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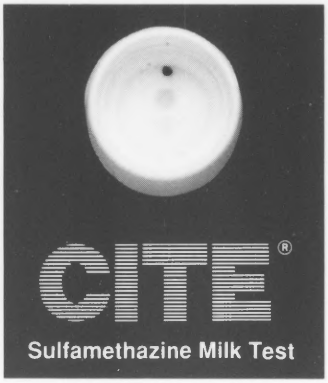


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### *Purpose*

1. To encourage graduate students to present their original research at the IAMFES annual meeting.
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3. To encourage participation by graduate students in IAMFES and the annual meeting.

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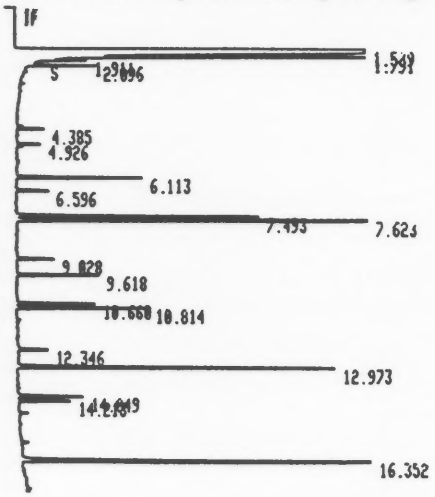


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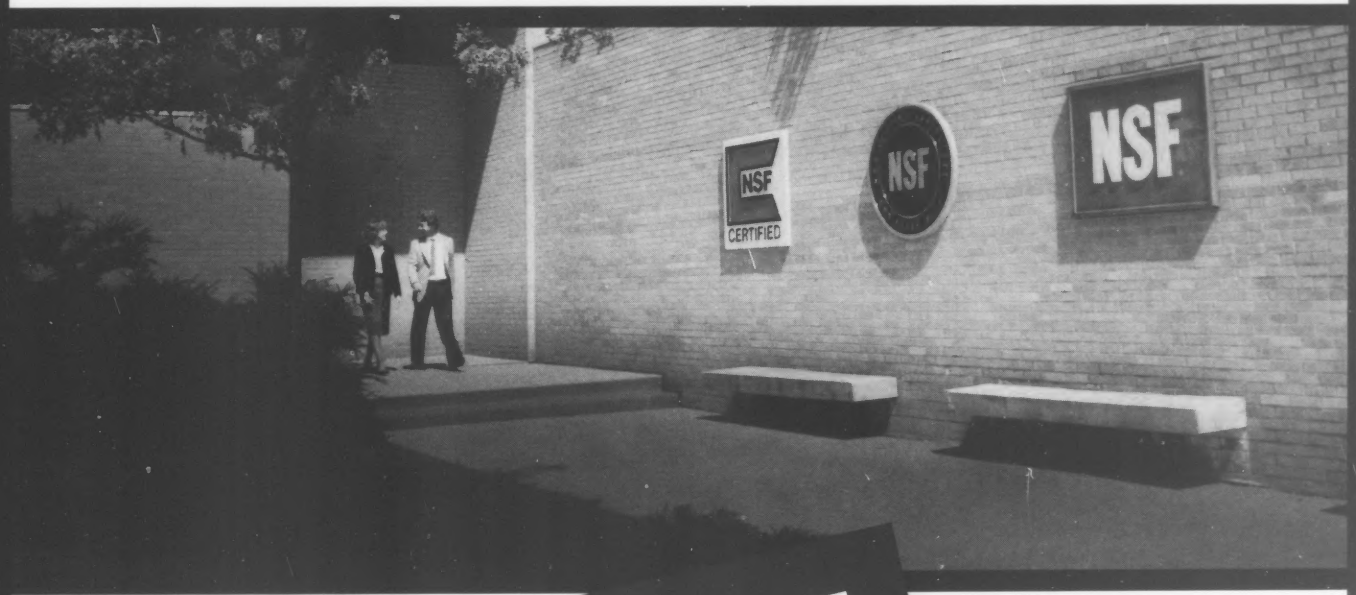


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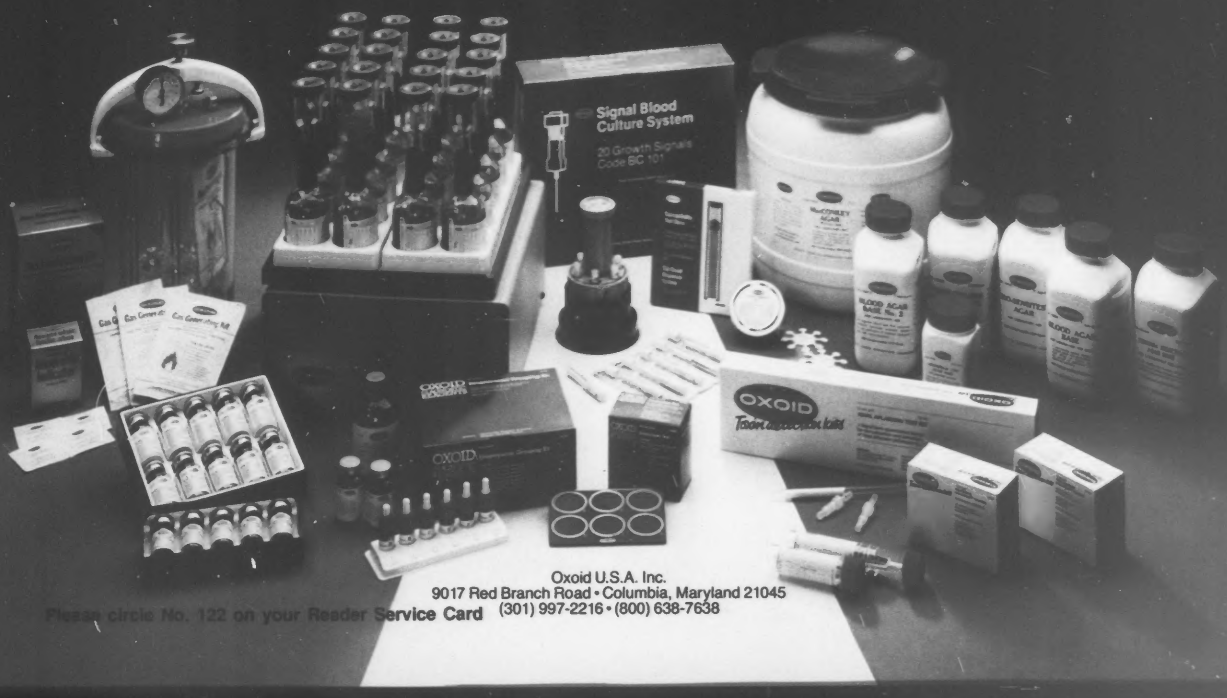


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*Dairy and Food Sanitation, Vol. 8, No. 10, Pages 521-523 (October 1988)*


# A Practical Environmental Sampling Plan For Dairy Processing Plants

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With the advent of concerns about environmental sanitation, many companies in the dairy industry have expanded their quality assurance programs to include sampling and testing environmental areas for pathogenic bacteria. The age old questions of sampling and testing -- why, where, frequency and cost -- face the industry as it attempts to control environmental sanitation, a sometimes elusive area of quality control. A practical approach to an environmental sampling program is desirable which considers testing cost as well as how to define areas for sampling to yield information to analyze the sources of environmental contamination.

In response to several food borne outbreaks traced to *Salmonella, Listeria Yersinia* and *Campylobacter* bacterial contamination of dairy products, the Milk Safety Branch of the Food and Drug Administration began the Dairy Safety Initiative Program of April 1, 1986[4]. The program, while primarily designed as an intensive inspection program, using the Pasteurized Milk Ordinance of the National Conference on Interstate Milk Shipments, was to also focus on potential non product contact contamination areas. This focus came as a result of the investigations of the then recent dairy product food borne outbreaks, which all strongly indicated post pasteurization contamination of the products as the source.

The Dairy Safety Initiative Program and its follow up reports[2,4,7] have each indicated that companies should perform environmental sampling for pathogenic bacteria in their processing plants to identify specific areas of possible contamination. Each report has recommended that the samples should be tested in an off site laboratory to avoid the possibility of expansion of the environmental contamination through laboratory accidents or "tracking" of the bacteria from the laboratory back into the processing areas.

While the reports have indicated many areas to be of concern and ways to control environmental sanitation, the recommendations do not outline the frequency of sampling or how a company might design a program to pinpoint sources of contamination. Without a specific plan of sampling, many companies may have sampled and tested their plant environment only to come to the conclusions that environmental contamination is an uncontrollable moving target, that results take too long to obtain, and the testing costs too much for the inconclusive data received.

The development of environmental sampling and testing plans which will yield more conclusive but cost effective data is needed to ease the frustration many quality control and plant managers may face. While each plant must tailor the sampling plan to a specific situation, the guidelines herein suggest ways to approach environmental sampling.

## Sampling Guidelines

Before environmental sampling begins, the person who will sample should keep some important points in mind about the target organisms:

1) A specific organism is being sought. The sample must be taken so that each target organism can be isolated. ("Target organisms" are defined as the specific organism looked for in the environment, such as *Listeria* or *Yersinia*). In most cases, this will mean taking separate swabs or samples for each target organism, as the isolation testing requires different media for each type bacteria.[6]

2) The environmental samples should be taken with an attitude to find the target organism. Otherwise the results may give a false sense of security that the organism is not present. In all cases, go for the dirt, grease or condensate and do not sample obviously clean sanitized surfaces.

3) Know the characteristics of the target organism(s) being sought, and sample where it is likely to be present. Each type of bacteria has specific parameters for growth, including the type of environment.[3]

4) Look for microbiological "havens", where the four requirements for bacterial survival and growth can occur: temperature, water, pH, and food.[5] All requirements must be met for growth. However, keep in mind that the target organisms may survive for periods of time with only two of the requirements and begin to grow if the third and fourth requirements are met.

## Initial Sampling

The first step of the environmental sampling plan is to identify areas of the plant that will be focus areas for

sampling. This is the screening step, when samples are taken from obvious microbiological havens, such as pooled product and water areas, drains, places where old product has built up, and conveyors. These are the collection points for the target organism, where the bacteria have drained or been carried from the actual sources. Sample each area of the plant in this manner, focusing on the lowest points of the area.

The samples should be taken while the plant is in operation, not after cleanup, to avoid cleaning and sanitizing solutions mixed with the sample, and to allow the bacteria to be carried to the collection points from the "havens" by runoff, condensate and drainage.

The results should yield an overview of the plant's environment and indicate if the target organisms are present in each area. An important point to consider at this time, however, is that only general areas have been identified, not necessarily the source of the environmental contamination.

**Locating Sources**

With the overview results obtained, the focus areas are identifiable. The second round of sampling will identify the sources of the environmental contamination in each focus area.

In each case, begin sampling at the "top", looking for microbiological "havens". Start by swabbing air handling areas where condensation and dirt have accumulated, overhead conveyors, pipelines, and the like. Next, look under equipment parts where product and condensate may have fallen onto mechanical areas. Sample under conveyor chains and in cracks and crevices. Do not overlook brushes, squeegees, towels or buckets used in the operation. Be sure to examine pistons, pump housings, agitator shafts, motors, valve assemblies and underneath all tanks.

When locating sources, it is important to sample every probable place. Due to the design of some dairy processing equipment, it is quite possible for bacteria to be transported to a product contact area by mechanical action, aerosol during operation, condensate drippage, the operator's hands during adjustment, or a combination of the above.

The results of the samples will outline the sources of environmental contamination, provided that all areas were sampled thoroughly.

**Controlling Testing Cost in Source Identification**

Environmental testing can be expensive using the preceding sampling plan. On reviewing commercial laboratory testing costs for *Listeria* organisms, the current range was found to be $10-40 per sample, depending upon the method utilized and if confirmation of organisms is desired.

Using an average cost of $20 per sample, the cost for overview sampling would be $600 (30 samples) and source location sampling could approach an additional $2000 (100 samples). With recheck sampling to follow-up after cleanup has taken place, a plant could have a laboratory invoice totalling in excess of $4000 for one round of environmental sampling.

This is not to recommend that target organism sampling should be discontinued. However, a more practical approach may be desired to control costs, yet still achieve useful information about the environment on a timely basis.

Most dairy processing plants are set up to test for total bacteria counts using Standard Plate Count Methodology[1]. It may be useful therefore, to couple target organism sampling with total count sampling. In this approach, two samples are taken during the source location sampling, one sent for target organism testing to the outside laboratory, and one tested on site for total plate count.

This approach does not suggest that there is always a correlation between pathogens and total bacteria counts, but one can identify sources of general environmental contamination to begin cleanup and have some indication if cleaning procedures are effective in reducing the total bacteria load while waiting for target organism results.

The rationale for this is that the microbiological haven mentioned previously can create the environment for the target organism to grow. While the target organism may or may not be present, other organisms will usually be present and growing if this microbiological haven is conducive to growth of the target organism. The haven can then be identified as a potential environmental contamination source and cleaned up while verification of the presence of target organisms takes place.

The total count to be expected cannot be defined precisely, but initial total bacterial counts of the "haven" might be in the range of 200,000 to 16,000,000 or more per area swabbed. Experience and experimentation will determine what total count level is desired or obtainable after cleanup. Whatever the initial total count level, a dramatic decrease in counts will indicate that the microbiological haven has been controlled. At that point, the recheck for the target organism must be done as assurance that the pathogen is under control at that particular source. It is important to follow up with target organism testing at this point, for a reduced total count will not be a reflection on a specific organism being eliminated.

**Analyzing the results**

When all results have been obtained from the source sampling, it will be helpful to map the source locations on a plant equipment diagram. Many times, relationships of two or more sources will become evident by mapping the points and asking the following questions:

1) Do the sources have a common link from a separate source by conveyors, carts, pipelines or other factors?
2) Do operator practices contribute or cause the condition to exist?
3) Is equipment design or layout the contributing factor?
4) Are havens present in the area which can be splashed, dripped, or aerosoled to the sources identified?

Until the results are fully analyzed to recognize the cause of the environmental contamination point, reaction to the results may lead to treating a symptom, not elimi-

nating the source. If the true source of environmental contamination is not found, and eliminated, the target organism will come back in future environmental samples, and may have spread to other areas. It is important, therefore, to have enough sampling data to pinpoint the true sources. If resampling after cleanup continues to show environmental contamination, continue to expand the map to include mechanical or personnel traffic patterns which may be contributing to the problem.

**Frequency of Sampling**

After the initial sampling is done and the sources are found and eliminated, the plant should routinely repeat the initial sampling part of the plan to monitor the environment as part of the quality control program. The frequency of routine sampling is dependent on the type of operation, design of the processing equipment, and traffic patterns which may reintroduce the target organisms into the environment. Only experimentation can determine the ultimate desired sampling frequency.

Figure 1 outlines the steps of a total environmental sampling plan. It is important to note that the plan continues to repeat itself in a cycle. One pass through the plan will not ensure a clean environment, and the cycle must be routinely repeated to monitor the changes in the plant environment which could lead to contamination.

**Conclusion**

Environmental sampling can be accomplished in a logical manner to obtain results to assist in the control of dairy pathogens. By planning the samples to be taken and understanding the growth patterns of the target organisms, a systematic sampling and testing program can help the plant to do more than just swab in the dark.

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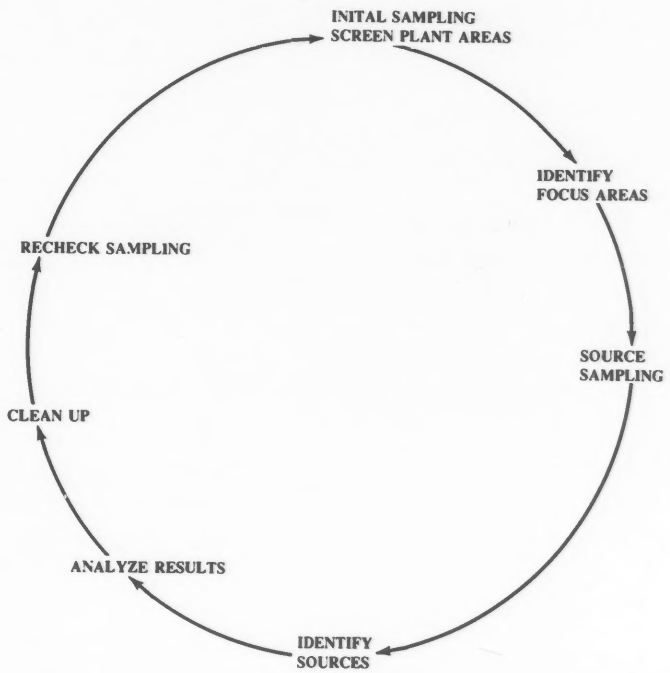


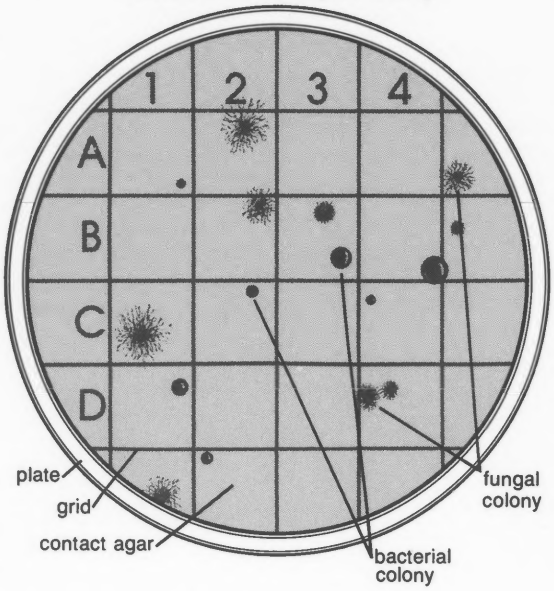

FIGURE 1.
*Environmental Sampling Plan Steps.*

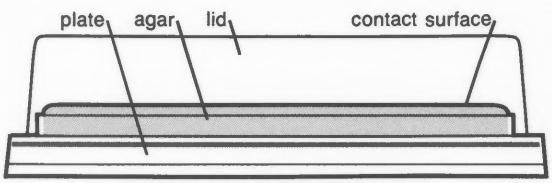
**remel** (rĕm'·ĕl), ***n.*** 1. an acronym for Regional Media Laboratories, Inc., Lenexa, Kansas. 2. a leading manufacturer of prepared culture media and related microbiology products for use in the **DAIRY** and **FOOD** industries. 3. a company to call for RODAC® plates.

R

**RODAC® plate** (RŌ·DĂK plāt), ***n.*** 1. an acronym for Replicate Organism Direct Agar Contact plate. 2. used in **DAIRY** operations and **FOOD** processing plants for **ENVIRONMENTAL SAMPLING** of sanitary quality of containers, equipment, and work surfaces encountered in production. 3. useful in evaluating cleaning compounds and disinfectants for reduction of microbial load. 4. contact medium is contained in a special plate (RODAC®) which has a grid on the bottom of the plate that is helpful in calculating the number of organisms present in the test area (see diagram).

A. RODAC® PLATE (TOP VIEW)




B. RODAC® PLATE (SIDE VIEW)

**rush** (rŭsh) ***v.i.*** 1. to move or go swiftly. 2. necessitating haste; as rush orders to REMEL for RODAC® plates and other microbiology quality control products. 3. delivery overnight in most areas. 4. for your rush order call REMEL:

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**(800) 332-4377** (KS).

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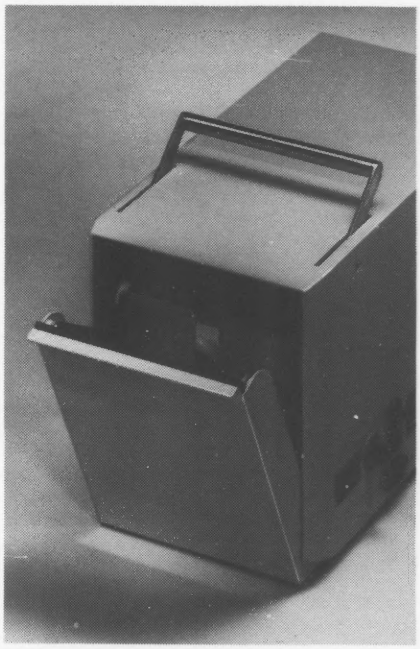

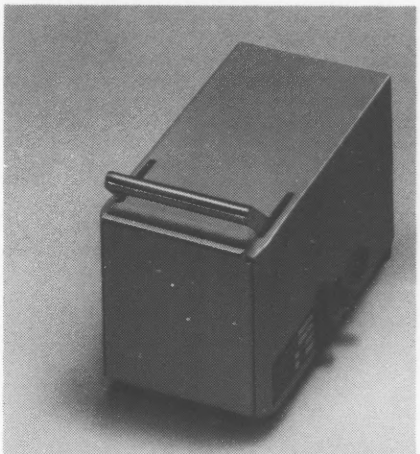

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*Dairy and Food Sanitation, Vol. 8, No. 10, Page 526 (October 1988)*


# Proper Food Care and Consumer Awareness Essential in Reducing Aflatoxin Poisoning

By Marilyn Brown
TAES Science Writer

Recent reports have sounded the alarm about aflatoxin and other naturally occurring toxins in certain foods and feedstuffs, including peanuts, corn, peppercorns, potatoes, chili sauce, cottonseed, and milk. The toxins are produced by molds that grow in the food, or in the case of milk, in the feed given to cattle.

Aflatoxins and other mycotoxins have received considerable attention from the Texas Agricultural Experiment Station (TAES) and other agencies worldwide. In the United States and other developed nations, governmental agencies monitor various foods and feeds for the presence of mycotoxins.

Aflatoxins are produced by molds that belong to the *Aspergillus flavus* or *Aspergillus parasiticus* family and are among the most poisonous naturally occurring substances known. Another family of mycotoxins, the penicilliums, have been of great use to medicine, helping the immune system fight off disease-causing organisms.

"Aflatoxins can cause serious health problems when consumed in large quantities over time," says Robert E. Pettit, who studies soilborne diseases for TAES. "Ingestion of aflatoxin can inhibit the immune system, making the body more susceptible to disease-causing agents. At high intake levels, aflatoxins can cause liver cancer," Pettit says.

"Some animals are more resistant to aflatoxins than others; in general, young animals and children are more susceptible to them than are mature animals or adults. Fish, young ducklings, and chickens are more sensitive, compared to larger animals such as mature beef cows and sheep that are more resistant," Pettit says.

In the past, aflatoxin poisoning of livestock feedgrains has been a problem, so the USDA makes a great effort to monitor its presence. USDA guidelines allow 5 to 20 parts per million as the maximum level at which aflatoxin can be present in a marketable food or feed.

Peanuts, for example, are tested several times. The first inspection occurs when the peanut farmer takes his crop to the buying point, where an inspector will segregate an entire load if even one kernel is found to have the yellow-green mold on it. Those peanuts cannot be used directly for food or feed and are processed to remove the toxin.

The peanuts are then sampled at the shelling plant, and samples are sent to a state chemist to be checked for aflatoxin. If any toxin is detected, the peanuts are diverted. The peanuts are tested again during processing, and products such as peanut butter also are tested.

"The final inspection occurs when USDA staff members purchase peanut products in the market to check them for aflatoxin," Pettit says.

After so many inspections, public health experts consider peanuts to be safe from aflatoxin, but other products lack such extensive monitoring.

"The ultimate solution to the mycotoxin problem is to prevent mold growth on or in any potential food or feed," Pettit says. "Reseachers are studying plant types that prevent the toxin-producing fungi from entering the seeds. By selecting plant types that produce seeds that have barriers to mold-invading fungi, mycotoxin contamination may be significantly reduced," he says.

Pettit's current efforts are aimed at discovering the presence of tannins and other compounds in peanut shells and pods that inhibit penetration by *Aspergillus* species.

Although the dangers of mycotoxins are real - for example, they were responsible for the Irish potato famine in the 1800s - proper food handling and storage can greatly reduce their development.

Aflatoxin contamination remains a serious problem in Third World countries, where these poisons enter the food supply through grains and peanut meal that are not stored and handled properly. Even the milk supply can become tainted when livestock consume contaminated grains, as can a nursing mother's milk. As with other species, young children are more susceptible to liver and immune system damage from the toxin.

Pettit and other researchers hope that their work will ease the incidence of aflatoxin poisoning. But neither their efforts nor government monitoring can replace care in production, processing, handling, storage, and marketing to prevent mold damage.

Consumers should never buy or eat moldy foods of any type, nor should they feed them to their animals, Pettit says. High heat only partially destroys aflatoxins, so it is safest to discard moldy products, he advises.

