley of Ingham County Health Deparment at the annual meeting of the Michigan Association.

3-A COMMITTEES MEET IN MADISON, APPROVE 2 NEW 3-A STANDARDS

The regular semi-annual meeting of the 3-A Sanitary Standards Committees was held April 3-5 at the Wisconsin Center, University of Wisconsin, Madison, Wisconsin. Nearly 100 equipment manufacturers, dairy processors, and regulatory sanitarians attended.

Two 3-A Sanitary Standards reached the signing stage by all parties concerned: the 3-A Sanitary Standard for Ice Cream Freezers and the 3-A Sanitary Standard for Rubber and Rubber-Like Materials. Both standards will be published the first of next year in The Journal of Milk and Food Technology and will become effective 12 months after the date of signing. (This means that all equipment bearing the 3-A Symbol must conform to the new standards after the effective date.)

Other matters on the agenda included consideration by sanitarians of pending standards for batch pasteurizers and fillers for cottage cheese and frozen desserts. Industry groups studied a proposed amendment to the 3-A Sanitary Standard for Storage Tanks to cover new "silo-type" tank installations. Additionally, the industry groups reviewed a series of amendments to 12 existing 3-A Standards to provide cross references to provisions of the new 3-A Standard for Rubber and Rubber-Like Materials.

Officials of the 3-A Committees expressed satisfaction at the accomplishments of the Madison meeting, which was one of a continuing series of conferences to develop voluntary sanitary standards for dairy equipment which may be accepted in all health jurisdictions. The next meeting of the 3-A Sanitary Standards Committees will be held at Atlantic City, N. J. on March 12, 13, 14, 1963.

ELEVEN MILLION SOUGHT FOR RADIATION

An additional $11,000,000 for radiological health activities in the fiscal year starting July 1 has been requested by the U. S. Public Health Service. The Budget Bureau has deferred action on the request pending a study by the Federal Radiation Council—but opinion is that the division will get most, if not all of it, in the light of the resumption of nuclear testing.

This is over and above the $5,000,000 increase requested for the division in President Kennedy's budget. If the entire $11,000,000 supplemental request is granted, it would bring the division's budget to nearly $27,000,000 much of it, of course, to go into research grants througout the country.

While large sums such as this may be needed for radiological health it is also believed that another division no less important in the environmental program also should get more money. That is the Division of Environmental Engineering and Food Protection, headed by Wesley E. Gilbertson.

As matters now stand, the division is allocated $7,502,000, which is actually $338,000 less than it is receiving in the current fiscal year. True, this is due to the elimination of non-recurring expenses in connection with construction of two shellfish laboratories — but one recent event suggests another critical look at this division's operating budget.

That event is the death of the proposed Urban Affairs Department. Many of the health protection functions which the new agency would have taken over will not fall within the metropolitan planning branch of Gilbertson's division. The failure to create a new Department of Urban Affairs should actually mean an intensification of metropolitan health planning within USPHS, so that the momentum gained in this vital aspect of environmental health will not be lost. The adage of not putting all the eggs in one basket is still a good one.

Editor's Note — From time to time during the past few months, mention has been made in the Journal of the so-called Gross Committee, or, using the complete title, the Committee on Environmental Health Problems. The completed Committee report is now in printed form and totals nearly three hundred pages. In this month's issue of the Journal we will publish one third of the report by the Sub-Committee on Milk and Food. The last two thirds of the report will be published in the May and June 1962 issues. We believe this is a highly significant report and that our members should know the findings and recommendations of this expert Committee. For those wishing the complete report covering all phases of environmental health, copies may be procured from the Public Health Service.

REPORT OF THE SUBCOMMITTEE ON MILK AND FOOD

INTRODUCTION

Food protection is defined, for the purposes of this report, to include: *(a)* The prevention and control of contamination with biological, chemical, or physical agents which, alone or in combination with other environmental insults, adversely affect man's health; and *(b)* the maintenance or improvement of those dietary, sensory, and other qualities which contribute to human welfare. The important multiple effects of foods on health and welfare are influenced, in large measure, by the environmental conditions under which the foods are produced, processed, packaged, and made available to the consumer. They, in turn, affect man's physical and mental responses to other stresses, which together make up the complex termed environmental health.

When foods come into contact with air, water, soil, and the byproducts of civilization, they acquire a variety of microbial and chemical contaminants which may be passed on to the consumer. Food processing may remove or destroy some agents, but it may also allow further exposure to environmental contamination. The complexities arising from multiple ingredients, processes, and types of contamination, make food protection a peculiarly difficult area of public health. Much of the needed research in this area requires an interdisciplinary team approach.

In contrast to air and water, for which availability and purity are the principal considerations, food, even when plentiful and uncontaminated, exerts profound physiological effects on the consumer. Although man's basic nutritional requirements have been defined, much remains to be learned about the more elusive, yet important, sensory properties of foods, and the more subtle dietary relationships to physical vigor, mental alertness, longevity, resistance to infection, and the onset of degenerative diseases. In any event, enough is already known to suggest that man's response to almost any environment stress may be affected by the food he eats.

Food also differs from air and water in being the private property of individuals and business enterprises, whose economic interests do not necessarily coincide with the needs of public health. Public pressure has led to a profusion of laws related to food, which sometimes result in the misuse of public health regulations to erect economic barriers.

