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Dairy and Food Sanitation

A Publication for Sanitarians and Fieldmen

- PCB's in the Food Chain and Regulatory Activities
- Tanker Receiving Losses in Fluid Milk Operations
- Warehouse Sanitation
- What We Have Learned From Metering Milk
- New York State Experiences With Antibiotic Testing

A Publication of the International Association of Milk, Food and Environmental Sanitarians, Inc.

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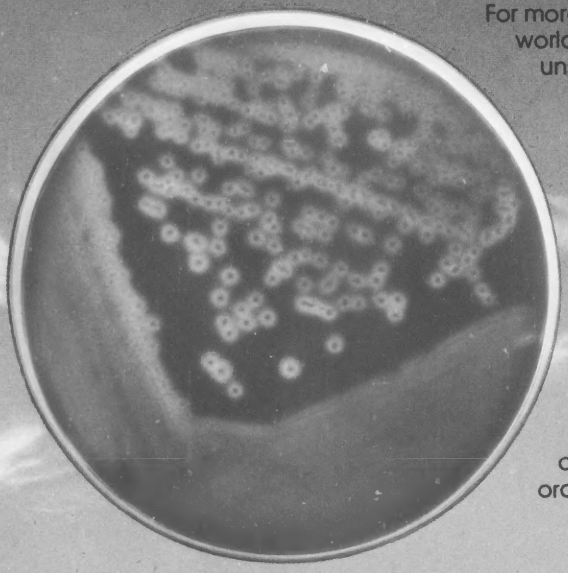

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Dairy and Food Sanitation

March, 1981

PCB's In the Food Chain and Regulatory Activities

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PCB'S, polychlorinated biphenyls, are an example of the speed with which technological advances are made and instituted before the effects of advances may be fully known. PCB's have proven themselves to be dangerous chemicals, but their destruction or breakdown is difficult, due to properties of heat stability, and resistance, toxicity, and nonflammability. Examples are given of PCB leakage, and the widespread effects of such accidents. A number of regulatory acts, and proposals to remove PCB-containing equipment from food processing plants are discussed.

A symptom of the modern world in which rapid technological advances have, at times, outstripped ability to foresee and forestall the consequences of such advances is polychlorinated biphenyls, PCB's. To put the problem of PCB's into perspective, remind yourself of DDT, agent orange, mirex, asbestos, dieldrin, and DES. Each compound is a symptom and, with other compounds, diagnosed as some of the negative products, or cost, of advances made by man in the last 50 years.

The long-term effect of these compounds on the ecosystem was not foreseen and only became apparent as time passed and methods of detection, communication, and epidemiology were tuned to these problems.

Polychlorinated biphenyls comprise a family of organic chemicals of quite remarkable chemical and physical properties. These properties include heat stability, heat resistance, toxicity, and nonflammability. These chemicals are biphenyl molecules that have been chlorinated to varying degrees to about 210 possible combinations with the degree of toxicity dependent on the degree of chlorination and the isomeric form. Those PCB's having five or fewer chlorine atoms tend to be more toxic than higher chlorinated biphenyls whose pattern of toxicity is associated with a longer half life and less susceptibility to metabolic alteration or degradation by the liver and other organs.

Studies have shown that PCB's containing six or fewer halogen atoms are readily absorbed from the intestine, are not excreted to an appreciable degree and are metabolized to more polar compounds stored for long terms in the skin and adipose tissues. Tissues from man and animals show PCB mixtures with more than 50% chlorination (more than 5 chlorine atoms) which suggests that PCB's with 5 or fewer chlorine atoms are more readily metabolized.

Also of importance in discussing toxicity of PCB's are the findings that commercial preparations contain impurities such as chlorinated dibenzofurans. It is not yet known in the Yushu incident, whether such a contaminant itself or in combination with PCB's produced the observed effects.

The Yushu, Japan incident of 1968 has been the source of most of the data on the toxic effects of PCB's on humans. This incident involved rice oil ingested by 1200 individuals which was found to have been contaminated with an average of 2500 ppm. of PCB's. The average cumulative dose that caused overt observable effects was 0.07 ounces or 2000 mg. in a one time exposure. Effects noted include chloracne, discoloration of the gums and nail beds, swelling of the joints, and waxy secretions from glands of the eyelids.

Unfortunately PCB's are bioaccumulative; that is, they are accumulated in the tissues of food species and are passed on to the feeding species.

Presented at the 67th IAMFES Annual Meeting. Milwaukee. WI. July 30. 1980.

Toxicity data, based on laboratory studies on animals, has demonstrated a definite low level exposure rate and more serious chronic toxicities such as liver damage, reproductive effects, and tumor production. PCB's are known to cause birth defects, miscarriages and still births.

PCB's were first marketed in 1929 with uses in paint, electrical condensors and motors, lights and transformers. PCB's were also widely used as a pigment fixative in carbonless carbon paper. It is estimated that 285,000,000 pounds of fluids containing PCB's are in use in transformers and 400,000,000 pounds in capacitors in the U.S. today. Also, an estimated 250,000,000 pounds remain in highway lights, caulking compounds, air conditioning motors, small appliances, flourescent lights, hydraulic fluids and other products. About 1.4 billion pounds of PCB's were produced in this country. Four percent have been destroyed, 11% are still in the environment and 19% are under varying degrees of control in land fills.

Americans have been exposed to PCB's via various routes through air, water, food, and direct contact. Some of these exposures are the result of examples as follows:

1969. Leak of PCB's into Escambia Bay, Florida in which less than 1 ppb. in the water killed half of the exposed shrimp within 15 days.
1971. 16,000 tons of fish meal containing PCB's from a leaking heat exchanger in North Carolina was used in finished feeds for meat animals, poultry and fish.
1977. Fish meal in a warehouse in Puerto Rico was contaminated by PCB's leaking from fire damaged transformers and was uncovered when PCB's were found in the tissue of chickens fed a feed processed from the fish meal.
1976. Sewage sludge being used by residents of Bloomington, Indiana to fertilize their gardens was found to contain high concentrations of PCB's from a local electric firm.
1979. Animal feed ingredients in Billings, Montana were contaminated by PCB's from a damaged transformer. This latest incident resulted in a 19 state and 2 foreign country investigation. A total of approximately 800,000 chickens, 3,800,000 eggs, 4,000 hogs, 74,000 pounds of bakery goods, and 800,000 pounds of assorted animal feeds and ingredients were destroyed.

Also in 1979 a farmer inadvertently used PCB's as a carrier for pesticides applied to cattle.

The toxicity of PCB's should be evident, as should their widespread use, availability in the environment, and potential for catastrophy. A critical point has been reached in this country, a point that Japan reached in 1972, with the regulation of PCB's to an extent to attempt removal of the disaster potential. The EPA, USDA and FDA published on May 9, 1980, proposed rules to remove this disaster potential.

PCB's are a symptom of products of the rapid technological advances worldwide, in this century. Hopefully these steps are the last that need be taken in response to the problem. However, that hope is somewhat diminished as the vast array of compounds in use today and the development of society advances.

The U.S. Department of Agriculture (USDA) enforces meat and poultry inspection acts. Since 1970 that agency has denied requests for new food producing equipment which contains PCB's. The agency did not, until a February 29, 1980 proposal in the *Federal Register*, attempt to reevaluate or remove machinery installed before 1970. In that proposal the USDA formalized the process of denying entry of new or replacement equipment which contained PCB's into plants regulated under the Federal Meat Inspection Act, the Poultry Products Inspection Act, or the Egg Products Inspection Act. These regulations will become effective sometime in the next several months.

In the *Federal Register* of May 9, 1980 the USDA published a proposal which is considered a second step in the attempt "to eliminate essentially all potential sources of PCB contamination". Under this proposal all equipment containing PCB's, except capacitors containing less than 3 pounds of PCB's, must either be removed from the plant or flushed to a level of less than 50 ppm PCB's, by weight, in the remaining fluid. Also, any PCB-containing fluids of greater than 50 ppm must be removed from the premises.

The Department of Health and Human Services' Food and Drug Administration (FDA) enforces the Federal Food, Drug and Cosmetic Act. Under that act the FDA on July 6, 1973 (38FR18096), under 402 (a) of the Act, issued regulations to control the contamination of foods, animal feeds and food packaging materials with PCB's. This regulation included the establishment of tolerances for unavoidable PCB residues from environmental contamination.

In establishing those tolerances the FDA recognized that levels of unavoidable PCB contamination would decrease. The FDA stance was to reduce the tolerances established as PCB contamination became more avoidable. Also included was a provision to restrict the use of PCB's in food processing plants (21CFR110.40), animal feed (21CFR500.45) and food packaging material manufacturing (21CFR109.15).

In the *Federal Register,* April 1, 1977 (42FR17487), the FDA proposed reducing allowable tolerances of unavoidable PCB contamination of foods. These are now in effect, with the exception that the proposed 2 ppm tolerance for fish is stayed, pending resolution of a petition concerning that tolerance.

The *Federal Register* of May 9, 1980 (45FR30984) contains an FDA proposal to amend its regulations on PCB's. This proposal provides that the use of PCB-containing equipment is stopped and the equipment removed or PCB-containing fluids are flushed to remove fluids containing greater than 50 ppm from food, food packaging, and animal feed processing plants. Additionally, food manufacturers will be required to either analyze susceptible raw materials for PCB's or obtain them under a certificate or suppliers guarantee regarding their PCB content.

The Environmental Protection Agency (EPA) enforces the provisions of the Toxic Substances Control Act. In that 1976 act Congress specified a timetable and procedure for regulating PCB's by singling them out. This Act provides the EPA with the authority to control the manufacture, processing, distribution, disposal and marketing of PCB's.

The manufacture or distribution of PCB's was banned by the EPA, effective July 2, 1979.

Exempted, in general, from this ban are PCB's in totally enclosed systems and a few uses which are not totally enclosed. Any fluid which contains less than 50 ppm of PCB's has also been exempted from the ban.

Enough of the rules and regulations that govern our lives. They are a changing facet of the PCB problem. Other facets include profit motives, emotions, attitudes, and the way man thinks. Regulations are a two-way street. They are designed as a means to preclude or diminish the effects of a problem. They also restrict the use and development of innovative practices. The PCB story given thus far illustrates that there are some fundamental ideas to keep in mind during daily operations.

You need to continuously remind yourself that you live with potential problems each day on the job, at home, even on vacation. A balance must be struck in actions between absolute freedom to indiscriminately perform jobs, and the everpresent requirement of regulatory agencies. In the current society everyone is required to become aware of hazards associated with different functions of his or her job, and to balance these hazards through judgment and prudence in actions. Be prepared to react, reconstruct, and correct those inevitable problems which occur. Consider the risk/benefit ratio of the retention of properly identified and stored samples of raw materials and finished products which your firm handles.

There is much to learn from the various PCB incidents. The government is establishing revised interagency communication modes to enable a better response to these problems. Mandatory regulations covering the activities of industry are in effect or are proposed. Industry should realize the potential for accidents and errors and be prepared to react to new technology and findings on compounds now in use.

The FDA is an already overburdened agency whose employees would rather not have another regulation to enforce, another incident to investigate, or another public outcry. As representatives of industry and as individual taxpayers, you certainly do not want continued expansion of regulatory agencies. The industry is relied upon to remain aware of, prevent and be prepared for such things as PCB accidents. Agencies are embarking on programs of education, surveillance, and cooperation with industry to assist in prevention and preparedness.

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TANKER RECEIVING LOSSES IN FLUID MILK OPERATIONS[1]

W. J. HARPER AND M. G. SMITH

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The Ohio State University

Analysis of the washings from raw milk tankers for BOD and COD revealed an average milk equivalent loss of 78 pounds of milk per 6000 gallon tanker. The mean loss represented 0.15% of the milk received and a BOD coefficient of 0.15 pounds/1000 pounds of milk per day. The loss per tanker increased in relationship to the time that the tanker stood at the plant before unloading.

It's assumed that bulk tank milk receiving losses are a minor portion of fluid milk operations' overall losses. Reported mean losses are 0.2 pounds of BOD per 1000 pounds of milk received (*4,6*). Methods of recovering raw milk from tanker rinsings have been proposed by several investigators (*1,2,3,4,6*). Tanker receiving losses for a large mid-west milk, cottage cheese and ice cream plant are reported, particularly the effect of the time the tanker stood before unloading.

The BOD and COD recovered from washing 6,000 gallon tankers at the plant was analyzed. Sampling stations had been established at the plant which received between 1.2 and 1.8 million pounds of milk daily, to permit segregation of wastes. Weekend sampling was done because no processing or CIP was in operation at that time, except in the plant receiving room. Tanks were washed one at a time, so results could be related to specific tankers. The time that each tanker stood before unloading was recorded, and in all cases, tankers were agitated with air for 15 minutes prior to unloading. Following unloading, the connecting hose was drained prior to the start of clean-up. Cleaning was done by an automated CIP procedure, following manufacturer's recommendations. Water usage of the CIP operation was computer-monitored. Samples were collected with a Manning automatic sampler and handled as recommended by the U.S. E.P.A. (*7*).

Flow proportional samples were collected, refrigerated and analyzed within 24 hours for both BOD and COD. BOD and COD analyses were done by standard procedures (*1*).

Analyses were made for 18 tankers: 6 in May, 6 in June and 6 in September. Mean ambient temperatures were 65°, 76° and 78° F, respectively. The time that tankers stood at the plant prior to unloading ranged from 15 minutes to 5 hours, with most unloaded within two hours after arrival.

The total volume of rinse water and cleaning solution used per tanker was 1620 gallons, or 32 gallons per 1000 pounds of milk received. The water volume used for all tankers was the same, within 50 gallons, plus or minus.

Ranges and means values for BOD and COD are shown in Table 1, with calculated milk equivalent loss. The equivalent loss was calculated on the basis of 1.0 pounds of BOD (or 2.0 pounds of COD) equivalent to 10 pounds of 3.5% milk. The equivalent loss ranged from 43 to 290 pounds of milk per day per tanker, with a mean loss of 76 pounds. This represents a 0.15% milk equivalent loss and a BOD loss of 0.15 pounds/1000 pounds of milk received, which is slightly lower than previously reported losses (*2,5*). The highest loss would represent a 0.56% milk loss and a BOD loss of 0.56 pounds/1000 pounds of milk received.

The amount of time the tanker stood before unloading and its effect on losses is shown in Figure 1. Bars represent the means and lines represent the range of values obtained. Results clearly indicate an increase in milk equivalent loss with increased standing when the same agitation procedure was used for each tanker. In one instance, after data was collected, a tanker which stood for 5 hours before unloading was given extended air agitation of 45 minutes and the milk equivalent loss was 202 pounds, as compared to a mean loss of about 250 pounds for tankers given 15 minute air agitation.

Based on a Class I raw milk price of $13.38/100 pounds, the residual milk in a 6000 gallon tanker after unloading represents an average loss of $10.44 per day, or $38.80 per day for the highest loss. Based on 7 days operation, the average annual loss per tanker is $3,810. For the plant involved, which received 30 tanker loads of milk per day, the annual average loss would be $114,318. The upper range of 290 pounds of milk lost per tanker per day amounts to an annual loss of $424,860.

[1]*Supported by a grant from the U.S. Environmental Protection Agency.*

While the loss per tanker is low, the cumulative loss becomes highly significant. Trials suggest that collection of two 20-gallon bursts through the spray balls of each tanker reduces this loss by 80%. One possibility is to put rinsings directly into the raw milk silo storage tank, rather than building a separate collection system. Assuming pure water is used, the dilution factor involved is 0.67%. Based on a recovery of 62.5 pounds of milk in 40 gallons of water, the actual dilution would be 0.54%.

While dilution is clearly an illegal process in most markets today, need exists to carefully evaluate current regulations and determine relative merits of minimal dilution as compared to the economic loss and pollution of wasted milk in tanker washings.

Results clearly indicate that prolonged standing prior to unloading increases milk loss by as much as 3.7 times. Wherever possible, the arrival of tankers should be scheduled to minimize time between arrival and unloading. Of course, this is easier to recommend than to accomplish, but another alternative is to develop more effective methods of mixing before unloading, in order to minimize adherence of milk to the tanker wall.

A possible error in interpretation of milk equivalent losses presented is that with standing, the ratio of components in the milk residual changes, so that the ratio of 10 parts milk to 1 BOD may not be valid. High fat content in such rinses is to be expected. Complete analysis of protein, lactose and fat in rinsings would be necessary to determine the validity, or lack of validity, of the BOD/milk ratio. Concentrations of compounds in the total waste water in these tests were too low to obtain valid analyses for components.

TABLE 1. *BOD, COD and calculated milk losses from the rinsing and washing of milk tank trucks.*

No. of Trucks	COD Range	COD Mean	BOD Range	BOD Mean	Mean Milk Equivalent Loss
18	650-4300	1800	330-2350	920	76 lbs.

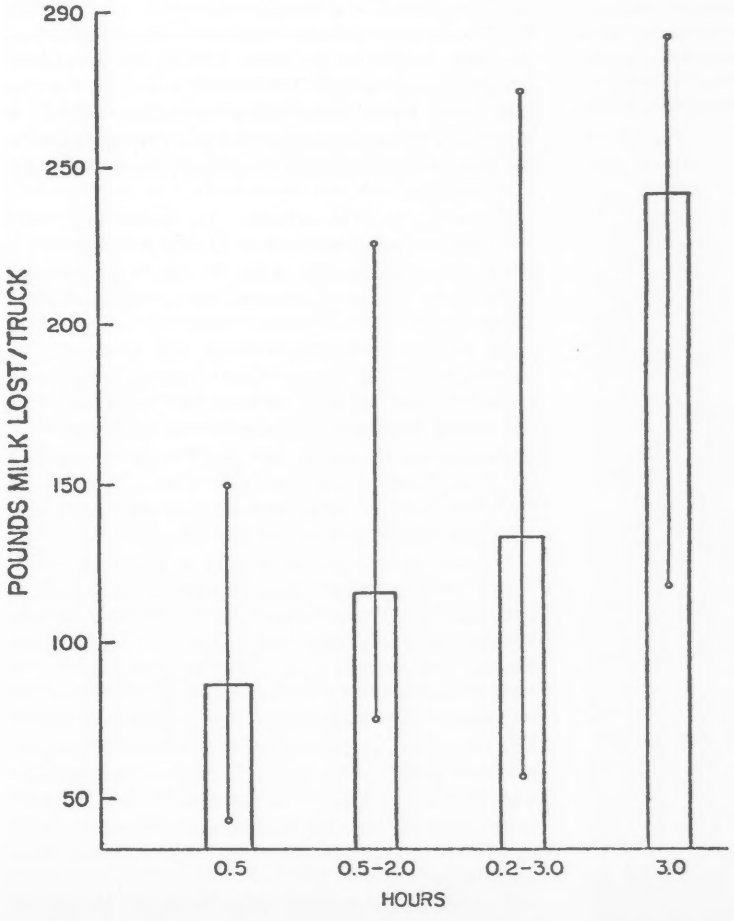

Figure 1. *Effect of Tankers Standing Before Unloading on Milk Loss (BOD X10)*

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MAKING 'CLEAN IS KEEN' A WAREHOUSE MOTTO

CHRIS LECOS

FDA Public Affairs Staff

FDA's message to operators of food storage warehouses is a simple one: Ignorance of the law is no excuse when it comes to good sanitation practices. Some FDA regional and district offices are using educational workshops to stress the point that informed warehouse operators and their employees are the real solution to any food contamination problem.

