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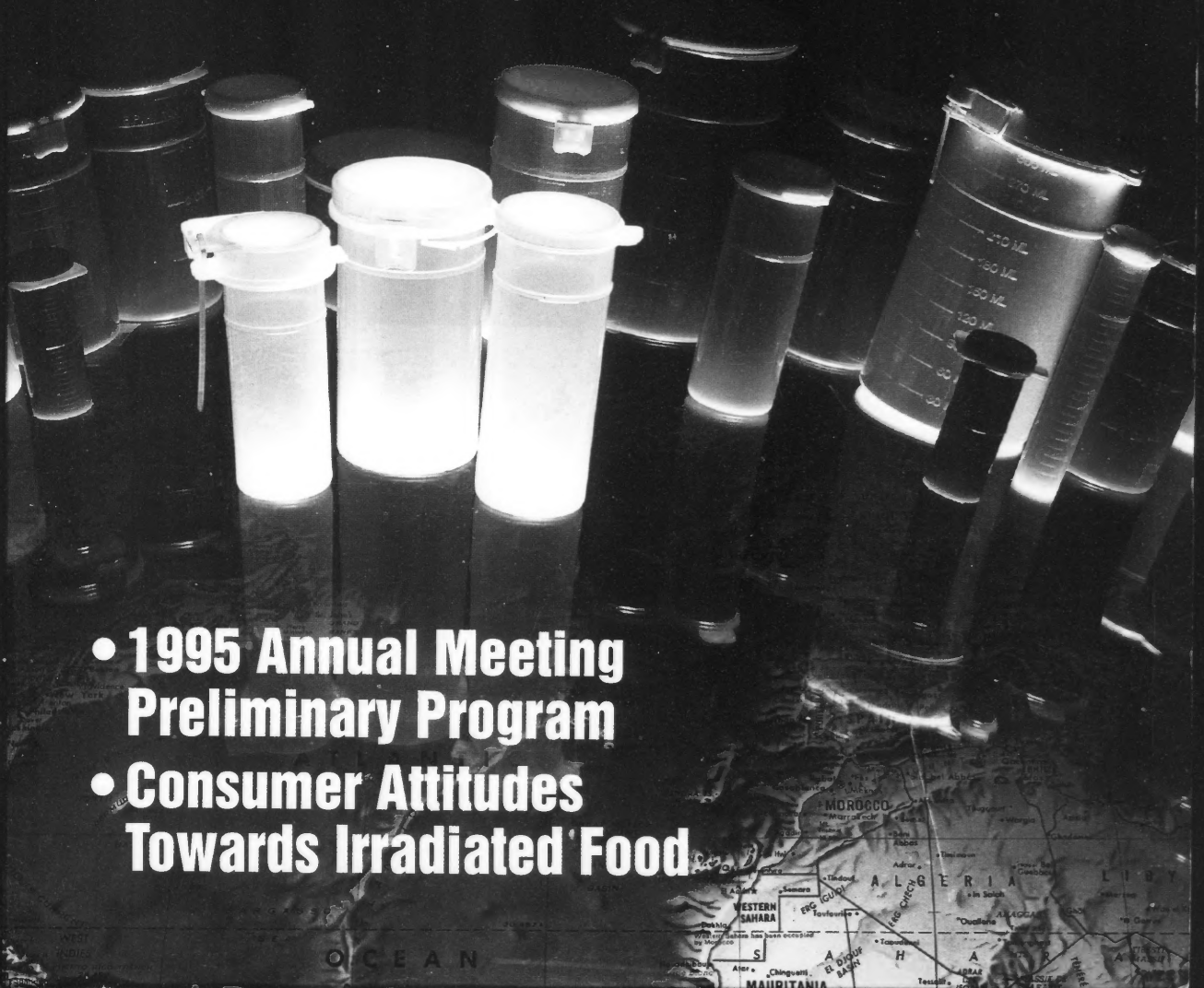
DAIRY, FOOD AND ENVIRONMENTAL

# Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.

APRIL 1995




- 1995 Annual Meeting Preliminary Program
- Consumer Attitudes Towards Irradiated Food