TRENDS

The store of Abraham Lincoln's day sold less than a hundred food items, consisting mainly of dried staples and produce from nearby farms. Meals were generally eaten at home, where they were prepared daily from the basic ingredients. Perishable foods, such as milk and meat, were used as quickly as possible or were converted to butter, cheese, sausage, etc., which would keep longer. Neither the causes of foodborne diseases nor the means of preventing them were clearly understood, and the quality of food products was determined largely by the odors, tastes, and appearances associated with spoilage.

About the turn of the century, notable changes began to appear in the traditional pattern, based on the development of farm machinery, commercial canning, long distance transportation by railroads, and mechanical refrigeration of storage warehouses. Concurrently scientific studies were begun which, over the years, have led to a succession of remarkable advances in the production, manufacturing, distribution, and serving of foods. For example, bacteriological and epidemiological studies on the role of milk and other foods in the spread of infectious diseases, such as typhoid fever, dysentery, tuberculosis, and septic sore throat, led to the establishment of sanitation programs involving pasteurization of milk, veterinary examination of dairy and food animals, inspection of restaurants, and education of food handlers in hygienic practices. Botulism was found to be caused by the toxins of spore-forming bacteria that could grow in foods without air. As a result, commercial canning practices were radically revised to incorporate adequate heat-processing for the destruction of these spores.

Biochemical research laid the foundation for modern concepts of human nutrition and toxicology. Prevention of deficiency diseases was made possible by supplementation with vitamins and minerals. Addition of vitamin D to milk, thiamine to flour, and iodine to table salt are well-known examples. Possible carcinogenic and other harmful effects resulting from improper use of certain food additives were considered, and legislation has been promulgated to control the commercial application of chemical preservatives, artificial colors, and the like, in order to prevent a potential problem from actually occurring.

In the agricultural field, tremendous strides have been made in the development and application of chemicals, such as fertilizers, weed-killers, insecticides, fungicides, and feed supplements; these have resulted in an increased food output per acre. Selection and hybridization have also increased the productivity of crop plants and domestic animals. With the aid of power-driven machinery, the American farmer now produces 10 times as much food per acre with less man-hours than his Indian or African counterparts.

The technology of food processing, packaging, and distribution has also undergone dramatic changes since World War II. The major trend is toward centralized processing and widespread distribution of commercially prepared convenience foods which minimize or eliminate culinary work in the preparation of meals. Among these foods are dried, precooked, and frozen products which are not sterile. The consequences of improper storage, shipment, or marketing are obvious. Because of the consumer demand for convenience products, modern foods are no longer simple commodities; they are compounds and blends of products, obtained from worldwide sources and subjected to multiple processes, which may introduce unrecognized health hazards.

Food processing is becoming increasingly complex and often involves elaborate electronic control of high-speed continuous operations. In some instances, momentary temperature fluctuations may result in failure to protect large amounts of the product, without the knowledge of the operator. High- temperature short-time processing, freezing, vacuum dehydration, and radiation sterilization may be applied singly or in combination to those products. Certain of these new methods involve increased handling after cooking or other treatment; therefore, the skin and fecal microflora, including bacteria, viruses, fungi, and parasites, may contaminate the final product. Continuing changes in processing techniques may be expected to introduce a variety of new problems in the future.

In addition to the usual glass and metal containers, foods are now being packed in treated papers, plastics, laminated foils, flexible tubes and pressurized cans. The time-honored method of canning involved heat sterilization, but today packaged foods may be only partially sterilized and held in the refrigerated or frozen state until marketed. Certain packaging techniques, for example, by excluding oxygen may prevent molds from developing; however, at the same time, such techniques may contribute to the less apparent, though more important, health hazards involving the growth of toxigenic bacteria.

More than 8,000 food items are available for sale in supermarkets, and new products are being offered to the consumer at the rate of about 2 dozen per day. Further evidence of the rapid rate of change in this field is provided by the fact that two-thirds of these convenience items either did not exist in 1946 or have been radically changed since that time.

Comparable developments have occurred in the food service industries. Today practically all urban wage earners and students eat at least one meal a day away from home. In addition to spending about $1 billion per month in restaurants, the American public is giving ever increasing patronage to commercial catering and delicatessen operations. The development of automatic vending machines, which deliver individual hot or cold foods and even complete meals, is also progressing rapidly. The automatic food dispensing business has increased from $10 million in 1954 to more than $200 million in 1960. In the future it may be expected to receive an even greater share of business now going to restaurants and grocery stores.

The retail value of the U. S. food supply now stands at approximately $80 billion per year, and it will continue to expand as the population grows. At present, industry is spending more than $100 million per year on new product developments, all of which, a priori, involve a wide assortment of food safety problems. Too often such technological changes are equated with improvements in quality, without discriminating between changes which actually reduce health hazards and those introduced primarily for reasons of convenience or economic advantage. Unquestionably many improvements have been made in both directions, but public health agencies have been unable to keep pace with the overwhelming number of new problems that continue to arise as the technological revolution in the food industry progresses.

An estimated 1 million cases of food poisoning occur annually in the United States. This estimate is probably too low because scarcely any individual escapes an occasional intestinal upset. The number of reported outbreaks has approximately doubled since 1952, and the majority of these outbreaks are of undetermined etiology and scope. Staphylococcal food poisoning and salmonella infections are among the most commonly reported forms of gastroenteritis, but investigation and reporting of foodborne illness are so grossly inadequate that a real evaluation of the impact of contaminated food on health cannot be made at the present time.