The one-story warehouse stands on a 5-acre site in a rural area about 25 miles northwest of Boston. Built 8 years ago, it has an enclosed rail siding and truck shipping docks. About $200 million worth of food flows in and out of the modern facility each year - stored there until it is shipped to retail food outlets in Massachusetts and New Hampshire.

The first indication of insanitary conditions in this warehouse occurred about 3 years ago when two investigators for the Food and Drug Administration went there to check on a consumer's allegation of glass in a can of tunafish. Their mission took on added dimensions after they observed signs of rodent infestation - pellets, nesting material, gnawed paper goods, and a strong odor of urine around a shipment of canned fruit juices warehouse employees were cleaning up and which, they admitted to the inspectors, had become contaminated after the shipment had been received.

A week later, a team of FDA investigators went through the warehouse making visual observations, taking notes and pictures, making tests, and collecting samples for later laboratory analysis and verification of the widespread, unchecked, rodent infestation they had found. Their examination of 80 lots of food revealed rodent filth "in, on or around" the wide variety of products. The investigation resulted in a State-imposed embargo to prevent any foods from going out of the warehouse, and a U.S. district court approved seizure of $4 to $5 million worth of products.

The 80 lots of food that FDA built its case on represented only 2 percent of what was stored in the huge complex. But this was enough to tie up most of the food kept there and to persuade the court to dispatch Federal marshals to seize the products. Was all the food seized actually contaminated? The answer is no, but the fact that it was being stored under conditions whereby it might have become contaminated gave FDA the power to act under the provisions of the Federal Food, Drug, and Cosmetic Act.

According to FDA officials, this distinction in the law - whether contamination is actual or potential - is often misunderstood by many of the approximately 25,000 food storage warehouses in the United States. Lamar H. Furr, a compliance officer for FDA's district office in Atlanta, explained it this way to a group of warehousemen in Macon, Ga.: A large number of sanitation and other violations in warehouses are committed through ignorance of the law, but "you (warehouse operators) are still bound by the law whether or not you know its requirements." The law's provisions and its definitions of adulteration and other illegalities were then explained to the warehousemen.

The law, he said, further defines an adulterated food as one which had been "prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth or may have become injurious to health." The emphasis is on what "may" happen.

Furr continued: "This section of the law is saying simply that when food products are prepared, packed or held (as in your warehouse) under insanitary conditions, the food products are legally considered adulterated. These foods are subject to action under the law - whether or not they are actually adulterated. FDA must prove only that conditions exist that could lead to their adulteration."

It is not a new message. FDA has been making the same point for years. But it is being stressed again in a series of workshops on warehouse sanitation. The first

Reprinted from FDA Consumer, *November, 1980.*

"The investigation resulted in a State-imposed embargo to prevent any foods from going out of the warehouse, and a U.S. district court approved seizure of $4 to $5 million worth of products."

ones were initiated by FDA's regional office in Atlanta in the closing months of 1979. Representatives of 349 food firms attended. Early this year, FDA's Chicago District Office conducted four workshops that attracted 512 people from 251 establishments. Others had been planned but were curtailed by budget cuts. FDA's Boston District Office began its workshop series in October 1980. Warehousemen and other food operators in Massachusetts, Connecticut, and Rhode Island were asked to attend. The New York Regional Office is planning sessions for spring 1981. To date, the programs have been put on by the regional and district offices on a voluntary basis.

A major feature of the workshop is an audiovisual segment of nearly 90 photographic slides of actual examples of poor warehouse conditions and operations - the kind that can result in contamination of foods stored in a warehouse and bring enforcement actions by FDA. The slides and script were prepared by FDA's Bureau of Foods Industry Programs Branch. The slide presentation was prepared so that warehouse owners and other food establishment operators can present it to employees. Maurice D. Kinslow, FDA's Atlanta regional director, said the package is a vital part of the sanitation workshops FDA officials are conducting on the local level.

"We needed something that could be directed not to owners, managers and supervisors, but to the guy who drives a forklift, sweeps up food spilled on a floor, or who unloads a boxcar," Kinslow said. "FDA and industry trade organizations have useful materials but their content has often been above the understanding of average warehouse workers," he said.

Kinslow considered the seven Atlanta Region workshops held over 2 months to be time and money well spent "because we had some unbelievably good evaluations of the workshops (from the warehouse operators)." The four workshops held by the Chicago District Office, in different Illinois cities in early 1980, were attended by more than 500 people.

"They were hungry for this kind of information," said Philip Sheeler, district director of compliance, "and there was a lot of good give and take. They want to avoid compliance action against them. They don't want complaints from their customers. They don't want to get involved in recalls, seizures and injunctions. And they don't want any of the attendant publicity that might be generated by any legal action."

Kinslow said he tried to encourage participation by mailing a personal letter to industry representatives in his region: "I sort of put it on the line to them that we have a lot of problems in this area, that we are taking legal actions left and right, that we are putting together these workshops, and that we would like them to attend. Sure, there was a subtle warning there, but I think it was effective in generating the kind of interest that we had.

"We felt that once we got them there we could show them something they had not been offered before, an audiovisual presentation they could borrow from us and use with their own employees to acquaint them with the facts of life of food sanitation in a warehouse." Kinslow said he decided to undertake a warehouse sanitation program because of a number of "outrageously severe" insanitary conditions in warehouses in his region.

"It was just a perception of mine . . . that we were having an excessively high number of prosecutions, injunctions, and mass seizures against warehouse operators. It did not matter how many we were prosecuting or closing up, they still continued to come across my desk. So, we decided to have a series of workshops aimed at smaller, independent operators because some of these firms were being prosecuted for the second or third time."

Kinslow launched the first workshop session by reminding a large audience of warehouse operators at Jackson, Miss., of the problems FDA ran into 10 years ago with the industry. Citing a random survey made by FDA in 1971 of 300 dry storage warehouses, Kinslow said the Agency had expected to find about 30 percent out of compliance; instead, its investigations showed some 60 percent were in violation of the law's sanitation requirements. In the same year, he said, the General

"... during the 1975 fiscal year, a total of 11,124 inspections were made of food manufacturing, packing, labeling, and storage establishments for possible sanitation, chemical, and food and color additives violations under the Bureau's program."

Accounting Office (GAO) audited 97 food manufacturing plants in 21 FDA districts and found 40 percent operating under insanitary conditions. Its finding prompted GAO to conclude that a serious sanitation problem existed in the food manufacturing industry throughout the country, leading to more money and manpower being pumped into food sanitation inspections.

"I think there has been considerable improvement over the conditions that existed 10 years ago," Kinslow said, "but I still have too many examples of filthy, rotten conditions to be complacent about it. Very frankly, the very nature of this particular kind of violation is one that fluctuates according to the amount of pressure you put on these folks. If left alone, it is so easy to slip and let little things occur that can create serious problems. Unless pressure is kept on them, they are going to regress."

A wide variety of food products that are processed, packed, labeled, and stored in the United States come under FDA's jurisdiction. Most FDA inspections, especially those involving multiple food storage warehouses, are conducted under what is known as the Food Safety Program that was put into effect by the Agency's Bureau of Foods in the mid-1970's. Data supplied by the Bureau show a steadily increasing level of compliance under the program.

For example, during the 1975 fiscal year, a total of 11,124 inspections were made of food manufacturing, packing, labeling, and storage establishments for possible sanitation, chemical, and food and color additives violations under the Bureau's program. Of that total, 83.4 percent were found to be in compliance with the law. The total included 3,108 inspections of warehouses, of which nearly 84 percent were found to be in compliance.

At present, only about 5 percent of the inspections being made under the Food Safety Program are revealing violations of the law, requiring Agency enforcement action, although the noncompliance level for warehouses alone is around 10 percent. During the first 10 months of the 1980 fiscal year (through last July 31), less than 4 percent of the 13,000 inspections made were out of compliance with the law. The total includes 2,322 inspections of warehouses, of which slightly less than 10 percent were found to be in violation.

Sanitation problems are the predominant violations found. These are those caused primarily by rodents, insects, and birds, and according to an earlier 1976 study by FDA, generally are responsible for almost 70 percent of the domestically produced food that has to be destroyed or diverted to nonhuman food uses because of FDA enforcement actions.

FDA officials readily admit that this effort barely scratches the surface of the total amount of food involved and that the Agency is faced with an almost impossible task of trying to monitor the safety of all foods, both that which is produced in this country as well as that imported here from other nations.

The enforcement of food safety standards is just a part of FDA's broad responsibilities under the Food, Drug and Cosmetic Act, a law which today has placed some 150,000 food, drug, cosmetic, medical device, radiological, and other firms under its jurisdiction. Some 79,000 of these are food establishments which manufacture, process, ship, pack, relabel, and store (warehouses) food.

Currently, say FDA officials, FDA inspects food storage warehouses on the average of once every 7 years. However, FDA at present has contract arrangements for inspections with 34 States. During the 1979 fiscal year, the Agency said, 8,221 warehouses were inspected with 2,253 conducted by FDA, 5,560 by State agencies, and 408 were done jointly by FDA and their State-level counterparts.

Dairy and Food Sanitation

The new IAMFES magazine, *Dairy and Food Sanitation* addresses many of the same concerns as does the *Journal of Food Protection. Dairy and Food Sanitation*, however, provides articles of immediate interest and application to the work of the practicing sanitarian, fieldman, and quality control person.

As such, it complements the scientific *Journal of Food Protection,* which continues to offer the latest research in milk and food sanitation and technology.

In addition to articles, *Dairy and Food Sanitation* contains departments formerly included in the *Journal*, but they're expanded in the new magazine to offer readers more complete information about news, events, and others in the field. Among the expanded departments are news about IAMFES affiliate members, meetings, and events; Association events; new product news; excerpts from such publications as the Center for Disease Control's "Morbidity and Mortality Weekly Report," and the Federal Register. New 3A and E-3A Sanitary Standards and amendments to existing standards are also included in *Dairy and Food Sanitation.*

Regular publication of *Dairy and Food Sanitation* began this January. Give the portion below to a colleague who might like to receive *Dairy and Food Sanitation*, or to request additional information about IAMFES and the *Journal of Food Protection.*

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WHAT WE HAVE LEARNED FROM METERING MILK

HAROLD F. STONE

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With the increased use of farm bulk tanks to measure quantities of milk came increased difficulties in tank calibration. Differences between farm tank stick measurements and milk plant meters or scales made it necessary to find a new way to locate inaccuracies quickly and efficiently. The realization that a meter needed special care by a trained person led to the development of a more efficient method of checking the accuracy of farm bulk tank measurements. The answer came with a portable meter rig which could be moved easily where it was needed.

Some twenty years ago the ten-gallon milk can was replaced by bulk tanks as a method of handling producer milk. These tanks were either calibrated at the factory or after installation in the milk house so that the dairy farmer would get paid accurately for the pounds of milk he produced.

At the time it was thought the accuracy of tanks should be checked every couple of years or whenever changes were noticed in the floor or the tank. In most cases very little rechecking was done after installation.

By the 1970's the situation grew more complicated because of increased production: there were many every day pickups, resulting in twice the volume of milk moved in and out of a tank that it was designed to handle; and there were two tanks in some milk houses where previously one had been sufficient.

Consequently, it was an endless job trying to keep up with accurate measurement checks on new tanks installed and on used tanks that were moved. The measuring procedure used, prover pails, was inadequate and the search was on for a more efficient method of checking the accuracy of farm bulk tank measurements.

One university-run operation utilized a meter measurement setup for on-site farm pickup. This was a good, accurate working method for use on one truck, but the expense of putting meters on every rig was great.

The alternative was to build a portable meter rig which could be moved easily where it was needed[1].

After completing installation of the metering setup in a van-type vehicle, two months were spent checking the equipment by metering the same loads of milk over and over. The results were better than expected.

This meter method involved traveling with the farm pickup truck and metering milk from each farm tank after it was measured with a stick. If the meter indicated the tank was incorrect by 1/32 of an inch or more,

[1] *One example is the outfit made by Clarence Drier, Accurate Metering Systems, Inc.*

a second measurement was made by prover pail on a day when the tank was empty. In this way, checkers concentrated on known trouble spots rather than to use valuable time on tanks that measured accurately.

As a backup measure, the accuracy of the metering outfit was tested by prover pail every time a tank was measured.

Components

The different components necessary to make this equipment work include: 24 feet or more of 1½ inch tygon hose; a milk pump; three horse power, 220-volt motor; air eliminator and screen with 1/8 inch holes; meter; air valves for blowing milk out of the system and another for blowing milk from the hauler's hose into his tank so it can be handled easier. An air compressor with a storage tank, an inplace cleaning tank, and lights to flood the inside of the van are also necessary.

Some pumps move about 70 gallons per minute, which is faster than that which most haulers use on their equipment. This means the metering outfit does not slow up the haulers when traveling along with them. From the pump, milk moves through the air eliminator, which by a float mechanism allows the air to go out the top through a 3/4 inch stainless steel pipe, and the milk flows out through the bottom.

This equipment has been used in some rough and hilly country, but had no problem on such land. One suggestion was to install the equipment on a four-wheel drive vehicle, or one incorporating posi-traction suspension on the rear wheels.

Operations

The screen between the air eliminator and meter has a very important function and should always be included. Parts of filter equipment, brush bristles and ice are often found in the screen. This debris would burst the piston if not filtered by the screen.

The meter head should be opened and inspected after each day's run. Any unusual wear or marks must be investigated.

Keeping track of the amount metered at each stop is done with the tre triple-duplicate ticket from the meter, showing the gallons pumped through each time it is cranked back to 0-gallons. A cumulative record of the number of gallons passed through each time in the meter is indicated at all times on its face, which resembles that of a automobile speedometer.

Findings

Why does the farm bulk cooler get out of calibration in the first place? Some of the more common reasons:

- A poor job was done in the original calibration, especially if tanks are only a few pounds off.

- Those doing the farm calibration 10-20 years ago were not properly instructed.

- The measuring sticks did not have the oil completely cleaned off, causing a rainbow or creeping line. Sometimes the wrong powder product was used on the stick for reading purposes.

- The water was not calm, making waves when measured.

- The measuring pails were not checked and rechecked at regular intervals by weights and measures.

- Poor records were kept on the large tanks when they were first calibrated. For example, contents of a five-gallon prover pail were either poured into the tank without being recorded or a five-gallon increment was recorded, but not poured in.

- Broken floors in the milk house contributed to some tanks being off, especially with the installation of the new 800-3,000 gallon tanks.

The result of increased usage of farm bulk coolers to measure milk may well be increased production, but will inevitably include greater problems with accurate calibration. The portable meter measuring rig, installed on a truck or van, may help to solve these problems quickly and efficiently.

New York State Experiences With Antibiotic Testing

HAROLD S. RUDNICK

Assistant Director
Division of Milk Control
New York State Department of Agriculture and Markets

Because of concern generated by the use of the Bacillus stearothermophilus *antibiotic test, a survey was conducted by the New York State Department of Agriculture and Markets to discover what impact this more sensitive test has on milk producers and processors.*

The B. stearothermophilus *test was found, with individual cows as well as milk in the bulk tank, to be eight to ten times more sensitive than the* Bacillus subtilis *test. It was also found that in thirteen percent of the cows treated, antibiotics were in quarters other than those which were infused. Eleven percent of all bulk tanks at farms checked had a positive antibiotic reaction twenty-four hours after the recommended withholding time when using the* B. stearothermophilus *test. Zero percent were positive using the* B. subtilis *test.*

Milk from treated cows should be withheld for at least twenty-four hours after the recommended withholding time stated on the preparation used.

Having seized and destroyed approximately one-quarter million pounds of dairy products in 1979 which were found to contain growth inhibitors detected by the *Bacillus subtilis* method, and knowing a more sensitive test would become effective in July, 1980, the Division of Milk Control attempted to assess the potential impact of this more sensitive test.

During July and August, 1979, the State Food Laboratory performed the *B. stearothermophilus* and *B. subtilis* tests on 1,054 routine samples collected by dairy products specialists. Antibiotics were found in five of these samples by *B. subtilis* and antibiotics were found in 41 samples by *B. stearothermophilus*. This suggested a possibility of an eight-fold increase in positive results once the new test was adopted.

The Division of Milk Control decided also to conduct a survey of cows treated for:

Mastitis or other infections
Cows fed medicated feed
Intramuscular or intravenous injections
Udder infusion and dry treatment

Among questions which needed answers from the study, most importantly, would increased sensitivity of the stearothermophilus test require longer withholding time? Would the stearothermophilus test pick up antibiotics in the bulk tank after the required withholding time? How much transfer in the cow's udder could be found with the stearothermophilus test? How much carryover was there in the dry treated cows?

It is important to point out that the sole purpose of the survey was to shed light on the probable impact of the more sensitive *B. stearothermophilus* test, both on producers and processors.

The farm survey started in January, 1980. Sample analyses were taken from fifty cows treated with antibiotics. Thirty separate herds were involved in the study. The survey included intramuscular, intravenous, and infusion treatments. Milk from dry treated cows were also examined. Samples were examined from cows treated by veterinarians using both commercial and specifically combined preparations, as well as from cows treated by the producer.