"Consumers who purchase foods and feeds selectively should not be fearful of aflatoxins," Pettit says. "The fear itself is bad, and the mental problems that can develop from worrying about food quality can be worse - in a different way - than the toxins," he says.

*(Reprinted from TAES Science Writer, Column 611)*

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## CHIEF, DIVISION OF FOOD PROTECTION AND SANITATION

The Rhode Island Department of Health is seeking qualified candidates for the position of Chief, Division of Food Protection and Sanitation. Duties include; on a state wide basis, to be responsible for the planning, direction, supervision, review and evaluation of the work of a staff engaged in carrying out a comprehensive environmental sanitation and food protection program; to provide leadership and direction to a supervisory staff engaged in administrative and advanced technical work. Successful candidates must possess a thorough knowledge of the principles, practices, and techniques of environmental sanitation and food protection and the ability to apply such knowledge in the planning, supervising, and evaluating the work of a staff in carrying out these programs. Candidates must possess a Master's degree in environmental health, in biological or chemical sciences, or in food technology and must have been employed in a responsible supervisory or consultant position in the field of environmental health of food technology or any combination of education and experience that shall be substantially equivalent. This position is subject to provisions of the Merit System Law and is subject to Civil Service Examination.

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*Dairy and Food Sanitation, Vol. 8, No. 10, Pages 528-531 (October 1988)*


# 'An Order of Fries - Hold the Sulfites'

*by Chris W. Lecos*

Various fresh, pre-cut potatoes and processed potato products that are commonly served in restaurants could no longer be treated with sulfites, under a regulation proposed by the U.S. Food and Drug Administration.

Sulfite-treated potatoes were a contributing factors in the deaths of four people, according to reports received by the agency.

Used by the food industry for many years, sulfites are applied to fresh, pre-cut potatoes and potato products to prevent discoloration and to extend their storage life. In effect, a potato stays whiter and firmer longer when the preservatives are used.

Sulfites have been widely used as preservatives or antioxidants in foods and drugs for many years. Sulfites are actually a group of sulfur-based chemicals - sulfur dioxide, sodium sulfite, sodium and potassium bisulfite, and sodium and potassium metabisulfite.

Although sulfites are not a health hazard to the majority of Americans, some people are sensitive to them and can suffer mild to severe allergic-type and even life-threatening reactions after consuming them. Particularly at risk are asthma sufferers - as many as 1 million - although some individuals with no known history of asthma also have reported adverse reactions to sulfites.

The symptoms most frequently reported are difficulty breathing, wheezing, hives, diarrhea, vomiting, abdominal pain, cramps, and dizziness. Seventeen deaths, including the four involving potato products, have been "probably" or "possibly" linked to the consumption of sulfites in either foods or drugs, according to FDA.

The proposed regulation refers to sulfites used on "fresh" potatoes. However, FDA broadly defines "fresh" to mean all potatoes and potato products that are "served or sold unpackaged and unlabeled" to consumers who - such as restaurant patrons - have no way of knowing if the preservative was used.

However, not all potato products in which sulfites are commonly used would be covered by the regulation. For example, it would not apply to canned, frozen and dehydrated potato products that bear food labels declaring the presence of sulfites.

As a result, some products that are served regularly in restaurants - such as french fries, cottage fries, and hash browns - would be covered by the proposed ban if they were delivered to the restaurant pre-cut, but unpackaged and unlabeled. They would *not* be covered if they were delivered in a properly labeled package identifying the use of sulfites.

## BAN COULD BE EXTENDED

FDA said it would consider extending the ban to include canned, frozen and dehydrated potato products after reviewing industry and public comments to the proposal. The proposed ban was published by the agency in the *Federal Register* last Dec. 10.

Since 1959, the use of sulfites as chemical preservatives has been considered by FDA to be "generally recognized as safe," or GRAS. In effect, sulfites have been approved food additives for more than 28 years. Their use on fresh potato products would no longer be approved if the regulation is adopted - an action FDA has taken with other food uses of sulfites.

Since Aug. 8, 1986, FDA has prohibited the use of sulfites on raw fruits and vegetables, an action directed mainly at various foods in salad bars. Potatoes were not covered by that regulation. As of Jan. 9, 1987, FDA has also required manufacturers to declare the presence of sulfites on the labels of packaged foods containing at least 10 parts per million sulfites. Since last June 3, drug companies have been required to produce a warning statement on prescription drugs containing sulfites. (For further information, see "Reacting to Sulfites," *FDA Consumer*, December 1985-January 1986, and "Sulfites: FDA Limits Uses, Broadens Labeling," *FDA Consumer*, October 1986.

Three principal factors have prompted FDA to add potato products to the list of foods in which sulfites would not be allowed:

- Sulfites are a known hazard to some individuals. Since November 1982, more than 1,400 complaints of alleged reactions to sulfites have been received by the agency. In March 1985, the agency formed an Adverse Reaction Monitoring System for investigating and evaluating the complaints it received. By the end of 1987, FDA had investigated 709 of the 887 consumer complaints received since March 1985 and had determined that 51 percent could be classed as "serious" reactions, including the 17 deaths that have been linked to consumption of various foods and drugs containing sulfites.
- The fact that Americans are eating more meals away from their homes increases the potential for "inadvertent [consumer] exposure" to sulfite-treated potato products that are unpackaged and unlabeled so that restaurant operators may not even be aware that the delivered products contain sulfites.
- There is potential for "misuse of products containing

sulfiting agents'' by restaurant and other retail food personnel. Some restaurants, for example, dip peeled and cut potatoes in sulfite solutions and then refrigerate them for later use. The misuse comes from food service employees who fail to apply sulfites properly.

Salad bar items and fresh fruits and vegetables (excluding potatoes) account for nearly half (47 percent) of all complaints of sulfite reactions reported to FDA. Potato products are responsible for 12 percent of the complaints, wine for 12 percent, and drugs for slightly more than 3 percent.

In discussing the various sulfite uses with ''fresh'' potatoes and potato products, FDA is making it clear that its definition of ''fresh'' goes beyond the raw, unpeeled potatoes heaped for sale in the supermarket bin. Actually, sulfites are not used in such instances.

As indicated, the proposal would affect sulfite use on ''fresh'' potatoes and potato products that are served or sold unpackaged and unlabeled, and it would affect the way potatoes and potato products are processed, cooked, served and/or sold in retail food outlets, including restaurants, grocery stores, convenience stores, and food vending machines. It also would affect the way potatoes are treated with sulfites at the plant and wholesale level, before delivery to restaurants and other retail outlets.

For example, the ban would include peeled potatoes that are treated with sulfites and refrigerated before cooking; those that are treated with sulfites, blanched in oil or water, and refrigerated before cooking; and potatoes that have been peeled, cut, and then dipped uncooked in sulfite solutions for use later.

## PUBLIC COMMENT SOUGHT

Even if the proposed regulation goes into effect as written, consumers with a taste for hash browns, cottage fries, or french fries, but who are sensitive to sulfites, would still have to be wary. That's because the regulation would not cover sulfite use in canned, frozen or dehydrated potato products. Sulfites are often applied at the processing plant or by a distributor, so a restaurant receiving a delivery might not know whether the cottage fries it uses have been treated with sulfites.

FDA evaluations show that frozen potato products may contain from 15 to 250 parts per million of sulfur dioxide equivalents; dehydrated potatoes, from 50 to 700 parts per million; and refrigerated potatoes, from 30 to more than 1,400 parts per million. (Sulfite levels are usually expressed in terms of sulfur dioxide equivalents. This is the amount of sulfur dioxide that would be released by a sulfiting agent applied to a food. FDA has found that these levels can vary widely - from 10 parts per million to more than 1,400 parts per million of sulfur dioxide equivalents - in the various potato products checked.) FDA said it would address these uses in the future. FDA also said it would continue to encourage the food industry to limit other sulfite uses, where possible, to the lowest possible levels.

FDA's investigation of the four deaths from potato products disclosed high levels of sulfites consumed by the victims, some of whom had a known sensitivity to the chemicals.

One of the victims was a known asthma sufferer who died from eating cottages fries in a restaurant. Shredded, raw, refrigerated potatoes obtained afterwards from the restaurant by FDA showed that they had 96 parts per million of sulfur dioxide equivalents. The same products delivered to the restaurant a month later disclosed sulfur dioxide equivalents of 615 and 582 parts per million. FDA was unable to determine why there was such a wide variance in the levels.

FDA was unable to obtain samples of the hash brown potatoes that apparently contributed to the death of another victim, who died after eating in a Texas military food service place. In a third case, also involving an asthmatic, a Los Angeles County examination of the hash brown potatoes received by the restaurant a month after the person's death showed that they contained 242 parts per million sulfur dioxide equivalents.

The fourth death also involved an individual with asthma who died after eating cottage fries. The coroner's report indicated that the sulfite-treated potatoes were a contributing factor in the victim's death.

## REPORT CITES ABUSES

One other case cited by FDA involved a sulfite-sensitive asthmatic patient who went into a coma for three weeks after eating cottage fries and who suffered severe motor and neurological damage. Analysis of the cooked potatoes indicated they contained 1,390 parts per million of sulfur dioxide equivalents. Samples of potatoes obtained from the plant, where they were peeled, steamcooked, sliced and refrigerated, showed that they had from 1,260 to 1,570 parts per million of sulfur dioxide equivalents.

In a December 1985 report, FDA's Advisory Committee on Hypersensitivity to Food Constituents declared that although sulfites were not a hazard to most Americans, the evidence clearly indicated that sulfites did pose a ''hazard of unpredictable severity'' to those with a sensitivity to the chemicals when ''exposed to sulfite agents in some foods at levels that are now current....''

The advisory committee also stated that sulfites were not necessary in frozen potatoes, that their use in canned and dehydrated potato products should be identified through labeling, and that the amounts used should be reduced to the ''minimum amounts'' required to ''achieve the desired effects.''

Although the advisory group indicated it did not believe that sulfites were widely used with frozen potato products, a survey by the California Department of Health in 1986 disclosed wide-ranging amounts present among 151 samples of various processed potato products collected by the state agency. The samples included 64 frozen potato products, about half of which contained sulfite residues ranging from 14 to 1,282 parts per million sulfur dioxide equivalents.

## *Sulfite Consumer Complaints by Types of Foods**

| Food Type | No. of Complaints | Percentage of Totals | No. of Serious Reactions | Percentage of Serious Reactions |
|---|---|---|---|---|
| Salad bar | 280 | 31.5 | 161 | 30.4 |
| Non-salad bar fresh fruits and vegetables, excluding potatoes | 143 | 16.1 | 82 | 15.5 |
| Wine | 111 | 12.4 | 67 | 12.7 |
| Seafood | 98 | 11.0 | 59 | 11.2 |
| Non-fresh potatoes | 57 | 6.5 | 39 | 7.4 |
| Fresh potatoes | 53 | 6.0 | 28 | 5.3 |
| Dried fruit | 43 | 4.8 | 21 | 4.0 |
| Baked goods | 35 | 3.9 | 24 | 4.5 |
| Drugs | 28 | 3.1 | 22 | 4.2 |
| Beer | 14 | 1.6 | 8 | 1.5 |
| Fruit and vegetable juices | 14 | 1.6 | 6 | 1.0 |
| Other alcoholic beverages | 13 | 1.5 | 12 | 2.3 |

*Source: Linda Tollefson, FDA Center for Food Safety and Applied Nutrition*

**Food products listed are those cited by consumers who reported having had an allergic reaction. In some instances, more than one type of product was implicated by the consumers. In other cases, some reported reactions each time they ate the same food. Data are for the period from November 1982 through September 1987.*

FDA's proposed ban of sulfites from certain uses in potatoes has been opposed by segments of the potato industry, some of which contended that there are no reasonable alternatives to sulfites. The canned potato industry says sulfites are needed to prevent discoloration. With frozen potatoes, sulfites are added to holding tanks to prevent oxidation of potato ends and scraps that are later used to make frozen hash browns. With dehydrated potatoes, sulfites inhibit the browning effect and are applied to peeled or cut potatoes and to cooked products before drying.

On the other hand, last December the National Restaurant Association (NRA) urged FDA to impose a ban on the use of sulfites "on all types of unlabeled potatoes." The restaurant group supported the ban of sulfites on fresh fruits and vegetables. Based in Washington, D.C., the NRA has 10,000 members who represent some 100,000 food service units. There are more than 550,000 food service operations in the United States, according to the NRA.

"Our members have stopped using sulfites in their restaurants - but suppliers continue to use the preservative," NRA president Michael J. Grisanti said in calling upon FDA to extend its proposed ban to include canned, frozen and dehydrated potato products. "A full ban, which would prevent all suppliers from using sulfites, would enable us to assure our guests that there are no sulfites in our food."

NRA argues that allowing continued use of sulfites on frozen, dehydrated and canned potatoes "confuses the issue and, most importantly, does not apply the intended protection to sensitive consumers."

### SULFITES NEEDED IN DRUGS

FDA has been reluctant to declare a total ban against sulfite use because of the lack of acceptable substitutes for sulfites for some uses, and because they are not considered a hazard to most consumers. For example, sulfites are needed to maintain the stability and potency of some drugs. Acceptable alternatives are not always available. The same is claimed for some uses of sulfites in certain foods.

Yet, it is the uses that are hidden and unknown to the consumer that pose the greatest hazard to people sensitive to sulfites. FDA's approach to date has been to minimize

public exposure by eliminating their use in some products, to require disclosure on food labels of products in which sulfites will continue to be used, and to require warning statements with prescription drugs.

FDA requires that if a food contains more than 10 parts per million of sulfites (this is the lowest level at which the preservative can accurately or reliably be measured), the labeling must state that the product contains sulfites. At the time the labeling requirements were set, FDA stated that it was "unaware of any evidence that establishes a level below which these substances will not cause a reaction in sensitive individuals."

Since sulfites will continue to be used in some drugs and fast foods, those who know they may be sensitive to the additives should check product labels for the possible presence of sulfites and should learn more about which foods and drugs still contain these preservatives.

*Reprinted from the FDA Consumer/March 1988.*

# News

## Nominations for 1989 IAMFES Awards Now Due

Awards nominations are due for the 1989 IAMFES Awards. The success of the IAMFES Awards Program depends on organizations which generously and regularly fund the program, but also on you, for nominating persons you know who are worthy of the awards.

Contact Leon Townsend, 110 Tecumseh Trail, Frankfort, KY 40601 with information on your nominees. Present Executive Board members are not eligible for the 1989 awards.

The awards are as follows:

*Sanitarian's Award. This is a $1000 award and plaque presented to any Sanitarian for outstanding professional contributions during the past seven years.

*Howard Barnum Industry Award. This $500 award and plaque will go to an industry representative in 1989. It is presented for service to food safety and sanitation.

*Educator Award. This $1000 award and plaque will be presented to an educator. It is presented to a person who has shown outstanding service to food safety and sanitation.

*Citation Award. This plaque will be presented to an IAMFES member for dedicated service to the Association in helping fulfill its objectives.

*Shogren Award. This $100 award and certificate will go to the affiliate organization with the best state or regional program and participation in IAMFES.

*Honorary Life Membership. A plaque is presented to a member who has shown long and extensive service to IAMFES.

*Certificate of Merit. This is presented to members who are active within their state and international group.

## Martin Awarded NEHA Presidential Citation

Paul F. Martin, Educational Director of The Educational Foundation of the National Restaurant Association, has received a Presidential Citation of the National Environmental Health Association "in recognition of distinguished service, leadership and accomplishments on behalf of NEHA". Signed by NEHA President Diane Eastman, the citation recognizes Martin's long years of service to the association, including his current term as President of NEHA's Industry Affiliate.

## UW Food Microbiologist Honored by Sanitarians

Edwin "Mike" Foster was selected to give the 1988 Ivan Parkin lecture by the International Association of Milk, Food and Environmental Sanitarians. The award consisted of a plaque, a $500 honorarium and travel expenses to the group's 75th Annual Meeting in Tampa, Florida, where Foster presented the lecture on July 31 at the association's opening session.

Foster is an emeritus professor of food microbiology and toxicology at the University of Wisconsin-Madison and was the director of the University's Food Research Institute from 1966 until 1986.

During his career, Foster studied the bacteriology of cheese, meat, silage and the dairy cow rumen. He is an expert on foodborne disease, particularly botulism and salmonella, and has had a long-term interest in food microbiology and public health.

The International Association of Milk, Food and Environmental Sanitarians includes about 3,000 scientists from government, industry and academia. The group's major goal is to promote a safe and wholesome food supply. Foster is the third individual to receive the lectureship.

## Leeds & Northrup Issues New Product Directory

HO.0003-CA is a new, 40-page Product Directory issued by Leeds & Northrup. Included in the broad product lines are descriptions related to Recorders and Data Acquisition; Process Control and SCADA/EMS; pH/ORP; Conductivity/Resistivity; Dissolved Oxygen; Sodium Ion, Humidity, Gas and Fine Particle Analysis; Process Transmitters; Temperature; Instrument Test and Calibration. Parts/supplies, total equipment and system services are also capsulized.

Using various photos and schematics, the new L&N Product Directory is a useful, easy-to-use reference for products related to the above categories. These encompass products produced under the L&N, BIF and HY-CAL trade names. Detailed Data Sheets can be ordered for specific interests.

For a free copy, write Leeds & Northrup, A Unit of General Signal, Mail Drop 246, Sumneytown Pike, North Wales, PA 19454.

Leeds & Northrup, a Unit of General Signal, is a leading, worldwide producer of electronic instrumentation and process control systems.

## *In Home, Garden...Use Pesticides Safely*

For most of us, pesticides are commonplace in the home or apartment. At the first sign of insects or other types of critters, we reach for whatever is handy to get rid of the pests.

"This kind of familiarity with pesticides can lead to carelessness and potential problems," said Dr. Phil Hamman, entomologist with the Texas Agricultural Extension Service.

"There are so many different products on the market today, all aimed at taking care of specific problems, such as home pests, lawn and garden pests, and plant diseases. Use of pesticides has become quite complicated over the years, and that's where the danger lies," Hamman said.

"With specific products for specific pest problems, safety with pesticides is all the more important today," said the entomologist. "There are hosts of potential risks associated with the use of all of these products as well as specific risks with certain ones."

"That's why it's so important to read the label of a particular product before buying it to make sure it's what you need to handle your specific situation. Then, before using that product, read the label again to make sure you are applying the pesticide properly and using the necessary precautions."

"A label on a pesticide container is a legal document, so make sure it's in place at all times," Hamman said. "That means storing the pesticide in an area protected from the weather so that neither the product nor the label will deteriorate. Never store leftover pesticides in an unmarked container. Of course, always store such products out of the reach of children; it's best to keep pesticides in a locked area."

"Two major problems in using pesticides are breathing fumes and absorption through unprotected skin," said Hamman. "Exposure to pesticides in these two ways can cause definite problems."

"Always mix pesticides in an open area where there is plenty of fresh air. Wear gloves and other protective clothing. If you accidentally spill pesticide on your skin, wash immediately. If chemicals get into your eyes, flush them with water for 15 minutes and get medical attention immediately. If clothes get contaminated, take them off as soon as possible and wash your skin with soap and water. Wash contaminated clothing twice, separately, in a strong detergent."

"When spraying or dusting large areas, wear safety glasses and a face mask, or wear sunglasses and cover your nose and mouth with a handkerchief. If you can smell a pesticide, it's entering your lungs," Hamman said.

If you suspect pesticide poisoning or contamination, immediately call your doctor or the nearest Poison Control Center.

## *A University-Industry Collaboration Way: The New Uses of Milk*

The milk industry is a sector where innovation is necessary in order for processing industries to increase their productivity and to stay competitive.

In that spirit STELA, a dairy sciences research group at Université Laval, has organized an important seminar on the topic of dairy ingredients and new uses for milk, which will be held on November 16, 17 and 18, 1988. With the collaboration of the National Dairy Council of Canada, the National Committee on Dairy Ingredients IDF-CANADA, Agriculture Canada and le Ministère de l'Agriculture des Pêcheries et de l'Alimentation du Québec, STELA has invited researchers of the academic community and representatives of the dairy industry, coming from many countries, to speak on their research work and on the recent developments in this field.

STELA regroups nearly 50 researchers, assistants, technicians and graduate students (M.Sc. and Ph.D.) forming the most important team on dairy research in Canada. Microbiologists, biophysicians, food engineers, etc., focus their research work on three main sectors: the optimization of processing technology of milk, the new methods for microbiological, physico-chemical and functional estimates, as well as research on microorganisms used in the processing of milk products.

According to STELA's activities and to the competence of the speakers, it is obvious that the objectives of this national seminar are to provide the Canadian dairy industry with new ideas to process milk and its by-products, to show new products and promote towards other food and non-food industry the use of Canadian dairy ingredients.

In fact, the first day will start by an evaluation of the general situation in dairy ingredients, followed by a presentation of the economic potential of this sector of interest. The R & D activities, extremely important for the dairy sector, will be developed by a representative of industry. The afternoon and the next day will be devoted to conferences on dairy ingredients used especially in dairy and food products.

The seminar will close with a conference on the dietary and parapharmaceutical uses of milk proteins as well as one on the influence of lactic bacteria on the immune system. The two day seminar will be summarized by M. Paul Paquin, director of the group STELA.

The detailed program of the seminar is already available.

For more information, contact: Brigitte Lamontagne, STELA Communication, 418/656-5981.

## U.S. Is Not In The Midst of a Cancer Epidemic, New Report States

The popular notion that the United States is suffering from a pollution-induced cancer epidemic is false, according to the report *Cancer in the United States: Is There an Epidemic?*, published by the American Council on Science and Health (ACSH), an independent scientific organization.

"Many Americans believe that we are currently experiencing a cancer epidemic. With the notable exception of lung cancer, which is caused primarily by cigarette smoking, this is not true. Both national and international data show no evidence of an overall cancer epidemic in the U.S.," said Dr. Alan C. Fisher, co-author of the ACSH report.

"Many Americans also believe that industrial pollution is the main cause of cancer in the U.S.," said Dr. Wendy Worth, co-author of the ACSH report. "But in fact, the best evidence indicates that only a very small proportion of cancers -- perhaps two percent of the total -- are attributable to such pollution. Cultural and personal habits, such as tobacco use, sexual practices, and sunbathing, contribute more to cancer causation than environmental pollution or toxic chemicals."

Black Americans have higher cancer rates than other racial and ethnic groups do, the ACSH report states. Black Americans are more likely than other Americans to die from cancers of the breast (among women under the age of 40), esophagus, colon, larynx, lung (among men), pancreas, prostate, cervix, and uterine corpus, and from multiple myeloma, U.S. cancer statistics show. The risks associated with smoking and diet, as well as other aspects of lifestyle, may contribute to these higher cancer rates, the ACSH report states.

"The exact number of cancers that can be eliminated by sound preventive methods is unknown, but the percentage is undoubtedly substantial," said ACSH Executive Director Dr. Elizabeth M. Whelan. "Eliminating the effects of cigarette smoking alone would eventually reduce the cancer rate by between 15 and 35 percent. If it became unfashionable to cultivate a suntan, the rates of skin cancer and melanoma might be substantially reduced. Eliminating alcohol abuse would also be beneficial in lowering cancer rates.

"Effective preventive measures can successfully reduce our cancer burden or at least postpone cancer until very late in life," she concluded. "To this end, current scientific knowledge suggests that our preventive efforts should be focused on personal activities, especially tobacco use, sunbathing and excessive alcohol consumption."

The American Council on Science and Health is an independent, nonprofit consumer education organization promoting scientifically balanced evaluations of food, chemicals, the environment, and health.

To obtain a copy of *Cancer in the United States: Is There an Epidemic?* send a self-addressed, stamped ($.66 postage), business-size (#10) envelope to: U.S. Cancer Report, ACSH, 47 Maple St., Summit, NJ 07901.

## Takeda U.S.A., Inc. Opens New Headquarters and Laboratories

To meet greatly increased demand for its services in the food processing, pharmaceutical, nutritional supplement and animal feed industries, Takeda U.S.A., Inc., has moved into spacious new quarters at 8 Corporate Drive, Orangeburg, NY 10962-2614.

The new headquarters facilities, built by Takeda, incorporate separate state-of-the-art food and pharmaceutical laboratories for testing, evaluation, general and customized product development, demonstration and educational activities.

The food laboratory includes a test kitchen and capabilities for sensory evaluation and "real life" simulation testing stability, solubility, water activity, shelf life, and other performance factors.

In addition to full-scale tableting equipment, the pharmaceutical laboratory is outfitted for environmental and developmental testing using advanced analytical instruments.

These laboratories occupy over one-fourth of the new facility's 23,000 sqaure-foot-building, which is set on a 6.8 acre plot.