Acute illnesses represent but one facet of the total problem. To this should be added other difficulties introduced through direct and indirect addition of chemicals which may have long-term effects on health. These may be introduced at different stages; e.g., during production (residues of insecticides, growth regulators in plants, hormones in animals, etc.) during processing (detergents or other contaminants of the water supply, dust and fumes from the air, and additives used in formulation), during storage (via leaching from containers) and during preparation for serving (contact with faulty utensils, and residues of cleaners or sanitizing agents). In addition, the human body may suffer other stresses of a psychological or physical nature, which should be integrated with those of food origin.

Study of the cumulative effects from repeated exposures to small amounts of food contaminants has only begun, and knowledge of the interrelationships between dietary factors and other elements of the environment is essentially lacking. Recent research has begun to indicate that the main nutrition problems of the future may well be concerned with the sensory properties of foods, such as flavor, odor, texture, etc. —how these are affected by processing, and their mediation via the central nervous system. All of this must be integrated with the above cited physical, chemical, and microbiological problems in respect to the whole human being.

Positive action is needed to stem the trend toward obsolescence of the food protection program in public health agencies, and thus keep pace with the developments in food science and technology. In contrast to the notable progress made in food sanitation during the first half of the 20th century, this area of Government activity has now become the weakest link in the protection of the Nation's food supply.

CITATION AWARD AND SANITARIAN'S AWARD

The Committee on Recognition and Awards is privileged to present a Citation Award each year at the Annual Meeting of the I.A.M.F.S. This Award differs from the Sanitarian's Award in several respects. There is no cash award. The recipient is cited for meritorious service rendered to the I.A.M. F.S., the professional sanitarian, public health, and its many and varied activities.

As in the past, the Committee will give careful consideration to the selection of the recipient. The advice and counsel of the Executive Board will be sought in making the selection. This Award represents an expression of gratitude from the entire association membership. It is a coveted honor, and is given only to particularly deserving members of the Association.

Any member may submit a nomination for the Citation Award. Affiliate Secretaries, in particular, are urged to submit nominations after consultation with their officers or members. Presentation will be at the Annual Meeting Banquet in Philadelphia.

It is not necessary to prepare a brochure. A letter setting forth the reasons why you believe the nominee should be considered for the Citation Award will suffice. The letter should be submitted to the Chairman of the Committee on Recognition and Awards by June 1, 1962.

Nominations for the Sanitarian's Award remain open until June 1. This honor, with $1,000.00 in cash (tax free) will also be presented to a deserving sanitarian at the Annual Banquet. Mail your request for an entry form now to:

William V. Hickey, Chairman
Committee on Recognition and Awards
International Association of Milk
and Food Sanitarians
250 Park Avenue, New York 17, N. Y.

NOTICE TO IAMFS MEMBERS

The U. S. Public Health Service will conduct a first intensive, national survey of sanitarians this Spring by distributing a short questionnaire to thousands of sanitarians employed in industry and in all levels of government. Information sought will include age, education, years of work experience, nature of work, type of employer, position title, salary and income, and related data. All information will be strictly confidential. A statistical summary and initial interpretation and analysis should be available in the early Fall.

This first major attempt to outline the professional characteristics of sanitarians is expected to be useful in sharpening a definition of this specialty, in helping educational institutions build more complete curricula for the training of sanitarians, and in providing various State legislatures with the data necessary to adjust salary schedules and issue more carefully constructed sets of regulations for sanitarian practice.

All of the professional societies in this field are cooperating in assuring a full response, and all sanitarians are urged to respond completely and promptly to this forthcoming request for information, and to submit the names of any sanitarians who may not have received a form to fill out.

I, personally, urge all members of IAMFS, Inc. to complete the questionnaire and return as promptly as possible, upon receipt. This project is extremely important to all sanitarians and a one hundred per cent return is needed.

"Red" Thomasson
Executive Secretary

PROTEIN CONTENT MAY FORM BASIS FOR MILK PRICE

The price dairymen receive for milk in coming years will depend partly on the findings of a nationwide network of scientists who are trying to standardize a test for protein content.

Since about 1890, dairy plants have been basing the price of milk on its fat content. The more fat, the higher the price.

Recently, however, weight-watchers and calorie-counters have been buying milk for its proteins, vitamins, and minerals rather than its fat. This has swelled the demand for low-fat milk.

Many economists have been puzzled by the problem of finding a fair way to price milk on the modern market. Some other standard was needed.

Two possibilities were considered. One involved basing the price on milk-solids-not-fat; the other involved pricing milk according to its protein content. Since milk is the nation's least expensive source of high-quality protein, and since the nutritional value of protein is widely recognized, it seemed reasonable to base the price of milk on the amount of protein it contained.

In response to this need, scientists developed a fast, low-cost test for protein content. An advantage of the test is that it can be taught to nearly anyone even though he may have little technical training.

The test requires a dye solution. The technician doing the testing measures the amount of color in the solution. He then adds a measured milk sample to the dye. The protein in the milk combines with part of the dye. The technician filters out the protein-dye compound, then measures the amount of dye left in solution. The amount of dye removed provides a measure of the amount of protein in the sample.