A form was developed which was submitted with each sample. The form provided information on the point of sampling---which quarter or quarters or bulk tank, the volume of milk sampled, type of preparation, and other details. Samples from each quarter and bulk tank were taken at the withholding time recommended on the preparation package or by the administering veterinarian. A second sample was taken twenty-four hours

Among conclusions drawn at the completion of the survey were:

- Analysis of results shows the new test to be approximately eight times more sensitive than the previous test.
- The new test can be lived with if all segments of the dairy industry exercise caution and if producers withhold treated milk at least 24 hours after the recommended withholding period.
- Producers must use a positive system of identifying treated cows.
- Processors must have an ongoing program of producer education and routine testing to assure antibiotic-free milk.

later from the same points. All samples were taken by dairy products specialists and tested at the New York State Food Laboratory.

Preparations administered during this survey covered a wide range of antibiotics, including Penicillin G and penicillin derivatives, Cephapirin, Cloxacillin, as well as a variety of other antibiotics in various combinations.

Of all quarters infused with antibiotics, 52% remained positive 24 hours after the withholding time recommended by *B. stearothermophilus*, while 17% remained positive 24 hours after the withholding time recommended by *B. subtilis*. Similar, but slightly higher, positive results were observed on 17 samples of milk from cows treated with veterinarian administered preparations. Of these, 64% of the quarters were found positive by *B. stearothermophilus* 24 hours after the recommended withholding time. Thirty percent were found positive 24 hours after the withholding time recommended by the *B. subtilis* method. In approximately 13% of the quarter samples tested, antibiotics injected into one quarter were found in additional quarters both at the recommended withholding time and 24 hours after the recommended withholding time.

Cows which were dry treated with antibiotics were also checked and were found to be 25% positive using *B. stearothermophilus* test and 0% positive using the *B. subtilis* test. Eleven percent of all commingled tank samples were found to be positive 24 hours after the recommended withholding time by the *B. stearothermophilus* test. Zero percent were found positive at this time by the *B. subtilis* test.

Based on these results, all New York State producers were asked to use more care identifying treated cows and were advised to withhold milk from treated cows for at least 24 hours longer than stated on preparation instructions.

Information from this survey was presented at five sessions in May, 1980 for milk processors, to alert them that the new test could be as much as eight times more sensitive than the *B. subtilis* test. In the first two months since beginning to use the *B. stearothermophilus* test, the Division of Milk Control in routine monthly sampling of commingled and finished products found 19 samples positive for inhibitory substances. In a similar period in 1979, nine samples were found to be positive using the *B. subtilis* method.

It is probable that the dissemination of these survey findings and recommendations to all segments of the dairy industry in New York State accounts for a doubling of positive antibiotic tests rather than the eight-fold increase that was anticipated.

Among conclusions drawn at the completion of the survey were:

Analysis of results shows the new test to be approximately eight times more sensitive than the previous test.

The new test can be lived with if all segments of the dairy industry exercise caution and if producers withhold treated milk at least 24 hours after the recommended withholding period.

Producers must use a positive system of identifying treated cows.

Processors must have an ongoing program of producer education and routine testing to assure antibiotic-free milk.

It is clear that the increased sensitivity of the *B. stearothermophilus* test leaves little room for error.

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PLEASE PRINT

Can SPC's Be Misleading?

C. K. JOHNS

Stittsville. Ontario. Canada

The Standard Plate Count (SPC) can be seriously misleading. Milks with moderately high Psychrotrophic Bacteria Counts (PBC) may easily escape detection with SPCs run on fresh samples. The main object of the SPC is to assess the care taken in milk production. Psychrotrophs must be given an adequate time to multiply, (ie: 24 to 30 hours), before an accurate count can be taken. Milk samples from milk cooled at low temperatures for long periods should be preincubated. The farmer has nothing to fear from Preliminary Incubation (PI) if he is doing a good job. Regular PI counts should be taken on each farmer's milk to keep the psychrotrophs out of the milk.

The following sentence has appeared in the last two editions of Standard Methods for the Examination of Dairy Products (1): "The Standard Plate Count (SPC) . . . is of considerable value." Few persons engaged in farm inspection or plant quality control would agree with this statement. Why is this?

When raw milk was cooled in cans, cooling was often slow, especially near the surface where the vast majority of bacteria had been carried by the rising cream. Here the temperature was high enough to allow for considerable bacterial multiplication, which continued until a sample was taken at the receiving station or plant. Usually the lactic acid bacteria made up a considerable proportion of the bacterial flora; these generally showed up in the SPC. However, with farm bulk tanks, cooling was faster, and to a lower temperature. This inhibited the growth of these acid-formers and other species with minimum growth temperatures of around 50 F, but allowed the growth of our worst enemies, the psychrotrophic bacteria. Unfortunately, some species of psychrotrophs failed to form recognizable colonies at 32 C for 48 h., so SPCs were frequently lower than Psychrotrophic Bacteria Counts (PBCs) (5). In one instance the PBC was 13 times higher than the SPC. Thus milks with moderately high PBCs may easily escape detection with SPCs run on "fresh" samples.

Since the main object of running bacterial tests on raw milk is to assess the care taken in its production, it is interesting that in one of the three Canadian universities where collaborative studies were carried out in the early 1960s, it was found that on 56% of the farms where equipment was obviously in unsatisfactory condition, SPCs were not over 25,000/ml (6). Obviously in such cases the SPC furnishes misleading information.

What can be done to increase the value of the SPC? In the comparative studies conducted by Hartley et al. (3), the only bacteriological test which showed a significant correlation with production conditions was the PBC. Unfortunately this test takes too long to be considered for routine testing. And since psychrtrophs generally make up a relatively small percentage of the total count, why not give them a chance to multiply before plating? The importance of such a procedure was recognized in Britain over 50 years ago (2). In County Clean Milk Competitions, instituted in 1920, samples were held at 60 F for 24 to 30 h before plating. The author, back in 1930, proposed Preliminary Incubation (PI) at 55 F for 18 h to increase the effectiveness of the Methylene Blue Reduction Test (*4*).

With the introduction of farm bulk tanks, where cooling was often substituted for cleaning of equipment, he felt the need for PI had greatly increased. And at the International Dairy Congress in 1962 the following resolution was passed (2): 'Where milk has been cooled at low temperatures for long periods, it is desirable to preincubate samples before carrying out tests. Further it will be helpful, both from the point of view of hygiene and the assessment of the suitability of milk for processing, to develop new and simple tests for the identification and determination of the bacteria concerned'.

Another aspect of bacterial counts which has only recently received greater attention is the recovery of bacteria injured by heat or sanitizers. In studies at Ottawa and Edmonton, samples representing only two milkings were subjected to PI. When held at 3 C (38 F) for 24 h and again subjected to PI, four times as many samples 'blew up' to over 100,000/ml, indicating that the extra time had allowed recovery of injured organisms. Thus, in order to get the full value of PI, samples representing only two milkings should be held an extra 24 h before being held at 55 C for 18 h.

The objection is sometimes raised that it is unfair to the producer to subject his milk to PI since he holds it at a much lower temperature. That he has nothing to fear if he is doing a good job is shown by the following results obtained at the Central Experimental Farm in Ottawa, Canada in March 1961:

BEFORE PI		
SPC	Coliforms	Psychro.
8,000	< 1	40
2,200	< 1	40
3,400	< 1	10
6,000	< 1	30
4,000	< 1	20
3,000	< 1	20
2,700	< 1	< 1

AFTER PI		
SPC	Coliforms	Psychro.
9,900	< 1	780
2,600	< 1	15
2,800	< 1	15
3,800	< 1	70
1,400	3	130
900	3	200
2,800	< 1	230

These results confirm the contention that the udder flora show little or no growth during PI at 55 F, while bacteria coming from inadequately cleaned and sanitized equipment may increase a hundredfold or more. And as Barnard has reported, the answer to large increases in SPC between farm and pasteurizer is to keep the psychrotrophs out of the milk by regular PI counts on each producer's milk.

So much for raw milk samples. What about pasteurized products? The urgent need for some form of pre-incubation was recognized by the late Wm. K. Moseley over 25 years ago. When trouble-shooting in plants, he found SPCs on 'fresh' samples were of very limited value. So after the initial plating he started holding samples at 45 F for 5 days. The results were most revealing. After 5 days many samples with reasonably low SPCs on the initial plating were up in the millions! By sampling each product from each filler, he could pinpoint the source of the psychrotrophs. However, it was 1972 before the Moseley Keeping Quality Test appeared in the appendix of Standard Methods (*1*). After his departure from Moseley Laboratories in 1969, he continued to do some consulting work, and soon convinced himself that five days was not long enough. Unfortunately, he discarded nearly all of the results of comparing 5 and 7 days. Of those he sent me, a few are shown in the following table:

Product	Standard Plate Count after:	
	5 days	*7 days*
Homo. gallon	4,600	1,500,000
" ½ "	6,400	2,400,000
2% "	4,500	180,000
" ½ "	5,400	450,000

Here again is evidence of recovery of injured bacteria although much slower at 45 F than in raw milk subjected to PI at 55 F. And needless to add, there is no need for an initial SPC on fresh products. More recently Moseley considered an SPC over 3,000/ml after pre-incubation for 7 days indicated a need for improved plant sanitation (*7*). Plants which can regularly meet this standard should have no problem with shelf-life from bacterial growth.

From what has been presented above, it should be obvious that the SPC, applied to 'fresh' samples, can be seriously misleading. The simplest way to overcome this weakness appears to be by subjecting samples of either raw or pasteurized products, before plating, to conditions which will encourage the growth of psychrotrophic bacteria.

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Affiliate News

Sanitarian Registration Key Issue at KS Meeting

The issue of sanitarian registration was very much present throughout the 51st Annual Conference of the Kansas Association of Sanitarians, held last fall in Great Bend, KS.

The Professional Examination Service test for sanitarian registration was offered in two parts the first day of the Conference. The group who took the test were the first in Kansas to do so, and several discussions were held throughout the meeting on the "pros" and "cons" of mandatory state registration.

As far as program sessions were concerned, they were varied, addressing such subjects as "Chemical Exposures: Formaldehyde," "Fundamentals in Cleaning," "Hazardous Wastes," "Product Preparation and Storage for Vending Machines," "Product Safety," and the new IAMFES journal.

"This business of trying to control chemicals one chemical at a time is futile, because there are hundreds of compounds," explained John Irwin, Chief of Occupational Health & Noise of the Kansas Department of Health and Environment. He spoke on "Chemical Exposures: Formaldehyde." "Toxic metals in paint pigments, for example are a fact of life. Many problems occur with lead in industry," Irwin said "The problems aren't with inhalation, but with eating the lead. It's on workers' hands when they eat lunch or smoke," he explained. "We're now testing chemicals at levels of sensitivity we never even heard of before," he said.

An entirely different problem was discussed as Les Flake of Diversey-Wyandotte spoke on "Fundamentals of Cleaning." Three basic cleaning problems occur in dairy and food plants, he noted. Fat, proteins, and minerals must be removed from equipment and each of the basic compounds presents its own problems and solutions, Flake said. To clean fats, alkaline solutions are needed, at a temperature no higher than 140° F. Proteins require a chlorine cleaner, but the concentration has to be lower than 400 ppm or stainless steel equipment will start pitting. Mineral cleaning requires that acid compounds or solutions be used, Flake said.

Among problems which vending machine companies encounter in offering safe products to their customers, said Mike Meehan, Landes Vending, is constant changes in temperature and treatment of the product. The refrigerated, unrefrigerated cycle the product goes through means the package sweats and the product may become soggy, he said. Should refrigeration units of vending machines fail, timers won't accept money and won't allow food to be vended, Meehan noted.

Kansas officers include, top, l to r, Larry Starr, First Vice President; Bill Spaniol, Past President; Tom Gross, Past Secretary-Treasurer; Dave Blevins, President; below, l to r, John Mitchell, Secretary-Treasurer; Bob Lancaster, Second Vice President; Dale Wing, General Section Chairman; and John Moshier, Food Section Chairman.

A look at the work of the Consumer Product Safety Commission (CPSC) was offered by Bob Baxter, of the CPSC's Kansas City office. "Much work by the CPSC is being done now on carcinogens, and possible carcinogens," among the thousands of other products the Agency investigates, Baxter said. The source of much information about injuries, deaths, and other problems associated with used consumer products is hospitals, some of which are paid to make daily reports to the CPSC. Only American-made products can be regulated by the Agency, Baxter said. Imports can be regulated by placing the responsibility on the importer, he noted.

The Awards Banquet featured a thought-provoking topic, "Bioethics--Hope for the Future," by Dr. Eugene Fleharty of Ft. Hays State Biology Department. Along with that, of course, was presentation of awards. Bill Spaniol, Wichita, received the Past President's Plaque while Service Awards from the Kansas Department of Agriculture went to Richard Wiggins, Chanute, and John Zook, Wichita. "Sanitarian of the Year" Honors went to Galen Ewing of Great Bend.

News and Events

Foodservice Energy Costs Can Be Reduced

You can reduce your lighting costs by an estimated 30 percent with little, if any, investment. While lighting costs are a relatively small percentage (eight to 10 percent) of a foodservice facility's total energy bill, lighting conservation offers immediate energy and dollar savings. Obviously, turning off lights that are not in use is one way to save energy. Choosing the right size and type of bulb, cleaning fixtures and eliminating unnecessary lights in kitchen and dining areas can reduce your lighting bill even more.

- Standard life lamps save energy when compared with extended life lamps.
- High efficiency flourescent lights will use about 14 percent less energy than older models.
- Incandescent lamps, high intensity discharge lamps and some types of fluorescents can be switched off and on as needed without serious loss of lamp life or performance.
- Relamp to lower wattage where possible.
- Contact your power company for recommendations on lighting design, and the selection of proper equipment and layout.
- Metallic additive lamps and high pressure sodium lamps are two of the most efficient lamps.
- Consider time clocks or photocells that turn off power automatically after closing hours for signs, exterior lights, fountains, waterfalls, etc., on grounds, and exterior lights on buildings.
- Replace resistance-type dimmers with transformer type.
- Investigate the feasibility of short-time (twist-on) timers to control lights in storerooms and walk-in refrigerators or other time-use areas where light is apt to be left on by mistake.
- Have the lighting output in your kitchen measured by a professional. When deciding on proper light levels, don't forget to consult employees, since the light requirements of each person will vary with his age and physical condition.
- Turn off lights when leaving for the day.
- Install individual electric switches to improve control of lighting in specific areas.
- Apply light finishes to walls, ceilings, floors and furnishing to reduce lighting requirements.
- All light fixtures should be replaced on a group basis at regular intervals instead of waiting for individual units to fail, since bulbs decrease in efficiency with age.
- Clean lighting fixtures thoroughly at least once a year, or as needed. Under average conditions, fixtures will collect enough dirt to cause light output to decline at least two percent a month. Dirt and normal deterioration together can cut light output more than 50 percent in two years.
- During winter daylight hours, take advantage of natural lighting whenever possible. Use windows facing south or west to provide lighting where practical, but try to control glare and reflections.
- Post reminders next to light switches to gain cooperation from employees and customers.

Reprinted from the National Restaurant Association's "Washington Report."

Hair Restraint a Foodservice Concern

The average person loses approximately 80 hairs per day (Laatsch, 1979). In a foodservice operation the question must be asked, where do they go and what is the significance if they fall into food? In addition, managers, supervisors, sanitarians and researchers are in conflict with employees over the effectiveness of a hair net, foodservice cap or hairspray for adequate prevention of hair from falling loose from the head or beard. This QA tech brief provides microbial information which foodservice operators can use in preparing policies on hair restraint. Human hair acts as an environmental sampler for microorganisms (Noble and Somerville, 1974). The types and numbers of microorganisms found on hair vary with length and color of hair, the health of the person and the environment in which the individual works (Noble and Somerville 1974). Resident flora found on the hair of the majority of the population are Coagulase-negative Staphylococcus, Micrococci and anaerobic diptheroids (corynebacterium).

As an example of bacterial populations on hair, Rivituso (1980) performed an analysis of 6 persons' hair and found an average count of 2.75×10^9 colony of forming units (CFU). Gunther, (1980) found that hair which had not been washed for six days carried 59,000 CFU per food of hair. Since hair weighs approximately 0.0023 grams per foot, this represents 2.56×10^7 CFU per gram. Hair washed one hour before sampling carried less than 30 CFU per foot (1.3×10^4 CFU per gram). In this experiment *Staphylococcus epidermidis*, a nonpathogenic microorganism, was present at 2,500 CFU per foot (1.09×10^6 CFU per gram). The pathogen *Staphylococcus aureus,* was not found in this experiment. However, it is reasonable to assume that it was probably there in small numbers because it is a very common contaminant to the human skin.

In order for hair to cause a food borne illness a number of conditions need to occur. There must be pathogenic organisms present, and these organisms must be able to multiply at a faster rate than non-pathogenic contaminants. For example, *S. epidermidis* must be present in low numbers, while *S. aureus* must have the following optimal conditions to generate potentially dangerous populations:

1) temperature 30°C-37°C (86°-99°F);
2) pH 7.0-7.5; 3) oxygen; and 4) a broad spectrum of nutrients (Buchanan and Gibbons, 1974).

In comparing these requirements for bacterial growth conditions generally will be suboptimal. Serving temperatures of 72°C (165°F), room temperatures of 23.6°C (75°F), high acidity in many foods above a pH 7.0, and high non-pathogenic bacteria. Finally, *S. aureus* contamination is most likely to originate from either a worker's hands or infested food, as opposed to illness originating from human hair.

This analysis indicates that it is to likely that hair will cause food borne illness. The problem with hair on food is the unsightly picture it presents to the customer and the high probability of a dissatisfied customer.

Customer satisfaction is essential to the success of a foodservice operation. One way to assure customer satisfaction is by preventing stray hairs from contaminating the food. Prevention can be assured by the use of a restraint which will hold the hair when it

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Lake Placid Hotel Cleans Up After Outbreak

It's cold a good part of the year at Lake Placid, New York-scene of the 1980 Winter Olympics-but the management of the Lake Placid Hotel felt some heat last fall when 106 guests attending a teachers convention suffered a gastrointestinal illness, characterized by stomach cramps, nausea, and diarrhea. The New York State Health Department sent four staff members to investigate and, although they couldn't find the exact cause of the illness, their findings led to the hotel being cited for 21 violations of the New York State Health Code.