"The size and capabilities of our new headquarters," said Toshi Asaoka, president of Takeda U.S.A., "are measures of our constantly-expanding responsibilities. As a major factor in vitamins and other ingredients, we are committed to providing the highest standard of technical service to nutritional supplement, food and feed manufacturers."

## Rid-A-Bird

Rid-A-Bird is proud to announce new management and new facilities. The company has been purchased by new owners and Keith Wilson is the new President and Fred Beecher has been appointed National Sales Manager. Robert D. Bosch past owner and President has been retained as a consultant.

Rid-A-Bird has also moved to an industrial park in Wilton, Iowa to a recently completed plant and office space totalling 5,000 square feet. Rid-A-Bird was founded in 1960 and is the largest manufacturer of contact avicide for pest bird control in the U.S. They will be displaying their products at the World Ag Expo in Amana, Iowa, the Farm Progress Show in West Brooklyn, Illinois, and the National Pest Control Association Show in Nashville, Tennessee.

For more information, contact: Rid-A-Bird, P.O. Box 436, Wilton, IA 52778 319/732-3970.

## Microbiology and Engineering of Sterilization Processes

The University of Minnesota, St. Paul Minnesota Campus will hold a Microbiology and Engineering of Sterilization Processes course December 5-7, 1988. The three day intensive lecture-problem course is for degreed scientists and technical managers involved in the research, development and manufacture of sterilized food, pharmaceutical products and medical devices. Directed by Professor Irving Pflug, University of Minnesota, the course is designed to develop an understanding of both the microbiology and engineering of sterilization processes. For further information, contact: Dr. William Schafer, Course Coordinator, Dept. of Food Science and Nutrition, 1334 Eckles Avenue, St. Paul, MN 55108 612/624-4793.

## Wastewater Management: A Serious Concern for Texas Leaders

Wastewater has become an increasingly serious problem for many Texas cities and counties.

Some officials of municipalities are addressing the problem, but others continue to ignore it, according to a director of environmental health with the Upper Guadalupe River Authority.

"We've got to take a hard look at wastewater management," said Lane Wolters of Kerrville.

He addressed a group of bankers, realtors, engineers, city officials, county commissioners, county Extension agents and others during an On-Site Wastewater Management meeting here recently.

The conference was arranged by the Texas Agricultural Extension Service in response to the growing problem of on-site wastewater management. Each Texas county, Wolters said, will be affected by House Bill 1875, passed during the last session of the Texas Legislature to regulate on-site sewage disposal systems in the state.

He urged public health officials to take the lead in anticipating wastewater management problems.

Public health officials in counties have "been comfortable with the old method of septic tank installation, the cookbook-type methods of waste disposal," he said.

Kerr County Extension Agent Jerrilyn Ray said the first step in managing on-site wastewater is to conserve water used.

When homeowners experience problems with wastewater disposal, such as with a septic system, often the most economical solution is not to put as much water in the system, Ray said.

"What that boils down to is conserving water inside the home or business," she said.

"Water is our most valuable resource and we can't take it for granted," Ray said.

Some water use figures, she said, include:

- The average person uses 60 to 80 gallons of water per day.
- The U.S. uses about 355 billion gallons of water daily, with an equivalent of almost 2,000 gallons per person used in industry and agriculture.
- Texas' water use already exceeds the dependable (renewable) supply by about 10 percent, or 1.8 million acre-feet, per year. This deficit is overcome by mining of non-renewable aquifer supplies and reuse of discharged wastewaters.
- Unless present dependable supplies are increased, the state's water deficit could increase to as much as 13 million acre-feet per year, or 80 percent above the present dependable supply in 50 years. This is based on the average of highest and lowest official water use projections.
- It takes about 136 gallons of water to produce and transport one loaf of bread; and an average of 1,400 gallons to produce and transport a hamburger, fries and a drink at a fast-food restaurant.
- About 100,000 gallons of water are required to produce and deliver an automobile.
- Each load in the washing machine uses 35 to 60 gallons of water. The dishwasher uses from 12 to 16 gallons per cycle, while hand washing dishes uses from 8 to 20 gallons.
- About 75 percent of water used in the home is for bathroom use. The sink faucet releases about 4 to 5 gallons per minute and the shower releases about 5 gallons of water per minute. One wasted faucet drip per second can cost homeowners about 2,000 gallons of water per year.
- To conserve water, always wash full loads in the dishwasher and washing machine, install water saver features on shower heads and in toilets, repair water leaks immediately, and reduce pressure of running water while brushing teeth or washing hands.

## *Lyme Disease Cases on Rise; Warmer Months Pose Particular Threat*

Lyme disease, an infection caused by the bites of ticks, has increased significantly in recent years and is now the most common tick-transmitted illness in the U.S. and worldwide. Eighty percent of cases occur between May and August, with July being the peak month of incidence. This information is found in *Lyme Disease*, a new report published by the American Council on Science and Health (ACSH), an independent scientific organization.

According to Dr. Eric S. Berger, Medical Director of ACSH, "Lyme disease can result in conditions such as facial paralysis, cardiac disorders and, especially, arthritis. Fortunately, antibiotics provide effective treatment for this problem.

"An early indication of Lyme disease is a characteristic rash that appears within 30 days of the tick bite. It consists of a bright red ring encircling the bite and a clear area at the center in a 'bull's-eye' pattern. Later, secondary skin lesions may occur away from the original bit.

"The Lyme disease rash commonly appears on the thighs or underarm areas and is usually accompanied by fatigue, headache, stiff neck, myalgia and general malaise.

"Since about half of all Lyme disease patients never exhibit the symptomatic rash, physicians frequently encounter great difficulty making the correct diagnosis."

Dr. Berger noted that late manifestations of Lyme disease may include neurologic complications such as inflammation of the brain and its covering membranes, inflammation of the nerve roots and facial paralysis; cardiovascular symptoms such as dizziness, shortness of breath and irregular heart rhythm; and arthritis, which may appear as late as two years after the rash.

"Different antibiotic regimens provide effective therapy at different stages of the disease," said Dr. Berger. "Because early treatment reduces the frequency of late complications such as arthritis, correct and proper diagnosis and therapy are essential.

Preventive measures include frequent skin inspection and immediate removal of any ticks, either by brushing off those unattached or using tweezers to remove those already affixed. Pets should be checked, as well. People entering tick-infested areas should wear clothing that is tight around ankles and wrists, use insect repellents containing diethyl toluamide or apply the tick toxin, Permanon, to clothing."

To date, more than 5,000 cases of Lyme disease have been reported in the U.S., primarily in wooded and coastal areas of the northeast, midwest and west. The actual number of cases is far greater, however; incorrect diagnosis and, in many states, the failure to require notification of the disease to public health authorities significantly impair case calculation.

To obtain a copy of *Lyme Disease*, send $2 with a self-addressed stamped ($.75 postage) #10 envelope to: Lyme Disease, ACSH, 1995 Broadway, New York, NY 10023. Greater quantities may be ordered at reduced prices.

## *FMI Takes FPCP Test on the Road*

The Food Marketing Institute (FMI) is offering the Food Protection Certification Program (FPCP), developed by Educational Testing Service (ETS) as an adjunct to its Managerial Sanitation Training (MUST) program in a series of one-day training and testing sessions in selected locations across the country.

The MUST program is designed for food store personnel with on-site sanitation responsibilities including deli counter, salad bar, and bakery workers. It is intended to reduce the spread of foodborne illness and provide a uniform level of excellence by ensuring that these employees meet FMI standards for food safety knowledge.

John Farquhar, vice president of the Science and Technical Service Division, FMI, said, "I think the test is an excellent adjunct to our MUST program. It gives us an objective measure of employee's knowledge of basic food safety procedures, as well as excellent feedback on the effectiveness of our training program.

While many government agencies, corporations and trade associations offer training, the need for independent, third party testing has become of increasing importance in the on-going effort to prevent the spread of foodborne illness. The FPCP test was developed by ETS in response to a need cited by the Federal Food and Drug Administration for a standardized test for food industry managers.

Based in Princeton, NJ, ETS is a nationally recognized testing organization which administers over 7.5 million tests a year. Through its Center for Occupational and Professional Assessment (COPA), the nonprofit organization develops and administers licensing, certification and employee selection examinations for a wide variety of federal, state and local government agencies, and for many trade and professional associations.

FMI is one of several major trade associations endorsing the FPCP. It is currently being used by the National Association of Restaurant Managers, the American Society of Aging, and the Georgia Hospitality and Travel Association, and other trade associations nationwide, as well as by cities, counties, corporations, and educators, on both a voluntary and a mandatory basis.

Food managers who are certified by ETS receive a nationally recognized certificate and an ID card, and are listed in ETS' National Registry.

# Industry Products

## New Sensaphone 1100 Combines Monitoring and Control Systems to Help Prevent Catastrophic Loss

• The New Model 1100 Sensaphone, available from Phonetics, Inc. is a high tech monitoring system which communicates over phone lines to help avoid catastrophic loss or damage to your valuable property, products or operating facilities.

The Model 1100 Sensaphone System gives you the most versatile Monitoring System for remote and unattended facilities now available, and "at the lowest cost".

If any monitored condition changes, the Model 1100 will automatically sound an Alert, call you by phone and deliver its warning message in English. You can also check on actual operating conditions by calling your Sensaphone from any phone worldwide to hear a complete Status Report.

In addition to its built-in sensing capabilities of electrical power, temperature level and high-sound level from a smoke or fire alarm, you can configure your Model 1100 to monitor those environmental conditions most critical to you.

The major design improvements are...

* Keyboard security via user selectable security code.
* All built-in sensor functions are selectable and programmable.
* Interfaces with most telephone answering devices.
* Listening time programmable from 1-199 sec.
* Power failure commit time programmable from 1 - 199 sec.
* Four digital alert input channels.
* Triggers local alarm accessory, during call-out cycle.

When an alert condition occurs, Sensaphone will immediately dial-out up to four phone numbers in sequence, to warn key personnel that a problem or emergency exists. They can promptly take action to minimize or prevent damage, downtime and repair costs. A prompt return call to acknowledge the Alert stops the Sensaphone's continuous call-out.

The Model 1100 utilizes patented technology and a proprietary voice synthesizer to deliver its Alert message in English. Its microprocessor can simultaneously monitor up to seven conditions and is compatible with a wide variety of sensor and alarm inputs.

The cost-effective Sensaphone Monitoring System is user installable and programmable and can eliminate the monthly charges for a central monitoring service.

The new Model 1100 is priced at only $300. Sensaphone products and technology can be readily adapted to custom or OEM applications.

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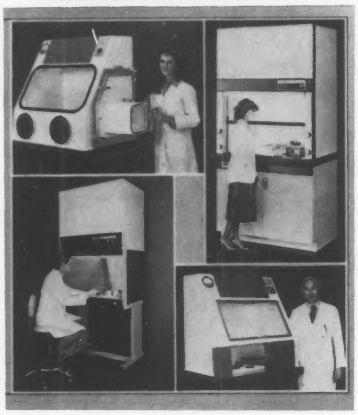

## Labconco Offers Guide to Selecting Equipment for Personnel and Product Protection

• Labconco Corporation, Kansas City, Missouri, offers an industry service publications, "Personnel and Product Protection: A Guide to Laboratory Equipment".

The booklet serves as a basic guide in the selection of equipment that provides personnel and product protection. This easy-to-understand publication is designed to help make the correct choice of equipment in specific laboratory situations.

First, commonly used terminology present throughout the brochure, is explained. Next, the products which provide product protection are discussed.

The third section examines equipment that directs air away from the operator, and provides personnel protection. Types of equipment which provide both product and personnel protection, are detailed.

Finally, a few comments on care and maintenance of equipment are offered. A glossary of terms and a bibliography are included in the back of the booklet.

For a free copy of "Personnel and Product Protection: A Guide to Laboratory Equipment", circle the reader service number.

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## Wheaton PET Plastic Media Bottles

• Wheaton PET Plastic Media Bottles eliminates the possibility of losing valuable cell culture media or biological products due to the accidental breakage of glass.

The Wheaton PET Media Bottles are available in 125 ml, 500 ml and 1000 ml and are sterilized.

Each PET Media Bottle is equipped with a 33-430 white polypropylene closure that consists of polypropylene with a foamed polyethylene liner to stop cap back off and ensure integrity of contents. The round shape of the bottle promotes rapid and uniform cooling and freezing for better circulation in your freezer or incubator.

A compact design, no drip pouring lip, and clearly marked graduations are features that make the PET Media Bottles easy to use and handle. Disposal is safely accomplished through incineration. No harmful gas is generated, only $CO_2$ and $H_2O$ are created.

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## New Food Grade Machinery Grease Resists Throw-Off Without Compromising Anti-Wear Protection

• Keystone Industrial Lubricants, a division of Pennwalt Corporation, introduces Nevastane[r] 2-PLUS a white, aluminum complex, food-grade machinery grease. A tacky texture to prevent throw-off and product waste is combined with wear resistant properties that are said to provide 50% higher wear resistance. Nevastane 2-PLUS is enhanced with corrosion inhibitors and is water resistant to protect food equipment and components from corrosion.

Nevastane 2-PLUS is stable over a wide temperature range, 0 to 350°F, and is formulated from ingredients meeting F.D.A. regulation 178.3570 and is authorized by the U.S.D.A. for use in federally inspected meat and poultry plants for incidental contact.

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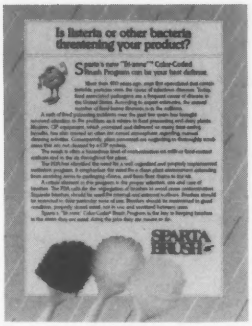


## New Sparta Tri-Zone Color Code System Helps Fight Bacterial Contamination

• Sparta Brush Company has introduced a bristle color-coding system for its brushes that is designed to help food service facilities and food processing plants prevent bacterial cross contamination.

The Sparta Tri-Zone System provides a reliable method to the FDA's recommendation for the segregation of brushes by usage zones. In the Tri-Zone System, brush bristles are color coded red, white and yellow. The red-bristle brushes are designated for use only in raw product contact areas. White-bristle brushes should be used for pasteurization areas and all food-contact areas. Yellow-bristle brushes are reserved for environmental cleanup of non-food-contact surfaces. The program also includes color-coded racks.

The color coding of the Tri-Zone System is the key to keeping brushes in the areas they are used and doing only the jobs they are meant to do. By preventing brushes from traveling from one plant area to another, or from one cleaning job to another, the transmission of bacteria can be controlled.

The Sparta Tri-Zone Color Coding program, plus the maintenance and proper use of brushes specifically designed for each task, are important steps in controlling bacteria in your plant. However, they cannot overcome deficiencies created through poor sanitation schedules and habits or improper chemical use.

Sparta Brush Company manufactures and markets a quality line of specialized brushes for the food service and food processing industries.

**Please circle No. 251**
**on your Reader Service Card**

## OXYRASE Product Announcement

• The OXYRASE Enzyme System is a novel biocatalyst that is capable of partially or completely removing dissolved oxygen in minutes. As a very job-specific enzyme system, OXYRASE reduces *only dissolved oxygen*; whereas, non-specific chemical reducing agents have undesirable effects because of side reactions. As a result, OXYRASE provides researchers with greater control over experimental conditions for creating and maintaining anaerobic environments.

Researchers are continually finding new uses for OXYRASE technology in a wide range of applications. One application for this product is isolating and cultivating anaerobic microorganisms. With the OXYRASE Enzyme System, working with anaerobic microorganisms is now faster, easier, and more economical than ever before. As little as 1.0 ml to 2.0 ml of OXYRASE can prepare 1 liter of medium for growing anaerobic microorganisms at a cost as low as $3.00 per liter of medium.

Another use of the OXYRASE Enzyme System is as a protective agent for oxygen-sensitive chemicals or reactions. OXYRASE has been used to completely protect biochemicals sensitive to autoxidation.

OXYRASE is available at 30 units per ml in 30ml and 100ml quantities, with larger amounts also available.

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## New Hand-Held Industrial Pyrometer Combines Economy With Precision

• The low-cost E-Z PROBE (R) Industrial Pyrometer has features and performance found only in instruments costing four times as much! Extremely reliable, fast response, automatic differential mode, decisive and repeatable readings. True 2° accuracy, -280°F to 2000°F temperature range, switchable °F and °C, automatic room temperature compensation. Scratch-proof tempered glass window protects an easy-to-read 1/2" LCD display. Unique magnetic backplate enables hands-free use most anywhere. Compact molded case resists high temperatures, toxic chemicals and shock. Type K thermocouple jacks on both ends of the case provide total sensor versatility. Automatic Low Battery and Open Sensor warning systems. Includes 9 volt alkaline battery for over 3000 hours of continuous use. Compact 2.7" x 4.8" x 1" size - weighs only 6 ounces. Designed and manufactured in USA by Electric Development Labs, Inc.

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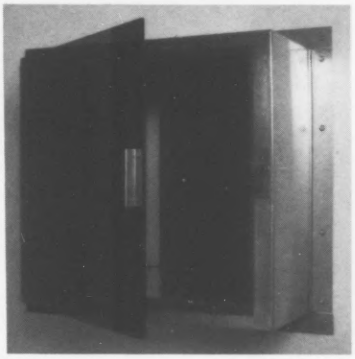

## Liberty Pass-Thru Windows

• The Liberty Pass-Thru window is a custom designed unit that provides easy access between the clean room and outer area while providing maximum protection against contaminants. The unit is essential to protect against outer contamination being passed into the clean room from a non-clean room area.

The Liberty Pass-Thru window is equipped with a mechanical interlock. The interior compartment of the Pass-Thru window is designed to prevent the accumulation of contaminants and is free of obstruction.

The Liberty Pass-Thru window is ruggedly constructed novaply, laminated with plastic laminate. Enameled CRS or 304 stainless steel are also available.

The windows are supplied completely assembled and ready for field installation.

**Please circle No. 254**
**on your Reader Service Card**

## New Sanitizing Solution Kills Listeria Bacteria

• A sanitizing solution has been introduced to eradicate the deadly Listeria bacteria, implicated in at least 100 deaths in recent years due to contaminated food.

The proprietary solution, ANTHIUM DIOXCIDE, developed by International Dioxcide, Inc. (IDI) of Clark, N.J., contains stabilized chlorine dioxide which is activated to release free chlorine dioxide.

According to Joseph M. Kelley, IDI Director of Operations, the formula, which conforms to FDA requirements (21CFR-178), is designed to sanitize food processing equipment.

Kelley said that Listeria Monocytogenes outbreaks have been directly linked to the organism's ability to survive usual plant sanitation procedures.

"The Listeria organism grows at refrigeration temperatures, making such dairy foods as milk, cheese products, ice cream and yogurt particularly susceptible."

"Regularly sanitizing the processing equipment and plant with our activated chlorine dioxide solution will kill these pathogenic microorganisms within seconds," he added.

**Please circle No. 255**
**on your Reader Service Card**

## *Cleaner Cooling Towers and Lower Chemical Costs Result From Using Strantrol Controllers*

• The new Strantrol® Chemical Controllers are the answer for those who have been spending thousands of dollars per year for water treatment to control algae and other organics in cooling towers. Through precise monitoring and control of free chlorine, pH, and TDS, the Strantrol® System reduces treatment costs while polishing cooling towers more effectively than ever before. With the new system, it is possible to precisely control free chlorine at levels much lower than previously believed effective, with no risk of corrosion. Accurate pH control (accurate to 0.1 pH/yr) keeps cooling towers from corroding and scaling and enhances the efficiency of the chlorine. Precise control over TDS, provided by the Strantrol® System, ensures that dissolved solids will always be at the predetermined set point. The Strantrol® System eliminates organics completely, thus reducing energy required to provide cooling. Using the new Strantrol® System, savings of 3% to 5% are not unusual and can run to hundreds of thousands of dollars per year in large cooling towers.

**Please circle No. 256 on your Reader Service Card**

## *Pennwalt's New Fabri-Kast Systems Bulletin Details Unique Containment System*

• A new product bulletin from Pennwalt Corporation introduces Fabri-Kast™ Systems, a unique concept of prefabricated polymer structures for handling, storage and processing of corrosive liquids.

The four-page bulletin describes how the acid corrosion-resistant Fabri-Kast components--trench sections, sumps, manways, etc.--perform the dual function of structural substrate and corrosion resistant lining.

The easy steps for installing Fabri-Kast Systems, compared to conventional methods, are described. Construction can be accomplished in much less time and at a lower installed cost.

The variety of available acid-resistant polymers is detailed, as are the many shapes and sizes of components that are possible with this engineered, precast approach.

For a copy of the Fabri-Kast Systems product bulletin, circle the reader service number.

**Please circle No. 257 on your Reader Service Card**

## *New Barrier Pouch Beverage Dispensing System Offers Extended Shelf Life, Purity and Convenience*

• A patented new barrier pouch beverage delivery system extends product freshness and shelf-life in a convenient, tamper-resistant controlled pressure dispensing system.

The revolutionary new Enviro-Spray Grow Pak sealed barrier pouch contains an environmentally safe carbon dioxide propellant, which is completely separated from the beverage at all times.

The easy-to-fill, easy-to-use system is well suited for beer, wine, soda, syrups and juices.

The slim, space-saving pouch design permits greater fill volume in sizes from 2 oz. to 2 gallons.

**Please circle No. 258 on your Reader Service Card**

## *Pre-Washed VOA Vials Available*

• Scientific Specialties Service, Inc., is offering it's line of pre-washed VOA Vials for use in water determination and similar work, and other glass vials, bottles, jars, and culture tubes in it's new catalog/price list #887.

The new catalog/price list which will be sent on request to interested readers, cover the complete line of Sci/Spec Teflon® Capliners which range in size from 5/16" thru 5" in standard (non-adhesive, pressure-fit) Teflon®, A-B (adhesive-backed) Teflon®, and Septrseal (Silicone/Teflon®) Septa; as well as glass vials, bottles, jars, and culture tubes with various closures (Teflon lined caps, Teflon®/Silicone Septa with closed-top or open-top caps, regular pulp and saran lined caps, etc.).

The new catalog also includes Teflon Sealing tapes in roll widths from 3/8" up to 7" and Teflon® Pressure Sensitive Tapes in roll widths from 1/4" up to 12" for laboratory and industrial uses.

Scientific Specialties Service, Inc. is a manufacturer and distributor of plastic and glass containment products to the health research and environmental control areas.

**Please circle No. 259 on your Reader Service Card**

## *Powers Process Controls' 512 Controller Offers Higher Level Communications Link*

• Powers Process Controls, a leader in control devices for more than four decades, has added a communications link to its popular 1/4 DIN 512 microprocessor-based controller. The communications option allows supervision by higher level devices such as PC's and PLC's.

"The communications option offered by the 512 processor allows tremendous flexibility for the user," says Stewart Peterson, Powers Process Controls Industrial Product Manager. "With the RS 485 interface, any command available from the instrument's front panel can be downloaded by a supervisory device."

The Powers communication protocol is especially robust, offering data transmission speeds up to 19,200 baud, with data integrity verified by CRC data check. The user gets fast response between the supervisor and field unit, with exceptional message accuracy. Messages are further speeded by special group commands that send all operating parameter valves and status in responses to a single request.

Up to 32 controllers may be installed on a multidrop loop connected to the host by an ordinary shielded wire pair. The total loop length may be up to 4000 feet.

The 512 Process Controller monitors and controls a wide variety of processes in virtually any industry. It is powerful enough to handle end-use applications from food and beverage manufacture to chemical processing, yet cost-effective enough to satisfy OEM requirements.

Powers Process Controls offers broad systems capability through a wide variety of process control equipment, including electronic and pneumatic process controllers, process programmers, alarms, regulators, sensors and control valves.

For a free copy of the 512 Process Controller brochure, circle the reader service number.

**Please circle No. 260 on your Reader Service Card**

## *Submersible Flat Surface pH Electrode*

• A submersible, continuous monitoring pH electrode with a Flat Surface is now available from Sensorex. The electrode's flat surface minimizes fouling, abrasion and breakage. Fouling is further reduced by use of a large area peripheral porous polyethylene reference junction. The reference electrode's sealed, gel-filled design allows it to be used at pressures as high as 100psig. The electrode's cable cap assembly mounts at the end of a 1/2" pipe and a quarter-turn installs or removes the electrode without the need for tools. The electrode, Model S650CD, is compatible with most pH meters.

**Please circle No. 261 on your Reader Service Card**

# Food and Environmental Hazards To Health

## Why Investigate Foodborne Illness

by Joel Greenspan, MD, MPH
U.S. Center for Disease Control

In the field of preventive medicine, we are always looking for primary prevention technologies which, when applied, will prevent illness from occurring. Immunization is a good example of a primary prevention technology. In the area of foodborne illness, HACCP is really a primary prevention technology, analogous to immunization. If food inspectors learn and practice this technology, they will be able to practice primary prevention medicine in the food area.