Developed in Norway, this technique has been used in Holland as a partial basis for payment since 1957. People throughout the world have studied the method, using different kinds of dye in different concentrations and measuring the colors with a variety of instruments. These differences have resulted in slight variations from laboratory to laboratory.

The big problem facing scientists now is to standardize the test. The methods used by the different researchers must be compared in a variety of laboratories, and scientists must choose the best features of each.

A key figure in the project is Prof. B. L. Herrington of the New York State College of Agriculture at Cornell University. Aided by a grant from the milk marketing administrator of the New York-New Jersey Milk Marketing Area, Prof. Herrington will exchange samples with laboratories throughout the United States. The researchers will try to decide which kind of dye to use, which instruments to employ, the optimum acidity of the solution, and the specifications for dye purity.

If present plans work out, the result may be an official test that can be approved by law as a basis for payment.

DISCUSS VENDING AT CALIFORNIA SEMINARS

More than 400 city, county and state health officials in California attended a series of seven, day-long vending sanitation seminars during March, reports Sidney S. Kallick, National Automatic Merchandising Association's Western office manager and counsel.

All were sponsored by N A M A , the California State Department of Pubilc Health and the U. S. Public Health Service.

The first three seminars were held in Los Angeles, March 5, 6, and 7.

David E. Hartley, N A M A public health counsel, was the instructor for the seminars.

"These training sessions are aimed at giving state and local health officials a better understanding of vending machines and methods of operation, and to improve vending company-public health department relations," Kallick said.

He noted that the seminars were requested by the California health department following passage last fall of a revised state restaurant code, which included a vending section patterned after the N A M A-sponsored U. S. Public Health Service Code.

The other four seminars were conducted in Fresno, San Francisco, and Sacramento. California vending companies provided the vending equipment for the sessions.

Present plans call for an eighth seminar in San Diego next October, Kallick said.

In other areas of N A M A public health activity, Hartley and a liaison group of Maryland Automatic Merchandising Council members met last month with Washington, D. C. public health officials. The object: to develop a vending sanitation code. Hartley said the vending industry story was well received by all officials which included health department supervisors, the Food Service Advisory Committee, members of the District of Columbia Health Board and the director of licenses.

CDC EXPANDS AUDIO-VISUAL FACILITIES

The Surgeon General of the U. S. Public Health Service, with the concurrence of the Board of Regents of the National Library of Medicine, has approved a transfer of the medical motion picture archives to the Audiovisual Facility of the Service's Communicable Disease Center in Atlanta. Effective January 1, the transfer of function from the Library in Washington D. C. involves the entire reference and historical collection of medical films and associated files.

The move is in keeping with the changing and expanding roles of both the Audiovisual Facility at CDC and the National Library of Medicine. The recently dedicated building of the Library in Bethesda, Maryland, will comprehensively serve medical needs through the printed word. The Audiovisual Facility in Atlanta has become a National resource for the development, production, distribution, and utilization of audiovisual materials supporting health and medical objectives. Already, extensive film cataloging, formerly accomplished at the National Library of Medicine, has become a responsibility of the Communicable Disease Center's audiovisual program.

BUDGET INCREASE URGED FOR MILK AND FOOD PROGRAM

The House-passed appropriation bill to provide funds for the Department of Health, Education and Welfare gives the Public Health Service some $1,000,000 more than it had in 1962 for milk and food sanitation programs. The Committee report on the bill is both vigorous and specific as to its feelings in this area.

The report states: "Milk is one of our nation's most important foods as well as being one of the most widely-produced products. Milk production handling methods on the farm, as well as processing techniques in dairy plants, are undergoing revolutionary changes associated with new technological developments. These changes have markedly affected established health safeguards and therefore impose the need for thorough investigation of their public health implications. Some of the laboratory tests which have been traditionally used by the industry and by milk sanitation control agencies have been made obsolete. The Committee was pleased therefore to learn that the Public Health Service has been able to develop recently a modified phosphatase test through which the performance of newly developed pasteurization process can be checked. However, there is much to be done in milk research with pathogenic organisms, including viruses, and studies on the new ultra-high temperature processing methods which are on the brink of commercial utilization. In its report for the last two years the Committee has stated its interest in seeing that more emphasis was placed on milk problems. It is disconcerting therefore to note that the Interstate Milk Certification Program is still operating on an inadequate basis. At present the level of PHS evaluation of state milk programs and spot checks of field conditions is only about 75% of requirements. The Interstate Milk Certification Program, begun in 1951, now facilitates the interstate movement of approximately 9,000,000,000 pounds of milk each year and is still growing. In view of the public health significance of this activity, the Committee will expect that a more thorough job be done in the future."

During the hearing on the appropriation bill, Wesley E. Gilbertson, Chief of the Division of Engineering Services and Food Protection at USPHS, testified that as of January 1 of this year 800 shippers were shipping raw and pasteurized milk. Mr. Gilbertson pointed out that under the program USPHS is expected to validate state certification. With the growing number of shippers and the increasing number of participating states, USPHS has been unable to carry out enough state validations, including checks on laboratory facilities and the status on the farms and in the pasteurization plants. Mr. Gilbertson also said that some of the ratings have been as much as 20 to 25% off of the certified rating, although he made it clear thas this was not a general situation. However, he expressed the opinion that these rating deficiencies should be taken into account in strengthening the Milk Certification Program.