The investigators reported a wide range of problems: staff members with possibly infectious gastrointestinal ailments at work in food preparation areas; inadequate staff handwashing facilities; foods known to be susceptible to contamination (such as seafood and chicken stock) stored at improper temperatures; improper storage of poisonous materials; inadequate sanitation of work counters and other food contact surfaces; unclean equipment; and dishes stored in such a way they could become contaminated.

The State fined the hotel operators $1,200 (reduced from $7,000). The hotel agreed to correct the problems and immediately initiated a training program for its food handlers. The health department held several training sessions for management personnel and inspected the hotel every 2 weeks to make sure the corrections were being made. By the end of January, the health department felt the Lake Placid Hotel was ready for guests - including Olympic officials and foreign dignitaries.

From: "FDA Consumer" April 1980.

AACC Schedules Symposium

"Cereals: A Renewable Resource" will be the topic of an international symposium sponsored by the American Association of Cereal Chemists and the Danish Cereal Society, August 11-14, 1981. The symposium will be held in Copenhagen at the Carlsberg Research Center in association with the Center.

Dr. Y. Pomeranz, USDA-SEA, U.S. Grain Marketing Research Laboratory, Manhattan, Kansas, and Dr. Lars Munck of the Carlsberg Research Center, Copenhagen, Denmark, are coordinating the program.

Registration for the symposium is limited to 100 participants and 30 spouses. A special program has been arranged for spouses which will include tours of Copenhagen, North Zealand and other areas of interest. Fees are $195 for participants and $90 for the spouses.

A copy of the complete program, including registration and housing information, may be obtained from AACC headquarters. Deadline for registration is July 10, 1981. Contact Dorothy Ginsburg, AACC, 3340 Pilot Knob Road, St. Paul, MN 55121 or call 612/454-7250.

IDF Seminar Set for May

The International Dairy Federation (IDF) will hold a seminar on "The Utilization of Dairy Ingredients in the Food Industry", in Luxembourg, May 19-21, 1981. The seminar is a platform for the exchange of information between world wide experts from the food and dairy industries on the technological, functional, nutritional and legal aspects of such utilization.

The program will consist of 16 presentations by speakers from all parts of the world, including Australia, Canada, Denmark, France, Germany, Netherlands, New Zealand, Sweden, United Kingdom and the USA covering the following topics:

Meat; bakery confectionery; convenience foods; infant foods; dietetic products; beverages; dairy; pet foods.

A preliminary registration form can be obtained from Harold Wainess, Secretary, The United States of America National Committee of the International Dairy Federation (USNAC), 464 Central Ave., Northfield, IL 60093.

Hair Restraints, *con't. from p. 115*

becomes loose. Hair nets and food service caps which totally restrain the hair are the only preventive measures which meet professional foodservice standards.

Hairsprays have been proposed by some people as a method to restrain hair in a foodservice operation. However, hairspray does not adequately restrain hair under normal applications (Savantakis, 1979; Bliznak, 1979; Conger, 1979). In addition, there are several other advantages of hair nets and caps over hairspray. The two types of hairspray on the market are "lacquer-based" and the "softhold" sprays. For "lacquerbased" hairsprays to effectively prevent hair from falling from the head, the application would have to be extremely heavy, to the point of gluing hair strands together. Also, each time the hair is disturbed, the "lacquer-based" hairspray would need to be reapplied (Savantakis, 1979).

"Soft-hold" hairspray contains less lacquer than the one previously stated (Laatsch, 1979). Consequently effective hair restraint application with this type of hairspray is not considered possible.

For these reasons, the only acceptable methods of hair restraint for the foodservice industry are hair nets and total coverage foodservice caps. Hair nets and total coverage foodservice caps do have a characteristic appearance and employees may resist wearing these hair restraints. If this occurs, it is essential that management have a clearly stated policy that can be enforced regarding hair restraint.

Employees should understand the necessity for repeat customer business. Customer satisfaction with cleanliness (personal hygiene), service and food quality are all important factors in establishing repeat customer business. Employees need to understand the necessity and the connections between their behavior and repeat customer business. This understanding will help in acceptance of using adequate hair restraint.

There is little doubt that a customer will become irritated and find food disgusting if hair is found in their food. It becomes critical for a professional foodservice operator to assure no loose hairs are deposited on the food. All persons having any contact with food in the food preparation or service areas-managers, sanitarians, inspectors, employees, tours-must wear a hair net, or total coverage food service cap. Specific attention to proper hair restraint will enhance the prestige and professionalism of the foodservice operation, insure repeat customers, and build toward long-term financial success. R. Swenson and C. P. Snyder.

Reprinted From "Minnesota Environmental Health Association Newsletter."

INCUS Reports on 64th Session of IDF

An eight-man delegation from INCUS, the Interim National Committee of the International Dairy Federation (IDF) in the USA, attended the 64th Annual Sessions of IDF at Bristol, England, September 9-12, 1980.

Members of the INCUS delegation were: Gregory M. Farnham, Dairyland Food Laboratories, Inc.; Fred J. Greiner, Dairy and Food Industries Supply Association; Thomas W. Holzinger, Borden, Inc.; Glenn H. Lake, Michigan Milk Producers Association and United Dairy Industry Association; John H. Nelson, Ph.D., Kraft, Inc.; Robert Nissen, Ladish Co., Tri-Clover Division; John W. Sliter, United Dairy Industry Association; and Harold Wainess, Harold Wainess & Associates, representing International Association of Milk, Food and Environmental Sanitarians. Peter Read, Ph.D., and Robert Weik, Ph.D., both of the U.S. Food and Drug Administration, also were present.

At Annual Sessions, IDF's six Commissions convene to oversee and coordinate investigations in key areas of concern to member countries' dairy industries. The ongoing work of IDF is performed by committees of experts within these Commissions; each committee is accountable to the Commission that establishes it. Committees periodically report on their work, usually at Annual Sessions, so these IDF meetings provide an opportunity for nations' dairy industry leaders to become informed about the progress of experts and to discuss and critique their work. Descriptions of the six IDF Commissions and their 1980 sessions follow.

Commission A-Production, Hygiene and Quality of Milk

This Commission's major area is the production of milk, with specific reference to hygiene, nutritional value, chemical and physical characteristics and quality. It also is responsible for work related to handling of raw milk from the cow to the dairy.

According to INCUS delegates, actions and reports of special interest to the US dairy industry were:

- a proposal for an IDF workshop on genetics, adopted
- formation of two new study groups of experts to investigate 1) mastitis and machine milking and

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INCUS Report, *con't. from p. 117*

2) environmental vs. pathogenic mastitis
- a dissertation on the presence of iodine and how it is introduced into milk through husbandry practices
- a special address by Dr. Courot of France, "Reproduction in Dairy Cattle," in which he illustrated the economic impact of progestation implants, quality checks on bull semen, the role of estrogen, induced lactation, embryo implants and other practices that will be important dairying practices in the future.

Commission B-Technology and Engineering

This commission reviews the best technical procedures to treat, process, package, store and distribute milk and milk products and is involved in engineering aspects of all dairy equipment. Its field also includes cleaning, sanitizing, sterilizing, automation, maintenance and safety of equipment.

In the Commission's session, a group studying the technical aspects of packaging milk and milk products presented an interim report, which included a special address on single service containers vs. multi-use bottles. Hygienic problems with multi-use containers, consumer preferences and labor costs were discussed.

A report and monograph on ultra-high temperature milk processing covered technical, chemical, microbiological and legal aspects and the keeping quality and nutritive value of UHT milk.

Other activities of interest to the US were an address on microbiological problems in cheese, a report on energy use in milk processing and drying plants and reactivation of a group to prepare an updated report on lipolysis defects occurring during manufacturing and storage.

Commission C-Economics, Marketing and Management

Commission C collects and assesses economic statistics related to dairying around the world and studies contemporary marketing and management practices.

The Commission president's annual report, "The World Dairy Situation," gave an overview of production and utilization; statistics on cow numbers, milk supplies, dairy products production, exports and imports; and dairy situations in individual IDF member countries.

Of importance to the US were:

- approval of a proposal to study changes in market conditions and to attempt to establish likely trends for the next five years for liquid milk, fermented milks and fluid cream
- upcoming investigations of the effect on total butterfat sales of butter spread/blends, to be conducted by the seven countries in which these are sold
- establishment of a new subject area to describe commercial organization of the dairy industry, showing the role of producer cooperatives, a description of cooperatives' management structure and of financing systems, including methods for raising capital
- announcement of a seminar, "Computerized Milk Transport Routing," to be held in Toronto in 1982.

"Concerning milk and dairy products competition and sales promotion," reports the US group, "the International Milk Promotion (IMP) group in Commission C is self-supporting (annual dues are. . . approximately $200 US). If the US does become a member of IDF, the US should also join the IMP. The IMP group gathers the world-wide per capita milk and milk product consumption figures for IDF publication. The IMP is encouraging broad participation in an International Milk Day (May 26, 1981)."

Commission D-Legislation, Standards of Identity, Classification, Terminology

The goals of Commission D are to contribute to better consumer protection and to promote fair practices in the trade in milk and milk products.

Although no changes are proposed in the relationship within the IDF/FAO/WHO Code of Principles, "the US should have a tremendous interest in this activity because all of the dairy standards considered by FAO/WHO originate in the IDF groups," states the INCUS delegation.

Commission D will survey national committees on labeling, a subject of significant interest in the US.

According to US representatives, "A report on definitions of heat treatments was undoubtedly one of the most controversial subjects discussed at Bristol." Three definitions were submitted: pasteurization, UHT treatment and sterilization. Many countries objected to definitions for the latter two because of doubt about reliability of analytical methods for distinguishing between them. The definitions also do not agree with those in the US Milk Ordinance and Code for pasteurization and UHT treatment. "If this is to be an international standard, it is important that the US contribute. . .," concluded the US group.

It also concluded US input is needed in upcoming Commission D work on establishing standards for good grade whey powder, lowfat spreads and a guide for the sensory evaluation of milk powder.

Work on a catalogue of cheese varieties and a multilingual dairy glossary continues; results should be of interest to the US dairy industry. US input into the new expert group on nutrition labeling would be helpful to other countries, as the US "is way ahead in this area."

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Food Service Sanitation Notes

Food Service Sanitation Notes *is written by the National Sanitation Foundation. Write to the NSF with your questions on food service sanitation, problems for which you need answers, or issues you feel should be aired. They'll be included in a future issue of* Dairy and Food Sanitation.

Q. What general recommendations can we make relative to product thermometers in foodservice operations?

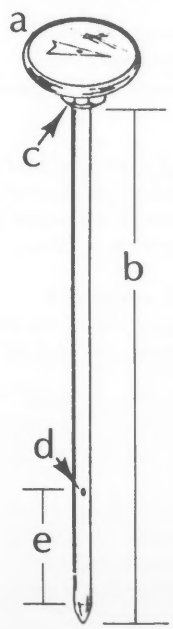
A. The following excerpts from the NSF Pocket Guide, "Thermometers in Food Service," give a few guidelines.

Single sample copies of this Pocket Guide brochure are available from NSF at no cost when a self-addressed, stamped envelope is provided with the request.

INFORMATION FOR SELECTING PRODUCT THERMOMETERS

a. Dial face diameter should be a minimum of 1 inch (25.4 mm) with 2°F (1°C) increments. A range of 0-220°F (−17.8-104.4°C) is satisfactory for most applications. More specific ranges may be desirable in some instances. If the thermometer is not to be used as a "pocket" instrument, a larger dial face is desirable to improve readability.

b. For most evaluations, a minimum stem length of 5 inches (127 mm) is sufficient. Some applications require a longer stem.



c. Some instruments are available with a "calibration nut," immediately behind the dial, for adjusting the indicating needle during calibration.

d. The immersion point on most product thermometers is about 2 inches (5 cm) up the stem. The immersion point varies for different makes, so be sure to read the manufacturer's instructions for specifics.

e. In practice, the temperature on the dial is an approximate average of temperatures being sensed between the immersion point and immediately behind the tip.

MEASURING PRODUCT TEMPERATURE

Sanitize the instrument with an acceptable wash, rinse, and sanitize procedure. You may use alcohol swabs to sanitize the instrument after the washing and rinsing, but be sure to allow sufficient time for the alcohol to evaporate before using the instrument.

Sense the temperature in the thermal center of the product. The thermal center may not coincide with the geometric center. Several readings may be required to determine the hot or cold spots. Keep in mind the sensing distance of the thermometer and its position in the product.

Allow time for the thermometer to stabilize in the product before recording a reading. For best results, observe pointer movement and wait until there has been no movement for at least 15 seconds. The instrument will react at different rates depending on the medium.

Record the reading or take appropriate action.

A complete cleaning and sanitization is recommended between food product temperature measurements. Exercise special caution after using the instrument in raw food products.

WARNING: Glass, liquid-filled instruments are **not permitted** for taking temperatures directly in food products because of the danger of breakage and mercury poisoning.

ADDRESS any other problems or questions you wish clarified or answered to:

Food Service Sanitation Notes
National Sanitation Foundation
3475 Plymouth Road
P. O. Box 1468
Ann Arbor, Michigan U.S.A. 48106

Selected responses will be published in a scheduled issue of *Dairy and Food Sanitation.*

Case Studies in Sanitation

This and future Case Studies in Sanitation *are written by Frank Raffaele, Vice President of Regulatory Compliance, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.*

Case #3-Bacteria

Fannon's Bakery in El Paso, Texas, was the major supplier of institutional sweet-goods in the large growing city. For the past 30 years, as the company passed from one owner to another, new equipment was constantly being brought in. Product lines were expanded to include cakes, cream pies, donuts, eclaires, and a wide variety of coffee rings and frozen turnovers.

In the fall of 1977, Fannon's began to ship and market their frozen eclaires and frozen Boston Cream Pies to institutional accounts in New Mexico and Arizona. In both states, they were supplying approximately 10% of the products utilized in the public school system.

In order to increase their production capacity, Fannon's installed a new automatic pie filler at the infeed to the pie oven. Pie filling was first mixed in one section of the production floor, and then pumped via an Oakes machine to a reservoir tank alongside the oven. A lightening mixer was mounted at the top of the tank to prevent some fillings from separating during breaks and down time. The reservoir tank was filled from the top and had no cover.

After baking, the pies were cooled for a period of 1½ hours before they were packaged and frozen in a conventional freezer, which was maintained at -10° F.

Fannon's management team had been divided over the merits of a blast freezer. They tabled the issue until next year, when it was argued, a decision would be made regarding the proposed new plant facilities that were needed if Fannon's was to expand its frozen accounts. Little did they realize that within a six month period of time, the doors to Fannon's would be closed and the plans and drawings for the new facility would be set aside-forever.

PHOENIX, ARIZONA, January 16, 1978. Mrs. Catherin Smith, working mother with 7-year old twin boys, began to be concerned. Since their return from school, the children seemed abnormal. Lacking pep and appearing pale, they soon began to complain of stomach cramps and headaches. She recalls that it was Ryan who began to vomit first, followed by Matt who developed diarrhea as well. By 6 p.m., the children were running temperatures over 104° F.

As Mrs. Smith pulled into the parking lot of St. Mary's Hospital, she realized her anxieties were shared by others as she encountered scores of troubled parents. The Emergency Room was packed with people, and the scene of 30 small children lying helpless on stretchers was something she would not soon forget.

While physicians and nurses worked through the night to restore electrolyte balance in the body chemistry of the children, the Phoenix health officials began their awesome investigation that would finally lead to Fannon's.

It would be at least another 24 hours before the causative agent of this disaster could be positively determined. Health officials suspected, however, that due to the time element (approximately 4 hours), Staph aureus was the main culprit.

At exactly 9:00 a.m. on January 17, 1978, field investigators from the El Paso FDA office entered the Fannon facility and conducted an intensive 3-day inspection, which involved numerous microbial samples. On January 22, a district court closed the doors of Fannon's and ended a 30 year tradition.

FDA FORM 483

1. A roof leak was noted over scaling containers and raw materials in the mixing room. Micro Sample #1.
2. Condensation and dripping water was noted on a pipe above a make-up table on line #1. Water droplets were seen falling into exposed products below.
   Micro Sample #2
3. Pooling water from a roof leak above the line #1 dough retarder was noted entering the interior of the box around electrical conduits. Said water was dripping into exposed products below. Micro sample #3.
4. The internal temperature of a refrigerated container of liquid whole eggs on line #1 was 48° F. The on board thermometer at the time read 56° F. Micro sample #4.
5. The reservoir at the base of the Bauer Glazer containing whole eggs on line #2 was not properly refrigerated and the product temperature was 72° F. Micro sample #5.
6. An in-line water filter, suspended under a pipe located above the cooler discharge conveyor for the ring line, was loose. Water from the filter was dripping onto exposed finished products below. Micro Sample #6.

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7. The lightening mixer located inside the filler reservoir tank on the pie line was mounted such that the mounting brackets and motor housing were below the lip of the tank. When the tank was first filled, the filling was noted in direct contact with metal brackets and motor housing. No tank cover was provided. Photo #1.
8. The stainless piping from the Oakes machine to the pie filler reservoir was broken down and demonstrated considerable evidence of discolored product buildup which also was odorous. Micro sample #7.
9. The chart inside the recording thermometer for the pie freezer had not been changed since December 1. Photo #2.

Among improvements which were needed:

1. Immediate attention to the depleted condition of the roof is required. Outside contractors should be retained immediately to determine what repairs and preventive maintenance is required to eliminate this serious situation.
2. Condensation must be eliminated from pies especially those directly over product and raw material areas. Proper insulation of the pipes will eliminate the condensation.
3. The pooling water atop the #1 dough retarder must be removed by wet vacuum to avoid the development of mold and insects.
4. Maintenance on portable egg tanks is grossly inadequate. Replace the faulty thermometer on the line #1 tank, and establish a training program for maintenance personnel designed to stress the importance of proper egg handling. Liquid whole eggs should never be stored above 40°F.
5. A refrigeration unit is needed in the reservoir of the Bauer Glazer to reduce the egg temperature to 40°F. maximum.
6. The in-line water filter above the ring line discharge conveyor must be repaired and should be relocated in a less sensitive area.
7. The lightening mixer must be mounted above and outside the filling tank and a cover must be provided.
8. Proper cleaning of the Oakes machine, pump, and stainless piping is an absolute must if bacteriological problems are to be avoided. This equipment must be cleaned in place with hot water followed by a sanitizer and potable rinse after each variety run. It must be broken down, cleaned and sanitized every day.
9. Creamed filled bakery products are extremely sensitive to microbiological contamination and blast freezing is probably the only safe way to get the product from ambiant temperature to below 40°F. quickly enough to keep bacteria from reaching dangerously high numbers.
10. The fact that the record chart in the freezer thermometer had not been changed indicates a serious management problem with respect to responsibility. Data collected must be analyzed daily by technically knowledgeable personnel.