Preventing foodborne illness is one of our goals, but occasionally a foodborne outbreak will occur, and health department personnel will be called upon to investigate. During such an investigation, HACCP analysis, together with epidemiological and laboratory analysis, is used to arrive at a complete understanding of how and why the outbreak occurred. Before I describe some of the more common agents which enter the human host by a food vehicle, I'd like to outline why it is important to public health workers to investigate food-related outbreaks in the first place.

First, investigation is crucial in order to control outbreaks. Unless we identify the agent, implicated food, and how the food becomes contaminated, food which is still in the marketplace may continue to cause illness and death. How do we know an outbreak is over? Only if we actively investigate it.

Although some forms of foodborne illness are self-limited and do not require specific therapy, investigation and identification are crucial to initiating proper treatment for others. Adult botulism, for example, is treatable with specific antitoxins which can stop its progress. Antibiotics are the recognized treatment for some other bacterial organisms. If we know what caused illness, sometimes we can help people who are ill.

In addition to treating an illness, accurate diagnosis allows us to supply information that is valuable, and perhaps reassuring, to the patient. Once a person is diagnosed with staph food poisoning, he will be reassured to hear he will be better in 24 hours or so. However, someone with salmonellosis may be ill for days or weeks, and it is important to let those people know, so they can plan accordingly.

Family and other contacts also need to know. For example, in Massachusetts, we require a food handler whose family member has salmonellosis to remain out of work temporarily. It is important to identify the illness and inform the food handler of the procedures to follow in order to return to work.

Investigations of foodborne illness are crucial if we are to identify faulty foodhandling practices. If these can be found, we can eliminate the circumstances from recurring through education and modification of the facility. Health agents who identify problems such as potential cross-contamination or poor time/temperature control can prevent illness from recurring in a food service establishment. Faulty foodhandling practices can be detected through a HACCP inspection.

As we investigate foodborne illnesses, we often learn something new. Twenty years ago, we did not know much about viral gastroenteritis or campylobacteriosis. There are probably other agents of foodborne disease we do not know much about yet, and every food inspector/investigator has the potential to add to society's knowledge of the causes of foodborne illness.

A final reason for investigating foodborne illness is to contribute to informed decisions about public resource allocations. When public health officials go before the Board of Selectmen, City Council, or state legislature, we need to convince officials that this is an important public health issue. The state has a budget, your cities and towns have budgets, and only a certain amount will go for public health in general, and a smaller amount for controlling foodborne illness. What are the chances of getting funding for a poorly defined public problem? I would answer - slim to none. Well conducted foodborne investigations may contribute to informed decision making.

Excerpt from a lecture presented at the HACCP training programs conducted by the Division of Food and Drugs, Massaschusetts Department of Public Health, June 1987; published in **Food and Drug Reporter**, July 1987.

NYS MFS Newsletter March 1988

## Nitrogen Dioxide Poisoning At A Skating Rink - Quebec

During the afternoon of Saturday, 6 February 1988, 2 referees officiating at a hockey tournament in an arena, experienced sufficient difficulty in breathing to cause them to withdraw from the games. During that night and the following day, 3 other referees and 1 player had similar repsiratory symptoms. Two to 6 hours later, they experienced coughing, dyspnea, polypnea with orthopnea, and a suffocating feeling. These symptoms progressed to include pulmonary rales and hemoptysis which persisted for 12 to 48 hours. Other players complained of dyspnea but had no signs of edema. Two persons also experienced headaches; in addition, one of these had nausea and vomiting. A week later, coughing was the only symptom remaining in a few patients. Such a clinical picture is suggestive of nitrogen dioxide poisoning.

The initial case was reported on 9 February, and 2 days later, several air samples taken in the arena gave the

following gas concentrations: carbon dioxide ($CO_2$) 1500 ppm, carbon monoxide (CO) 12 ppm, and nitrogen dioxide ($NO_2$) 3 ppm. The concentrations of $NO_2$ found in the air 5 days after the first signs of poisoning strongly suggests that it was probably the gas responsible for this incident.

An interview with those responsible for the arena and its maintenance revealed that the propane powered ice surfacing machine had not been functioning properly on Saturday, 6 February, requiring the replacement of the motor sometime between that night and the next morning.

**Discussion:** The symptoms experienced by these 9 individuals represent the classic picture of acute exposure to an irritant gas, in particular $NO_2$, when the circumstances and evolution of the poisoning are considerd.

The majority of such poisonings occurring in arenas are due to CO. In the incident reported here, 3 persons presented with symptoms compatible with CO poisoning, i.e., nausea, vomiting and headache. It is therefore possible that this incident involved a mixture of both gases, CO and $NO_2$. The high residual concentration of 3 ppm of $NO_2$ found 5 days after the incident can be explained by temperature inversion, which usually occurs in the arena environment, and poor ventilation.

The risk of poisoning increases as concentrations of the gas in the air and exposure times increase. The latter factor explains the reason for very few players being affected compared to officials and employees. The players would have only spent approximately one hour a day in the arena compared to an average of 8 to 10 hours for the officials and employees.

Individuals experiencing such a poisoning should be properly counselled regarding the risk of recurring alveolar edema and delayed obstructive bronchiolitis so that they may inform their physicians to recieve the appropriate treatment if such an occurrence occurs later.

Finally, arena personnel should ensure that the following preventive measures are carried out: regular maintenance checks on ice sufacing machines to ensure that they are functioning properly and efficiently, discharge of exhaust gases from such machinery should be above the temperature inversion zone, i.e., 2 to 3 metres, installation of catalytic air purifiers, and good general ventilation of such buildings.

Can Dis Weekly Report 4/16/88

## Failing by Degrees

The addition of a toothbrush to one New York firm's travel accessories kit proved to be a more monumental step than it had anticipated. That innovation brought FDA inspectors on the scene to tell the company it had bitten off more than it could chew.

Unique Packaging Corp., Plattsburgh, N.Y., assembles a variety of gift packages, such as sewing kits, manicure sets and travel accessories, which are advertised to retail stores through the company's catalog. Until early 1985, none of its products came under FDA jurisdiction. Then the firm bought some toothbrushes from Taiwan to include in its travel kits, and found it, therefore, had to register as a distributor of foreign medical devices. Since medical devices are regulated by FDA, the agency's Buffalo district office inspected the firm in November of that year.

The Buffalo investigators found no problems with the toothbrushes. However, during the inspection, they learned the firm had begun including in its travel kits fever thermometers imported from Japan, which are also medical devices and must meet criteria for accuracy established by FDA.

The investigators found the firm's officials had little knowledge of the good manufacturing practices required for medical devices. The firm had no quality control program, had not been testing the thermometers for accuracy, and had not inspected the thermometers before repackaging.

The investigators collected a sample of thermometers, which subsequently failed the accuracy test. Since the firm had not included this version of its travel kit in its catalog yet, none had been sold, and it agreed to withhold sales of the product.

In August 1986, at the request of FDA's Buffalo office, a U.S. marshal carried out a court order and seized 20,000 thermometers, valued at about $4,000, at the firm. On Aug. 17, 1986, the firm shipped them back to the original foreign supplier, Tsubasa Industry Co., Tokyo, Japan, under the terms of a consent decree.

FDA Consumer, April 1988.

**N.M.C.**

NATIONAL MASTITIS COUNCIL

Keep cows on their feet right after milking

Mastitis control programs frequently focus on management during the milking process and dry cow therapy. What about the management of the cow after milking? Of course, the use of a postmilking germicidal teat dip is a must to control contagious mastitis. However, the cow is exposed to environmental bacteria between milkings.

Research has suggested that the teat canal is dilated immediately after milker removal and may take up to two hours to constrict. Although there is no definitive research to show that the udder actually is more susceptible to infection at this time, it has been suggested that exposure to pathogens after milking must be kept at a minimum.

A logical solution is to feed cows after milking so they will remain standing. In addition, management of cows so they are on their feet a minimum of time before milking, such as in holding areas, may reduce the likelihood that they will lay down immediately after they are milked.

It is desirable at all times to reduce exposure to environmental pathogens by paying close attention to barn or free stall sanitation, frequently removing manure from lots and possibly using inorganic materials (sand) for bedding. The key to reducing exposure of the udder to environmental pathogens is to provide a "clean and dry" environment at all times.

1840 Wilson Blvd.
Arlington, VA 22201
703-243-8268

## Audio Cassettes of the IAMFES 75th Annual Meeting

Convention Recordings International Inc., have audio cassettes available for sale of the Annual Meeting July 31 - August 4. The cost is $8.50 per cassette including shipping. For more information write or call: Convention Recordings International Inc., 13030 Starkey Rd., Suite 5, Largo, FL 34643, 813-581-2196.

## *Authors Wanted*

Dairy and Food Sanitation is looking for individuals interested in writing articles for our journal. If you are interested, please contact IAMFES for more information,
P.O. Box 701
Ames, IA 50010
Attn: Margie Marble

DEADLINE JAN. 1, 1989

# CALL FOR PAPERS

## IAMFES 76th Annual Meeting

**August 13-17, 1989**

## Instructions to Prepare Abstracts

**Procedure**

1. Use the printed Abstract form that appears on the other side of this page. Complete the form using a typewriter equipped with a reasonably dark ribbon.

2. Type in the title, capitalize the first letter of the first word and of any proper nouns.

3. List authors and institution(s). Capitalize first letters and initials. Indicate with an asterisk the author who will present the paper. Give complete mailing address of the author who will present the paper.

4. Check the proper box to indicate if the paper will be presented by a graduate student and is to be entered in The Developing Scientist Award Competition.

5. **Type the abstract *double-spaced,* in the space provided on the abstract form.**

6. **Mail *two* copies of the abstract before January 1, 1989 to:**

Kathy R. Hathaway
Executive Manager, IAMFES
P.O. Box 701
Ames, Iowa 50010

7. Enclose *two* self-addressed standard post cards. One will be used to acknowledge receipt of the abstract and the other to notify the speaker about the scheduling of the paper. Two cards must be included with *each* abstract that is submitted.

**Content of the Abstract**

The abstract should describe briefly: (*a*) the problem that was studied, (*b*) methods used in the study, (*c*) essential results obtained, and (*d*) conclusions. Statements such as "results will be discussed" should not appear in an abstract.

**Oral Presentations**

Papers will be scheduled so a speaker has a maximum of 15 minutes, including a discussion. Hence the actual presentation should be no more than 11-13 minutes so that time for discussion will be available. Projectors for 2 x 2 inch slides will be available. If the speaker needs other projection equipment, Kathy R. Hathaway (address given earlier) should be contacted as soon as possible.

**Subject Matter for Papers**

Papers should report results of applied research in such areas as: food, dairy, and environmental sanitation and hygiene; foodborne disease hazards; food and dairy microbiology; food and dairy engineering; food and dairy chemistry; food additives; food and dairy technology; food service and food administration; food and dairy fermentations; quality control; mastitis; environmental health; waste disposal, pollution, and water quality.

**Developing Scientist Award Competition**

Open to graduate students enrolled in M.S. or Ph.D. programs at accredited universities or colleges who will present their own original research. Candidates cannot have graduated more than one year prior to deadline for submission of abstracts. Form must be signed by the student's major professor or department head signifying approval. An extended abstract form will be required later.

**Additional Abstract Forms**

Extra copies of the abstract forms may be obtained from Kathy R. Hathaway (address given earlier) or you may photo copy this one.

**Membership in IAMFES**

Membership in IAMFES is NOT necessary for presenting a paper at the annual meeting.

**(OVER)**

# IAMFES Abstract Form
# DEADLINE: JANUARY 1, 1989

Title _____

_____

Authors _____

_____

Institution and Address _____

_____

Office Phone # _____

**Developing Scientist Award Competition** ❑ Yes ❑ No (Please check appropriate box)

Major Professor/Department Head approval (signature & date) _____

Please type abstract, double-spaced, in the space provided above.

Selected presentations with permission are audio and/or video taped during the meeting.

As a speaker, I authorize IAMFES to audio and video tape my presentation.

Your signature _____

I do not wish to be taped.

Your signature _____

DEADLINE JAN. 1, 1989

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Institution and Address _____

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Office Phone # _____

**Developing Scientist Award Competition** ❑ Yes ❑ No (Please check appropriate box)

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Please type abstract, double-spaced, in the space provided above.

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As a speaker, I authorize IAMFES to audio and video tape my presentation.

Your signature _____

I do not wish to be taped.

Your signature _____

# Letter To The Editor

Kathy Hathaway, Editor
Dairy and Food Sanitation
Box 701
Ames, IA 50010

Dear Kathy:

The Executive Board of the National Conference on Interstate Milk Shipments (NCIMS) convened a meeting on April 5, 1988 in Washington, D.C. to discuss the area of animal drug residues. Also present were representatives from the American Veterinary Medical Association (AVMA), Milk Industry Foundation (MIF)/International Ice Cream Association (IICA), National Milk Producers Federation (NMPF), American Dairy Products Institute and the Food and Drug Administration's Center for Food Safety and Applied Nutrition (CFSAN)/Center for Veterinary Medicine (CVM). As a result of recent information and studies concerning the use of sulfamethazine in food producing animals, the Executive Board of NCIMS passed a series of resolutions in an effort to effectuate an immediate action plan to prevent sulfamethazine residues in milk. These actions are part of a long-standing surveillance effort by states in detection of antibiotic residues in milk.

The actions taken by the Executive Board addressed the following items:

1. Requested the Center for Veterinary Medicine in the Food and Drug Administration to issue an interim letter disallowing the extra label use of sulfamethazine by veterinarians.
2. Urged the Food and Drug Administration to ban the use of sulfamethazine as a veterinary drug.
3. Authorized the Chairman of NCIMS to correspond with state veterinary medical associations and boards concerning sulfamethazine use by veterinarians.
4. Established a task group to immediately develop and distribute educational information regarding the concern of sulfamethazine use in the dairy industry.
5. Authorized the Chairman of the NCIMS and Chairman of the FDA Liaison Committee to work with the Milk Safety Branch of the FDA to develop a monitoring network for farm bulk tank milk shipments under the Interstate Milk Shippers Program.
6. Established a study committee to examine the concept of a certification program or other methods to control the use of antibiotics by dairy farmers.

The Executive Board of NCIMS feels the actions taken are consistent with goals and objectives of the NCIMS Conference in maintaining a safe and wholesome milk supply.

For milk sanitation regulatory activities under the NCIMS, the conference has adopted the Grade A Pasteurized Milk Ordinance (PMO). Under this ordinance only approved and properly labeled drugs are to be used in treatment of lactating dairy animals. When used in accordance with label directions, the prescribed withdrawal times are to be followed before any milk from treated animals is offered for sale.

Whenever an animal drug is observed in the milkhouse, parlor, milking barn or adjacent areas on a dairy farm, and the animal drug is not approved and labeled for use on dairy animals or properly labeled for "extra-label use", it is to be considered in violation of the PMO. Regulatory agencies are to take immediate appropriate action to have the unapproved drugs removed from the area.

Approved animal drugs used for treatment of nonlactating dairy animals (calves and dry cows) are to be stored in segregated areas away from those used to treat lactacting animals. This is to prevent inadvertent misuse of these drugs.

Any drugs (animal or human) are to be stored in such a manner that they cannot contaminate the milk or milk product-contact surfaces of the equipment, containers or utensils. Improperly stored and/or improperly labeled drugs are a violation of the PMO.

When a milk producer is debited on a farm inspection as a violator relating to drug storage and labeling, corrective action by the producer must be taken. If the required action is not taken and the producer is similarly debited on the next inspection, his permit to sell Grade A milk is suspended.

With all of the above actions notwithstanding, the NCIMS is not engaged in an effort to deny the use of approved, effective and economical veterinary drugs for lactating dairy cattle. We are however, endeavoring to prevent the illegal and irresponsible use of veterinary drugs in the dairy industry and illegal drug residues in our milk supply.

Recent surveys of dairy farms have revealed that there is a generous supply of over-the-counter and prescription drugs on numerous farms. Since dairy farmers are responsible for the control and use of these drugs on their farms and frequently consult with veterinarians relating to animal health and drug use issues, we ask that you share the information contained in this letter with your membership.

It is our hope that through a unified approach from all of those who in any way contribute to the production of milk and dairy products that we will correct problems of illegal drug residues in our nation's milk supply quickly but in a manner that is equitable to all.

Very truly yours,

James I. Kennedy, Chairman
National Conference on
Interstate Milk Shipments

# Affiliate News

## IAMFES Member Ribbons

Those affiliates who would like to have their IAMFES members designated by ribbons on badges at your annual meetings, please contact the Ames office.

This a good way to promote membership within IAMFES and allows you to see how many IAMFES members you have within your affiliate.

These ribbons are available to you at no charge. Just call Sandy at 800-525-5223, or 515-232-6699 in advance of your meeting with the amounts of ribbons you will need.

## Texas Association of Milk, Food & Environmental Sanitarians

On June 7-8, 1988, the Texas Association of Milk, Food & Environmental Sanitarians held its 6th Annual Meeting in Austin, Texas. Approximately 275 persons attended.

The meeting featured several well known speakers including the following: Dr. Don Nelson, Director of Special Programs, Texas State Board of Plumbing Examiners, Austin, TX "Cross Connection-The Unseen Hazard"; Dr. Ruth Eden, Bactomatic, Princeton, NJ "Commercialization of Biosensores for Food Microbiology"; Mr. Clyde Bohmfalk, Director, Texas Water Commission, Water Quality Division-Austin, TX "Waste Water Regulations"; Dr. H. Michael Wehr, Administrator, Laboratory Services Division, Oregon Dept. of Agriculture, Salem, OR "Antibiotics in Fluid Milk Products"; Roger W. Dickerson, Jr., Chief, Food Engineering Branch, Division of Food Chemistry & Technology, Center for Food Safety and Applied Nutrition, Cincinnati, OH "Envelope Procedure for the Elimination of Contamination Due to Cross Connections of Piping in Milk Plants"; Dr. William Edward Owens, Assistant Professor of Microbiology, Hill Farm Research Station, Louisiana Agricultural Experiment Station, Louisiana State University, Homer, LA "Pre and Post Dips"; Dr. Tim Phillips, Texas A & M University, Dept. of Veterinary Public Health, College Station, TX "Detection and Detoxification of Aflatoxins"; Gerald E. Vince, District Director, Food & Drug Administration, Dallas, TX "Risk Assessments in Foods and Drugs"; Dennis Baker, Director, Division of Food and Drugs, Texas Dept. of Health, Austin, TX "New Bottled Water Regulations"; Dr. Kirk W. Brown, Professor of Agronomy, Soil & Crop Sciences Dept., Texas A & M University, College Station, TX "Preventing Groundwater Contamination"; Mr. Bruce Truitt, Public Information Officer, Austin-Travis County Health Dept., Austin, TX "Press Relations".

## Upcoming IAMFES Affiliate Meetings

**1988**

**NOVEMBER**

**1-3, North Dakota Environmental Health Association Annual Fall Conference,** to be held at the Holiday Inn, Minot, ND. For more information, contact: Peri Dura 701/224-2382.

**9-10, Alabama Association of Milk, Food and Environmental Sanitarians** will hold it's first annual meeting at the Howard Johnson Hotel, Birmingham in conjunction with the Alabama Dairy Conference. For more information, contact: Robert E. Shelton, Alabama Dept. of Public Health, PO Box 645, Leeds, AL 35094 205/699-5833.

*(Left to Right) Wendell Littlefield, Perry Fisher, Edith Mazurek, Joe Goddard and Terry Ryan.*

Again this year a special Lab Session was held with the following topics and speakers: Mr. Joe Bare, Chief, Environmental-Analytical Section, Laboratory Evaluation Officer, Texas Dept. of Health, Austin, TX "Update on Laboratory Certification"; Tammy Way, Microbiology Laboratory Manager, Applied Microbiological Services, Inc., College Station, TX "Listeria Testing in Milk"; Dick Albert, Chief Organics-Pesticides Section, Texas Dept. of Health, Austin, TX "Sulfa Drug Testing using HPLC Methodology"; Charles P. Davis, Microbiologist, Environmental-Analytical Section, Texas Dept. of Health, Austin, TX "Rattlesnake Pills-Cure or Calamity?".

As an added feature this year a hands-on Lab workshop was held at the Texas Dept. of Health Laboratory in Austin. This workshop concerned Direct Microscopic Somatic Cell Count under the direction of Mr. Joe Bare.

Awards for outstanding service to the TAMFES organization were given to Mr. Joe Goddard, Texas Tech University, Lubbock; Mrs. Edith Mazurek, (retired), Fort Worth Health Dept., Fort Worth; and Mr. Perry Fisher, Campbell-Taggart, Dallas.

*Al Waggoner, Texas A&M University.*

*Roger Dickerson, FDA, Cincinnati, OH.*

*Barbeque at the Manchaca Volunteer Fire Department.*

Table exhibits were displayed by American Mfg., Austin; Sani-Weld, Houston; IAMFES, Ames, Iowa; and Dr. Tim Phillips, Texas A & M University, College Station.

During the business meeting which was held directly following the closing of the annual meeting, the following officers were elected:

President - Mr. Terry Ryan
President-Elect - Mr. Al Wagner, Jr.
Secretary - Ms. Janie F. Park
Treasurer - Mr. Ron Richter

The second annual TAMFES Golf Tournament was held Monday, June 6 and had 66 participants. An evening social consisting of Texas style BBQ and outdoor country & western dance was held at the Manchaca Volunteer Fire Dept. the evening of June 7 with 253 attending.

With outstanding speakers and topics of interest, golf, and good eating, a very successful TAMFES annual meeting was held.

# From the Ames Offfice . . .

*Kathy R. Hathaway*

You'll notice the blue abstract forms in this October issue as well as in the October issue of the *Journal of Food Protection*. Use these forms to submit your abstract for papers to be presented during the 76th IAMFES Annual Meeting, August 13-17, 1989 at the Hyatt Regency Crown Center, Kansas City. You will be notified by the IAMFES Program Chairperson, Ron Case, of your acceptance. Deadline for abstracts is January 1, 1989.

Graduate students are invited to participate in the Developing Scientist Award Competition. Deadline for these abstracts is also January 1, 1989. Graduate Students enrolled in M.S. or Ph.D. programs at accredited universities or colleges whose research deals with problems related to environmental, food and/or dairy sanitation, protection and safety are encouraged to submit an abstract. Candidates cannot have graduated more than one year prior to the deadline for submitting abstracts.

Five awards are presented for the Developing Scientist Award, sponsored by the Foundation Fund through support of IAMFES Sustaining Members. Award Recipients receive: 1st place, $500 and plaque; 2nd place, $200 and certificate; 3rd place, $100 and certificate; 4th place, $50 and certificate; 5th place, $50 and certificate. All five receive a years membership with IAMFES which includes both journals, the *Journal of Food Protection* and *Dairy, Food and Sanitation*.

Graduate students may use the blue abstract forms in this issue, denoting their participation in the Developing Scientist Award competition by checking the appropriate box indicated.

Renewal forms have been mailed to all members and subscribers. Remember the change from calendar year to 12 month membership/subscription as discussed in the September issue, FROM THE AMES OFFICE column. If you wish to remain on a calendar year, simply renew by mid-December. If you renew for example, January 15, 1989 your membership/subscription will run from February 1989 - January 1990.

Memberships and subscriptions continue to increase with total distribution up dramatically. August 1988 vs. August 1987: *Journal of Food Protection* up 435, *Dairy and Food Sanitation* up 646.

We look forward to your timely renewal! American Express has been added for your convenience, along with Master Card and Visa. Feel free to call in your renewal and charge it, 800-525-5223, 515-232-6699. Please ask for Sandy Engelman.

The IAMFES Executive Board meets in Ames this month for the annual fall board meeting/program planning session. A report on the board meeting will be published in the December issue.

When submitting news for publication in *Dairy and Food Sanitation,* information must be received 1 1/2 months prior to the issue you would like it published in. For example: Deadline for the December issue for news is October 15. Thank you for your cooperation in helping us meet the printer's deadlines.

Until next time.