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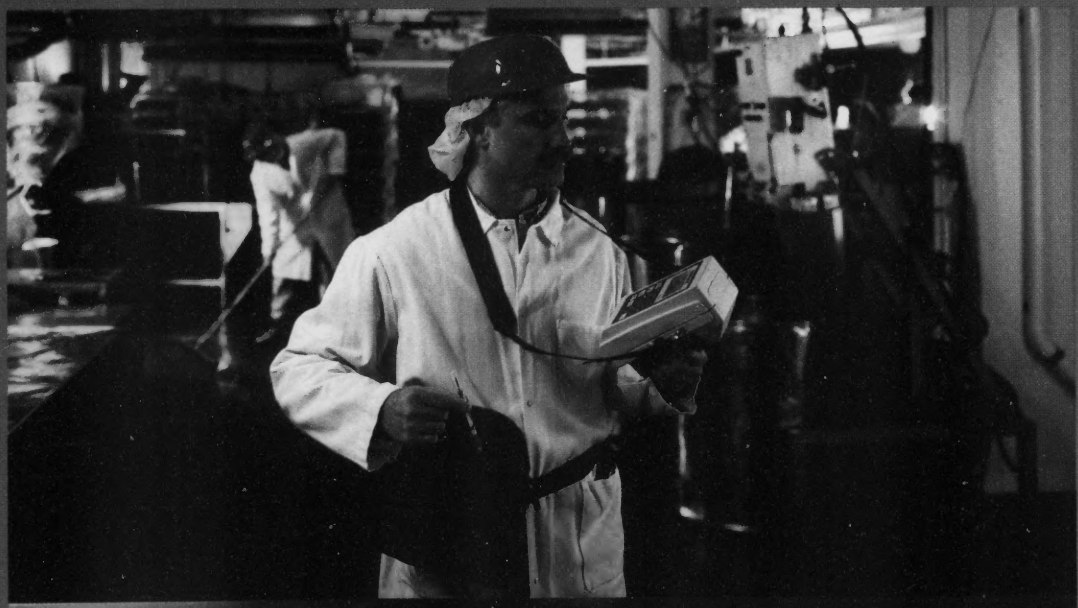

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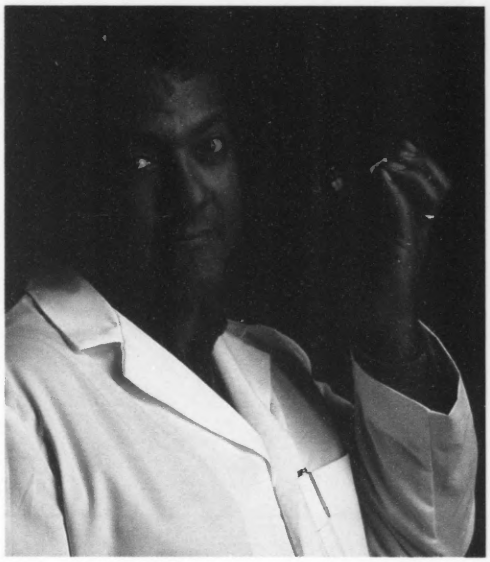

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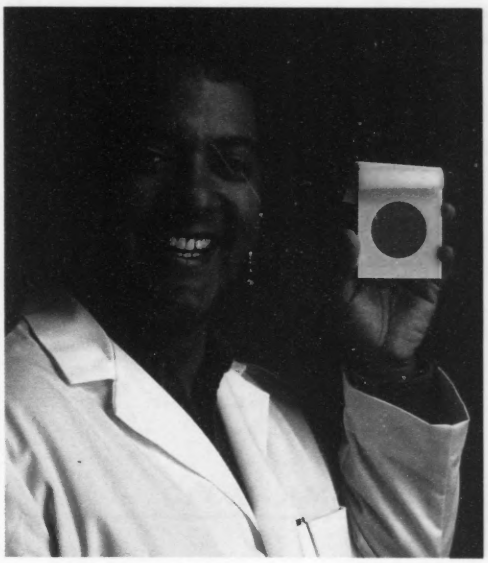

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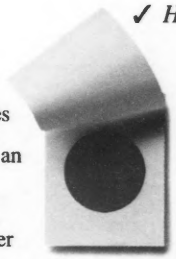

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DAIRY, FOOD AND ENVIRONMENTAL
# Sanitation
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## ARTICLES



## ASSOCIATION NEWS



## DEPARTMENTS



**Editor's Note:**
We have chosen to reprint Dr. Christine Bruhn's article from the *Journal of Food Protection*, February 1995 issue because we feel the information it provides would be beneficial to our DFES readers.

## EXTRAS

The International Association of Milk, Food and Environmental Sanitarians

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DAIRY, FOOD AND ENVIRONMENTAL

# Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.