Amendment to 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment

NUMBER 20-12
Formulated by
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

The "3-A Sanitary Standards for Multiple Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-11" are hereby further amended as indicated in the following:

Section I. Standards for Acceptability, Sub-paragraph (2): Add the following materials to the list of Generic Classes of Plastics:

	Maximum Percent of Weight Gain		
	Cleanability Response (Section F Regimen)	Product Treatment (Section G Regimen)	
		Solution I	Solution J
Polyurethane*	1.22	1.59	1.29
Polymethylpentene* *	0.10	0.20	0.20

These standards shall become effective May 11, 1981.

** covered by CFR 177. 1680 for contact with dry food*
** * as covered by 21 CFR 177. 1520*

Committee Reports

The following "catalog" of available educational materials was compiled by the Education Subcommittee of the Farm Methods Committee.

FARM METHODS COMMITTEE

EDUCATION SUBCOMMITTEE

Bulletin NDPC 23 Sept. 1976 Cost $ .50
Name: Guideline for Preventing Rancid Flavors in Milk
Prepared by: Subcommittee on Rancid Milk of the Quality Assurance Task Force, D. K. Bandler, Chairman, Subcommittee, The Northeast Dairy Practices Council, R. P. March, Chairman
Write to: Northeast Dairy Practices Council
118 Stocking Hall
Ithaca, New York 14853

Bulletin NDPC 26 April 1977 Cost $1.00
Name: Guidelines for Milking Parlor Types and Selection. . .and Suggested Milking Procedures in Parlors
Prepared by: A Subcommittee of the Buildings and Utilities Task Force, F. E. Gilman, Subcommittee Chairman The Northeast Dairy Practices Council, D. F. George, Chairman
Write to: Northeast Dairy Practices Council
118 Stocking Hall
Ithaca, New York 14853

Manual Special Report 29 Revised Edition Cost $1.00
Name: Dairy Plant Fieldman Haulers Grader and Tester's Manual
Prepared by: V. S. Packard
Extension Specialist Dairy Products, University of Minnesota
Write to: Agriculture Extension Service
University of Minnesota
St. Paul, Minnesota 55101

Bulletin NDPC 27 Jan. 1977 Cost $ .50
Name: Guidelines for Dairy Manual Management
Prepared by: The Building and Utilities Task Force Subcommittee Chairman, A. R. Grout, The Northeast Dairy Practices Council, D. F George, Chairman
Write to: Northeast Dairy Practices Council
118 Stocking Hall
Ithaca, New York 14853

Bulletin NDPC 25 March 1977 Cost $ .50
Name: Guidelines for Cleaning and Sanitizing Bulk Pickup Tankers
Prepared by: The Cleaning and Sanitizing Task Force Subcommittee (Thomas Chicoine, Chairman) Northeast Dairy Practices Council, D. F. George, Chairman
Write to: Northeast Dairy Practices Council
118 Stocking Hall
Ithaca, New York 14853

Publication 1977 Single Copy Free
Name: "CMT, Your Tool for Detecting Subclinical Mastitis"
Prepared by: Bob Appleman, Extension Dairyman and Ralph Farnsworth, Veterinarian Specialist, University of Minnesota
Write to: Bulletin Room
University of Minnesota
St. Paul, Minnesota 55018

Guide BVMM-27 Single Copy Free
Name: Drug Use Guide: Dairy Cattle and Calves
Prepared by: FDA Bureau of Veterinary Medicine in Regards to Intramammary Infusion Products for Treating Mastitis
Write to: Industry Information Branch
Bureau of Veterinary Medicine
Food and Drug Administration
5600 Fishers Lane
Rockville, Maryland 20857

Guide Cost $2.00
Name: Hoard's Dairyman Herd Health Guide
Prepared by: Recognized Veterinarians - What to do before the Problem Creates a Loss
Write to: Hoard's Dairyman
Fort Atkinson, Wisconsin 53538

con't. p. 123

Education Subcommittee, *con't. from p. 122*

Book 1978 Cost Free

Name: Mastitis Management

Prepared by: Dr. W. Nelson Philpot
Louisiana State University
Homer, Louisiana 71040

Write to: Babson Bros. Co.
2100 S. York Road
Oak Brook, Illinois 60521

Colored Slides Cost $50.00

Name: Milk Quality Tests, sixty colored slides with script including information on procedures, standards, and corrective measures for eight common tests for milk quality

Prepared by: Dr. Sidney E. Barnard
Pennsylvania State University
University Park, Pa 16802

Write to: Dr. Sidney E. Barnard
Pennsylvania State University
University Park, Pa. 16802

Booklet 1978 Cost Free

Name: Milk Producer Aids

Prepared by: HI-Life Rubber Inc.
Ninety Seven Page Booklet on milk producers aids in the production of high quality milk

Write to: HI-Life Rubber Co.
110 Lincoln Street
Johnson Creek, Wisconsin 53083

Color Movie Sound Film 1978 Cost Rent for two days $10.00 One week $15.00

Name: A New Training Film for Bulk Milk Haulers (28 minutes)

Prepared by: Prof. R. P. March of Cornell University, Mr. Ray A. Belknap of the FDA, USPHS Served as a consultant

Write to: Cornell Film Library
31 Roberts Hall
Cornell University
Ithaca, New York 14853

Subcommittee members
Sid Barnard
Bender Luce
Vernal Packard
Ronald Richter
Ewing Roe
Howard Eastman
Vernon Nickel [Chairman]

PLASTICS SUBCOMMITTEE

Cleanability of milk handling systems and components is dependent on several factors among which are construction material, surface smoothness and design. The use of plastics as containers, gaskets, components of stainless steel and glass assemblies and hoses has been successful because improved technology has been able to satisfy cleanability requirements. A regulatory authority showed this committee some hose recently introduced to the market and asked for an opinion on cleanability. The inner surface of the hose was wrapped with plastic tape and it was our opinion that this presented a major cleanability problem. The 3A Standards for Multiple Use Plastics recognizes the need for proper choice of materials and surface smoothness and outlines the requirements.

At the 1977 International Meeting in Sioux City, several on this committee felt that our 1978-1979 project should involve a survey of the types of flexible and rigid hoses and pipes which are now being used to handle milk.

The only new product that we found being marketed since 1977 is a tanker hose which is reinforced by a spirally wound clear rigid plastic in the wall. The outside surface resembles a vacuum cleaner hose, but the inside surface is sufficiently smooth to permit good cleaning. A piece of this hose had been returned from the field--and where a truck had run over the product, the reinforcement had cracked. It is suspected that with continued coiling and flexing, the broken reinforcement could penetrate the inner surface and cause a soil build-up problem. However, since we had not seen this occur, we can say that if the tubing is well maintained it would not pose a problem in cleanability.

This project is continuing and we are searching for new hoses being marketed.

Subcommittee members
Byron DeYoung
Ronald Christianson
Omer Majerus
J. Smucker
Ken Kirby
G. Smith
Bernard Saffian [Chairman]

FARM METHODS COMMITTEE

CLEANING AND SANITIZING OF FARM MILK EQUIPMENT SUBCOMMITTEE

The following topics will be evaluated with written recommendations for inclusion in the 1980 Farm Method Committee Report.

1. CIP milk meters.
2. Effectiveness of cleaning tube and plate coolers.
3. Booster heating systems.
4. Sizing of wash lines to milk line.
5. Udder preparation devices.
6. Maintenance of large vacuum systems.
7. Cross connections of in-place cleaning systems.
8. CIP system protection without four walls.
9. Parlor wash of milker units.
10. Standardized use of an acidified rinse.
11. Bleach being used as a sanitizer.
12. Milker take-off units (stationary and portable).
13. Mechanical washing of bulk tanks (portable and stationary units).
14. Cleanability of plastic parts (valves on milk hoses used in parlors, claws and pipeline milk inlets).

Subcommittee Members

Henry Atherton
Cecil White
Edward Aylward
Walt Suntkin
Robert Sanders
Charles Flack
O. Darrell Williams
Howard Schultz
Laverne Jenkins
Glen Ward
Harold McAvoy
James Welch [Chairman]

Farm Methods Committee

Dale E. Termunde, Chairman
Babson Bros. Co.
2100 South York Road
Oak Brook, Illinois 60521

Boyd M. Cook, Eastern Assistant Chairman
Maryland Cooperative Milk Producers
1717 Gwynn Oak Avenue
Baltimore, Maryland 21207

James I. Kennedy, Western Assistant Chairman
Missouri Milk Board
909 Missouri Boulevard
Jefferson City, Missouri 65101

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Commission E-Analytical Standards, Laboratory Techniques

This Commission, divided into bacteriology and chemistry groups, works to establish recognized analytical methods for milk, milk products and substances related to dairying, e.g. rennets. It also deals with subjects directly related to these methods, including standardization of laboratory techniques and equipment, automated methods, samples and interpretation of analytical results.

At the session, committees of experts submitted reports on:

- results of a study to find the cause of variations in moisture results in tests of identical split samples of whole milk powder (temperature and relative humidity in the lab were significant factors.)
- a recommended procedure for counting colonies of mesophilic aerobic bacteria and psychrotrophic bacteria
- determination of PCBs, submitted by the group on pesticide residues
- measuring solubility of dried milk
- determining the presence of heavy metals, such as iron, lead, iodine and tin
- the freezing point of milk
- characterization of dried milk according to heat treatment and usage
- determination of BHT and niacin
- determination of chymosin and bovine pepsin (The common practice of selling blends of these two enzymes as "rennet" makes this method a potentially valuable tool.)

Commission F-Dairy Science and Education

This Commission's role is to consider scientific problems of all types concerning production, processing and distribution of milk and dairy products, the significance of milk and dairy products in human nutrition, and all aspects of education and training of personnel for the dairy industry.

The experts who have finished studying pathogens in cheese were asked to consider a new topic, "inhibition of pathological organisms by starter cultures." The group that published its report on the physical properties of butter was disbanded. The Commission reviewed a report on accelerated cheese ripening.

Study continues on the significance of milk in calcium metabolism and on heat resistant proteases in milk, especially UHT milk, and methods for determining the presence of proteases. New expert groups were formed to study genetic modification of dairy cultures and the comparative nutritive value of vegetable and milk proteins.

Calendar

March 15-18---23rd ANNUAL MEAT SCIENCE INSTITUTE. Sponsored by the Food Science Division, University of Georgia and the National Independent Meat Packers Association. Center for Continuing Education, University of Georgia. Contact: J. A. Carpenter, Food Science Dept., College of Agriculture, University of Georgia, Athens, GA 30602.

March 23-25---PESTICIDE RECERTIFICATION COURSE. Atlanta, GA. Sponsored by American Institute of Baking. Contact: AIB, 1213 Bakers Way, Manhattan, KS 66502.

March 16-17---29th ANNUAL FOOD TECHNOLOGY CONFERENCE. Cosponsored by the St. Louis and Kansas City Sections of IFT and the Dept. of Food Science of the University of Missouri. Theme: "Food Ingredients--New Sources, Functionality, Cost Reduction, Nutrition, Toxicology and Availability." University of Missouri, Columbia. Contact: W. Snyder, Secretary, St. Louis Section of IFT, 2526 Baldwin St., St. Louis, MO 63106.

March 23-25 AMERICAN CULTURED DAIRY PRODUCTS INSTITUTE ANNUAL TRAINING SCHOOL AND JUDGING CONTEST. El Tropicano Hotel, San Antonio, TX. Contact: C. Bronson Lane, ACDPI. PO Box 7813, Orlando, FL 32854.

March 23-27---MOLDS AND MYCOTOXINS IN FOODS. Short course sponsored by American Association of Cereal Chemists and the University of Minnesota. Course will be held at Coffey Hall, 1420 Eckles Ave., Univesity of Minnesota, St. Paul, MN 55108. Course fee: $375. Contact: Ruth Nelson, Short Course Coordinator, AACC, 3340 Pilot Knob Road, St. Paul, MN 55121, 612-454-7250, or Office of Special Programs, 405 Coffey Hall, 1420 Eckles Ave., University of Minnesota, St. Paul, MN 55108, 612-373-0725.

March 24-25---EASTERN EQUIPMENT COMMITTEE ANNUAL SEMINAR AND PLANT TOUR. Holiday Inn, Saddle Brook, NJ 07662. Contact: Richard Voss, Chairman, 11 Nearwater Road, Rowayton, CT 06853, 203-853-4828.

March 25-26---ANNUAL MEETING, IOWA ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. Starlite Village, Ames, IA. Contact: H. E. Hansen, 4010 University Avenue, Des Moines, IA 50311.

March 25-27---SOUTHEASTERN REGIONAL LABORATORY DESIGN SEMINAR. Atlanta, GA. Fee: $400. Contact: Norman V. Steere & Associates, Inc., 140 Melbourne Ave., SE, Minneapolis, MN 55414, 612-378-2711.

March 31-April 1---WESTERN FOOD INDUSTRY CONFERENCE. Freeborn Hall, University of California, Davis. Contact: John C. Bruhn, Chairman, or Shirley Rexroat, Program Assistant, Dept. of Food Science and Technology, University of California, Davis, CA 95616, 916-752-2192 or 2191.

April 6-7---WAREHOUSE AND RETAIL STORE SANITATION Manhattan, KS. Course sponsored by American Institute of Baking. Contact: AIB, 1213 Bakers Way, Manhattan, KS 66502.

April 6-9---ANNUAL EDUCATIONAL CONFERENCE, MISSOURI MILK, FOOD & ENVIRONMENTAL HEALTH ASSOCIATION. Ramada Inn, Columbia, MO. Contact: Erwin Gadd, PO Box 570, Jefferson City, MO. 65102.

April 12-15---DAIRY AND FOOD INDUSTRIES SUPPLY ASSOCIATION, 62nd Annual Meeting. Hyatt Hilton Head, Hilton Head, SC. Contact: Dairy and Food Industries Supply Association, Inc. 5530 Wisconsin Ave., Washington, DC 20015.

April 13-15---PESTICIDE RECERTIFICATION. Hershey, PA. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

May 11-13---QUALITY CONGRESS. Sponsored by the American Society for Quality Control, in cooperation with the 5th Triennial Conference of the International Academy of Quality. San Francisco, CA. Contact: D. C. Schmidt, Manager, Public Relations, American Society for Quality Control, 161 W. Wisconsin Ave., Milwaukee, WI 53201.

May 12-14---36th ANNUAL PURDUE INDUSTRIAL WASTE CONFERENCE. Stewart Center, Purdue University, West Lafayette, IN. Contact: J. D. Wolszon, Purdue Industrial Waste Conference, Civil Engineering Bldg., Purdue University, West Lafayette, IN 47907.

May 13-15---3A SANITARY STANDARDS COMMITTEE MEETINGS. Galt House, Louisville, KY. Contact: Harold Thompson, DFISA, 5530 Wisconsin Ave., Room 1050, Washington, DC 20015.

May 16-20---61st ANNUAL NATIONAL RESTAURANT SHOW. McCormick Place, Chicago, IL. Contact: NRA Convention Dept., One IBM Plaza, Chicago, IL 60611.

May 18-21---INTERSTATE MILK SHIPPERS CONFERENCE. Hot Springs, AK. Contact: Herb Vaux, Indiana State Board of Health, 1330 W. Michigan St., Indianapolis, IN 46206.

May 27-29---AMERICAN SOCIETY FOR QUALITY CONTROL, 36th Annual Quality Congress San Francisco, CA. Hilton & Tower. ASQC, Dept. P1-1000, 161 W. Wisconsin Ave., Milwaukee, WI 53202.

June 1-4---PENNSYLVANIA DAIRY FIELDMEN'S-LABORATORY DIRECTORS CONFERENCE. Keller Conference Center, The Pennsylvania State University, University Park, PA. Contact: Wallace C. Jackson, RD 2, List Hill Road, Valencia, PA 16059.

June 7-10---IFT 81, 41st ANNUAL MEETING AND FOOD EXPO, Institute of Food Technologists. World Congress Center, Atlanta, GA. Contact: IFT, Suite 2120, 221 North LaSalle St., Chicago, IL 60601, 312-783-8424.

June 8-10---AIB/FDA SANITATION AND QUALITY ASSURANCE MANAGERS WORKSHOP. Chicago, IL. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

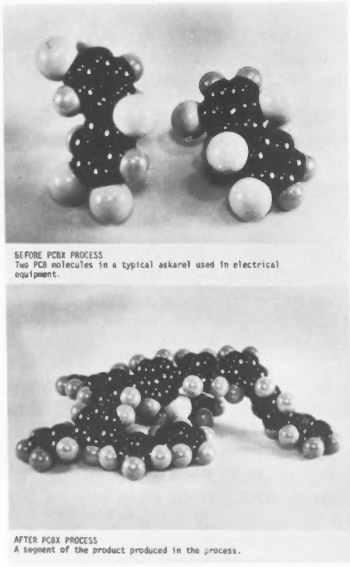
June 21-24---24th ANNUAL CANADIAN INSTITUTE OF FOOD SCIENCE AND TECHNOLOGY. Theme: "Research: Whose Business?" Winnipeg Convention Centre/ Holiday Inn, Winnipeg, Manitoba, Canada. Contact: Barry McConnell, Conference Chairman, Dept. of Food Science, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2.

July 13-15---PRINCIPLES OF QUALITY ASSURANCE. Washington, DC. Course sponsored by American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502.

Aug. 9-12---IAMFES ANNUAL MEETING. Sheraton-Spokane, Spokane, WA. Contact: IAMFES, PO Box 701, Ames, IA 50010, 515-232-6699.

Aug. 17-21---21st ANNUAL MEETING, HOSPITAL, INSTITUTION & EDUCATIONAL FOOD SERVICE SOCIETY. Houston, TX. Contact: HIEFSS, 4410 West Roosevelt Road, Hillside, IL 60162.