Kathy R. Hathaway
Executive Manager

# International Association of Milk, Food and Environmental Sanitarians Committees

## Committee and Chairperson

**APPLIED LABORATORY METHODS**
Helen Carr
Mich. Dept. of Agric.
1615 S. Harrison Rd.
E. Lansing, MI 48823
517-337-5065

**AUDIO VISUAL LIBRARY**
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# Abstract of Papers Presented at the Seventy-Fifth Annual Meeting of the IAMFES

**Tampa, Florida, July 31 - August 4, 1988**

**Abstracts of most papers submitted for presentation at the 75th Annual Meeting of the IAMFES appear on this and the following pages. The complete text of some of the papers will appear in future issues of the *Journal of Food Protection* or *Dairy and Food Sanitation*.**

## DAIRY PRODUCT PROTECTION

### PROPOSITION 65 AND ITS EFFECT ON THE DAIRY & FOOD INDUSTRY

Christine M. Bruhn, Ph.D., Center for Consumer Research, University of California, Davis, CA 95616

California's Proposition 65 is a natural outgrowth of growing lack of confidence in the safety of the food supply and the effectiveness of government regulatory bodies. Although born in California, the proposition has spawned similar legislation in at least four other states. Implementation of the "Safe Drinking Water and Toxic Enforcement Act" has generated interest and concern from the food industry, consumer organizations, and federal regulatory agencies. The act has two provisions. The first prohibits any person knowingly discharging any chemical known to cause cancer or reproductive toxicity into drinking water. The second provision requires a warning before exposing any individual to chemicals known to cause cancer or reproductive toxicity. Violation of either the warning or discharge requirement will incur a civil penalty not to exceed $2,500 per day for each exposure. There is no cumulative ceiling on the number of individuals who may be claimed to be affected, or the number of days during which the penalty can be assessed. This can have a substantial financial impact on a company. In addition the provision allows any person, whether personally affected or not, to sue an alleged violator. Both public and private plaintiffs are entitled to 25% of all fines collected upon a successful prosecution of violation. Interpretation of this provision is very complex. Critical questions relate to the quantity of a chemical considered to be a significant amount, the presence of natural toxins, and the conflict with existing state or federal controls. Current emergency guidelines specify that those chemicals regulated by existing state and federal guidelines and those practices consistent with good manufacturing practices are not considered a violation. Spurred by the Proposition, some manufacturers are analyzing their product line to establish a base line level of those regulated substances. Others are surveying cleaning and sanitizing chemicals to assure that regulated substances are not discharged in the water supply. Consumers can call a toll free number to inquire about exposure to toxins. Warning signs are appearing in retail outlets, but they contain little or no information. Advocates of Proposition 65 object to the emergency regulations stating the intent of the regulation is to establish new more safe exposure limits. The warning system does not provide the consumer with sufficient information to make an informed decision regarding relative risk. Litigation is expected.

### EFFECT OF HIGH-TEMPERATURE SHORT-TIME PASTEURIZATION ON *LISTERIA MONOCYTOGENES* IN MILK

W.H. Stroup, A.R. Prosser, J.T. Tierney, J.H. Bryner*, and R.W. Dickerson, Jr., National Animal Disease Center, PO Box 70, Ames, IA 50010

Inoculated raw milk was processed through a high-temperature short-time pasteurizer (1140 L/h) using a holding temperature of 72 to 73°C and a holding time of 15 to 16 s to determine if *Listeria monocytogenes* could survive the legal pasteurization standard (71.7°C-15 s) in commercial-scale equipment. In five runs, the inoculum was freely suspended in raw milk obtained from a local farm, yielding about $10^8$ organisms/ml. In seven runs, the inoculum was intracellularly suspended by the method of Donnelly in raw milk obtained from a local farm, yielding about $5x10^4$ organisms/ml. In the final nine runs, the inoculum was experimentally injected into cattle, yielding about 2500 organisms/ml in the raw milk. Before each test, the residence time in the holding tube was verified by salt timing, and all sampling ports and lines downstream from the flow diversion valve were sanitized with hot water (79.5°C for 5 min). Grab samples were taken before and after the pasteurized side of the regenerator, after the cooler, and after the vacuum breaker. A continuous bleed sample was also taken after the cooler. None of the samples of pasteurized milk were positive for viable *L. monocytogenes*. Consequently, under the conditions of this study, *L. monocytogenes* did not survive the legal pasteurization standard in equipment that complied with the requirements of the Grade A Pasteurized Milk Ordinance.

### EFFICACY OF HIGH-TEMPERATURE, SHORT-TIME PASTEURIZATION FOR INACTIVATION OF *LISTERIA MONOCYTOGENES* IN MILK

J. Lovett*, J.G. Bradshaw, D.W. Francis, R.G. Crawford, C.W. Donnelly, G.K. Murthy, and I.V. Wesley, Food and Drug Administration, Division of Microbiology, 1090 Tusculum Ave., Cincinnati, OH 45226

Full-scale commercial pasteurization equipment operated at 72-73°C with a holding time of 15-16 s was used to determine the ability of commercial thermal processing to inactivate *Listeria monocytogenes* strain Scott A. Milk samples taken before and after the pasteurization side of the regenerator, after the cooler and after the vacuum breaker were analyzed for the presence of *L. monocytogenes* using the classical cold enrichment procedure, the FDA enrichment procedure, and the USDA enrichment procedure of Lee. In addition, the plant air, environment and water supply was monitored for *Listeria*. Three methods of providing a *L. monocytogenes* concentration in raw milk were employed: freely suspended (extracellular), inside bovine phagocytes (an *in vitro* procedure) and inside bovine phagocytes in milk of experimentally infected cows (*in vivo*). No *Listeria* or alkaline phosphatase was detected in the pasteurized milk. This report details the microbiological data.

### GROWTH OF *LISTERIA MONOCYTOGENES* AT 10°C IN MILK PREINCUBATED WITH SELECTED PSEUDOMONADS

D. L. Marshall* and R. H. Schmidt, Food Science and Human Nutrition Dept., University of Florida, Gainesville, FL 32611

Sterile whole milk, skim milk, and 10% reconstituted nonfat dry milk (NDM) were preincubated for 3 d at 10°C with selected pseudomonads (*P. fragi*, and *P. fluorescens* strains P26, T25, and B52), followed by inoculation with *Listeria monocytogenes* and further incubation at 10°C. Growth curves of *L. monocytogenes* were constructed for each treatment combination and generation times were statistically compared for differences. Results indicated that *L. monocytogenes* did not affect the growth or survival of the *Pseudomonas spp*. However, growth rates of *L. monocytogenes* were significantly ($P < 0.05$) enhanced in milk systems preincubated with pseudomonads. Doubling times of *L. monocytogenes* were reduced by up to 3 h when grown in preincubated milks. The three strains of *P. fluorescens* showed more stimulation of growth of *L. mon-*

*ocytogenes* compared to *P. fragi* in preincubated whole or skim milk but not in preincubated NDM. Milk composition had little effect on the growth of either genera when incubated alone. This study demonstrates that *L. monocytogenes* can grow in the presence of *Pseudomonas spp.* Furthermore, data suggest that the presence of the pseudomonads may enhance the growth of *L. monocytogenes* in milk.

### BEHAVIOR OF *LISTERIA MONOCYTOGENES* IN CHOCOLATE MILK AND ICE CREAM MADE FROM POST-EXPIRATION DATE SKIM MILK

M.E. Berrang, J.F. Frank* and R.E. Brackett, Dept. of Food Science and Technology, University of Georgia Agricultural Experiment Station, Griffin, GA 30223-1797

*Listeria monocytogenes* has been isolated from commercial chocolate milk and chocolate ice cream, products that are often formulated using returned milk. The objective of this study was to determine the growth and survival of *Listeria* in these products. Chocolate ice cream and chocolate milk mixes were formulated using either commercial skim milk held past expiration or fresh skim milk. The mixes were pasteurized after formulation and inoculated with *Listeria*. Selective (lithium chloride-phenylethanol-moxolactam agar) and non-selective (Na caseinate standard methods agar) media were used for microbial enumeration during product storage. Chocolate milk was stored at 7°C for 12 d and chocolate ice cream was stored at -18 to -25°C for over two months. Selective plating in chocolate milk for *Listeria* showed no difference in growth rates between product made with fresh or returned milk during the first 5 to 8 d of incubation. After 8 to 10 d of incubation, growth of *Listeria* slowed in three of the four samples made with returned milk. This slower growth was accompanied by an increase in the growth of contaminants in the product made from returned milk. Survival of *Listeria* in chocolate ice cream was not affected by the use of older milk in the formulation. The use of expired milk does not appear to increase growth of *Listeria* in these products.

## MILK QUALITY

### MILK QUALITY IMPROVEMENT PROGRAMS - ARE THEY WORKING?

Panel Discussion

William W. Coleman, MN Dept. of Agriculture, 90 W. Plato Blvd, St. Paul, MN 55107

The quality of raw milk on the farms has shown a marked improvement. Improvements in management have allowed standards to be reduced. Premium programs have added the monetary incentives to keep them low

Advancements in technology will continue to make greater milk quality improvements possible. Through all these programs and improvements, I still see a problem from a regulatory standpoint. Much of the philosophy in the field remains the same as it was years ago. If the count is low, the milk must be good. Too many producers still believe that is the case. More time and effort needs to be put into educating the producer on the all around importance of conditions and proper management of the entire milking facility. Fieldservice has to take a more active role in working with producers in these areas.

Points that need to be stressed to producers are; (1) the type of bacteria are more important than the number; (2) the proper use of drugs must be understood and followed; (3) the proper use of pesticides and chemicals are essential around cattle, their feed, and water supply; (4) facilities must be maintained on a day to day basis year round.

Milk Quality Improvement Programs will continue to add new challenges to the producer but the purchaser of the milk must be willing to keep them aware of how best to meet these challenges.

Good effective educational programs and fieldservice will remain the key to being able to say yes to the question of, "Are they working?"

### MILK QUALITY IMPROVEMENT PROGRAMS - ARE THEY WORKING?

Darrell L. Bigalke, President, Food and Dairy Quality Management Inc., 245 E. 6th St., St. Paul, MN 55101

Recent reported foodborne disease outbreaks associated with dairy products have increased the awareness of the need for effective quality control programs in the dairy industry. Most of the reported foodborne outbreaks were associated with *Listeria, Salmonella, Yersinia,* and other post-pasteurization contaminants. With this in mind, the dairy industry has placed considerable emphasis on proper environmental control. Environmental programs have focused on effective cleaning and sanitizing of the processing environment. While these environmental programs have improved product safety and quality, they alone cannot assure product quality and safety. Many dairy processing plants are still plagued with contamination by spoilage organisms, coliforms, and foodborne pathogens. Assurance of dairy product safety and quality must be achieved through effective process control.

A proven method of process control is the Hazard Analysis Critical Control Point (HACCP) concept. Implementation of a HACCP system is a five-step process:

1. Identification of hazards for ingredients in processing and distribution.
2. Identification of control points.
3. Selection of control procedures and specifications.
4. Assigning responsibility for control.
5. Documentation of control.

In the dairy industry, Critical Control Points include microbial populations, time/temperature requirements, equipment sanitation and operation, and environmental sanitation. The HACCP system will control such critical processes as pasteurization, curd cooking, sanitation, time/temperature control, and other processing functions that if not controlled, will result in a food safety hazard.

A dairy processing plant's Quality Control Department must monitor the effectiveness of a HACCP system through effective process monitoring (line sampling). When properly utilized, line sampling can monitor for the potential of post-pasteurization contamination from any of the critical processing points.

Today, the quality control programs implemented by many dairy processing operations have not achieved control of post-pasteurization contamination. The dairy industry must take a more aggressive approach to achieve effective process control and to assure product safety and quality.

### MILK QUALITY IMPROVEMENT PROGRAMS - ARE THEY WORKING?

D.K. Bandler*, D.P. Brown, J.H. Davidson, E.T. Wolff, Cornell University, 11 Stocking Hall, Ithaca, NY 14853

Cornell University has conducted a formal Milk Quality Improvement Program for over two decades. In 1965 it joined with Penn State and Rutgers to form the Tri-State Milk Flavor Program. Today it is funded by an annual grant of $330,000 from the New York State Milk Promotion Order.

All New York State commercial milk processing plants are evaluated for product shelf life. Samples are subjected to 12 quality tests on the day after pasteurization with follow-up tests run on day 7,10 and 14. Results show a significant improvement in milk quality over the last 5 years.

Sell-by dates for milk processed in New York State are set by the individual processor. Data from the Milk Quality Improvement Project (MQIP) are used to assist in determining the pull date and to measure performance. Plants with unsatisfactory keeping quality results are assisted by Extension staff to improve quality assurance programs. Workshops and seminars are used to increase employee awareness and knowledge. Sell-by dates have been extended as a result of this program.

## BACTERIAL ATTACHMENT TO BUNA-N GASKETS IN MILK PROCESSING EQUIPMENT

Melvin H. Czechowski, International Biocide Laboratory, Diversey Corporation, 1532 Biddle Ave., Wyandotte, MI 48192

The attachment of bacteria to buna-n gaskets in milk processing equipment was determined at intervals of 1, 2, 3, 4, and 6 weeks. The number of gaskets contaminated with bacteria increased at each time interval. The numbers of bacteria on the gaskets also tended to increase, but some variations in counts from week to week were observed and could be a reflection of differences in the quality of cleaning. Bacteria were found on the surfaces and in the cracks of gaskets exposed to the flowing milk and in areas of the gaskets facing the metal pipe. The physical deterioration of these gaskets was also followed throughout the study. Gaskets deteriorated significantly over time; exhibiting cracks, holes and abrasions. The results of this study show that gaskets can become a source of bacterial contamination of milk. Without proper sanitation such contamination can lead to the formation of a biofilm which can ultimately have a serious impact on product quality and shelf-life.

## THE PI COUNT - IS IT GOOD ENOUGH?

J.R. Bishop*, Dept. of Food Science and Technology, Virginia Polytechnic Institute and State University, Blacksburg, VA 24061

One of the main objectives of a raw milk evaluating system is to obtain a consistent and reliable estimate of the quality. One of the many quality attributes of raw milk refers to the magnitude of the microbial population and to the types of organisms present. The Standard Plate Count (SPC) does not accurately reflect the quality of milk or the sanitary conditions employed in the production of milk. There is general agreement that the Psychrotrophic Bacteria Count (PBC) is the most reliable method of indicating conditions of production on the farm. One index of raw milk psychrotrophic bacterial quality is the Preliminary Incubation (PI) count. Many researchers have concluded that the PI count is clearly superior to the SPC in evaluating the microbiological quality of raw milk. There are others not quite so enamored with the PI count. FDA data do not favor either the SPC or the PI count as being a better indicator of sanitary and production conditions on dairy farms.

What are the problems with PI count? The time required for results needs to be shortened. The temperatures (13°C vs. 32°C) utilized may be giving inconsistent results due to requiring a group of bacteria (psychrotrophs) to rapidly grow at each of these. Why not incubate at the temperature preferred by psychrotrophic bacteria - 21°C?

## PRE-PASTEURIZATION PROCESSING PARAMETERS AND POSSIBLE EFFECTS ON FLUID MILK SHELF LIFE

R. Fuqua*, R. Boling and N. Nugent, Dairymen, Inc., 10140 Linn Station Rd., Louisville, KY 40223

An analysis of the shelf-life of fluid milk products processed at a highly automated plant was conducted over a two year period in an effort to determine the relationship of variable prepasteurization processing parameters and product spoilage due to sporeforming bacteria. Total mesophilic spore counts, Moseley counts and flavor analysis of the milks were used to compare products processed by two milk separation times and temperatures, with and without passing through a vacuum chamber, and two product standardization methods. During the analysis, the raw milk was monitored to indicate any change in quality. Results from the study indicate that separation temperatures and holding times may activate certain mesophilic/psychrotrophic sporeforming bacteria which cause off flavors to develop after a lag phase of growth 8-10 d after pasteurization.

## THE SIGNIFICANCE OF AERIAL MICROBIOTA ON THE QUALITY OF DAIRY PRODUCTS

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Air sampling was carried out with Centrifugal Air Sampler at an air intake of 40L/min. Selective media were used for the enumeration of airborne bacteria and fungi. Samples were taken at several locations in dairy plants (loading docks, pre and post pasteurization areas, including fillers, drains). Samples were taken before and after CIP procedures, and environmental surface sanitizing. Dominant isolates were identified. *Pseudomonas, Serratia, Klebsiella, Sarcina, Micrococcus, Staphylococcus, Fusarium, Aspergillus, Rhisopus, Penicillium, Chladosporium, Candida, Kluyveromyces, Rhodotorula, Saccharomyces* were the most frequently isolated species. The level of contamination varied between 10-15,000 CFU/$M^3$ air. The highest was found near air movement sites, fillers, fans, blowers, drains, reclaim rooms and staging area. Fungi contamination of dairy products (cheese) could be related to air contamination, psychrotrophic gram negatives and psychrotrophic gram positives were related to pasteurized milk spoilage.

# DAIRY MICROBIOLOGY

## IDENTIFICATION OF MICROORGANISMS ISOLATED FROM SWEET WATER AND GLYCOL COOLING SYSTEMS IN DAIRY PLANTS

B.J. Overdahl* and E.A. Zottola, University of Minnesota Dept. of Food Science and Nutrition, 1334 Eckles Ave., St. Paul, MN 55108

Sweet water and glycol/water mixtures used in the cooling sections of HTST pasteurizers have been suggested as potential sources of spoilage and pathogenic bacteria in pasteurized milk. This paper reports on the identification of microorganisms isolated from 92 samples of sweet water and 24 samples of glycol obtained from 116 dairy plants in 22 states. These samples were examined using modified MPN techniques. The samples were incubated at 10°C for 7 d and 37°C for 48 h. The isolates were obtained from those samples that showed growth in the enrichment of both temperatures and times. Initial identification was done using API 20 E strips. Final identification was done using classical methods. A total of 196 isolates were identified. The two organisms most commonly found in both sweet water and glycol were species of pseudomonas (14%) and staphylococci (32%). Of those isolated from sweet water, 16% were pseudomonas and 38% were staphylococci; whereas from glycol, 7% were pseudomonas and 9% were staphylococci. In addition, *Salmonella typhimurium* was isolated from one sweet water sample. Other potential pathogens were also isolated from both sweet water and glycol.

## A RAPID PROCEDURE FOR DETECTION OF *SALMONELLA* IN RAW MILK

S. K. Frank, P. J. Whalen, K. M. Shahani* and M. Gershman, University of Nebraska, Dept. of Food Science and Technology, 134 Filley Hall, Lincoln, NE 68583-0919

There is a need for a method to detect rapidly salmonellae in raw milk. A highly successful dual phage lysis procedure has been developed with improved selectivity, sensitivity and rapidity. The lysates prepared have long term storage stability and have been used to examine successfully *Salmonella*-spiked and unspiked, 100 ml raw milk samples in which as few as $10^1$ salmonellae/ml could be detected. The method involves reduced selective pre-enrichment time and rapid selective isolation. Salmonellae are concentrated repeatedly and are encouraged to multiply rapidly to achieve a detectable level by selective pre-enrichment of the milk sample itself followed by pre-enrichment in tetrathionate broth to hasten selective isolation. The pathogens are harvested and suspended in a semi-solid lawn over a *Salmonella*-selective medium. Soft agar

suspensions of two *Salmonella*-specific bacteriophages are dropped onto the lawns, and the plates are incubated and checked for phage lysis (lacunae formation). The procedure in truly rapid, simple, and cost efficient. The time lapse between raw milk sample receipt and a presumptive positive test report is only 7.5 h. A confirmed report is possible after 7.5 h and probable within 24 h.

### EFFECT OF ABBREVIATED SELECTIVE ENRICHMENT AND OF POST ENRICHMENT ON THE RECOVERY OF *SALMONELLA* SPP. FROM NONFAT DRY MILK

G. Allen*, F.B. Satchell, W.H. Andrews, and V.R. Bruce, Food and Drug Administration, Center for Food Safety and Applied Nutrition, Division of Microbiology, 200 C St., SW, Washington, DC 20204

Methods such as hydrophobic grid membrane filtration, enzyme immunoassay, and DNA hybridization, recently approved by the Association of Official Analytical Chemists for the rapid recovery of *Salmonella* spp. organisms from foods, use an abbreviated (6-8 h) selective enrichment incubation period. In addition, a post enrichment, following selective enrichment, may be used to enhance the recovery of *Salmonella* spp. organisms. The effect of these variables, i.e. reduced selective enrichment incubation period and inclusion of post enrichment, on the efficiency of the conventional culture method of FDA's *Bacteriological Analytical Method* has not yet been studied. Accordingly, the objectives of this study were to (a) compare relative efficiency of 6 h and 24 h selective enrichment incubation periods, (b) determine necessity of post enrichment, and (c) compare productivity of Rappaport-Vassiliadis (RV) medium, now widely used in Europe, relative to selenite cystine and tetrathionate broths.

Replicate 25-g test portions of artificially contaminated nonfat dry milk were used for comparison of methods. Results from this study indicated that for the analysis of nonfat dry milk (a) test portions may be selectively enriched for only 6 h without compromising recovery, (b) post enrichment did not enhance recovery and (c) there was no advantage of using RV medium.

### A PROCEDURE FOR THE DIRECT MICROSCOPIC COUNT OF BACTERIA IN NONFAT DRY MILK

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Bacteria in non-fat dried milk (NDM) were enumerated by a method involving preliminary solubilization of the milk proteins in 0.015 N NaOH followed by centrifuging, washing in NaOH, and microscopically examining stained smears. The method was used to determine the bacteria in a number of samples of NDM obtained from government surplus stocks or from local retail sources. The bacterial counts for the surplus NDM samples ranged from $4.64 \times 10^5$ to $2.83 \times 10^6$ (the mean and median were 6.23 and $2.84 \times 10^6$). The counts for the retail samples ranged from $4.48 \times 10^5$ to $2.42 \times 10^7$ (mean and median were 5.57 and $2.85 \times 10^6$). The predominant bacteria observed were paired streptococci although some samples contained rod-shaped bacteria, with identifiable spores.

### DETECTION OF ANTIBIOTIC RESISTANT BACTERIA IN COMMERCIAL MILK IN HERMOSILLO, MEXICO

M. D. C. de Aguayo*, B. L. Duarte, F. M. de Oca, Centro de Investigacion en Alimentacion y Desarrollo, A.C. Apdo. Postal #1735, Hermosillo, Sonora, Mexico

The sanitary quality of 100 samples of commercial milk from Hermosillo, Mexico, was evaluated. Fifty-three samples of pasteurized milk were analyzed, 25 samples of powdered milk and 22 samples of ultrapasteurized milk. The microbiological analysis were elaborated according to the 1985 FDA manual, serotyping based upon Bailey and Scott, and antibiogram following Kirby and Bauer. In pasteurized milk eight *E.coli* were isolated, one of them was enteropathogenic. All of them were Polimixin B and Tobramicin resisant; however, 88% were resistant to gentamicin, and 37% were carbencillin and chloramphenicol resistant. Four *St. aureus* were isolated which were resistant to penicillin and ampicillin, two of them were tetracyclin resistant and one of them was erythromicin resistant as well. Two *Salmonella* penicillin and polimixin B resistant were isolated, and additionally one of them showed resistance to chloramphenicol. Other non-pathogenic bacteria which were isolated were resistant to antibiotics. In powdered milk 14 *St. epidermidis* 2 *serratia sp.* were isolated. They presented antibiotic resistance. The pasteurized milk is the most contaminated including with pathogenic bacteria, in the ultrapasteurized 2 pathogenic bacteria were isolated and the powdered milk presented no pathogenic bacteria. It is concluded that the milk is not well processed or it is contaminated after the process and, most of the surviving bacteria were antibiotic resistant.

## DAIRY PRODUCT SANITATION

### THE STATISTICAL EVALUATION OF MILK COMPONENT ANALYSIS

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A study has been made of the within-lab and between-lab variability of infra-red instruments used in component analyses of milk. An eleven-lab (12 instruments) monitoring group received one set of 12 control samples once each week over a 48 week period. Results of the adjusted infra-red analyses were returned to the central laboratory for statistical evaluation. Mean difference and standard deviation of the difference of infra-red vs control sample test results averaged well under Association of Official Analytical Chemists (AOAC) standards. Between-lab variability for all components was found, generally, to fall with AOAC standards for within-lab control. In addition, accuracy of infra-red testing of milk components in herd improvement laboratories around the United States has been evaluated on a regional basis over a six-month period. Mean difference and standard deviation of the difference between infra-red and control sample results have been found to be the equivalent or better than AOAC standards in all regions.

### EVALUATION OF RAW MILK QUALITY BY THE WISCONSIN MASTITIS TEST AND CATALASE ACTIVITY

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This study was conducted to evaluate quality of raw milk as related to the Wisconsin Mastitis Test (WMT) and catalase activity. Forty-one samples of individual cows, six samples from farm bulk tanks, two samples from milk tankers, and two samples from receiving silos were first screened for abnormality using the WMT. The catalase activity of these samples was determined by the Catalasemeter in terms of the disc flotation time which was inversely proportional to the amount of catalase in the disc.