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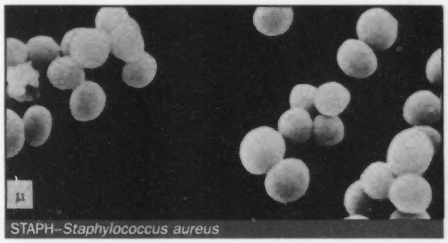
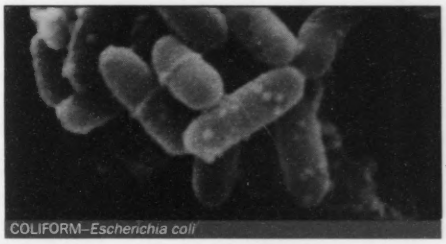
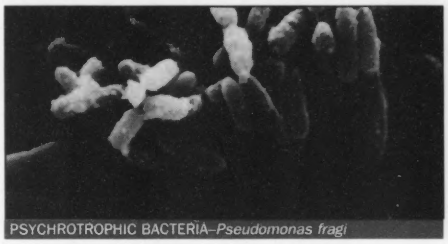


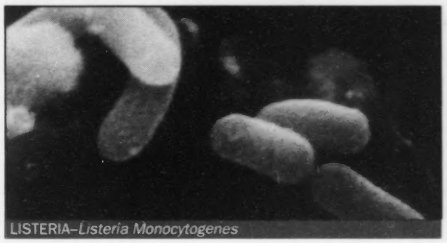
STAPH–*Staphylococcus aureus*



COLIFORM–*Escherichia coli*



PSYCHROTROPHIC BACTERIA–*Pseudomonas fragi*



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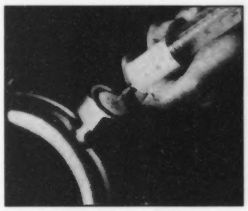

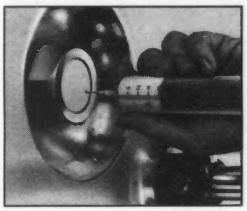

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DAIRY, FOOD AND ENVIRONMENTAL

# Sanitation



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# THOUGHTS

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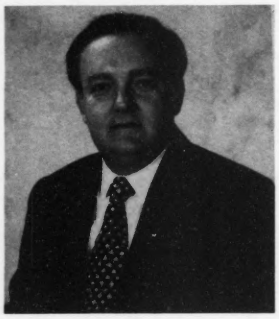

By C. DEE CLINGMAN,
IAMFES President

# "Eat, drink, and be wary"

The past 36 months or so haven't been kind to those of us in food safety. With people becoming ill and dying from the food they eat in a casual environment, it makes society wonder what do all of us do each day to protect the susceptible? During this period we have had children die and others become ill from eating hamburgers in restaurants' and the proverbial favorite, ice cream, was contaminated with another illness producing organism.

Are these food-borne illnesses a nuance or are they a deeper seated issue of lack of adequate controls? Or adequate prevention personnel? Or adequate financial resources toward prevention? Or all of these perhaps? Have we as food safety "experts" lost our sense of priorities? Perhaps, being more concerned about the administrative part of our jobs than prevention? Have we adapted our food safety prevention programs and ourselves, through training, on **today's** food supply and distribution systems? Twenty years ago a restaurant received deliveries of fresh bread, meat, dairy products, etc., on a daily basis. Today we want one delivery of everything every two weeks. That same restaurant 20 years ago made most of their menu items from scratch each day; today processors and suppliers are providing the restaurant industry with "value added" menu items. Food safety controls are now more critical further back in the food processing line. Are we controlling these food processors and distribution systems adequately? I know not!

Recently, I watched the movie *Outbreak* at the theater. It was a powerful movie that made me wonder if those of us in the food safety arena are ready (educationally and emotionally) to address a similar fast spreading illness. What if the AIDS virus mutated, as what occurred in the movie with another virus, and AIDS was now transmittable through food! Do we even have the necessary systems in place to stop or control such an event of widespread food transmitted infection?

The movie *Outbreak* brought out another more emotional issue to the surface. If there was a massive outbreak of illness through food are we ready through scientific knowledge to recommend an entire town of residents be destroyed even those showing no signs of illness to stop the disease? How about destroying the food or water supply as we know it today? If the deadly virus was transmitted through beef, for example, could we destroy all the cattle and dairy herds in the world?

We can never really tell how we will perform under pressure. There are far too many variables. But we can help ourselves along by staying technically competent and resourceful. Being resourceful is knowing where to get information if you don't have it at hand. The IAMFES Annual Meeting meets both of these objectives. The latest technical information is available through symposia and workshops. Networking with professional colleagues is the best way to get to know where information can be obtained in the future. This year's IAMFES Annual Meeting in Pittsburgh, Pennsylvania will be an outstanding way to ready yourself for the crisis of tomorrow. You can't fail to avail yourself of new food safety technology. I **will** see you in Pittsburgh – won't I?