New Product News



BEFORE PCBX PROCESS
Two PCB molecules in a typical askarel used in electrical equipment.

AFTER PCBX PROCESS
A segment of the product produced in the process.

•*A portable process to destroy highly toxic PCBs* (polychlorinated biphenyls) contained in electrical transformer and capacitor fluids has been developed by Sunohio, Canton, OH.

While the EPA has been asked to treat as confidential certain proprietary aspects of the process, PCBX is basically a chemical disposal method that breaks apart the very stable and toxic PCB molecule, rearranging it to form other chemical compounds that are either known or believed to be harmless and environmentally safe. Compared to incineration, PCBX is safer environmentally, as it is performed in a totally enclosed liquid system at very low temperature and pressure. Transformer oils, contaminated with PCBs, are not burned up but are cleaned up and restored for reuse, free of PCBs.

•*Dri-Dek interlocking floor tiles* offer a perforated surface and a 9/16" thick design to drain fluids instantly, leaving a safe, dry, anti-skid surface. Made from flexible vinyl, Dri-Dek helps relieve leg and back strain in stand-up operations. The square-foot tiles interlock to form any size surface. A new 4-color brochure fully describes Dri-Dek, and includes a physical properties chart, details on Kendall Plastics, Inc.'s no-risk trial policy, and full pricing information. Two free 1/9 area Dri-Dek samples are included with each brochure. Call 1-800-348-2398 (in Indiana call collect, 1-219-347-5235) or write: Kendall Plastics. Inc., Kendallville, IN 46755.

•*Mutant bacterial treatment aids* have been used to improve the operation of biological waste treatment systems in the food processing industry since 1975. Polybac Corporation offers applications data and operational results for seven treatment plants in the United States and abroad. Each system was inoculated with Polybac^{R} Mutant Bacterial Aid. Immediately active upon entering the system, the mutant bacteria secrete significantly higher enzyme concentrations than naturally occurring forms, resulting in improved waste treatment plant performance under normal and extreme operating conditions. Data sheets are available on request from Polybac Corporation, 1251 South Cedar Crest Blvd., Allentown, PA 18103.

•*Allied Chemical Corporation*, now produces an animal-feed grade of sodium bicarbonate. Sodium bicarbonate is used as an additive by the food, industrial chemical, rubber, pharmaceutical, fire extinguisher, soap and detergent, animal feed, textile, paper, and leather industries. Contact: Allied Chemical Corporation, Chemicals Company, Attention: K. L. Terreri, P.O. Box 2064R, Morristown, NJ 07960.

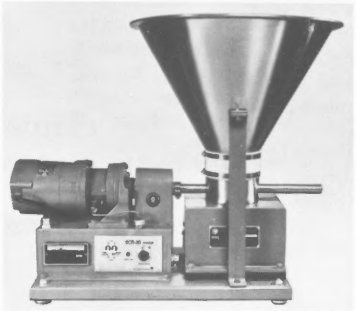
•*The Ceilcote Company* offers a brochure describing its flooring systems which provide protection under many service conditions. Entitled "Ceilcote floor systems: long-lasting protection for industrial floors," the 16-page brochure describes Ceilcote sealers, conventional and advanced multi-layer monolithic systems, and acid-proof brick construction. Contact: The Ceilcote Company, 140 Sheldon Road, Berea, OH 44017.

•*The Mini-Orbit*, a new lightweight, high-capacity milker, has been developed by Babson Bros. Co., builders of Surge Dairy Farm Equipment. The Mini-Orbit is a full pound lighter than the Mini-Cup II, which makes the new milker easier to carry, attach and remove. Its 39-cubic-inch capacity is more than any other claw-type milking unit offering improved vacuum stability. The clear polysulfone thermoplastic top provides good visibility to help avoid overmilking and harvest more milk. Larger, repositioned nipples, larger inflation stems, and a stainless steel bowl ensure faster, more complete milkout, better balance and lower center of gravity. For more details, contact your Surge dealer or write: Babson Bros. Co., 2100 South York Road, Oak Brook, IL 60521.

•*A new folder outlines characteristics of Conwed's plastic nettings* for unitizing products ranging from fresh meats and processed foods to bottled beverages to component parts and chemicals. Individual product data inserts describe a heavy-duty Tensionet wrap for hard-to-secure loads and a newer, lighter weight Tensionet 2 netting. Contact: Conwed Corporation, Promotional Services Department, P.O. Box 43237, St. Paul, MN 55164.

•*"Sta-Dri" roll-dispensed food processors polyethylene aprons* are designed for iimited-use life, which varies from one day to a week or more. They come in 3 sizes and several weights. The aprons have a patented roll-dispensing feature, and are packaged in rolls of 100 per carton, dispensed one at a time. The aprons are USDA accepted for food and meat handling. For more information, contact: William B. Smith, United Plastic, Inc., 109 N. Duncan Road, Champaign, IL 61820, 217-359-5400.

•*A self-contained, portable instrument for measurement of relative equilibrium humidity (REM)*, which is indicative of moisture content and temperature, has been specifically designed for the commodities industry. For test measurements of grains, beans, powders, plastic pellets, and other materials, the Novasina sensor provides easy calibration. Contact: Voland Corporation, 5 Skyline Drive, Hawthorne, NY 10532, (914) 347-3040.



•*The SCR-20 Feeder* from Vibra Screw, Inc., is a volumetric screw feeder utilizing a patented controlled vibration principle to provide metering of dry materials at accuracies of ±1 to 2%, minute-to-minute. Its unique vibration feature prevents bridging and flooding of the material and preconditions it to a constant bulk density. Other features include a slide-out solid state controller for easy access and maintenance, direct in-line SCR drive for a 20:1 feed range, seal-less screw and tube assembly, and bolt-on modular components. Easily interchangeable screw assemblies provide for capacities of .037 to 200 cu. ft./hr. Contact: Vibra Screw, Inc., 755 Union Blvd., Totowa, NJ 07511, 201-256-7410.

•*Stretchband and Shrinkband packaging equipment* capable of production speeds up to 40 bundles per minute has been introduced by Omega Design Corporation. To form a unit bundle, Omega Stretchband equipment applies a tight web of non-stretch utility grade polyethylene around all four sides of a group of rectangular items. Omega Shrinkband models use utility grade polyethylene film, unlike conventional banding equipment which requires expensive shrink film and high heat levels. Contact Paul Taraschi, Omega Design Corporation, 255 Welsh Pool Road, Lionville, PA 19353 215-363-6555.

•*Effective control of rats and mice* is possible with Model RDA "Trans-sonic Sound Generator" by Av-Alarm Corporation. Intense (107 db) high frequency sounds drive rodents from restaurants, food processing and storage facilities, home, factories, and warehouses--without bothering people. Patented Av-Alarm sound frequencies have been increased so as to irritate rats with ultrasonic waves. Powered from either ordinary house current or a battery, Model RDA has an effective coverage of thousands of square feet. The unit comes complete with two speakers, one which rotates or can be remotely located for maximum efficiency in any situation. Contact Av-Alarm Corporation, P.O. Box 2488, Santa Maria, California 93455, 805-928-4818.

•*A nonwoven disinfecting cloth* from Britain has a built-in color indicator which fades to warn the user as the material loses its bactericidal properties. The system is a safe, simple and economical way to prevent cross contamination in many applications. A blend of wide spectrum bactericides is bonded electrostatically to the cloth. Similarly bonded to the bactericide, but not to the cloth, are blue stripes which gradually fade as the disinfectant is consumed. When the stripes are no longer visible, the user knows that the cloth should be replaced.

The bactericides are tasteless, nontoxic and non-tainting, so that the system is completely safe and can be used directly on food contact surfaces. The product is simple to use as the cloth is dampened with clean water from a tap and wiped over the surface to be disinfected; rinsed, and hung to dry until needed again. Tests show the system is effective against all common food-poisoning bacteria, including salmonella, and antibiotic-resistant organisms. Contact: Wipex Products, 17 Weymouth Mews, London W1N 3FQ England.

•*Kendall's ID-4 Teat Dip* is an effective, non-irritating, non-staining iodine that kills a wide range of bacteria found on teats. ID-4 is non-irritating to the teats because of the type of Iodine used, the same Povidone Iodine found in hospitals where non-irritation and efficacy against bacteria are important. ID-4 Iodine Teat Dip is available in 1-gallon containers as well as in 15-gallon drums. Contact: The Kendall Company, Agricultural Products, One Federal Street, Boston, MA 02101.

•*A new high density polyethylene, Chemplex 6004*, has been developed for production of lightweight gallon milk containers on continuous extrusion blow molding equipment. The resin is fast processing and yields bottles with excellent impact strength and rigidity. Satisfactory containers have been produced with weights as low as 55 g. Contact: H. D. Gudrian, Chemplex Company, Rolling Meadows, IL 60008.

•*The Bactometer® M-120 Microbial Monitoring System* is a computerized model capable of handling up to 480 samples simultaneously. The basic unit consists of an incubator for 120 samples, a dedicated microprocessor for data analysis, and a hard copy printer for entering data or data presentation. Depending on the options selected, the instrument can be expanded to accept up to three additional 120 sample incubators and/or a color video screen display.

The microprocessor is preprogrammed to detect bacterial responses. Individual samples are monitored every six minutes, thus assuring rapid detection. Contact: Bactomatic, Inc., PO Box 3103, Princeton, NJ 08540, 609-452-8515.

Holders of 3-A Symbol Council Authorizations on February 15, 1981

Questions or statements concerning any of the holders of authorizations listed below, or the equipment fabricated, should be addressed to Earl O. Wright, Sec'y.-Treas., P.O. Box 701, Ames, Iowa 50010.

01-06 Storage Tanks for Milk and Milk Products

28 Cherry-Burrell Corporation (10/ 3/56)
(unit AMCA Int'l)
575 E. Mill St.
Little Falls, New York 13365

102 Chester-Jensen Company, Inc. (6/ 6/58)
5th & Tilgham Streets
Chester, Pennsylvania 19013

2 CREPACO, Inc. (5/ 1/56)
100 C.P. Avenue
Lake Mills, Wisconsin 53551

117 DCI, Inc. (10/28/59)
St. Cloud Industrial Park
St. Cloud, Minnesota 56301

76 Damrow Company (10/31/57)
196 Western Avenue
Fond du Lac, Wisconsin 54935

115 DeLaval Company, Ltd. (9/28/59)
113 Park Street South
Peterborough, Ontario, Canada
(not available in USA)

109 Girton Manufacturing Company (9/30/58)
State Street
Millville, Pennsylvania 17846

114 C. E. Howard Corporation (9/21/59)
P.O. Box 2507
City of Industry, California 91746

127 Paul Mueller Company (6/29/60)
P.O. Box 828
Springfield, Missouri 65801

31 Walker Stainless Equipment Co. (10/ 4/56)
Elroy, Wisconsin 53929

02-08 Pumps for Milk and Milk Products

325 Albin Motor Aktiebolag (12/19/79)
Box 139, S-681 01 Kristinehamn
Sweden
(not available in USA)

214R Ben H. Anderson Manufacturers (5/20/70)
Morrisonville, Wisconsin 53571

212R Babson Bros. Co. (2/20/70)
2100 S. York Rd.
Oak Brook, Illinois 60621

29R Cherry-Burrell Corporation (10/ 3/56)
(unit AMCA Int'l)
2400 Sixth St., Southwest
Cedar Rapids, Iowa 52406

63R CREPACO, Inc. (4/29/57)
100 CP Avenue
Lake Mills, Wisconsin 53551

205R Dairy Equipment Company (5/22/69)
1919 South Stoughton Road
Madison, Wisconsin 53716

65R G & H Products, Inc. (5/22/57)
5718 52nd Street
Kenosha, Wisconsin 53140

145R ITT Jabsco Incorporated (11/20/63)
145 Dale Way
Costa Mesa, California 92626

314 Len E. Ivarson, Inc. (12/22/78)
3100 W. Green Tree Road
Milwaukee, Wisconsin 53223

26R Ladish Co., Tri-Clover Division (9/29/56)
9201 Wilmot Road
Kenosha, Wisconsin 53140

319 Mono Group, Inc. (3/21/79)
(Mfg. by SSP Pumps Ltd.)
847 Industrial Drive
Bensonville, IL 60106

241 Puriti S. A. (9/12/72)
Alfredo Noble #39, Industrial Pte. de Vigas
Tlalnepantla, Mexico
(not available in USA)

148 Robbins & Myers, Inc. (4/22/64)
Moyno Pump Division
1345 Lagonda Avenue
Springfield, Ohio 45501

306 Stamp Corp. (5/ 2/78)
2410 Parview Road
Middleton, WI 53562

332 Superior Stainless, Inc. (12/10/80)
211 Sugar Creek Rd.
Delavan, WI 53115

72R L. C. Thomsen & Sons, Inc. (8/15/57)
1303 43rd Street
Kenosha, Wisconsin 53140

219 Tri-Canada Ltd. (2/15/71)
P.O. Box 4589
Buffalo, NY 14240

175R Universal Milking Machine Div. (10/26/56)
Universal Cooperatives, Inc.
408 South First Ave.
Albert Lea, MN 56007

329 Valox Products Corp. (6/10/80)
20447 Noedhoff St.
Chatsworth, Calif. 91311

52R Viking Pump Div. (12/31/56)
Houdaille Industries, Inc.
406 State Street
Cedar Falls, Iowa 50613

5R Waukesha Foundry Company (7/ 6/56)
1300 Lincoln Ave.
Waukesha, Wisconsin 53186

04-03 Homogenizers and High Pressure Pumps of the Plunger Type

247 Bran and Lubbe, Inc. (4/14/73)
1241 Rand Rd.

Des Plaines, IL 60016

87 Cherry-Burrell Company (12/20/57)
(unit AMCA Int'l)
2400 Sixth Street, Southwest
Cedar Rapids, Iowa 52404

37 CREPACO, Inc. (10/19/56)
100 CP Avenue
Lake Mills, Wisconsin 53538

75 Gaulin, Inc. (9/26/57)
44 Garden Street
Everett, Massachusetts 02149

237 Graco Inc. (6/ 3/72)
P.O. Box 1441
Minneapolis, Minnesota 55440

309 General Dairy Equipment (7/19/78)
(Mfg. by Rannie A/S, Denmark)
434 Stinson Boulevard
Minneapolis, Minnesota 55413

256 Liquipak International, Inc. (1/23/74)
2285 University Avenue
St. Paul, Minnesota 55114

05-13 Stainless Steel Automotive Milk Transportation Tanks for Bulk Delivery and/or Farm Pick-up Service

131R Almont Welding Works, Inc. (9/ 3/60)
4091 Van Dyke Road
Almont, Michigan 48003

70R Brenner Tank, Inc. (8/ 5/57)
450 Arlington
Fond du Lac, Wisconsin 54935

40 Transportation Equipment Corporation (10/20/56)
900 Sixth Ave., Southeast
Minneapolis, Minnesota 55114

66 Dairy Equipment Company (5/29/57)
1919 South Stoughton Road
Madison, Wisconsin 53716

45 The Heil Company (10/26/56)
3000 W. Montana Street
Milwaukee, Wisconsin 53235

297 Indiana Tank Co., Inc. (8/29/77)
P.O. Box 366
Simmitt, Indiana 46070

305 Light Industrial Design Co. (3/23/78)
8631-A Depot Road
Lynden, WA 98295

201 Paul Krohnert Mfg., Ltd. (4/ 1/68)
811 Steeles Avenue
Milton, Ontario, Canada L9T 2Y3
(not available in USA)

85 Polar Tank Trailer, Inc. (12/20/57)
Holdingford, Minnesota 56340

47 Pullman Trailmobile (11/ 2/56)
701 East 16th Avenue
North Kansas City, Missouri 64116

121 Technova Inc. Gosselin Division (12/ 9/59)
1450 Hebert c.p. 758
Drummondville, Quebec, Canada J2C 2A1
(not available in USA)

189 A. & L. Tougas, Ltee (10/ 3/66)
1 Tougas St.
Iberville, Quebec, Canada
(not available in USA)

25 Walker Stainless Equipment Co. (9/28/56)
New Lisbon, Wisconsin 53950

08-17 Fittings Used on Milk and Milk Products Equipment and Used on Sanitary Lines Conducting Milk and Milk Products

291 Accurate Metering Systems, Inc. (6/22/77)
1731 Carmen Drive
Elk Grove Village, IL 60007

79R Alloy Products Corporation (11/23/57)
1045 Perkins Avenue
Waukesha, Wisconsin 53186

245 Babson Brothers Company (2/12/73)
2100 South York Road
Oak Brook, Illinois 60521

284 Bristol Engineering Company (11/18/76)
210 Beaver Street
Yorkville, Illinois 60560

301 Brown Equip. Co., Inc. (12/ 6/77)
9955-9¼ Ave.
Hanford, California 93230

82R Cherry-Burrell Company (12/11/57)
(unit AMCA Int'l)
2400 Sixth Street, Southwest
Cedar Rapids, Iowa 52406

260 CREPACO, Inc. (5/22/74)
100 CP Avenue
Lake Mills, Wisconsin 53551

322 ALFA-LAVAL LIMITED (7/16/79)
(not available in USA)
113 Park St. So.
Peterborough, Ontario
Canada K9J 3R8

304 EGMO Ltd-Israel (3/16/78)
(Martin Silver P.E.)
406 Kinderkamack Rd.
River Edge, NJ 07661

271 The Foxboro Company (3/ 8/76)
Neponset Street
Foxboro, Massachusetts 02035

67R G & H Products, Inc. (6/10/57)
5718 52nd Street
Kenosha, Wisconsin 53140

203R ITT-Grinnell Company, Inc. (11/ 7/68)
DIA-FLO Div
33 Centerville Rd.
Lancaster, Pennsylvania 17603

34R Ladish Co., Tri-Clover Division (10/15/56)
9201 Wilmot Road
Kenosha, Wisconsin 53140