In a current DAIRY INDUSTRY NEWSLETTER mention was made of the report prepared by an Advisory Committee of 18 top level scientists recommending the establishment of a National Environmental Health Center. It will be remembered that the Subcommittee on Milk and Food of this Advisory Committee expressed the opinion that Federal legislation relating to the certification of interstate milk and shellfish shippers was very much needed. In this connection it is interesting to note that the House Appropriations Committee report takes cognizance of the report of this Advisory Committee and states "The Committee concurs in the belief that the Public Health Service should expand its environmental health programs to a level sufficient to cope with the ever-increasing health problems resulting from the contamination of the air, water, and food."

NATIONAL MASTITIS COUNCIL MEETS

A coordinated attack on mastitis — a major cost item for the nation's dairy farmers — is now developing.

The National Mastitis Council held its first annual meeting in Chicago in February. Over 100 persons participated. Included were dairy farmers, processors, suppliers, veterinarians, health officers, and educators — a broad cross-section of the entire dairy industry.

The National Mastitis Council was organized as a result of the National Conference on Mastitis that was held in Chicago in October, 1960 under the sponsorship of the Mastitis Action Committee of the International Association of Milk and Food Sanitarians. Over 200 dairy leaders from all parts of the nation met to discuss the mastitis problem and to exchange information. They recommended that a comprehensive program be developed to reduce the incidence of mastitis in dairy cows, and an organization be formed to get the job done. The National Mastitis Council is that organization.

A highlight of the February 15, 1962 annual meeting was a discussion of the mastitis screening tests now being used in various parts of the country. A group of five experts presented the results of their experiences with specific tests. Information on such experiences under practical conditions is vitally necessary in expanding mastitis control programs.

Dr. C. J. Haller, Chairman of the Mastitis Committee of the New York State Veterinary Medical Society, and Dr. H. C. Temple, New York State Experimental Testing Laboratory, discussed their work with the Modified Whiteside Test in the New York Mastitis Control Program.

Dr. Harold Amstutz, Head of the Department of Veterinary Clinics, Purdue University, reported on his experience with the Calalase Test.

Mr. Nelson Hall, Supervisor of the Division of Sanitation, Saginaw (Michigan) City Health Department, discussed his results in using the Direct Microscopic Test.

Dr. O. W. Schalm, Director of Mastitis Research, University of California, discussed the California Mastitis Test and compared it practicability and results with those of the other tests discussed at the meeting.

All of the screening test are based on the fact that a cow suffering from mastitis secretes milk with a high cell count even though the udder inflamation may not have reached the clinical stage in which the appearance of the milk is changed.

Other featured speakers on the program included Mr. Norman Myrick, Director of Public Relations, Milk Industry Foundation, and Mr. W. D. Knox, Editor, "Hoard's Dairyman." Mr. Myrick stressed a need to consider the relationship of the mastitis problem to the consumer's interest in the taste and nutritional attributes of the milk and other dairy foods she buys. Mr. Knox reviewed the progress made thus far by the National Mastitis Council and pinpointed ways in which it can be of greater effectiveness in the future.

Chairmen of four committees reported on accomplishments to date and plans for future work in the following areas: Education, Control Programs and Procedures, Research, and Finance.

Surveys made by the committees disclosed that (1) there are at least 60 research projects now underway that deal with various aspects of the mastitis problem, (2) there are many leaflets and other educational materials available but considerable improvement in them is necessary, and (3) only a handful of states now have organized mastitis control programs.

At the business session, officers and other directors were elected to serve for the next 12 months. The President will be R. W. Metzger, D.V.M., who directs the Quality Control Division of the Dairymen's League Cooperation Association, Syracuse, New York. Dr. Metzger also represents the International Association of Milk and Food Sanitarians on the Council's board. Mr. Fred Idtse, National Purebred Cattle Association, Beloit, Wisconsin, will be Vice President and Mr. M. G. Van Buskirk, Dairy Executives Conference, Chicago, Illinois, will be Secretary-Treasurer.

The 9-Man Executive Committee will consist of the 3 officers and the following persons: C. L. Dickinson, Farm Equipment Institute; J. C. Flake, International Association of Milk and Food Sanitarians and Evaporated Milk Association; J. R. Hay, American Veterinary Medical Association; H. G. Hodges, De Laval Separator Company; D. H. Jacobsen, American Dairy Association; E. E. Kihlstrum, Johnson and Johnson.

Other nationally known organizations concerned with various facets of the dairy industry also are represented on the 23-member board of directors.

A wealth of useful information will be assembled in the proceedings of the meeting. Each person who registered will receive a copy as soon as it is available. Other persons many purchase copies. The detailed procedure for purchasing copies will be announced later after the costs of duplication have been determined.

SAMUEL CATE PRESCOTT DIES

Dr. Samuel Cate Prescott, one of the country's most distinguished pioneers in food technology and for many years Dean of the School of Science and Head of the Department of Biology and Public Health at Massachusetts Institute of Technology, died in Cambridge, March 19.

A nationally known scientist and educator, Dr. Prescott was a charter member and the first president of the Institute of Food Technologists. He would have been 90 years old on April 5.