The WMT scores of five of forty-one (12.2%) individual cow samples were abnormal as evidenced by the WMT score of $> 21$ mm. The disc flotation times of milk samples with the WMT score of $\geq 21$ mm ranged from 16.7 to 308.1 s. A general linear relationship between the catalase activity and the WMT score was observed. Occasionally, a sample with a high WMT score ($> 21$ mm) showed relatively low catalase activity. The data indicated that the Catalasemeter may be useful in rapidly detecting abnormal milk. However, elevated catalase activity in milk may be due to factors other than the high somatic cell counts. This fact should be considered in interpreting data obtained by using the Catalasemeter.

## DETERMINATION OF SULFONAMIDES RESIDUE IN MILK BY HPLC-UV AND GC-MS

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Sulfonamides, therapeutically important antimicrobial drugs, are widely used to treat acute systemic and skin infections in farm animals or as feed additives to promote growth. They are currently available "over the counter" to the dairy industry. By combining HPLC separation and spectrum matching with GC-MS confirmation of the purified peak, positive identification of sulfonamide molecular species in milk was achieved. Using 10 ml of milk, detection was limited to 10 ppb.

Lyophilized milk was extracted with acetone-methanol (85:10). Sulfonamides are purified on anionic resin MP-1 (Bio-Rad) pre-equilibrated with 0.2 M phosphate buffer pH 7.8. Elution from the resin is done with acetonitrile - 10 mM ammonium acetate buffer pH 4.6 (1:3) which is also used for the HPLC. A reverse phase column (Lichrosorb RP8) with isocratic elution is used to separate 7 common sulfonamides. Positive identification is done by Waters 990 photodiode array detector which monitor the spectrum of the peaks and confirm them with library of spectra. Purified peaks are then dried, derivitized with diazomethane and subject to GC-MS with multiple ion detection for final confirmation. Sulfamethazine was found as the major sulfonamide in milk marketed in New England. Thirty ppb sulfamethazine was confirmed in an off-the-shelf milk sample. This study confirmed early reports that milk marketed in the United States is contaminated with sulfonamides. Brady and Katz reported 42% contamination in milk collected in Pennsylvania, New Jersey, and New York (Journal of Food Protection 1988, in press), Collins-Thompson et al. reported 49% contamination in samples from 16 cities across U.S. (Journal of Food Protection 1988, submitted). Both studies used the newly developed radio receptor assay for sulfonamides and other antibiotics (Charm and Chi, Journal of A.O.A.C. 1988, 71, in press).

## SHOULD PASTEURIZATION OF MILK FOR CHEESEMAKING BE MANDATORY

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Standards of Identity promulgated in 1949 for many natural cheeses contain two options for assuring product safety - pasteurization of milk for cheesemaking or holding finished cheese for 60 days or more at temperatures of 35°F or higher. Subsequent research and well-documented outbreaks of foodborne illness caused by cheese have established that the 60 day, 35°F + hold is not consistently effective, particularly against *Salmonella* and *Listeria*. Since milk pasteurization is effective against these and other pathogens, should its use for cheesemaking be mandatory?

Currently, pasteurization of milk for cheesemaking is in widespread use. There are, however, types and varieties in which typical, desirable flavor and body characteristics cannot presently be achieved when the milk is pasteurized. Sharp cheddar, Swiss, Parmesan and Romano are examples.

Pasteurization of milk for cheesemaking is one of the initial steps in the process. Post pasteurization risks must still be effectively managed.

Mandatory pasteurization would pre-empt the use of alternate safety technology, and industry would have little incentive to research alternatives. Safety systems, incorporating a combination of elements such as sub-pasteurization heat treatment, lactic culture competition, culture-secreted or enzyme-induced inhibitors, and make or curing procedures, appear to be feasible.

It is questionable whether a mandatory pasteurization requirement would significantly strengthen regulations already in place. FDA's Current Good Manufacturing Practices (CGMP) regulations, although generic, clearly include pasteurization as an option for foods or ingredients which may contain or support the growth of pathogenic microorganisms.

Mandatory pasteurization for cheesemaking should not be required at this time. However, industry can no longer ignore the unreliability of the 60 day, 35°F + holding procedure. Research on cheese safety systems must be intensified, and safety management further strengthened.

## EVALUATION AND CONTROL OF MICROBIOLOGICAL CONTAMINATION OF CONVEYOR LUBRICANTS

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The biosusceptibility of conveyor lubricants due to environmental contamination with dairy and beverage products and airborne organisms was evaluated in two dairy sites and in the laboratory. Microorganisms included common gram negative and gram positive bacteria as well as species of yeasts and filamentous fungi. The concerns for the lubricant serving as a vehicle and growth medium for selected dairy product pathogens was evaluated using a strain of *Listeria monocytogenes*. The need for a fast acting, compatible, safe biocide was established. Glutaraldehyde was added to selected lubricant formulations and was found to reduce bacterium levels by $\geq$ 99.99%, and fungal levels by $\geq$ 99.9% in 30 min. These results suggest the Glutaraldehyde would successfully control contamination during average residence time (30 min) of once through conveyor lubricants during actual operation in the food/beverage and dairy industry.

## MODELLING OF SALT TRANSFER DURING BRINING OF FETA CHEESE AND DETERMINATION OF DIFFUSION COEFFICIENT

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The mass transfer occurring during brining of Feta cheese was mathematically modelled by considering that, diffusion is the controlling mechanism. Two alternative models were developed by accepting the cheese samples as finite and semi-finite solids. Diffusion coefficient was determined by fitting the experimental data to the models, and on the average it was in the order of $3x10^{-10}$ $m^2/s$. The finite body model described the system well for all brining times. However, the semi-infinite model was also in agreement with the experimental results when Fourier number is less than 0.1

## A COMPARATIVE STUDY ON THE PRODUCTION OF A WHITE CHEESE-SUBSTITUTE FROM SOYMILK AND SOYMILK-BOVINE MILK MIXTURES

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In this study soymilk was used to make a white cheese-substitute by applying iso-electric curding at pH 4.5. *Streptococcus lactis* was used as the starter bacteria.

Six different types of cheese was produced by using soymilk, bovine milk and mixtures of soymilk and bovine milk. Effects of adding rennet extract with $CaCl_2$, and cheese powder on the sensory properties of the soymilk-made cheese were also investigated. The products were ripened at 8°C in glass containers filled with 8% brine. Chemical analyses were made at the 1st, 6th, and 12th weeks, and organoleptic analyses were made at the 6th and 12th weeks. Results of the organoleptic analysis were evaluated by statistical methods.

A cheese-substitute was successfully made from soymilk and bovine milk 1:2 mixture which was found to be "good" in flavor, "white" in color and "excellent" in appearance. Soymilk resulted in a high moisture, high protein, low fat containing cheese and was found to be "weedy" and "feed" in flavor, "weak" and "pasty" in body and texture and "yellow" in color. Cheese powder did not give the expected cheese aroma to the final product.

## FOOD SERVICE SANITATION

### COMPUTERIZATION OF FOOD SERVICE INSPECTIONS

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Adopting computers in environmental health inspection processes yields many benefits, including improved staff productivity and greater success in achieving communication and enforcement goals. Computer compilation and processing of inspection data results in less expensive, more rapid, and more comprehensive reporting of inspection program results for management decision making.

Environmental health program managers contemplating computerization are faced with a critical decision between mounting an in-house effort to design and implement a computer system, and purchasing one of several types of computer systems currently available from industry suppliers. Advantages and disadvantages of either choice will be discussed.

Industry's role in computerization is highly consultative, rather than a simple selling function. The primary responsibility of companies offering environmental health computer systems is to conscientiously develop systems (both hardware and software) that match customer needs. They should be willing to share their accumulated expertise so that customers can benefit from the breadth of their experience. Once provided, they must support the systems they develop.

### USE OF FIELD COMPUTERS FOR STATE FOOD SERVICE, REGULATORY FOOD SERVICE INSPECTIONS, AND DAIRY FARM INSPECTIONS

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A field hand-held computer was used in early 1987, to conduct food service program evaluations in Colorado and Wyoming, and a concurrent retail food store evaluation in Wyoming. It is now being successfully used for regulatory food service inspections.

The unit is used as an integral part of the inspection. A note pad, standard inspection report, and pen/pencil is not used.

The inspection information stored in the hand-held computer is transferred electronically to the office computer data base, becoming part of a total ADP system.

The evaluation data was analyzed by a datatrieve software program developed in the FDA Denver office.

Advantages of using a field computer for environmental health inspections:

1. It is relatively easy for a computer illiterate person to use.
2. There is a tendency to enter all violations observed directly into the unit as seen, rather than taking notes and transferring to an inspection report.
3. The drudgery of hand written reports is eliminated, since the unit provides legible printed reports in the field.
4. Easy analysis of status of any particular environmental health program/personnel by program administrators, and outside evaluators.

### A SURVEY OF FOOD SAFETY PRACTICES IN NEW YORK STATE SOUP KITCHENS

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Food safety practices in soup kitchens in New York State were studied between March and June 1986. A total of 50 kitchens, 24 from New York City and 26 from upstate, were randomly selected and surveyed. A food log was used to record the potentially hazardous foods served during a one week period, while critical points in food preparation and storage were examined using a food safety checklist. In addition, kitchen managers' knowledge regarding appropriate food safety practices was examined by a 10 question written quiz. Of the soup kitchens that used cooked leftovers (42%), 55.6% improperly cooled them and 31.8% of the managers did not know proper temperatures to reheat these foods. The majority of sites did not have a thermometer in their primary refrigerator (65.2%) or in their primary freezer (79.5%). No soup kitchen used thermometers to check whether foods reached proper internal temperatures. These results indicate that two areas of concern with respect to preventing foodborne outbreaks in the soup kitchens studied are the cooling and reheating of leftovers.

### EFFECTIVENESS OF COLD-SERVING UNITS IN FOODSERVICE OPERATIONS AS DETERMINED BY TIME-TEMPERATURE PATTERNS AND BACTERIAL COUNTS

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Effectiveness of two types of cold-serving units (CSU) was determined by time-temperature patterns and mesophillic and psychrotrophic counts ($\leq$ 10 CFU/g) of bulk (2.27 kg) and portioned (100 g) cottage cheese, tuna salad (100 g), and deviled eggs (90 $\pm$ 10 g) held on a CSU in a laboratory for 24 h and in three field sites for 4 h. In the laboratory, ice on the mechanically cooled stainless steel basin of a CSU maintained cold temperature ($\leq$ 7.2°C); in field sites *only* mechanical cooling was used.

*All* product temperatures in the laboratory were > 7.2°C after 2 h. In field sites, all *portioned* products were < 7.2°C after 2 h. Differences were attributed to ice in the laboratory acting as an insulator and increasing product temperature. Bacterial growth in all products was less $\leq$ I log cycle in laboratory and field sites indicating the potential for slow growth in foods held on these two types of CSUs. A significant ($p \leq 0.05$) difference in mean product temperature but not bacterial counts was reported between bulk and portioned cottage cheese in the laboratory ($t = -2.27$) and field sites ($t = -3.10$).

## FOOD MICROBIOLOGY

### COMPARISON OF TEN MEDIA FOR ENUMERATION OF *LISTERIA MONOCYTOGENES* IN OYSTERS AND COUNTRY-, AND DRY-CURED HAMS

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Ten direct plating media were evaluated for their suitability to recover and enumerate *Listeria monocytogenes* strain Scott A from raw oysters and country-, and dry-cured hams. Five lots of each food were inoculated with $10^2$, $10^4$, and $10^6$ healthy *L. monocytogenes* cells/g; uninoculated subsamples served as controls. Viable *Listeria* cells were enumerated by surface spreading 0.1 ml of serial dilutions on solidified test media The plates were incubated at 30°C for 48 h before *L. monocytogenes* colonies were counted and confirmed using morphological and biochemical tests. McBride's Listeria Agar (MLA), gum base nalidixic acid tryptone soya agar (GBNTSA), Dominguez Rodriguez Isolation Agar (DRIA), and Modified McBride's Listeria Agar (MMLA) were best for enumeration of *L. monocytogenes* in oysters; DRIA, Donnelly's Listeria Enrichment Agar (DLEA), LiCl Phenylethanol Moxalactam Agar (LPMA), and Modified Vogel-Johnson Agar (MVJA) were best for country-cured ham, and Modified Despierres Agar (MDA), MMLA, LPMA, and MVJA were best for dry-cured ham. Choices were made based on relative recovery of cells as well as ease of recognizing and counting *L. monocytogenes* colonies. The direct plating technique is suitable for enumerating healthy cells of *L. monocytogenes* from oysters and hams when present at populations of $10^4$/g or higher. At lower populations, background flora inhibit enumeration.

## THE EFFECTS OF MODIFIED ATMOSPHERE STORAGE ON GROWTH OF *LISTERIA MONOCYTOGENES* AND *AEROMONAS HYDROPHILA* ON FRESH BROCCOLI

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The effects of modified atmosphere storage on survival and growth of *Listeria monocytogenes* and *Aeromonas hydrophila* on fresh broccoli were investigated. Four lots of fresh broccoli florets were individually inoculated with about $10^4$ cells/g of one of two strains of either *L. monocytogenes* or *A. hydrophila*: a fifth uninoculated lot served as a control. Each lot was subdivided and stored at 15°C in an atmosphere containing 11% $O_2$, 10% $CO_2$, and 79% $N_2$ or in ambient air. Samples were analyzed for populations of viable *L. monocytogenes*, *A. hydrophila*, total aerobic microorganisms and yeasts and molds using Modified McBrides Listeria agar, starch ampicillin agar, tryptic soy agar, and dichloran rose bengal chloramphenicol agar, respectively. Analysis was done initially and after 2, 4, 6, 8, and 10 d. In addition, overall sensory quality and surface pH were monitored. Storage in modified atmosphere did not result in significantly different populations of any of the microorganisms enumerated when compared to storage in air. *L. monocytogenes* populations increased to $10^9$ cells/g after 10 d of storage whereas *A. hydrophila* increased to $10^8$ CFU/g after 10 d. Total aerobic populations and yeast/mold populations increased to $10^{11}$ and $10^9$ CFU/g, respectively, after 10 d. Broccoli stored in modified atmosphere was judged to be saleable after 8 d, at least 2 d longer than broccoli stored in air.

## SURVIVAL OF *LISTERIA MONOCYTOGENES* IN GROUND BEEF OR LIVER DURING STORAGE AT 4° AND 25°C

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Survival and growth of *L. monocytogenes* strain Scott A (SA) were studied in freshly ground beef or liver during storage at two temperatures of 4° and 25°C. Cells were enumerated at various periods by surface-plating appropriate dilutions on Plate Count Agar and on two selective media, McBride Listeria Agar (MLA) and cyclohexanedione-nalidixic acid-phenylethanol agar (CNPA) of Jay. Plates were incubated at 35°C for 48 h. The aerobic counts in the fresh samples were ca. $10^4$ CFU/g, and the SA inocula were $0.7\text{-}1 \times 10^5$ CFU/g. Total aerobes in ground beef stored at 4°C were > $10^8$ after 2 weeks, while in liver the background flora increased at a slower rate ($10^6$ CFU/g after 17 d). Colonies of *Listeria* were counted and selected colonies were confirmed biochemically. Recovered numbers remained unchanged during a storage of over 30 d in either ground meat or liver. Storage at 25°C and testing after 4, 8, 23 and 24 h confirmed recovery but absence of multiplication of the organism. This study demonstrated survival of *L. monocytogenes* in refrigerated ground meat or liver during storage from freshness to spoilage by the natural microflora, although multiplication was not evident. It also demonstrated the need for selective *Listeria* media for meats. No difference was observed in survival of the organism, despite differences in composition and spoilage pattern of meat and liver.

## A MODIFIED PLATING TECHNIQUE FOR ENUMERATION OF STRESSED SALMONELLA

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A plating technique that would allow for recovery and enumeration of stressed *Salmonella typhimurium* was developed. Enumeration of *S. typhimurium* cultures, freshly propagated in tryptic soy broth (TSB) at 37°C for 18-24 h on xylose lysine desoxycholate (XLD), Hektoen enteric (HE), Salmonella-Shigella (SS), and brilliant green (BG) agars resulted in recovery of $10^1$ and $10^2$ fewer cells than when tryptic soy agar (TSA) was used as the plating medium. This decreased recovery on selective media was not observed when *S. typhimurium* was pour plated in TSA, allowed to stand at room temperature for 4 h, overlaid with XLD, BGA, SS or HE and incubated at 37°C for 48 h. These media retained their selective and differential properties when modified plating technique was used. *Staphylococcus aureus* was inhibited, and *Enterobacter cloacae* was easily differentiated from *S. typhimurium* when mixed cultures were used. In addition, the population of freshly propagated *S. typhimurium* was determined, and the cultures were placed at -20°C for 1-2 wks. The number of viable cells decreased as a result of freezing. Plating of the frozen samples on selective media in the traditional method showed reduced recovery on XLD, BGA, HE and SS as compared to recovery on TSA. Use of the overlay technique allowed for recovery with the selective media at the same level as when TSA was used. Use of the modified plating method appears to allow for recovery of injured cells and would be useful when enumeration of *S. typhimurium* is required.

## EVALUATION OF A DNA HYBRIDIZATION METHOD FOR THE DETECTION OF *SALMONELLA* IN PROCESSED EGG PRODUCTS

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A study was conducted to evaluate the efficacy of a DNA hybridization method (GENE-TRAK Salmonella Assay) in comparison to the standard USDA culture procedure for the detection of *Salmonella* species in processed egg products. Two hundred ninety-eight samples were analyzed, representing a variety of liquid, frozen, and dried egg products. Test samples included potentially naturally contaminated raw products, uninoculated finished products, and finished products inoculated with a variety of *Salmonella* and non-*Salmonella* bacteria. Of 20 samples positive by the USDA method, all were detected by the DNA hybridization assay. Four additional samples were positive by hybridization and negative by culture, resulting in an unconfirmed positive rate for the hybridization assay of 1.4%. These results indicate that the DNA hybridization method is a reliable procedure for the analysis of processed egg products for *Salmonella* contamination, with a high degree of specificity and sensitivity. Two advantages of the hybridization method are decreased analysis time (2 days versus 4 to 7 days for the culture method), and lack of reactivity of the DNA probes employed with competing bacteria such as *Citobacter*, *Proteus* and *Pseudomonas*, organisms which frequently complicate conventional culture analysis.

## ISOLATION OF E. COLI 0157:H7 FROM FOODS THROUGH THE USE OF MONOCLONAL ANTIBODIES

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A membrane filter method which uses an enzyme-labelled monoclonal antibody stain has been developed for rapid detection of *E. coli* 0157:H7 in foods. The procedure is performed directly on a hydrophobic grid-membrane filter without need to transfer (blot) onto nitrocellulose. Pure cultures of 55 *E. coli* 0157:H7 strains all gave positive reactions in the assay showing as purple dots on the filters. Percent recoveries of individual *E. coli* 0157:H7 organisms from artifically contaminated meats ranged from 95 to 100%. The method allows for presumptive detection of *E. coli* 0157:H7 within 24h. Cross reactions with non-*E. coli* 0157:H7 organisms and other enteric bacteria appear to be restricted to Group N *Salmonella*. The latter organisms are readily distinguished from the *E. coli* within a second 24h period with appropriate antisera.

## LETHALITY OF MODIFIED ATMOSPHERES TO *CAMPYLOBACTER JEJUNI* IN TURKEY ROLL

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*Campylobacter jejuni*, a cause of acute bacterial gastroenteritis, is frequently found in poultry. The objectives of this study were to evaluate survival of *C. jejuni* in turkey roll held under modified atmosphere storage and to determine an optimal culture medium and diluent for recovery of *C. jejuni*. Lethality and variation in recovery rates from various diluents is a major problem in working with *C. jejuni*. Seven diluents were compared as to their ability to maintain viable *C. jejuni* by diluting pure cultures and plating onto Campylobacter blood-free agar and Brucella Blood Agar. Cary-Blair diluent (0.1% agar) consistently produced the highest counts of *C. jejuni*, followed by reinforced clostridial medium and fluid thioglycollate USP. The preferred plating medium was blood free *Campylobacter* agar. Of the modified atmospheres evaluated (100% air; 100% nitrogen; 85% nitrogen: 10% carbon dioxide: 5% oxygen; 40% nitrogen: 60% carbon dioxide; and 20% nitrogen: 80% carbon dioxide), the 80% nitrogen: 20% carbon dioxide atmosphere was most inhibitory to *C. jejuni* and also reduced both aerobic and microaerophilic spoilage microflora in turkey roll stored at 4°C.

## SURVIVAL AND GROWTH OF *AEROMONAS HYDROPHILA, VIBRIO PARAHAEMOLYTICUS,* AND *STAPHYLOCOCCUS AUREUS* ON COOKED MINCE AND SURIMIS MADE FROM ATLANTIC POLLOCK

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The present study was undertaken to determine if compositional differences in mince, salt-added surimi, and low-salt surimi prepared from Atlantic pollock affected the growth of *Aeromonas hydrophilia, Vibrio parahaemolyticus*, and *Staphylococcus aureus* on these products in the cooked state. Samples were steamed, cooled, and inoculated. Samples inoculated with *A. hydrophila* were stored at 5, 13, and 25°C; all others were stored at 5 and 25°C. *A. hydrophila* grew well on the mince and low-salt surimi but not on the salt-added surimi at all three temperatures. *V. parahaemolyticus* counts decreased slightly on all three products during storage at 5°C. At 25°C *V. parahaemolyticus* counts initially decreased on all three products but then rose at least $10^2$ MPN/g on the mince and salt-added surimi. Counts on the low-salt surimi rose $<10^1$. *S. aureus* counts did not increase on any of the products stored at 5°C. During storage at 25°C, *S. aureus* counts were always slightly higher on the surmis than on the mince, with highest counts on the low-salt surimi. Compositional differences had a major effect upon the growth of *A. hydrophila* on mince, salt-added surimi, and low salt surimi. Effects upon the growth of *V. parahaemolyticus* and *S. aureus* were slight.

## INFLUENCE OF MODIFIED ATMOSPHERE PACKAGING ON THE MICROFLORA AND QUALITY OF FRESH BELL PEPPERS

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Fresh bell peppers were individually seal-packaged in film, sealed in gas-flushed (5% $O_2$, 10% $CO_2$, 85% $N_2$) film pouches, or stored in cardboard packing crates. All samples were stored at 13°C, and changes in populations of total aerobic microorganisms, psychrotrophs, yeasts and molds, members of Enterobacteriaceae, and lactic acid bacteria were determined. In addition, overall sensory quality, color changes, and surface pH were monitored. Individual-sealed and gas-packaged peppers developed higher populations total aerobic microorganisms, yeasts and molds, and Enterobacteriaceae than did unpackaged peppers. Individual seal packaging also resulted in higher populations of Enterobacteriaceae than did gas packaging but populations of other groups of microorganisms were similar. Color and surface pH of the peppers did not differ in any of the treatments. Individual seal packaged and gas-packaged tomatoes remained unspoiled at least 6 weeks whereas unpackaged peppers spoiled in 3 weeks.

# FOOD PROTECTION

## SUBLETHAL EFFECT OF GAMMA IRRADIATION ON *SALMONELLA* AND *E. COLI*

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Irradiation technology is another choice for the preservation of food that may be used in combination with traditional or conventional food preservation methods. The aim of irradiation is to reduce the initial microbial load of the product and at the same time deactivate the pathogenic microorganisms. In this study, irradiation of food samples contaminated with *E. coli* and *Salmonella* has resulted in three types of cells: dead, viable and reversibly injured. Injury that was caused by irradiation was found to be repairable. The increase that was observed of the lag time for *Salmonella* was another indication for the injury.

## INCIDENCE OF ANTIBIOTICS IN MEAT SAMPLES PURCHASED IN HERMOSILLO, MEXICO

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The use of antibiotics for non-veterinary purposes such as addition to feed for growth promotion has raised concern about the potential danger of residue occurrance in poultry and beef. Samples of classified beef and poultry purchased at meat shops in Hermosillo, Mexico were analyzed for presence and quantification of antibiotic residue levels. Tetracyclines, beta lactams, aminoglycosides, gentamycin and chloramphenicol were determined using a radioactively labeled competitive assay (The Charm II Test, Penicillin Assays, Inc.). All tested meat extracts presented detectable levels of one or more antibiotic families. In poultry meat extracts, mixtures of 3 different antibiotics were commonly found. Tetracyclines were present in 100% of the assayed samples at different concentrations. About 70% of bovine extracts had beta lactams, these residues were absent in poultry extracts. The found concentration of streptomycin, gentamycin and penicillins were within the tolerance limits, while chloramphenicol and most of the tetracyclines were above such limits. This preliminary study indicates that the presence of antibiotic residues in animal tissues destined for human consumption has already become an important problem in this area of Mexico.