287 Koltek OY (1/14/77)
Kotinummentieiz
SF-00700 Helsinki 70
Finland
(not available in USA)

239 LUMACO (6/30/72)
Box 688,
Teaneck, New Jersey 07666

200R Paul Mueller Co. (3/ 5/68)
P.O. Box 828
Springfield, Missouri 65801

295 Precision Stainless Products (8/11/77)
(Mfg. by Toyo Stainless Co. Ltd.)
5636 Shull St.

Bell Gardens, CA 90201

242 Puriti, S.A. (9/12/72)
Alfredo Nobel #39 Industrial Pte de Vigas
Tlalnepantla, Mexico
(not available in USA)

149R Q Controls (5/18/64)
Occidental, California 95465

334 Stainless Products Inc. (12/18/80)
1649 72nd Ave., Box 169
Somers, WI 53171

73R L. C. Thomsen & Sons, Inc. (8/31/57)
1303 43rd Street
Kenosha, Wisconsin 53140

300 Superior Stainless, Inc. (11/22/77)
211 Sugar Creek Rd.
P.O. Box 622
Delvan, Wisconsin 53115

191R Tri-Canada, Ltd. (11/23/66)
P.O. Box 4589
Buffalo, NY 14240

250 Universal Milking Machine (6/11/73)
Div. of Universal Cooperatives
407 First Ave, So.
Albert Lea, Minnesota 56007

278 Valex Products (8/30/76)
20447 Nordhoff St.
Chatsworth, California 91311

86R Waukesha Specialty Company, Inc. (12/20/57)
Darien, Wisconsin 53114

Inlet and Outlet Leak Protector Plug Valves for Batch Pasteurizers

09-07 Instrument Fittings and Connections Used on Milk and Milk Products Equipment

321 Anderson Instrument Co., Inc. (6/14/79)
R.F.D. #1, Fulton, New York 12072

315 Burns Engineering, Inc. (2/ 5/79)
10201 Bren Road, East
Minnetonka, MN 55343

206 The Foxboro Company (8/11/69)
Neponset Avenue
Foxboro, Massachusetts 02035

285 Tank Mate Company (12/ 7/76)
2269 Ford Parkway
St. Paul, Minnesota 55116

32 Taylor Instrument Process Control (10/ 4/56)
Div. Sybron Corporation
95 Ames Street
Rochester, New York 14601

10-00 Milk and Milk Products Filters Using Disposable Filter Media, As Amended

35 Ladish Co., Tri-Clover Division (10/15/56)
9201 Wilmot Road
Kenosha, Wisconsin 53140

296 L. C. Thomsen & Sons, Inc. (8/15/77)
1303 43rd St.
Kenosha, Wisconsin 53140

11-03 Plate-type Heat Exchangers for Milk and Milk Products

316 Agric Machinery Corp. (2/ 7/79)
P.O. Box 6
Madison, NJ 07940

326 American Vicarb Corporation (2/ 4/80)
(Mfg by Vicarb S. A. France)
1522 Main Street
Niagra Falls, N.Y. 14301

20 A.P.V. Company, Inc. (9/ 4/56)
395 Fillmore Avenue
Tonawanda, New York 14150

30 Cherry-Burrell Corporation (10/ 1/56)
(unit AMCA Int'l)
2400 Sixth Street, Southwest
Cedar Rapids, Iowa 52404

14 Chester-Jensen Co., Inc. (8/15/56)
5th & Tilgham Streets
Chester, Pennsylvania 19013

38 CREPACO, Inc. (10/19/56)
100 CP Avenue
Lake Mills, Wisconsin 53551

120 DeLaval Company, Ltd. (12/ 3/59)
113 Park Street
South Peterborough, Ontario, Canada
(not available in USA)

279 The Schluter Co. (8/29/76)
(Mfg. by Samuel Parker Ltd.)
112 E. Centerway
Janesville, WI 53545

17 ALFA-LAVAL, Inc. (8/30/56)
(Mfg. in Sweden)
2115 Linwood Ave.
Ft. Lee, New Jersey 07024

15 Kusel Dairy Equipment Company (8/15/56)
820 West Street
Watertown, Wisconsin 53094

12-04 Tubular Heat Exchangers, for Milk and Milk Products

248 Allegheny Bradford Corporation (4/16/73)
P.O. Box 264
Bradford, Pennsylvania 16701

243 Babson Brothers Company (10/31/72)
2100 S. York Road
Oak Brook, Illinois 60521

103 Chester-Jensen Company, Inc. (6/ 6/58)
5th & Tilgham Street
Chester, Pennsylvania 19013

307 G&H Products, Inc. (5/ 2/78)
5718-52nd St.
Kenosha, WI 53141

217 Girton Manufacturing Co. (1/23/71)
Millville, Pennsylvania 17846

252 Ernest Laffranchi (12/27/73)
P.O. Box 455
Ferndale, California 95536

238 Paul Mueller Company (6/28/72)
P.O. Box 828
Springfield, Missouri 65801

96 C. E. Rogers Company (3/31/64)
P.O. Box 188
Mora, Minnesota 55051

13-06 Farm Milk Cooling and Holding Tanks

240 Babson Brothers Company (9/ 5/72)
(Mfg. by CREPACO, Inc.)

2100 S. York Road
Oak Brook, Illinois 60521

11R CREPACO, Inc. (7/25/56)
100 CP Ave.
Lake Mills, Wisconsin 53551

119R DCI, Inc. (10/28/59)
St. Cloud Industrial Park
St. Cloud, Minnesota 56301

4R Dairy Equipment Company (6/15/56)
1919 South Stoughton Road
Madison, Wisconsin 53716

92R Alfa-Laval Limited (12/27/57)
350 Dutchess Turnpike
Poughkeepsie, N.Y. 12602

49R Alfa Laval, Inc. (12/ 5/56)
(De Laval Agricultural Division)
350 Dutchess Turnpike
Poughkeepsie, N.Y. 12602

10R Girton Manufacturing Company (7/25/56)
Millville, Pennsylvania 17846

95R Globe Fabricators, Inc. (3/14/58)
3350 North Gilman Rd.
El Monte, California 91732
(not available in USA)

356 Meyer D. Haderer (2/3/81)
P. O. Box 220
Bowdle, S.D. 57428

179R Heavy Duty Products (Preston), Ltd. (3/ 8/66)
1261 Industrial Road
Preston, Ontario, Canada
(not available in USA)

12R Paul Mueller Company (7/31/56)
P.O. Box 828
Springfield, Missouri 65801

249 Sunset Equipment Co. (4/16/73)
293 Como Ave.
St. Paul, Minnesota 55103

16R Zero Manufacturing Company (8/27/56)
Washington, Missouri 63090

16-04 Evaporators and Vacuum Pans for Milk and Milk Products

164R Anderson International Corp. (4/25/65)
19699 Progress Drive
Strongsville, Ohio 44136

254 Anhydro, Inc. (1/ 7/74)
165 John Dietsch Square
Attleboro Falls, Massachusetts 02763

132R A.P.V. Company, Inc. (10/26/60)
137 Arthur Street
Buffalo, New York 14207

263 C. E. Howard Corporation (12/21/74)
240 N. Orange Avenue
City of Industry, California 91746

107R C. E. Rogers Company (8/ 1/58)
P.O. Box 118
Mora, Minnesota 55051

277 ConTherm Corp. (8/19/76)
DeLaval
P.O. Box 352
Newbury Port, MA 01950

186R Marriott Walker Corporation (9/ 6/66)
925 East Maple Road
Birmingham, Michigan 48010

273 Niro Atomizer Inc. (5/20/76)
1600 County Rd F.
Hudson, WI 54016

299 Stork Food Machinery, Inc. (11/16/77)
(Mfg. by Stork-Friesland B.V.)
P.O. Box 816
Somerville, New Jersey 08876

311 Wiegand Evaporators, Inc. (8/28/78)
5585 Sterrett Place
Columbia, Maryland 21044

17-06 Fillers and Sealers of Single Service Containers For Milk and Milk Products

333 Anderson Bros. Mfg. Co. (12/15/80)
1303 Samuelson Road
Rockford, Illinois 61101

192 Cherry-Burrell Corporation (1/ 3/67)
(unit AMCA Int'l)
2400 Sixth St., Southwest
Cedar Rapids, IA 52404

324 ERCA (11/29/79)
S.A.B.P. 54 Z.I. de Courtabeouf
Avenue de Pacifique, 91943 Les Ulis
Cedex, France
(not available in USA)

137 Ex-Cell-O Corporation (10/17/62)
2855 Coolidge,
Troy, Michigan 48084

220 Hercules, Inc., Package Equipment Div. (4/24/71)
2285 University Ave.
St. Paul, Minnesota 55114

330 Milliken Packaging (8/26/80)
(Mfg. by Chubukikai Co. Ltd.)
White Stone, South Carolina 29353

281 Purity Packaging Corporation (11/ 8/76)
800 Kederly Drive
Columbus, Ohio 43228

211 Twin-Pak Ltd. (Canada) (2/ 4/70)
(Mfg. by Thimonnier & Cie, France)
Steel & Cohen, 745 Fifth Ave.
New York, New York 10022

19-03 Batch and Continuous Freezers, For Ice Cream, Ices and Similarly Frozen Dairy Foods, As Amended

286 O.G. Hoyer, Inc. (12/ 8/76)
201 Broad St.
Lake Geneva, WI 53147
(Mfg. by O.G. Hoyer A/S of Denmark)

146 Cherry-Burrell Company (12/10/63)
(unit AMCA Int'l)
2400 Sixth Street, Southwest
Cedar Rapids, Iowa 52404

141 CREPACO, Inc. (4/15/63)
100 CP Avenue
Lake Mills, Wisconsin 53551

22-04 Silo-Type Storage Tanks for Milk and Milk Products

168 Cherry-Burrell Corporation (6/16/65)
(unit AMCA Int'l)
575 E. Mill St.
Little Falls, New York 13365

154 CREPACO, Inc. (2/10/65)
100 CP Avenue

Lake Mills, Wisconsin 53551

160 DCI, Inc. (4/ 5/65)
St. Cloud Industrial Park
St. Cloud, Minnesota 56301

181 Damrow Company, Division of DEC (5/18/66)
International, Inc., 196 Western Ave.
Fond du Lac, Wisconsin 54935

262 DeLaval Company Ltd., Canada (11/11/74)
350 Dutchess Turnpike
Poughkeepsie, N.Y. 12602 Canada

155 Paul Mueller Co. (2/10/65)
P.O. Box 828
Springfield, Missouri 65801

312 Sanitary Processing Equip. Corp. (9/15/78)
Butternut Drive
East Syracuse, New York 13057

165 Walker Stainless Equipment Co. (4/26/65)
Elroy, Wisconsin 53929

23-01 Equipment for Packaging Frozen Desserts, Cottage Cheese and Milk Products Similar to Cottage Cheese in Single Service Containers

174 Anderson Bros. Mfg. Co. (9/28/65)
1303 Samuelson Road
Rockford, Illinois 61109

209 Doboy Packaging Machinery Division (7/23/69)
of Nordson Corporation, 215 N. Knowles Ave.
New Richmond, Wisconsin 54017

302 Eskimo Pie Corp. (1/27/78)
530 E. Main St.
Richmond, Virginia 23219

258 Hercules, Inc. (2/ 8/74)
2285 University Ave.
St. Paul, Minnesotta 55114

24-00 Non-Coil Type Batch Pasteurizers

161 Cherry-Burrell Corporation (4/ 5/65)
(unit AMCA Int'l)
575 E. Mill St.
Little Falls, New York 13365

158 CREPACO, Inc. (3/24/65)
100 CP Avenue
Lake Mills, Wisconsin 53551

187 DCI, Inc. (9/26/66)
St. Cloud Industrial Park
St. Cloud, Minnesota 56301

177 Girton Manufacturing Co. (2/18/66)
Millville, Pennsylvania 17846

166 Paul Mueller Co. (4/26/65)
P.O. Box 828
Springfield, Missouri 65601

25-00 Non-Coil Type Batch Processors for Milk and Milk Products

162 Cherry-Burrell Corporation (4/ 5/65)
(unit AMCA Int'l)
575 E. Mill St.
Litlle Falls, New York 13365

159 CREPACO, Inc. (3/24/65)
100 CP Avenue
Lake Mills, Wisconsin 53551

188 DCI, Inc. (9/26/66)
St. Cloud Industrial Park
St. Cloud, Minnesota 56301

167 Paul Mueller Co. (4/26/65)
Box 828
Springfield, Missouri 65801

202 Walker Stainless Equipment Co. (9/24/68)
New Lisbon, Wisconsin 53950

26-01 Sifters for Dry Milk and Dry Milk Products

229 Russell Finex Inc. (3/15/72)
156 W. Sandford Boulevard
Mt. Vernon, New York 10550

173 B. F. Gump Division (9/20/65)
Blaw-Knox Food & Chem. Equip. Inc.
750 E. Ferry St., P.O. Box 1041
Buffalo, NY 14211

185 Rotex, Inc. (8/10/66)
(Mfg. by Orville Simpson Co.)
1230 Knowlton St.
Cincinnati, Ohio 45223

176 Koppers Company, Inc. (1/ 4/66)
Metal Products Division
Sprout-Waldron Operation
Munsy, Pennsylvania 17756

172 SWECO, Inc. (9/ 1/65)
P.O. Box 4151
6033 E. Bandini Blvd.
Los Angeles, California 90051

27-01 Equipment for Packaging Dry Milk and Dry Milk Products

313 WPM Systems, Inc. (10/10/78)
Div. of St. Regis Paper Company
4990 Acoma St.
Denver, Colorado 80216

28-00 Flow Meters for Milk and Liquid Milk Products

272 Accurate Metering Systems, Inc. (4/ 2/76)
1731 Carmen Drive
Elk Grove Village, Illinois 60007

253 Badger Meter, Inc. (1/ 2/74)
4545 W. Brown Deer Road
Milwaukee, Wisconsin 53223

223 C-E IN-VAL-CO, Division of Combustion (11/15/71)
Engineering, Inc.
P.O. Box 556, 3102 Charles Page Blvd.
Tulsa, Oklahoma 74101

265 Electronic Flo-Meters, Inc. (3/10/75)
P.O. Box 38269
Dallas, TX 75239

226 Fischer & Porter Co. (12/9/71)
Magnetic Flowmeters
Dept. 372 County Line Road
Warminster, Pa. 18974

224 The Foxboro Company (11/16/71)
Neponset Avenue
Foxboro, Massachusetts 02035

327 The Kanthal Corporation (5/ 7/80)
(Mfg. by Bulten-Knathal AB,
Hallstahammar, Sweden)
Wooster Street
Bethel, CT 06801

320 Max Machinery, Inc. (3/28/79)
1420 Healdsburg Ave.
Healdsburg, CA 95448

270 Taylor Instrument Company Division (2/ 9/76)
Sybron Corporation, 95 Ames Street
Rochester, New York 14601

29-00 Air Eliminators for Milk and Fluid Milk Products
30-00 Farm Milk Storage Tanks

257 Babson Bros. Co. (2/ 7/74)
(Mfg. by CREPACO, Inc.)
2100 S. York Road
Oak Brook, Illinois 60521

31-00 Scraped Surface Heat Exchangers

274 Contherm Corporation (6/25/76)
P.O. Box 352
Newburyport, Massachusetts 01950

322 Cherry Burrell (7/26/79)
2400 6th St. SW
Cedar Rapids, IA 52406

290 CREPACO, Inc. (6/15/77)
100 So. CP Ave.
Lake Mills, WI 53551

32-00 Uninsulated Tanks for Milk and Milk Products

264 Cherry-Burrell Company, (1/27/75)
(unit AMCA Int'l)
575 E. Mill St.
Little Falls, NY 13365

268 DCI, Inc. (11/21/75)
P.O. Box 1227
St. Cloud, Minnesota 56301

33-00 Polished Metal Tubing for Dairy Products

310 Allegheny Bradford Corporation (7/19/78)
P.O. Box 264
Bradford, PA 16701

289 Ladish Co., Tri-Clover Division (1/21/77)
9201 Wilmot Road
Kenosha, Wisconsin 53140

308 Rath Mfg. Co. Inc. (6/15/77)
2505 Foster Ave.
Janesville, WI 53545

335 Stainless Products Inc. (1/4/81)
1649-72nd Ave., P.O. Box 169
Sumers, WI 53171

331 United Industries Incorporated (10/26/80)
1546 Henry Ave.
Beloit, WI 53511

35-00 Continuous Blenders

292 Waukesha Division, Abex Corp. (8/24/77)
1300 Lincoln Ave.
Waukesha, WI 53186

36-00 Colloid Mills

293 Waukesha Division, Abex Corp. (8/24/77)
1300 Lincoln Ave.
Waukesha, WI 53186

37-00 Pressure and Level Sensing Devices

318 Anderson Instrument Co., Inc. (4/ 9/79)
R.D.#1 Fulton, N.Y. 12072

317 C-E Invalco Division of Combustion (2/26/79)
Engineering, Inc.
P.O. Box 556
Tulsa, OK 74101

328 Rosemount, Inc. (5/22/80)
12001 West 78th St.
P.O. Box 35129
Eden Prairie, MN 55344

JFP Abstracts

Abstracts of papers in the March Journal of Food Protection

Prevalence of *Staphylococcus aureus* in Raw and Pasteurized Milk Used for Commercial Manufacturing of Brazilian Minas Cheese, Edson Clemente dos Santos[1], Constantin Genigeorgis[2]* and Thomas B. Farver[2], Escola de Veterinaria, Universidade Federal de Minas Gerais, Belo Horizonte, MG, Brazil and Department of Epidemiology and Preventive Medicine, School of Veterinary Medicine, University of California, Davis, California 95616

J. Food Prot. 44:172-176

Raw and pasteurized milks used for cheesemaking were surveyed in a dairy plant, Juiz de Fora, MG, Brazil from 1978 to 1979. Raw milk samples were collected from 78 of 127 milk producers supplying 12,000-15,000 liters of milk daily to the plant. The TPC ranged from ($\log_{10}$) 4 CFU/ml to 7.17 CFU/ml with a ($\log_{10}$) mean of 5.59 CFU/ml. *S. aureus* cells were present in 46.9% of the samples. Mean number of *S. aureus* was ($\log_{10}$) 4.69 ± 0.54 CFU/ml; the highest number was ($\log_{10}$) 5.99 CFU/ml. Counts based on isolation on TPEY medium and confirmation on coagulase agar plate (CAP) did not differ significantly ($P > 0.05$) from counts based on isolation on Plate Count Agar/DNA agar and confirmation of nuclease-positive colonies on CAP. Fifty bulk pasteurized milk samples were collected from five milk collection systems. TPC had a mean ($\log_{10}$) of 4.02 ± 0.62 CFU/ml with the highest count being ($\log_{10}$) 5.6 CFU/ml. The pH of the milk ranged from 6.55 to 6.89. Type of collection system did not affect the pH of the milk or the TPC ($P > 0.05$). Three samples contained *S. aureus* at levels of ($\log_{10}$) 3, 2.3 and 4.43 CFU/ml. Detection of *S. aureus* was based on methods used for raw milk plus use of Baird-Parker/CAP method.