Dr. Prescott played a major role at M.I.T. in the initiation of programs in food technology and biological engineering. He established the nation's first industrial biology course, contributed to the application of enzymes to industry and carried out pioneering research in industrial hygiene.

His contribution to the field of food science and technology was of such importance that the Institute of Food Technologists has for some years underwritten a "Samuel Cate Prescott Fellowship" to encourage graduate work in the field. The award, made annually, consists of an honorarium of $1,000 and an engrossed plaque.

Born on a New Hampshire farm in 1872, Dr. Prescott received his bachelor of science degree from M.I.T. in 1894 and joined the Institute staff the following year. He was appointed an instructor in biology in 1896, assistant professor in 1903, associate in 1909 and professor in 1914.

His early work laid for the first time a sound basis for scientific control of the canning industry and he later worked on low-temperature food preservation - which led to the field of quick freezing - while on leave of absence for a year in 1918 as Chief of the Division of Dehydration in the Bureau of Chemistry.

Dr. Prescott was appointed acting and then permanent - head of the Department of Biology and Public Health in 1921 and 1922 respectively. Ten years later he was appointed the first Dean of the School of Science. He served as honorary lecturer in the department for two years after his retirement in 1942 and then continued on at M.I.T. as Emeritus Professor of Industrial Biology.

Dr. Prescott had wide experience in many fields. He diagnosed and proved preventable a crippling banana disease in the years before World War I and during the war, serving as a major in the Sanitary Corps of the U. S. Army, had charge of food inspection and worked on the development of dehydrated foods.

During World War II was appointed Special Consultant to the Secretary of War. He served as dehydration consultant after his retirement in 1942.

Dr. Prescott received many honorary degrees and professional awards and was a member of a large number of professional and honorary societies. He published many articles and textbooks on food technology, bacteriology and industrial biology. He was the author of "When M.I.T. Was Boston Tech," a history of the early years of M.I.T., published in 1954.

FITCH TAKES POSITION WITH PURITAN CHEMICALS

Puritan Chemicals has announced the appointment of Mr. Keith A. Fitch, to the position of Area Engineer with headquarters in Jacksonville, Florida.

Mr. Fitch is a registered Professional Engineer and a Registered Sanitarian (Georgia and California). He holds an A.B. degree in chemistry from Park College, Parkville, Missouri.

Most recently, Mr. Fitch has been manager of the Institutional and Hospital Division of Klenzade Products, a major manufacturer of cleaning and disinfecting chemicals. He is a Fellow of the American Public Health Association and member of the American Association for the Advancement of Science. He is a member of the International Association of Milk and Food Sanitarians; the National Society of Professional Engineers; the Institute of Food Technologists; and the Association of Food & Drug Officials of the United States.

Mr. Fitch has had extensive experience in the field of institutional, industrial, and hospital sanitation. He is a former inspector of the Food & Drug Administration and was Executive Director of the Orkin Institute of Industrial Sanitation. He has also been a consulting sanitary engineer and staff advisor on sanitation to a nationally known food manufacturing corporation.

CALENDAR OF MEETINGS

1962

May 1-2—Pennsylvania Association of Milk Dealers, Annual Convention, Penn Harris Hotel, Harrisburg, Pennsylvania. Administrative Officer, Henry R. Geisinger, 303 Telegraph Building, Harrisburg, Pennsylvania.

May 9-10—National Dairy Council, Board of Directors Meeting, Sheraton-Chicago Hotel, Chicago, Illinois. Administrative Officer, Milton Hult, 111 North Canal Street, Chicago 6, Illinois.

May 9-10—New England Association of Ice Cream Manufacturers, Annual Convention, Sheraton Plaza, Boston, Mass. Administrative Officer, Malcolm D. MacLeod, 70 Franklin Street, Worchester, Massachusetts.

May 10-11—Milk and Ice Cream Accounting Conference, Sheraton-Oklahoma Hotel, Oklahoma City, Okla. Administrative Officer, Wm. L. Carter, IAICM, 1105 Barr Bldg., Washington 6, D. C.

May 12-14—Georgia Dairy Association, Annual Convention, Buccaneer Motel, Jekyll Island, Ga. Administrative Officer, T. Charles Allen, 2434 Bank of Georgia Bldg., Atlanta 3, Ga.

May 14-15—Illinois Dairy Products Association, Annual Round-Up, Soangetaha Country Club, Galesburg, Illinois. Administrative Officer, M. G. Van Buskirk, 309 W. Jackson Blvd., Chicago 6, Ill.

May 14-15—Milk and Ice Cream Accounting Conference, Sheraton Hotel, Portland, Oregon. Administrative Officer, Wm. L. Carter, IAICM, 1105 Barr Bldg., Washington 6, D. C.

May 14-16—Iowa Milk and Ice Cream Mfgrs. Association, Annual Convention, Blackhawk Hotel, Davenport, Iowa. Administrative Officer, John H. Brockway, 710 Fifth Avenue, Des Moines 9, Iowa.

May 15-17—Annual Meeting South Dakota Association of Sanitarians, Rapid City, South Dakota. Curtis Anderson, Secretary, PHS Indian Hospital, Sioux Sanitorium, Rapid City, South Dakota.

May 17-18—Milk and Ice Cream Accounting Conference, Monterey, Calif. Administrative Officer, E. B. Kellogg, Milk Industry Foundation, 1145 19th Street, N. W. Washington, D. C.