## HACCP ANALYSIS OF CONVENIENCE STORE OPERATIONS - MICROBIAL EVALUATION OF ROAST BEEF SANDWICH PRODUCTION

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Processing of roast beef sandwiches was evaluated for potential microbial hazards in nine convenience stores (c-stores) in the Lansing, Michigan area. Evaluation consisted of a modified Hazard Analysis Critical Control Point (HACCP) approach in which processing methods in six c-stores where observed. Time-temperature relationships during sandwich production were recorded at six c-stores. Sandwich samples were obtained immediately after production at six c-stores and three days later from all nine c-stores for microbiological analysis. The mean log of colony forming units (CFU)/g for Total Plate Counts in roast beef immediately following processing was 6.04 and after 3 d of refrigeration (1 to 5°C) in the store, was 8.39. Presumptive counts for *S. aureus* were isolated in 61% of the samples but never exceeded 4 as the mean log of CFU/g. Methods to optimize microbiological quality of roast beef sandwiches were identified as time-temperature control and personnel training.

## MONITORING A RETAIL FOOD STORE DELI USING HAZARD ANALYSIS CRITICAL POINT SYSTEM

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This paper will address a Hazard Analysis Critical Control Point (HACCP) approach for retail markets. In the ever expanding delicatessens, there are microbiological hazards (risks associated with the preparation, storage and display of certain foods). Information about formulation (time/temperature sensitive ingredients), process or preparation stets and the importance of expected use of the food products (point of purchase information to the customer) will be presented. A number of specific flow charts and/or models of HACCP will be shown as examples of how to properly monitor a market deli.

## PACKAGED IMPORTED ETHNIC FOODS - THE PROBLEMS

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Surveys have shown many quality and potential health problems associated with packaged imported foods sold in "ethnic" markets. Although these products are predominantly Asian, foods from many countries are involved. The visible signs of the various problems will be depicted on slides, including swollen and rusty cans, leaking bottles and jars, moldy and insect infested foods, etc. There will also be a wide variety of products for the audience to examine visually and olfactorily. Likely causes of the problems will be discussed.

## PACKAGED IMPORTED ETHNIC FOODS - FDA'S EFFORTS AT CONTROL

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The history of FDA's response to the quality and potential health problems associated with packaged imported foods sold in "ethnic" markets will be reviewed.The discussion will emphasize the Agency's ten point plan as well as some accomplishments achieved to date.

## FUNGI ISOLATED FROM CITRUS PRODUCTS

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A variety of citrus products, including dried pellets, frozen concentrated orange juice (FCOJ), irradiated FCOJ, unpasteurized orange juice, and packaging for chilled orange juice, were qualitatively assayed for their fungal microflora. Samples were from commercial and non-commercial sources. Yeast identifications were based on standard taxonomic procedures and published identification keys. Molds were identified using macro and microscopic comparisons with literature descriptions and illustrations. Fungi identified were *Aspergillus niger, Aspergillus* sp., *Aureobasidium pullulans, Brettanamyces lambicus, Byssochlamys* sp., *Candida maltosa, Candida sake, Cladosporium* sp., *Fusarium* sp., *Geotrichum* sp., *Hanseniaspora guilliermondii, Hanseniaspora* sp., *Penicillium* sp., *Pichia membranaefaciens, Rhizopus* sp., *Rhodotorula* sp., *Saccharomyces cerevisiae, Schwanniomyces occidentalis, Torulaspora delbrueckii* and *Trichoderma* sp.

## AN UPDATE ON AEROMONAS HYDROPHILA

*Aeromonas hydrophila*, a member of the *Vibrionaceae* family, is becoming recognized as a significant human pathogen. In addition to causing gastroenteritis, particularly in certain groups, it can cause non-gastrointestinal infections such as meningitis and wound infections. Though the organism is considered part of the flora of various water supplies, surveys of retail fresh foods have indicated a widespread occurrence of *A. hydrophila* in fresh animal and vegetable food products. Studies from our laboratory indicate that both clinical and food isolates can grow at 5°C, a temperature formerly thought sufficient to prevent the growth of foodborne pathogens. Research has indicated that *A. hydrophila* can readily be destroyed by heat or irradiation. Growth of the organism in ground pork can be controlled by 3% NaCl or pH values below 6.0. The organism is sensitive to commonly used food plant sanitizers. Though no definition of virulence exists for *A. hydrophila*, food isolates display a number of the same factors associated with virulence in other Gram-negative bacteria. Thus, the presence of *A. hydrophila* in foods should be viewed with caution. The behavior and control of *A. hydrophila* in foods appears similar to other Gram-negative foodborne pathogens and the data presented can be utilized for its control in food systems.

## SYNTHESIS OF HEAT SHOCK PROTEINS AND THERMOTOLERANCE IN BACTERIAL CELLS AND THEIR PROBLEM IN THERMAL PROCESSING OF FOOD

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The heat resistance of food spoilage bacteria varies with how to apply heat to food which is contaminated with bacterial cells. Cells of *Escherichia coli* and *Staphylococcus aureus*, grown in M9 supplemented with glucose and Casamino acids and Trip-soy broth, respectively, were found to increase their resistance to heat at 50°C and 55°C, by being incubated previously at a lower constant temperature or by being heated with a temperature rise in an incubator. The increase in heat resistance was defined here as the thermotolerance of cells. Chloramphenicol inhibited, but partially, the thermotolerance. During the preincubation process and the rising temperature process, cells produced so-called heat shock proteins, which have been suggested to contribute to the cellular thermotolerance, as detected by polyacrylamide gel electrophoresis and fluorography. It is likely that the production of heat shock proteins is responsible for the protein-synthesis dependent thermotolerance, although protein-synthesis independent thermotolerance remains to be investigated. The thermotolerance of cells may evoke a problem in certains of thermal process of pasteurization.

## METHOD IN STUDYING FLOW PATTERNS AND RESIDENCE TIME DISTRIBUTION OF FLUIDS CONTAINING PARTICULATES

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Aseptic Processing and Packaging (APP) of particulates contained in foodstuffs has recently generated widespread industrial interest and considerable growth in research activity. For public safety considerations, all particles must receive the proper thermal treatment. Therefore, the Residence Time Distribution (RTD) of particles in their carrier fluid must be known. Previous research performed for aseptic processing of particulates have assumed that particle velocity is equal to carrier fluid velocity. Consequently, the RTD of particles was also assumed to be the same as the carrier fluid. However, as particle density, size, fluid viscosity, and flow rate change, the RTD and flow pattern of the particles might deviate from that of the carrier fluid.

To study the possible separation of particulate and liquid fractions during processing a photoelectric technique has been employed. The cross-section of holding tube was divided into several regions, allowing for particles to be located and their velocity calculated as affected by changing particle size, fluid viscosity and flow rate. These findings are examined as to their possible impact on regulations.

## THE MICROBIOLOGICAL SAFETY OF FRESH PROCESSED POULTRY

### WHAT CAN BE DONE TO CONTROL *SALMONELLA* DURING POULTRY PRODUCTION?

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Methods that can be used to control *salmonella* during poultry production must necessarily be considered in relation to effect on production costs. Only rarely do *salmonella* infections in chickens, in contrast to turkeys, cause significant loss in production efficiency.

There can be no doubt that producing fresh poultry carcasses dependably free of *salmonella* requires delivery of uninfected flocks to slaughter. This can be achieved only by a comprehensive and continuous control effort extending through all stages of production from the basic genetic stock to the market flock. This effort must be directed toward using only breeding stock free of infection and hatching and rearing all generations in an environment free of exposure. This general approach has been used with considerable success for many years in Sweden and has been supported by major federal subsidy. Developing comparable programs in most major poultry producing areas would require major restructuring of the industries with large increases in production costs.

Perhaps any realistic control effort at this time should be directed at reducing or eliminating infection in breeding stock and the contamination of feeds.

Extension of current efforts to identify serotypes and strains of *salmonella* of particular public health significance might allow the industries to concentrate on control of only a few which would greatly simplify the effort. Recent implication, in the USA and UK, of whole shell eggs as a source of *Salmonella enteritidis* is representative of this point. Although this serotype has long been recognized in poultry, the public health significance had not previously surfaced. There is active investigation to determine whether particular strains are responsible for the problem. The results of this work will determine the necessary direction and scope of control efforts.

The role of native gut microflora in containing *salmonella* by competitive exclusion remains under active investigation. Current information indicates that if this protective mechanism is fully functional intestinal colonization in heavily exposed populations is restricted to $\pm$ 2.0% of the flock. However, even this relatively low colonization incidence allows high levels at subsequent carcass contamination unless methods are developed to greatly reduce cross contamination during processing.

### COLONIZATION OF POULTRY BY *CAMPYLOBACTER JEJUNI* AND THE POTENTIAL FOR INTERVENTION

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As chickens are the prominent reservoir for human campylobacteriosis, we hope to intervene in *Campylobacter jejuni* colonization. Baseline data were gathered to document some parameters involved in the colonization of chicks by *C. jejuni*. We observed that the colonization dose 50% value was approximately 35 cells when the challenge was administered to chicks less than 24 hours old. Chicks were consistently colonized during the first 72 hours by challenges of about 100,000 CFU. Certain strains of *C. jejuni* were more likely to colonize than others. By using oral-fecal repeated passage of a non-colonizing isolate (A74/0), we were able to create a congenic colonizing isolate (A74/C). Outer membrane protein (OMP) preparations were analyzed by SDS PAGE. Bands visualized by total protein stains migrating at *ca*. 82 and 30 kdal had absent or reduced expression in the A74/C. Sera from rabbits immunized with OMP or formalin treated whole cells of the A74/0 or A74/C isolate were used to evaluate the OMP preparations by Western Blot analysis. A major antigenic band at *ca*. 30 kdal was detected in A74/0 but was conspicuously absent from A74/C. To understand the immune response of the chick to *C. jejuni* colonization, we monitored the chick humoral IgG and biliary sIgA status as assessed by ELISA. Samples were taken from more than 200 *C. jejuni* colonized or noncolonized chicks, housed in a controlled environment. In the colonized chicks, humoral IgG values were highest at hatch (A=2.14 @405nm), dropped to their lowest level after 14 days (0.55), and increased by 28 days to 0.99. By contrast the non-colonized chicks showed IgG levels of 0.71 at 28 days. The sIgA activity was lowest at hatch (0.57) and increased by day 28 in colonized chicks (1.50), while remaining comparatively low in the control chicks (0.98). Colonization by *C. jejuni* in the chick was apparently not diminished by these humoral and secretory responses.

### FACTORS AFFECTING THE PERSISTENCE OF *SALMONELLA* DURING THE PROCESSING OF POULTRY

Huda S. Lillard, USDA, ARS, Russell Research Center, PO Box 5677, Athens, GA 30613

In addition to cross-contamination with *Salmonella* during processing, bacteria, including salmonellae, attach firmly to poultry skin. Neither flagella nor fimbriae seem to play an important role in the attachment of *salmonella* to chicken skin. Firm attachment occurs in the first 15 sec of exposure. Electrostatic attraction between negatively charged bacteria and receptor sites on skin seems not involved. Changes in pH and ionic strength did not alter attachment patterns. Cells (95%) are initially entrapped in a water film on the surface then migrate to the skin. Skin crevices become deeper during water immersion. Bacteria are entrapped in these crevices and seem protected from bactericides. The effect of entrapped bacteria on the microbiological sampling of poultry was investigated. Bacterial counts and *Salmonella* incidence are frequently based on the whole carcass rinse procedure; it was assumed that most bacteria are recovered in the first rinse. A substantial number of bacteria were still recovered after rinsing carcasses 40 times. This raises questions about sampling methods, previously reported bacterial counts, and *Salmonella* incidence.

### CHEMICAL AND PHYSICAL TREATMENTS IN FEED AND PROCESSING WATERS TO REDUCE *SALMONELLA* IN PROCESSED POULTRY

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Boilers were inoculated with $10^4$ - $10^6$/ml *Salmonella typhimurium* and often $10^5$ - $10^6$/ml *Campylobacter jejuni* in drinking water 4 and 2 d prior to processing at 49 d in an experimental facility. Various chemicals were added to scald and/or chill waters or as pre- or postchill dip in efforts to reduce microbial contamination on carcasses. In each trial 12 carcasses were sampled per treatment using a whole carcass rinse. Treatments were 1 and 2% lactic acid, 0.5 and 1% $H_2O_2$, 100 ppm Cl, 1% acetic acid, 1200 ppm potassium sorbate, NaOH to adjust pH to 10.5 and several proprietary substances. Treatments which resulted in reduced or undetectable levels of *Salmonella* and *Campylobacter* included lactic acid in scald, chill, and as a dip application, and several proprietary substances. In all trials incidence of contamination on control carcasses was 50% or greater. Addition of propionic acid (0.2 to 0.4%) to poultry feed resulted in significant reductions in total coliforms and *E. coli* in the intestinal tract with no adverse effects on growth or feed conversion.

### PERSISTENCE ON AND RECOVERY OF *LISTERIA* FROM REFRIGERATED PROCESSED POULTRY

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Three studies, one on raw (I) and two on cooked (II, III) poultry, were done. I. The USDA-FSIS (U), FDA (F) and a new antibiotic-based (A) enrichment methods were compared for ability to isolate added and indigenous *L. monocytogenes* (Lm) from paired processed chicken carcasses held aerobically at 5°C for up to 11 d. All three methods showed nearly equal recoveries of added Lm (28, 24, and 34 confirmed isolates, respectively). However, the recovery rate from method A gave more even results in numbers of isolates recovered at all 3 sampling times (day 0, 3 and 11).

II. Lm strains Scott A (SA) and V7 were added to give Log CFU/

g of 0, 2.7 or 6.7 in cooked chicken homogenates and held at 4°C for up to 20 days. Total bacteria (TB) and Lm counts were determined on total plate count agar (TPA) and on Listeria Selective Isolation (LSI), McBride Listeria Agar minus blood (MLA-B) and Modified Acriflavin Ceftazidime Esculin (MACE) agar media. By day 20, Lm counts reached levels of Log CFU/g of 7.9 and 9.4 in the low and high inoculum samples and TB counts reached Log CFU/g of 9.2 in non-Lm inoculated controls. MACE, LSI and MLA-B were all able to inhibit background microflora from the 10 d samples but the LSI permitted growth of Log 4 CFU/g of non-*Listeria* from the 20 d samples.

III. The U method was compared to a commercial ELISA monoclonal antibody kit (Organon-Teknika, E method) for detection of Lm added to give Log 1.7 or 2.7 CFU/g in sterile chicken homogenate to which was also added a cocktail of several taxonomically related, thermoduric non-sporeforming bacteria at Log 3.9 CFU/g. One set of samples was tested immediately and the other held at 5°C for 6 d before testing. Comparable results were obtained with the U and E methods with no false positive results for the latter method. Samples found to be *Listeria* positive by the U and E methods were confirmed to be Lm positive using the API Rapid STREP test strips which gave positive identification results in 24 h when starting with pure colonies of suspect isolates.

(This research was supported in part by grant funds from the Southeastern Poultry and Egg Association.)

## ENVIRONMENTAL PROTECTION

### HOT TUBS AND HEALTH CONCERNS

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Contrary to many reports found in newspapers or heard over radio or television, water in hot tubs is not involved in the transmission of the causative agents of AIDS, genital herpes or genital warts. However, the water in hot tubs, which are operated improperly, has been involved in the transmission of disease agents which cause selective types of dermatitis and folliculitis. Hot tubs have caused a considerable number of deaths and numerous injuries to users of these facilities. The use of hot tubs by pregnant women has been associated with fetal damage. The use of certain chemicals in the treatment of water in hot tubs is the probable cause of a chemically induced dermatitis.

### BIOMONITORING OF WASTE EFFLUENTS - AN OVERVIEW FOR ENVIRONMENTAL SANITARIANS

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Test methods for monitoring the quality of wastewater effluents have drastically changed in the last twenty-five years. During the early 70's the major focus of testing and monitoring of waste effluents from municipal pollution control facilities was on oxygen demand and eutrophying characteristics. As new and increased numbers of chemical substances have been identified in wastewaters, increased emphasis has been placed on biological monitoring for evaluating toxic effects.

In 1984, the Environmental Protection Agency issued a national policy calling for the biological monitoring of wastewater effluents to assess toxic effects on aquatic organisms. As more state water authorities adopt EPA recommendations for effluent toxicity testing, local sanitarians will need to have a greater knowledge of techniques and terminology related to biomonitoring. This presentation will provide an overview of the terminology and techniques currently used in biomonitoring. In addition, aquatic toxicology research activities that may have future applications in biomonitoring will be presented.

## THE FUTURE OF WATER QUALITY & ITS AFFECTS ON THE DAIRY & FOOD INDUSTRY

### ANALYSIS OF A WATER SURVEILLANCE PROGRAM

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This paper reviews the US EPA regulations particular to the protection of drinking water in the United States and speaks to the water surveillance system used by Hershey Foods Corporation to evaluate the quality of water used in its operations.

There is some indication that the pesticides used in agri-business and the chemicals of society are entering the surface and ground water in the United States. Since the water companies and, in some cases, the food processing plants themselves use and treat these water sources for use, these materials are now entering the water delivered to the processing plants. Good manufacturing practices dictate that the incoming water used for product, processes, cleaning, or personnel be treated like any other raw material, including the analysis for chemical contamination.

The American Water Works Association has adopted a drinking water policy that states, in part, that "all water utilities should deliver to the customer an adequate supply of high-quality drinking water at a cost commensurate with the needs of each individual water system." The US EPA, through the promulgation of the National Primary Drinking Water Regulations and National Secondary Drinking Water Regulations (SDWA 40 CFR 141, 142, 143), has provided the instrument to assure the delivery of safe water to users. It is now incumbent upon the provider and the user to evaluate the success or failure of the water protection system.

For the last five years, Hershey Foods Corporation has been conducting a quarterly water quality monitoring system that applied to all company facilities. The parameters selected were those required by the SDWA (41 FR 28402, 52 FR 25715-16) and the analyses performed by US EPA-licensed laboratories. The results were compared to SDWA standards and to the water company's water quality data. Water companies are mandated to conduct and report on their product delivered, and these reports are available to all users upon request. Water is a very valuable raw material and should receive the attention it deserves!

## AN UPDATE ON PEST PROBLEMS, STRATEGIES AND NEW CONTROL TECHNOLOGIES FOR THE FOOD INDUSTRY

### SIGNIFICANCE OF COCKROACH INFESTATIONS TO HUMAN HEALTH

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Domestic species of cockroaches are considered to be the most commonly encountered insects by man. The German cockroach, *Blattella germanica*, is ubiquitous, and represents the most serious threat to the food industry. Cockroaches are strong psychological stressors to man; their presence, and our efforts to control them, adversely affect our health. Additionally, because these insects are so closely associated with man, and commonly feed on decaying food, crumbs, or scraps, and commonly occur in unsanitary areas such as sewage systems and septic tanks, they are perceived as vectors of pathogenic microorganisms. Cockroaches have been incriminated in the maintenance or transmission of over 30 species of pathogenic bacteria, two viruses, fungi, protozoans, and parasitic worms. However, allergies to cockroaches are the most common and potentially serious cause of disease in man. Allergies to cockroaches are second only to allergies to house dust mites. In some extreme cases, anaphylactic shock and death can result from exposure to German cockroach infestations. The recent introduction of the Asian cockroach, *Blattella asahinai*, represents new problems. These, and implications to the food industry, are described in detail.

## INSECTICIDE RESISTANCE IN THE GERMAN COCKROACH

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Insecticide resistance in the German cockroach has been studied in nearly 50 field-collected strains from diverse locations. They are tested with 12 insecticides by the time-morality method of exposure in comparison with a known susceptible strain. One low- to moderate-level resistance was detected to diazinon, chlorpyrifos, and acephate. Resistance to malathion is widespread with about half of the strains tested showing high-level resistance. High-level resistance to the carbamates propoxur and bendocarb also occurs. It is uncommon with propoxur, but most of the strains are highly resistant to the bendiocarb. High-level resistance to pyrethrins occurred in about half of the strains tested. Resistance to the pyrethroids allethrin, phenothrin, fenvalerate, and cyfluthrin is beginning to appear. All of the strains tested were susceptible to one or more of the insecticides used. While resistance is a serious problem in this species, it can be overcome by selecting an appropriate insecticide.

## INSECT GROWTH REGULATORS AND FUMIGATION FOR SUPPRESSION OF GERMAN COCKROACHES

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New technologies for control of cockroaches have been developed within the past five years to provide reliable and safe pest control. Two of these technologies that show potential for use in homes and restaurants are the insect growth regulators and fumigation.

Insect growth regulators (IGR's) are synthetically produced chemicals that are based on the insect's own hormones. The juvenile hormone analogs are a group of IGR's that cause cockroaches, that are exposed as nymphs, to mature to adults that are not capable of reproduction and have morphological abnormalities. Another group of IGR's are the chitin synthesis inhibitors. The chitin synthesis inhibitors prevent the formation of a new exoskeleton as nymphs molt from one nymphal stage to the next. Consequently, the cockroaches die due to desiccation or cannibalism.

Fumigation is an older control technology that is commonly used for wood destroying organisms and is being adapted for cockroach control in free-standing restaurants. Fumigation is the only available technology that can kill all cockroaches and their eggs within four hours of treatment. Since fumigation is the release of a toxic gas that dissipates after confinement is removed, it is ideal for food handling establishments where there is concern that pesticide residues may contaminate food preparation and serving areas.

Cockroaches have not had sufficient time to evolve resistance to IGR's and fumigation since they are new technologies. Therefore, both control techniques are extremely effective where implemented in an integrated control program.

## NOVEL BAITS AND ROLE OF REPELLENTS FOR COCKROACH POPULATION MANAGEMENT

Richard S. Patterson, USDA, ARS, Insects Affecting Man & Animals Research Laboratory, 1600 SW 23rd Dr., Gainesville, FL 32604

Toxic baits have been available for control of cockroaches for many years; however, the development of new active and inactive ingredients have dramatically improved performance. New bait formulations containing hydramethylnon (Combat) have been introduced into over-the-counter pesticide markets. Hydramethylnon is a non-repellent stomach poison that kills by inhibition of mitochondrial metabolism. It is formulated in a bait similar to an oatmeal cookie that is placed within a childproof plastic bait tray. Cockroaches can enter the device to consume the toxic bait; the openings are too small for children to contact the bait. Studies have demonstrated greater than 95% control of German cockroaches in heavily infested apartments for more than six months after one treatment.

Repellents are being developed to alter the normal movements of cockroaches to obtain food or water, and to protect sophisticated electronic equipment. Three new chemical groups of repellents are being patented by the USDA and exclusive license will be sold to the chemical industry. No effective repellent has ever been previously developed for cockroaches. When applied to surfaces, repellents can provide up to 3-4 months of effective control. Proposed locations of treatment would be soft drink vending machines, computers, food packages, and syrup cases. Such applications would reduce the spread of cockroaches from infested to noninfested premises.

# HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP)

## THE HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP) CONCEPT

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The hazard analysis critical control point (HACCP) system is a series of actions that should be taken for all processed/prepared foods. The HACCP system is illustrated below:

Determine Hazards and Assess Their Severity and Risks
Identify Critical Control Point(s)
Institute Control Measures
&
Establish Criteria to Ensure Control
Monitor Critical Control Point(s)
Take Action Whenever Monitoring
Results Indicate Criteria Are Not Met
(Verification that the System Is
Functioning as Planned)

The HACCP system is rational because it is based on historical data on the causes of illness and spoilage. It is comprehensive because it deals with ingredients, process and subsequent use of products. It is continuous because problems are detected when they occur and action is taken then to correct them. It is systematic because it is a thorough plan which covers step-by-step operations and procedures. The HACCP is the best means yet devised to ensure safety of food processing and preparation operations.

## HACCP SYSTEMS FOR RETAIL AND RESTAURANT OPERATIONS

Frank L. Bryan, Food Safety Consultation and Training, 2022 LaVista Circle, Tucker, GA 30084

There are many hazardous operations that are associated with the preparation of foods in food markets and foodservice establishments. These hazards have been repeatedly documented as major contributing factors during investigation of outbreaks of foodborne disease. Risks vary depending on (a) the food source, (b) methods used to prepare foods, (c) duration and conditions of storage and display, and (d) the interval between heating and consumption. Although many different foods are prepared in these operations, they can be classified into categories on the basis of foodservice systems and certain critical control points tend to apply for each system. For example, cooking is a critical control point of Cook/Serve Systems, hot holding as well as cooking is a critical control point for Cook/Hold Hot Systems, chilling is a critical control point for Cook/Chill and Cook/Freeze Systems, and obtaining foods from safe sources and reheating, if applicable, are critical control points for Assemble/Serve Systems. The HACCP system provides several magnitudes of food safety assurance over that offered by traditional inspections for food market and foodservice operations.