Survival and Growth of *Staphylococcus aureus* in Commercially Manufactured Brazilian Minas Cheese, Edson Clemente dos Santos[1] and Constantin Genigeorgis[2]*, Escola de Veterinaria, Universidade Federal de Minas Gerais, Bello Horizonte, MG, Brazil and Department of Epidemiology and Preventive Medicine School of Veterinary Medicine, University of California, Davis, California 95616

J. Food Prot. 44:177-184

The potential for *Staphylococcus aureus* survival, growth and enterotoxigenesis in Minas cheese was studied. Twenty lots of cheese were made with raw and pasteurized milk and with and without starter culture. Cheese milk was inoculated with *S. aureus* strains 100, 243 or 137 and a pooled inoculum at levels of ($\log_{10}$) 4.23 to 6 cells/ml. Use of starter, type of inoculum, ripening time and interaction of starter by strain affected significantly the final pH of the cheese (5.22 with starter versus 5.45 without starter). Final NaCl content of cheeses differed significantly ($P < 0.01$) with lot indicating lack of uniformity in salting. Moisture was affected significantly by *S. aureus* inoculum, time of ripening and use of starter ($P < 0.05$). Final moisture ranged from 30.6 to 45.6%. Highly statistically significant effects on *S. aureus* counts during ripening were observed for use of starter ($P < 0.001$), type of *S. aureus* inoculum ($P < 0.001$) and time of ripening ($P < 0.05$). Use of starter culture had an inhibitory effect on *S. aureus* growth. Use of raw or pasteurized milk did not affect significantly the staphylococcal counts. *S. aureus* growth occurred in all lots made without starter culture. Levels of *S. aureus* greater than ($\log_{10}$) 7 cells/g were observed in 27/47 and 7/46 cheeses made with pasteurized and raw milk, respectively. Enterotoxins A, B and C were detected in 10/16 and 0/4 cheeses made with pasteurized and raw milk, respectively, and more often in cheeses made without starter than with starter culture. This study demonstrated the need for more uniform manufacturing practices, use of starter culture and use of pasteurized milk only.

Potential for Presence and Growth of *Staphylococcus aureus* in Brazilian Minas Cheese Whey, Edson Clemente dos Santos[1] and Constantin Genigeorgis[2]*, Escola de Veterinaria, Universidade Federal de Minas Gerais, Bello Horizonte, MG, Brazil and Department of Epidemiology and Preventive Medicine, School of Veterinary Medicine, University of California, Davis, California 95616

J. Food Prot. 44:185-188

Presently there is a great interest in further utilization of Minas cheese whey by the Brazilian food industries. The potential growth of *Staphylococcus aureus* in Minas cheese whey was evaluated. *S. aureus* strain 100 was inoculated at levels of ($\log_{10}$) 3 and 5 cells/ml in sterile whey along with ($\log_{10}$) 7.17 cells/ml of *Streptococcus lactis* and *Leuconostoc cremoris* starter and incubated at 37 C for 8 h. *S. aureus* growth occurred at both levels of inoculum. Better growth was observed at the higher inoculum ($P < 0.05$). Thermonuclease was detected after 2 h of incubation only in the whey inoculated with ($\log_{10}$) 5 cells/ml and when growth reached about ($\log_{10}$) 7. Then we determined the presence of *S. aureus* in Minas cheese whey after inoculation of pasteurized milk with strains 100, 137 and 243 alone and in combination at levels ($\log_{10}$) of 4.23 to ($\log_{10}$) 6.20 with or without starter, and sampling the whey 60 and 70 min after the cheese processing started. A significant sampling time effect for *S. aureus* counts was observed ($P < 0.01$). Duncan's Multiple Range test showed that there were significant differences in strain behavior. Starter culture effect and the interactions were not significant ($P > 0.05$). The failure to observe a starter culture effect upon staphylococcal counts in whey may be due to the short time between starting the cheesemaking process and sampling of whey, insufficient amount of lactic acid produced by the starter culture and the detrimental effect of the processing temperature (34-36 C) upon the starter bacteria.

Inhibition of Growth of *Staphylococcus Aureus* and Enterotoxin-A Production in Cheddar Cheese Produced with Induced Starter Failure, G. F. Ibrahim*, D. R. Radford[1], A. K. Baldock and L. B. Ireland, Dairy Research

Centre, Department of Agriculture, P.O. Box 217, Richmond, New South Wales 2753, Australia

J. Food Prot. 44:189-193

Bacteriophage was used to induce starter failure in 12 batches of Cheddar cheese produced from milk inoculated with *Staphylococcus aureus*. At the end of cheddaring, only half the curd of every batch was salted and each curd portion was pressed separately. These cheeses were then stored at 4 C and also at a cheese maturation temperature of 11 C. Changes in the count of *S. aureus*, the associative growth of other microorganisms, pH, organoleptic properties and enterotoxin A concentration during production and storage were monitored. The data indicated that, in cheese without starter activity, inhibition of growth of *S. aureus* and enterotoxin production may be achieved during production by not salting the curd at the end of cheddaring, avoiding pressing at high ambient temperatures and minimizing the pressing time of the curd. Storage of salted cheese at 11 C appears to be a potential hazard because of significant increases in *S. aureus* count and enterotoxin concentration. When unsalted cheese was stored at 11 C, the count of *S. aureus* decreased and no change was observed in enterotoxin concentration; however, serious flavor deterioration occurred after 2 weeks. At 4 C, the *S. aureus* count decreased at a higher rate in unsalted cheese as compared with salted cheese, and in both instances there was no change in enterotoxin concentration.

Determination of Antibiotics in Meat Using *Bacillus stearothermophilus* Spores, M. Bielecka[1], J. D. Baldock[2] and A. W. Kotula*, Meat Science Research Laboratory, USDA, SEA, Beltsville, Maryland 20705

J. Food Prot. 44:194-200

Ten parameters affecting sensitivity, accuracy and simplicity of the diffusion plate method for determining antibiotic residues in meat were evaluated with spores of *Bacillus stearothermophilus* as the test organism. Eight antibiotics were studied and included penicillin, bacitracin, tetracycline, chlortetracycline, oxytetracycline, streptomycin, erythromycin and neomycin. Sensitivity of the method was most influenced by concentration of inoculum, quantity of assay medium on the plate and sample size. The optimal concentration of inoculum was established as 2×10^5 spores/ml of medium, quantity of the assay medium on plate/100 mm dia., as 6 ml and quantity of sample poured on disc/12.7 mm dia., as 100 µl. The pH of the assay medium was also important to both antibiotic potency and test organism growth. The activity of streptomycin and erythromycin was the most sensitive to pH variations.

Seasonal Concentration of Coliform Bacteria by *Crassostrea virginica*, the Eastern Oyster, in Chesapeake Bay, David Hussong, R. R. Colwell and Ronald M. Weiner*, Department of Microbiology, University of Maryland, College Park, Maryland 20742

J. Food Prot. 44:201-203

Samples of water, sediment and oysters from actively harvested oyster beds located in Tolly Point and Eastern Bay of the Chesapeake Bay region were sampled over a 2-year period during which total coliforms remained at low densities. Under these conditions, there were times when total coliform densities in oysters significantly varied from those in overlying waters. The observed seasonal concentration of coliforms by oysters should be considered when assessing the efficacy of bacteriological quality standards.

Scanning Electron Microscopy of Microbial Attachment to Milk Contact Surfaces[1], P. T. Zoltai, E. A. Zottola* and L. L. McKay, Department of Food Science and Nutrition, University of Minnesota, 1334 Eckles Avenue, St. Paul, Minnesota 55108

J. Food Prot. 44:204-208

Milk contact surfaces were observed by scanning electron microscopy (SEM) techniques for possible microbial attachment. Cultures of *Pseudomonas fragi* 4973, *Staphylococcus aureus* JAL, *Streptococcus lactis* C2, *Streptococcus cremoris* and *Lactobacillus bulgaricus* RR inoculated onto glass coverslips or stainless steel chips were examined. Stainless steel surfaces displayed many possible harborages for microbial colonization. SEM examination of *P. fragi* 4973 showed development of fibrous material, with numerous stick-like projections extending from the cell to the glass or stainless steel surface. These apparent attachment appendages became more pronounced as contact time increased. *S. aureus, S. lactis, S. cremoris* and *L. bulgaricus* did not display such fibrous material.

Variation of Laboratory Cheesemaking Procedures, C. L. Hicks*, J. O'Leary, E. B. Aylward and B. E. Langlois, Food Science Section, Department of Animal Science, University of Kentucky, Lexington, Kentucky 40546

J. Food Prot. 44:209-210

The variability of yield for Cheddar cheese manufactured in 7- and 390-kg-size vats and cottage and direct-acid-set cheese manufactured in 7-kg-size vats was compared. The direct-acid-set cheese had less variability than Cheddar or cottage cheese (% coefficient of variation was .91, 1.79 and 4.69, respectively) manufactured in 7-kg-size vats and Cheddar cheese manufactured in 360-kg-size vats (% coefficient of variation was .91 and 1.98, respectively). Cottage cheese had the largest variability between replications using small vats because of additional stirring and curd manipulation required in its manufacture. Therefore, when cheese variety is of no concern, the direct-acid-set cheese procedure would reduce variation between replication more than traditional Cheddar procedures when used in an experimental design. In addition, a greater number of vats of cheese could be manufactured per day using the small vat system.

Growth and Aflaxtoxin Production by *Aspergillus parasiticus* in the Presence of *Lactobacillus casei*, S. M. El-Gendy and E. H. Marth*, Department of Food Science, and The Food Research Institute, University of Wisconsin-Madison, Madison, Wisconsin 53706

J. Food Prot. 44:211-212

When a mineral salts-glucose broth was inoculated simultaneously with *Aspergillus parasiticus* and *Lactobacillus casei* and incubated at 28 C for 10 days, (*a*) larger numbers of *L. casei* survived than when the bacterium was grown alone, (*b*) growth of *A. parasiticus* initially was more rapid but total growth during the incubation was comparable to that of the mold growing alone, (*c*) production of aflatoxin was less than when the mold grew alone and (*d*) degradation of aflatoxin by the mold was somewhat greater than when the mold grew alone. Growth of *L. casei* for 3 days before adding *A. parasiticus* resulted in (*a*) better survival of *L. casei* than when it grew alone but not better than when the two organisms were added to broth simultaneously, (*b*) slower growth of *A. parasiticus* than when it grew alone, (*c*) production of less aflatoxin than when the mold grew alone or when both organisms were added to broth simultaneously and (*d*) no apparent degradation of aflatoxin during the 10-day incubation period.

Thermal Inactivation of L-Glutamic Acid Decarboxylase from *Escherichia coli*, Terrance L. Smith[1], James W. Moran[2] and Lloyd D. Witter*, Department of Food Science, University of Illinois at Urbana-Champaign, Urbana, Illinois 61801

J. Food Prot. 44:213-214

The rate of thermal inactivation of glutamate decarboxylase (EC 4.1.1.15) from *Escherichia coli* was determined in terms of the z value and thermodynamic parameters. The enzyme was inactivated at a faster rate than *E. coli* when heated at food process temperatures in buffer.

Cooked Product Temperature and Curing Ingredients Affect Properties of Irradiated Frankfurters, R. N. Terrell[1]*, G. C. Smith[1], F. Heiligman[2], E. Wierbicki[2] and Z. L. Carpenter[1], Meats and Muscle Biology Section, Department of Animal Science, Texas A & M University, College Station, Texas 77843 and Food Engineering Laboratory U.S. Army Natick Research and Development Command, Natick, Massachusetts

J. Food Prot. 44:215-219

Frankfurters (9.07-kg batches) were conventionally made in which three replications of the following treatment combinations were used (*a*) curing ingredients: 0 or 50 ppm of sodium nitrite, 75 ppm of sodium nitrite-25 ppm of sodium nitrate, or 50 ppm of sodium nitrite-25 ppm of sodium nitrate, (*b*) seasoning: dry soluble or equivalent ground spice, (*c*) cooked product temperatures of 65.5 or 76.6 C and (*d*) radiation processing levels of either 0, 0.8 or 3.2 megarads. Regardless of curing ingredient combinations or levels of irradiation, lowering internal cooked product temperatures (65.5 vs. 76.6 C) improved internal color, off-odor, off-flavor, moistness and overall desirability scores of frankfurters. Use of a dry soluble seasoning in comparison to an equivalent natural ground spice seasoning had no effect on sensory, chemical or palatability traits of irradiated frankfurters. Although not significant, frankfurters made without nitrite (0-NO_2) compared to those made with 75 NO_2-25 NO_3, had greater process shrinkage values and were significantly less desirable in visual color, off-flavor and overall palatability. External and internal color scores of frankfurters made with NO_2 and NO_3 combinations were less intensely pink, with an increase in irradiation from 0 to 0.8 to 3.2 megarads. Sensory traits (off-flavor, off-odor, texture and overall palatability) were less desirable in those frankfurters irradiated at 3.2 megarads as compared to those irradiated at 0.8 megarads. Both levels of irradiation produced less desirable frankfurters than the non-irradiated controls (0 megarads). Improvements in sensory properties of irradiated frankfurters may be accomplished by use of at least 50 ppm of NO_2 and cooking to a final internal product temperature of 65.5 C.

Design and Performance of Systems for Cleaning Product-Contact Surfaces of Food Equipment: A Review, D. G. Dunsmore*, A. Twomey[1], W. G. Whittlestone[2] and H. W. Morgan[2], Dairy Research Centre, P.O. Box 217, Richmond, N.S.W. 2753, Australia

J. Food Prot. 44:220-240

This paper reviews the routine and periodic systems used to clean food equipment. The manner in which soil accumulates on surfaces, and factors affecting that accumulation are discussed. The mechanisms by which microbial development on the equipment surface is controlled by the system is also discussed. The contamination sequence of deposition, attachment, depletion, growth and contamination by the organism is presented in detail. Changes in surface microbial numbers over time are reviewed for system components and complete systems. The relationship between the amount of soil on the surface and microbial survival is examined. The ability of the routine and periodic systems to control soil accumulation and microbial development is discussed. Factors affecting design of a cleaning system are also presented. These factors are used to design a cleaning system, using a pipeline milking machine as an example.

SOMEONE YOU SHOULD KNOW IN THE DAIRY INDUSTRY

Dr. Anita Todd,
Nutrition Educator

Dr. Todd is Director of Nutrition Education for the Dairy Council of Arizona, which is a non-profit nutrition education organization supported by the dairymen of the state. As an affiliated unit of National Dairy Council, they provide nutrition information, literature, workshops and services to educators, health professionals, and consumers. Dr. Todd has an extensive educational background. Earning a Bachelor of Science degree in Home Economics from the University of Arkansas, she taught high school home economics before receiving a Master of Arts in Education and her Doctor of Philosophy in Education from Arizona State University. Child development and early childhood education were her areas of specialization. Dr. Todd is also a wife and mother.

Food...Your Choice!

"Ten years of Elementary classroom teaching make it possible to perform my responsibilities for the Dairy Council of Arizona. My primary responsibility in nutrition education is to encourage and aid Arizona schools to implement Dairy Council's nutrition education programs. Since nutrition is not always a required subject, my first job is to 'sell' teachers and/or administrators on the benefits of including nutrition in their busy schedule. Where enthusiasm is generated, training workshops are scheduled and materials ordered for each teacher. Materials provided to teachers of grades K-6 are curriculum kits called 'Food...Your Choice.' The kits have teacher guides with carefully outlined, activity oriented lessons, books of worksheets for the students, punch-out serving size photos of many foods, posters, records, song sheets and take-home material for the parents.

"In the workshops, basic nutrition is presented as teachers are trained to use the curriculum materials. In the three years since 'Food...Your Choice' has been available, it has appeared in more than 200 Arizona schools.

"Soon, the 'Food...Your Choice' curriculum will expand to cover grades 7-10. Teachers in selected subject areas will have teaching kits available, and it will be necessary to devise a different strategy for implementing 'Food... Your Choice' at this level.

Food...Early Choices

"The most exciting recent addition to Dairy Council's curriculum is a nutrition education program for preschoolers called 'Food...Early Choices.' Since I strongly feel early childhood is one of the best periods for learning in all areas, I was especially glad when National Dairy Council decided to develop this program, and I could be a part of development from the beginning.

"Trial runs for the materials and activities of 'Food... Early Choices' were conducted in Arizona day-care centers and preschools during the summer of 1979. When complete, the program made its national debut in Arizona through a project I developed for the Arizona Department of Education. The project, a part of Arizona's Nutrition Education and Training Program, aimed at the Child Care Food Programs of the state. In just six months, more than 445 preschool teachers in Arizona were trained in the nutritional needs of young children and the use of curriculum materials.

"Chef Combo, an appealing, mustached hand puppet is the star of the preschool program. The children are told he is a food expert and knows what is good to eat and how to fix good food. He easily captures the attention and affection of young children and adults, making it easy for the teacher to use him when introducing the more than 20 different nutrition learning activities in the program. Other versatile components of this program are colorful food picture cards, a food floor mat game, posters, a song record and playing cards. Through the use of these materials, the preschoolers learn why they need to eat good food, and why they need to taste new or different foods. They also learn to be clean and careful when working with food. Chef Combo also communicates with parents through information sheets sent home with the children. This program potentially influences the eating habits of thousands of families.

In Addition

"Paperwork galore is associated with arrangements, orders and follow-up of these workshops. In addition, I make presentations to other groups who are interested in nutrition education such as college classes, parent organizations and other nutrition educators. Ongoing nutrition education programs must be serviced with material replacement, consultation and sometimes re-motivation or 'pep talks.'

"Many authorities on health agree that good nutrition is the foundation of good health. For this and many other reasons, I consider it a privilege to be involved with the dairy industry and the Dairy Council of Arizona in its unique role of service to the Arizona community through nutrition education."