May 20-22—New York State Milk Distributors, Inc., Annual Meeting, Sheraton Ten Eyck Hotel, Albany, N. Y. Administrative Officer, J. Russell Fox, 74 Chapel Street, Albany 7, N. Y.

May 21-22—Milk and Ice Cream Accounting Conference, Milwaukee Inn, Milwaukee, Wisc. Administrative Officer, E. B. Kellogg, 1145 19th St., N. W., Washington, D. C.

May 21-23—Assn. of Ice Cream Mfgrs. of Pa., New Jersey & Delaware, Inc., Annual Meeting, Pocono Manor Inn, Pocono Manor, Pennsylvania. Administrative Officer, Peter F. Rossi, 405 Lexington Avenue, New York 17, N. Y.

May 22-25—National Restaurant Association, Mc Cormick Place, Chicago, Ill.

May 24-26—Dairy Institute of California, Annual Spring Meeting, Yosemite National Park. Administrative Officer, R. J. Beckus, 11th and L Building, Sacramento, Calif.

June 6—The Holstein-Friesian Association of America, Annual Convention, Hotel Roanoke, Roanoke, Virginia. Administrative Officer, Robert H. Rumler, Brattleboro, Vermont.

June 7-9—Annual Meeting Rocky Mountain Association of Milk and Food Sanitarians and the Wyoming Dairy Association, University of Wyoming, Laramie, Wyo. Administrative Officer, William R. Thomas, Dairy Section, Univ. of Wyo.

June 10-15—VIII Congress of the Inter-American Assn. of Sanitary Engineering, Washington, D. C. Administrative Officer, Edmund G. Wagner, c/o Officer of Public Health, I.C.A., Washington 25, D. C.

June 11-12—Milk and Ice Cream Accounting Conference, Sheraton Hotel, Louisville, Kentucky. Administrative Officer, Wm. L. Carter, IAICM, 1105 Barr Bldg., Washington 6, D. C.

June 12-14—Wisconsin Dairy Foods Association, Inc., Summer Conference, Dell View Hotel, Lake Delton, Wisc. Administrative Officer, A. E. Van Thullenar, 222 S. Hamilton St., Madison 3, Wisc.

June 12-14—Indiana Association of Sanitarians, Annual Meeting, Rice Hall, Indiana State Board of Health, 1330 W. Michigan St., Indianapolis, Ind. Secretary Karl K. Jones, Indiana State Board of Health.

June 17-21—The American Dairy Science Association, Annual Meeting, University of Maryland, College Park, Maryland. Administrative Officer, H. F. Judkins, 32 Ridgeway Circle, White Plains, New York.

June 17-21—National Association of Retail Grocers, Annual Convention, Auditorium, San Francisco, California. Administrative Officer, Marie Kiefer, 360 North Michigan Ave., Chicago 1, Illinois.

June 17-22—American Association of Food and Drug Officials of the U. S., Hollywood, Fla.

June 18-20—Grocery Manufacturers of America, Inc., Mid-Year Meeting, Greenbrier, White Sulphur Springs, West Virginia. Administrative Officer, Paul S. Willis, 205 E. 42nd Street, New York 17, N. Y.

June 18-21—National Dairy Council, Summer Conference, Sheraton-Chicago Hotel, Chicago, Illinois. Administrative Officer, Milton Hult, 111 North Canal Street, Chicago 6, Illinois.

June 28—Evaporated Milk Association, bi-monthly meeting of the Industry, Builders Club, Chicago, Illinois. Administrative Officer, E. H. Parfitt, 228 N. LaSalle Street, Chicago, Illinois.

July 12-13—Pennsylvania Dairy Fieldmen's Conference, Annual Meeting, Pennsylvania State University, University Park, Pa. Administrative Officer, Dr. F. J. Doan, Pennsylvania State Univ., University Park, Pa.

August 5-8—West Virginia Dairy Products Association, Annual Meeting, Greenbrier Hotel, White Sulphur Springs, West Virginia. Administrative Officer, S. J. Weese, West Va. University Dairy, Morgantown, W. Va.

Sept. 10-12—Association of Ice Cream Mfgrs. of New York State, Annual Meeting, Whiteface Inn, Whiteface, N. Y. Administrative Officer, Peter F. Rossi, 405 Lexington Ave., New York 17, N. Y.

Sept. 11-13—University of Minnesota, Dept. of Dairy Industries, Dairy Products Institute Meeting, Dairy Industries Bldg., St. Paul Minnesota. Administrative Officer, S. T. Coulter, Head, Dept. of Dairy Industries, University of Minnesota, St. Paul 1, Minn.

Sept. 12-13—National Dairy Council Board of Directors Meeting, Sheraton-Chicago Hotel, Chicago, Illinois. Administrative Officer, Milton Hult, 111 North Canal Street, Chicago 6, Illinois.

Sept. 17—Wisconsin Creameries Association, Annual Convention, Whiting Hotel, Stevens Point, Wisconsin. Administrative Officer, Oscar Christianson, 1 West Main Street, Madison, Wisconsin.

Sept. 18-20—American Dairy Association Board of Directors & State Managers Meeting, Olympic Hotel, Seattle, Washington. Administrative Officer. M. J. Framberger, 20 N. Wacker Drive, Chicago, Illinois.