# SEAFOOD SANITATION

## VIBRIOS IN SHELLFISH

Gary E. Rodrick, University of Florida, Food Science & Human Nutrition Dept., FSB 449, Gainesville, FL 32611

Product quality and safety for raw shellfish destined for direct consumption remains a paramount issue throughout the entire shellfish industry. Despite extensive regulations for the harvest environment and proc-

essing aspects of shellfish production, significant foodborne outbreaks involving Vibrios continue to attract regulatory and public attention. Causes are debated, yet appear to arise from a combination of persistent problems unique to the organism, their environment, particular at risk consumers and the regulatory burden. Most of these issues have and are continuing to be addressed, with recent focus on the utility of indicator organisms to direct and approve natural harvests. These issues and research dealing with uptake, elimination, retention and depuration of Vibrios will be discussed.

## THE ROLE OF OXIDANTS IN PATHOGEN CONTROL IN SEAFOODS

Walter J. Blogoslawski, Natural Marine Fisheries Service, Northeast Fisheries Center, Milford Laboratory, 212 Rogers Ave., Milford, CT 06460

To ensure the safety of the public health, the water used in molluscan culture or holding facilities must be free of biological contaminants before contact with exposed shellfish. Thus, bacteria-free seawater is currently used in the following operations: (1) in hatcheries to protect sensitive larvae from exposure to potentially fatal pathogens; (2) in depuration stations, facilities where bacterially contaminated adult shellfish held in trays or ponds cleanse or depurate themselves by pumping clean seawater through their filter-feeding mechanisms.

This paper reviews briefly bacterial, and toxic diseases borne by adult shellfish that are transmissible to man and the diseases, especially of genus *Vibrio*, which adversely afflict shellfish larvae. Chlorine and ozone disinfection methods available to cleanse or depurate contaminated bivalves are also presented. Each method is evaluated with regard to (1) present and past use, (2) ability to prevent disease transmission, (3) chemistry of the oxidant in seawater.

## ROLE OF LACTIC ACID IN PATHOGEN CONTROL IN SEAFOODS

Dr. Jim Bacus, Diversitech, Inc. at Progress Center, One Progress Blvd, Box 28, Alachua, FL 32615

Natural lactic acid (L+) produced via fermentation has been used for centuries as an effective, natural food preservative. Many common foods such as cheeses, yogurt, pickles, olives, and dried sausages rely on controlled lactic acid production to achieve their characteristic flavor and texture, as well as their relative safety and stability. Additionally, lactic acid/lactate is a normal constituent of muscle tissues and is used routinely as a direct food ingredient.

Within the last several years, natural lactic acid has become more recognized as an effective antimicrobial treatment for fresh meat, poultry, and seafood products. In addition to an immediate decontamination effect, natural lactic acid also exhibits a "delayed" bacteriostatic effect during storage resulting in extended shelf-life.

Natural sodium lactate, the neutral sodium salt of lactic acid, also has gained recognition as an effective food ingredient to extend shelf-life and enhance flavor while not altering other product characteristics in most processed meat, poultry and seafood products. Natural sodium lactate is utilized in a wider range of product types where changes in product pH are not desirable.

The utilization of both lactic acid treatment and sodium lactate to control microbial contamination and growth in fresh and processed seafood will be discussed with specific emphasis on food pathogens.

## THE MODEL SEAFOOD SURVEILLANCE PROGRAM

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The Model Seafood Surveillance Program (MSSP) study was authorized by Congress in 1987 fiscal year budget to have NOAA design "a program of certification and surveillance to improve the inspection of fish and seafood consistent with the Hazard Analysis Critical Control Point system."

The National Marine Fisheries Service is proceeding with the study utilizing a three-pronged approach: product safety, plant hygiene, and economic fraud. The product safety issue will be addressed through a contract to the National Academy of Science. Plant hygiene and economic fraud issues will be addressed using the Hazard Analysis Critical Point (HACCP) concept during specific industry by industry workshops conducted in conjunction with National Fisheries Institute and other trade associations through Saltonstall/Kennedy grants. The final product which NOAA intends to deliver to Congress will be a surveillance system for seafood products which provides for reasonable consumer protection in the consumption of fishery products, and treats imported, domestic, and exported products equally.

A description of the background, approach, and progress to date, of the study will be given.


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# ☑CHECK FOR MORE INFORMATION ON THE IAMFES EXHIBITORS FROM THE 75TH IAMFES ANNUAL MEETING

The following is a list and description of all exhibitors at the IAMFES Meeting held in Tampa, Florida this past August.

Check each box for more information, tear out and mail today to:

IAMFES
Dept. SW
PO Box 701
Ames, IA 50010

Your request for more information will be sent to each company checked. Must be postmarked no later than December 15, 1988.

❑ GENE-TRAK SYSTEMS, Framingham, MA -- DNA probe diagnostics for rapid detection of food borne pathogens.

❑ NAMA (NAT'L AUTOMATIC MERCHANDISING ASSOCIATION), Chicago, IL -- Pictorial display of new food vending machines along with two novelty vendors for attendee use.

❑ EDUCATIONAL FOUNDATION OF THE NATIONAL RESTAURANT ASSOCIATION, Chicago, IL -- Applied Foodservice Sanitation Educational Materials.

❑ CAPITOL VIAL, INC., Fonda, NY -- Plastic vials and accessories.

❑ CONTROL ONE, INC., Greenwich, CT -- Electronic Monitoring Systems for Temperature, Humidity, and flow/pulse monitoring.

❑ GUARDIAN PROTECTION PRODUCTS INC. -- Modesto, CA -- Residual Anti-microbial products.

❑ MICHELSON LABORATORIES INC., Los Angeles, CA -- An independent testing laboratory specializing in food and environmental analyses.

❑ WEBB TECHNICAL GROUP INC., Raleigh, NC -- Complete and comprehensive analytical, consulting, and research and development services.

❑ DIFCO LABORATORIES, Detroit, MI -- Products for Microbiology.

❑ WALKER STAINLESS EQUIPMENT COMPANY, INC., New Lisbon, WI -- Aseptic literature, strainer, and other literature.

❑ OREGON DIGITAL SYSTEMS, Corvallis, OR -- Handheld computers and PC data base for environmental health inspectors.

❑ DR. R.H. ELLINGER & ASSOCIATES, LTD., Northbrook, IL -- Consulting services for Product Development, Quality Assurance, and Regulatory Compliance.

❑ OXOID USA INC., Columbia, MO -- Dehydrated Microbiological Culture Media, Laboratory Items, and Toxin Detection Kits.

❑ MOBAY CORPORATION SPECIALTY PRODUCTS, Kansas City, MO -- Insecticides for use in institutional and restaurant facilities.

❑ R. L. ROSS MARKETING/THIELMANN, Apollo Beach, FL -- Asceptic transport and processing containers.

❑ DTR COMPANY LTD., Modesto, CA -- Disposable temperature recorders, solid state temperature recorders, and electronic thermometers.

❑ MICROLIFE TECHNICS, Sarasota, FL -- Bacterial inoculant for wastewater treatment enhancement and improved greasetrap maintenance.

❑ KIRKEGAARD & PERRY LABS, Gaithersburg, MD -- Immunoassays and antibodies used to detect Salmonella, E. Coli 0157:H7, and Listeria.

❑ FOSS FOOD TECHNOLOGY CORP., Eden Prairie, MN -- Compositional analysis of milk and dairy products.

❑ J.T. EATON & COMPANY, INC., Twinsburg, OH -- Rodenticides, glue traps (roaches, rats, mice & flies), Pest catchers, and Bait stations.

❑ HACH COMPANY, Ames, IA -- Microbiological systems for analysis of water and foods.

❑ STRAHMAN VALVES, INC., Florham Park, NJ -- Washdown and clean-up equipment.

❑ REITMAN MANUFACTURING CO., Oakland, CA -- Anti-siphon float valve approved by USDA and FDA.

❑ NASCO, Fort Atkinson, WI -- Sterile Whirl-Pak sampling bags, and other sampling equipment.

❑ EDUCATIONAL TESTING SERVICE, Princeton, NJ -- Food Protection Certification Program - Test of knowledge to prevent foodborne illness.

❑ SPARTA BRUSH COMPANY, INC., Sparta, WI -- New Tri-Zone Color Coated Brush Program designed to control cross-contamination.

❑ WEBER SCIENTIFIC/NJDL, East Windsor, NJ -- Specializing in butterfat and bacteria count supplies to dairy laboratories.

❑ STRANCO, INC., Gradley, IL -- Strantrol pH, conductivity, chlorination, and dechlorination controllers.

❑ SAMPLETECH, DIV. OF AQUAFINE CORP., Valencia, CA -- SampleTech: a unique, fast, accurate in-line fluid sampling system from Aquafine.

❑ AQUAFINE CORPORATION, Valencia, CA -- Ultraviolet sterilization disinfection equipment for water and liquid sweeteners.

❑ 3M MICROBIOLOGY PRODUCTS, St. Paul, MN -- Tecra salmonella test kits and Petrifilm SH and VRB plates.

❑ THE SCHLUETER COMPANY, Janesville, WI -- Ultraviolet Purification Equipment and Sanitation Equipment.

❑ SUMMIT LABORATORY SUPPLY INC/DEIBEL LABS, Madison, WI -- Laboratory testing and consulting, sales of laboratory supplies and research-toxin products.

❑ CHARLES FELIX ASSOCIATES, Leesburg, VA -- Food Protection Educational Materials.

❑ KLENZADE, DIV. OF ECOLAB, INC., St. Paul, MN -- Sanitation products, systems, and services.

❑ SMITHKLINE ANIMAL HEALTH PRODUCTS, West Chester, PA -- PENZYME$^{R}$ and PENZYME$^{R}$ III Antibiotic Residue Screen Test for Milk. EQUATE$^{R}$ rapid detection test for salmonella in food.

❑ SWAGELOCK COMPANY, Solon, OH -- Tube fittings, valves, and fluid system components.

❑ ABC RESEARCH CORPORATION, Gainesville, FL -- Comprehensive chemical, microbiological and environmental analytical and consulting services.

❑ AMPCO PUMPS, Milwaukee, WI - Centrifugal pump used solely for pumping cleaning and/or sanitizing solutions.

❑ TIME PRODUCTS, INC., Atlanta, GA -- Detergents, Sanitation chemicals, and chemical feed systems for beverage and food processing industries.

❑ AGRITECH SYSTEMS, Portland, ME -- Diagnostics of Contaminants.

❑ MAAG AGROCHEMICALS, INC., Vero Beach, FL -- NYTEK$^{R}$ 645 - a ready-to-use penetrant sealer & fungus inhibitor.

❑ ORGANON TEKNIKA, Durham, NC -- Salmonella test systems, as well as New Listeria-Tek: detects Listeria with results within 48 hours.

❑ FRISTAM PUMPS INC., Middleton, WI -- Sanitary design centrifugal pumps.

❑ FUNKE DAIRY SUPPLIES INC., Cincinnati, OH -- Process filtration products.

❑ ENVIRONMENTAL TEST SYSTEMS INC., Elkhart, IN -- Dip and read test systems for the detection of microbials and sanitizers.

❑ BECTON DICKINSON MICROBIOLOGY SYSTEMS (BBL), Cockeysville, MD -- BBL$^{R}$ Dehydrated Culture Media: for a wide variety of testing applications in the processed food and dairy industries.

❑ CHICOPEE, Norcross, GA -- Industrial and institutional wiping products.

❑ FOOD PROCESSING MACHINERY & SUPPLY ASSOC., Alexandria, VA -- Inviting food and beverage processors, as well as scientists and academia to attend the 1989 International Exposition for Food Processors, Anaheim, CA, Jan 19-Feb 1.

❑ CONFERENCE FOR FOOD PROTECTION, Orlando, FL -- Promotion of this meeting being held Oct 15-19, 1988, Grosvenor Resort at Walt Disney World Village, Orlando, FL.

❑ SILLIKER LABORATORIES, Chicago Heights, IL -- Video used to train the food and dairy industries.

❑ ACCESS ANALYTICAL SYSTEMS, Brandford, CT -- Colilert® - Breakthrough in coliform testing.

❑ ADOPH COORS COMPANY, Golden, CO -- Package with a unique self-pressurizing system for dispensing flowable products.

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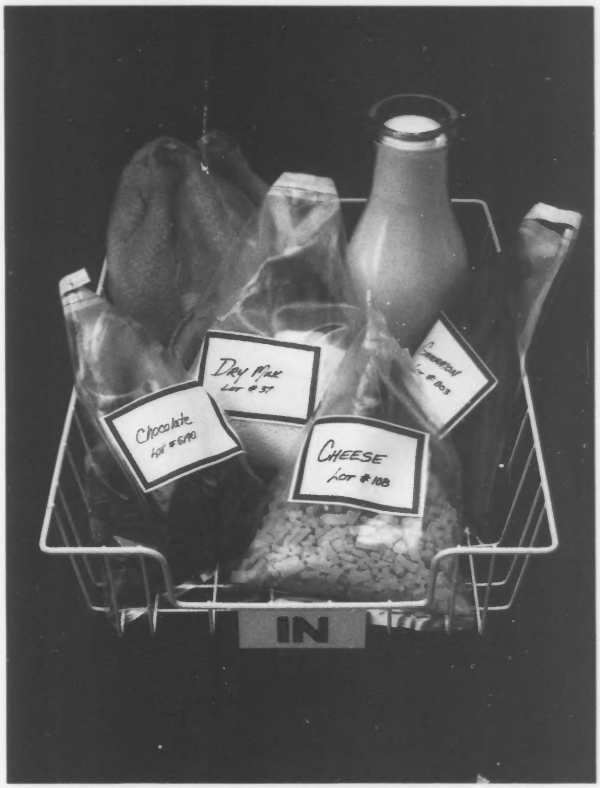


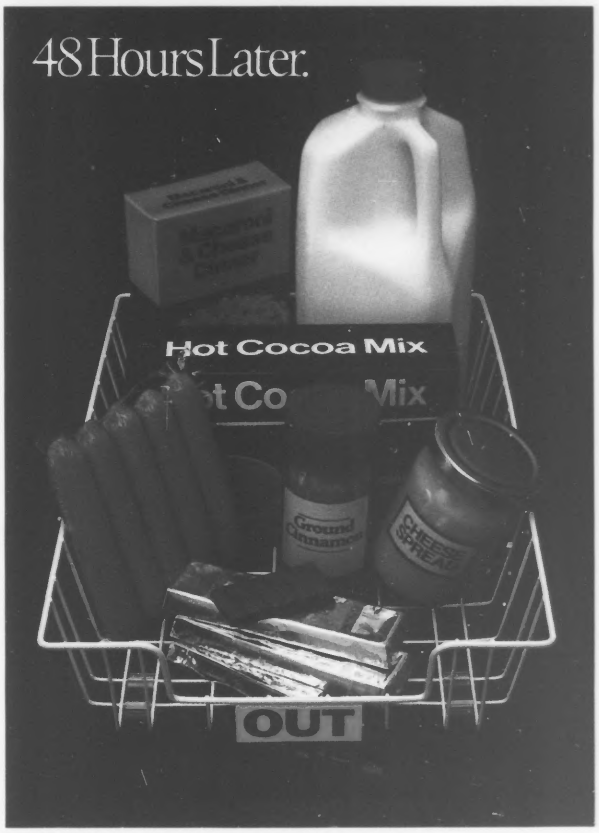


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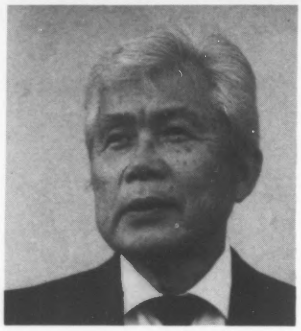
# Preventive Pest Control



*By George Okumura*

## Insect Infested Rodent Bait

**Q. Can rodent bait become infested with insects?**

A. Rodent bait can become infested with various species of stored food insects, such as: Red Flour Beetle, Confused Flour Beetle, Sawtoothed Grain Beetle, Cigarette Beetle, Drugstore Beetle, Warehouse Beetle, Indian Meal Moth and Almond Moth.

**Q. Are all baits susceptible - pellet, paraffin and loose baits?**

A. All have been known to become infested when baits are not inspected periodically and when old baits are not disposed. In Hawaii, the baits are placed in paraffin because of high humidity. One of the major pests that infests this bait is the Almond Moth.

**Q. Are there other insects that are attracted to the baits?**

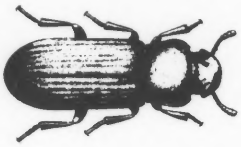
A. When the baits become wet from the hose water, during the general clean-up, after a period of time the loose baits ferment and attract many secondary pests, such as Hairy Fungus Beetle, Foreign Grain Beetle and Dried Fruit Beetle. Outdoor baits may become wet by the rain. The outdoor wet baits are more frequently infested than the indoor.

**Q. Have there been occasions where any of the secondary pests you have mentioned have become a major problem?**

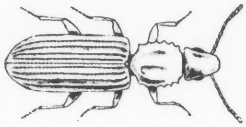
A. I had an experience where a pile of grain became wet by summer rain and when fermentation occurred, the food processing plant was almost shut down by an invasion of thousands of Hairy Fungus Beetles.

**Q. It appears that one of the good manufacturing practices is to keep the bait dry and make periodic inspections of the bait. Is this true?**

A. Yes. Be sure to examine the bait you buy. It may be already infested because of poor housekeeping and a long storage period by the vendors.

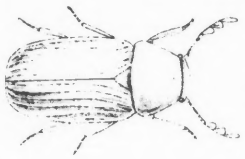


*Confused Flower Beetle*



*Sawtoothed Grain Beetle*

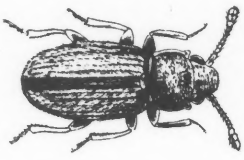
*Warehouse Beetle*



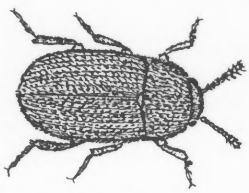
*Drugstore Beetle*

*Indian Meal Moth*

*Dried Fruit Beetle*



*Foreign Grain Beetle*



*Hairy Fungus Beetle*

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# Coming Events

**1988**

## NOVEMBER

• **3, Sanitation Workshop for the Food Industry,** Inn at the Park, Anaheim, CA. Presented by the University of California Cooperative Extension with assistance from industry trade associations and food industry personnel. Bacteriological concerns, environmental sampling, cleaning and sanitizing compounds, and regulations will be emphasized. For more information, contact: Kathryn Boor, Food Science and Technology, UCD, Davis, CA 95616 916/752-1478.

• **2-4, Gum Chemistry and Technology**, will be held in Chicago, Illinois. For more information, contact: AACC Short Course Program, 3340 Pilot Knob Rd., St. Paul, MN 55121, 612/454-7250.

• **1-3, Basic Pasteurization Course,** to be held at the Viscount-Travel Lodge, 1818 Southwest Freeway, Houston will be sponsored by the Texas Association of Milk, Food and Environmental Sanitarians. For more information, contact: Janie Park, TAMFES, PO Box 2363, Cedar Park, TX 78641-2363, 512/458-7281.

• **1-3, North Dakota Environmental Health Association, annual fall conference** to be held in Minot, North Dakota at the Holiday Inn. For more information contact: Peri Dura 701/224-2382.

• **14-18, Hazardous Waste Site Safety,** held at the University of Florida, Gainesville, FL. For more information, contact: Sharon Baker, Registrar or Michael DeLuz, Program Assistant, TREECO Center - University of Florida, 3900 SW 63rd Blvd., Gainesville, FL 32608, 904/392-9570.

• **16-18, Hazardous materials: Train-The-Trainer,** to be held at the University of Florida, Gainesville, FL. For more information, contact: Sharon Baker, Registrar or Michael DeLuz, Program Assistant, TREECO Center - University of Florida, 3900 SW 63rd Blvd., Gainesville, FL 32608 904/392-9570.

• **17, Food Microbiology Update,** to be held at the Holiday Inn Holidome, Sacramento, CA. Contact Kathryn J. Boor, Food Science & Technology, University of California, Davis, CA 95616, 916/752-1478.

• **21, Hazardous Waste Site Supervision**, to be held at the University of Florida, Gainesville, FL. For more information, contact: Sharon Baker, Registrar, or Michael DeLuz, Program Assistant, TREECO Center - University of Florida, 3900 SW 63rd Blvd., Gainesville, FL 32608, 904/392-9570.

• **28-December 1, National Milk Producers Federation Annual Meeting,** to be held at the Hilton, Anaheim, California. For more information, contact: James C. Barr, 1840 Wilson Blvd., Arlington, VA 22201, 703/243-6111.

• **30-December 1, Field and Laboratory Sampling of Food, Drugs, and Agricultural Commodities,** to be held in Arlington, Virginia. Course size is limited and on a "first come" basis. To register, first verify space availability by calling or writing AOAC Education Dept., 1111 N 19th St., Suite 210, Arlington, VA 22209, 703/302-3032.

## DECEMBER

• **5, Pesticide Applicator Certification Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831 916/421-8963.

• **5, Microbiology and Engineering of Sterilization Processes.** Given at the University of Minnesota, St. Paul, Minnesota Campus. This intensive lecture-problem course is for degreed scientists and technical managers involved in the research, development and manufacture of sterilized food, pharmaceutical products and medical devices. The course is designed to develop an understanding of both the microbiology and engineering of sterilization processes. For further information contact: Dr. William Schafer, Department of Food Science & Nutrition, 1334 Eckles Avenue, St. Paul, MN 55108, 612/623-4793.

• **6-7, Pests Associated With Food Industry and Environmental Sanitation Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831, 916/421-8963.

• **8-9, Advanced Course on Pest Recognition and Food Industry Problems,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831, 916/421-8963.

• **8-9, Starch: Structure, Properties and Food Uses,** sponsored by AACC to be held in Chicago, Illinois. Information can be obtained by contacting: AACC Short Course Program, 3340 Pilot Knob Rd., St. Paul, MN 55121, 612/454-7250.

**1989**

## JANUARY

• **23-27, Insect Fragment Seminar,** Okumura Biological Institute, Clarion Hotel, Sacramento, CA. Contact: George Okumura, 6669 14th St., Sacramento, CA 95831, 916/421-8963.

## FEBRUARY

• **20-22, ABC Research 15th Annual Technical Seminar,** Hilton Hotel, Gainesville, FL 32608. For additional information, contact: Sara Jo Atwell, 904/372-0436.

## MARCH

• **29-30, The Center for Dairy Research at the University of Wisconsin-Madison will be holding its annual Cheese Research and Technology Conference** at the Holiday Inn East, Madison, WI. For more information, contact: Sarah Quinones 608/262-2217.

## JUNE

• **13-15, Hazardous Materials Management International Conference and Exhibition '89** will be held at the Atlantic City Convention Center, Atlantic City, New Jersey. For additional information, contact: Mary Jo McGuire, Group Show Director, Tower Conference Management Co., 800 Roosevent Rd., Bldg E -- Suite 408, Glen Ellyn, IL 60137-5835, 312/469-3373.

## SEPTEMBER

• **27-29, Liquitec Expo '89.** For more information contact: Carolyn Mesce, Marketing Manager, Liquitec Expo Inc., PO Box 630, West Paterson, New Jersey 07424, 201/256-0011.

**1990**

## DECEMBER

• **12-18, American Society of Agricultural Engineers will be sponsoring the International Symposium on Agricultural and Food Processing Wastes.** For more information contact: Jon Hiler, American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MO 49085, 616/429-0300.

# IAMFES

International Association of Milk, Food and Environmental Sanitarians, Inc.

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And the bug came
and infected the cow
that father bought
for two zuzim.
ONE COW, ONE COW.

And the tetracycline came
and killed the bug
that infected the cow
that my father bought
for two zuzim.

And the child came
and drank the milk
that contained the tet'
that killed the bug
that infected the cow
that my father bought
for two zuzim.

And the test was needed
to save the child
that drank the milk
that contained the tet'
that killed the bug
that infected the cow
that my father bought
for two zuzim.

And Stanley came
and invented the test
that saved the child
that drank the milk
that contained the tet'
that killed the bug
that infected the cow
that my father bought
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