Sept. 24—Dairy Mixers, Inc., of Philadelphia, Annual Outing, Aronimink Country Club, Philadelphia, Pa. Administrative Officer, Ernst J. C. Fischer, 2809 W. Queen Lane, Philadelphia 29, Pa.

Sept. 24-26—American Dairy Association, Board of Directors & State Managers Meeting, Olympic Hotel, Seattle, Washington. Administrative Officer, M. J. Framberger, 20 N. Wacker Drive, Chicago 6, Ill.

Sept. 27—Evaporated Milk Association, bi-monthly meeting of the Industry, Builders Club, Chicago, Illinois. Administrative Officer, E. H. Parfitt, 228 N. LaSalle Street, Chicago 1, Illinois.

Oct. 2-3—Minnesota Creamery Operators' and Managers' Association, Annual Convention and Business Sessions, Hotel Lowry, St. Paul, Minnesota. Administrative Officer, Floyd Thompson, 416 New York Building, St. Paul 1, Minnesota.

Oct. 10-11—Vermont Dairy Industry Association, Annual Meeting and Educational Conference, University of Vermont, Burlington, Vt. Administrative Officer, Henry V. Atherton, Dairy Bldg., Burlington, Vt.

Oct. 10-11—Washington State Dairy Foundation, Statewide Convention, Chinook Hotel, Yakima, Wash. Administrative Officer, Robert J. Keyser, 550 Skinner Bldg., Seattle 1, Wash.

Oct. 13-16—National Automatic Merchandising Association, Brooks Hall, San Francisco, Calif.

Oct. 19-20—Iowa Creameries Association, Iowa Milk Producers Federation, Iowa Milk Driers Ass'n., State Convention, Hotel Roosevelt, Cedar Rapids, Iowa. Administrative Officer, Arthur Kirchhoff, P. O. Box 377, Ames, Iowa.

Oct. 21-24—National Association of Food Chains, Annual Convention, Denver Hilton & Brown Palace Hotels, Denver, Colo. Administrative Officer, Clarence Adamy, 1725 Eye Street, N. W., Washington 6, D. C.

Oct. 24-27—International Association of Milk and Food Sanitarians, Inc. Annual Meeting, Ben Franklin Hotel, Philadelphia, Pennsylvania. Administrative Officer, H. L. Thomasson, P. O. Box 437, Shelbyville, Indiana.

Oct. 28-30—International Association of Ice Cream Mfgrs., Annual Convention, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J. Administrative Officer, Robert H. North, 1105 Barr Building, Washington 6, D. C.

Oct. 28-Nov. 2—Dairy Exposition, Atlantic City, New Jersey. Administrative Officer, Joseph Cunningham, Dairy Industry Supply Association, 1145 - 19th St. N. W., Washington, D. C.

Oct. 29-31—National Association of Retail Ice Cream Mfgrs., Inc., Annual National Convention, Hotel Haddon Hall, Atlantic City, N. J. Administrative Officer, E. M. Warder, 2223 Detroit Ave., Toledo 6, Ohio.

Nov. 7-8—Wisconsin Cheese Makers' Association, 71st Annual Meeting and 1962 Worlds Championship Cheddar Contest, Northland Hotel, Green Bay, Wisc. Administrative Officer, Joseph J. Bauer, 115 W. Main St., Madison 3, Wisc.

Nov. 12-14—Grocery Manufacturers of America, Inc., Annual Meeting, Waldorf Hotel, New York, New York. Administrative Officer, Paul S. Willis, 205 E. 42nd Street, New York 17, N. Y.

Nov. 19-20—South Dakota State Dairy Association, Annual Convention, Sheraton Cataract Hotel, Sioux Falls, S. Dakota. Administrative Officer, Ervin Kurtz, Brookings, S. Dakota.

Nov. 26-29—Southern Association of Ice Cream Manufacturers, 48th Annual Convention, Americana Hotel, Bal Harbor, Fla. Administrative Officer, Edward J. Koontz, Box 5107, Biltmore, N. Carolina.

Nov. 27-28—Northwest Association of Ice Cream Manufacturers and Minnesota Milk Council, Annual Convention, St. Paul Hotel, St. Paul, Minn. Administrative Officer, D. T. Carlson, P. O. Box 72, Willmar, Minn.

Dec. 6—Evaporated Milk Association, bi-monthly meeting of the Industry, Builders Club, Chicago, Illinois. Administrative Officer, E. H. Parfitt, 228 N. LaSalle Street, Chicago, Illinois.

Dec. 12-14—Wisconsin Dairy Foods Association, Inc., Annual Convention, Schroeder Hotel, Milwaukee, Wisc. Administrative Officer, A. E. Van Thullenar, 222 S. Hamilton St., Madison 3, Wisc.

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Memo

To: SURGE Dealers
Subject: Sanitarians

When you became a SURGE Dealer and attended the SURGE Training Center, we told you that when installing a SURGE Pipeline Milker to never never fail to do the following things --

1. Draw a rough sketch of the installation you propose to make.

2. Show this sketch to
   A. The health department who is responsible for the milk supply from your customer's dairy farm --

   B. The milk plant fieldman who represents the dairy that will pay for your customer's milk each month --

If you do what you were told to do at the SURGE Training Center, you will avoid some difficulties that might come up later on -- and the dairyman who buys a SURGE Pipeline will be a lot happier too.

SURGE

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