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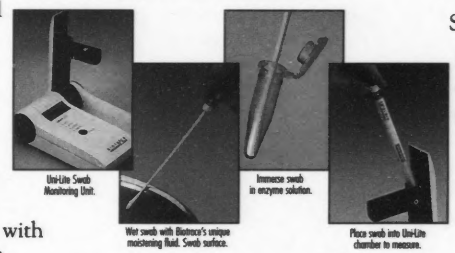


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# On My MIND...

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## "Food borne? Food-borne? Foodborne?"

**Food borne? Food-borne? Foodborne?** Is one right and the other two wrong? The answer to that question is not as clear as you might think.

One spelling is definitely wrong. According to Webster's Ninth New Collegiate Dictionary, FOODBORNE is not a word. That leaves the other two. Surprise – they are both right – sometimes. It depends on how they are used.

Both are adjectives, which are combinations of a noun (food) and a verb (borne, which is a past participle of the verb bear). According to the Chicago Manual of Style, adjective com-binations of this sort have a hyphen between them when they precede a noun. Thus we would write: "A food-borne disease requires investigation."

But, when the order of the sentence is noun, verb, adjective; no hyphen is required. Thus, we would write: "The disease is food borne."

To further complicate things, as a matter of style, a publication may choose to use one form over another. We choose to use the hyphenated form. We choose to use FOOD-BORNE. We will do our best to be consistent in our selection.

And, don't forget, useage changes over time. Remember when your mother used to say "Ain't ain't in the dictionary?" Well, it is now!

In case you haven't had enough of this, how do you spell waterborne? Or shelf-life? Hmmm...

**Pittsburgh.** I wrote last month about Pittsburgh and how it is so different from its image. Maybe I'm just sensitive, but I seem to be seeing pictures and stories about Pittsburgh everywhere I look. The movie "Milk Money" was set in Pittsburgh, but you saw very little of the city. There was a great shot from the top of Mount Washington as the boys entered the city for the first time, but that was about all.

The April Issue of *Runners World* magazine featured Pittsburgh in the column "On the Road." It, too, had some great photographs of the city.

The new TV show "Hope and Gloria" is set in Pittsburgh. The installment I saw had a number of great shots of Pittsburgh. In fact there was one night shot that was so pretty that I wished I had been able to capture it for later use. Without sounding like an endorsement for the show, I do think you should tune in at least once to see Pittsburgh as it is today.

**Taxes.** I signed off on IAMFES' federal and state income tax forms today. (Just because we are tax exempt, doesn't mean that we don't have to file!) That got me to thinking about a little bit of information which you may not know. IAMFES is a charitable organization and as such, your gift to us is federal (and maybe state) tax deductible. We are in the habit of sending receipts to all contributors, so if you'd like to do something nice for your association that is tax deductible, send us a contribution. It is a little late to be able to include this deduction on your 1994 return, but it will sure be there for the 1995 version. Make your gift payable to IAMFES but be sure to indicate that it is a gift so we will know to send you a receipt.

**E-mail.** We have had an internal e-mail system for several months. I may be old and slow in my ways, but I must admit that I like it. I can e-mail to anyone in the office (or everyone at once) and know not only that they got the message, but that they did or did not read it. It's great.

At our last Annual Meeting, I asked several people if they thought IAMFES should get on an e-mail network. Everyone told me that they weren't on the network at the time and they saw no need for us to do it. Here we are just eight months later and these same people are calling asking us for our e-mail address.

We could use it to send and receive mail; journal manuscripts; news releases; advertising; and all kinds of things. At the same time, we would be that much more accessible to our members. I'm sure it is something we will be installing in the near future, so keep your eyes open for yet another way to communicate with us.

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## THE QUEST FOR QUALITY

# *Similar* BUT *Different*

## An American Perspective

**Bill LaGrange,** extension food scientist at Iowa State University, looks at similarities and differences within the Australian and the United States Dairy industries, including the quality area.

The Australian reputation for marketing high quality dairy foods was confirmed for me in June as I visited several dairy processing plants and sampled the large variety of excellent flavored products during a three-week tour of Australia.

I soon learned that there were great similarities between our two countries' dairy industry, with very few differences. One example relates to quality assurance and HACCP (Hazard Analysis Critical Control Point) programs.

In the U.S., HACCP is just now beginning to be recognized as an important food safety assurance program within the dairy foods industry, even though the HACCP concept was born more than 30 years ago as a program to assure safe food for astronauts.

Many of the U.S. food giants have implemented HACCP. Most medium to small volume plants are aware of HACCP and know they should develop and implement a HACCP program but few seem motivated to do so without a nudge from the government or a customer.

That nudge will soon be coming in the form of federal legislation in the U.S. Implementation may be a few years off as the wheels of government can move slowly.

Although I was invited to lecture about HACCP and its merits, I quickly learned that many Australian dairy plants have a HACCP program in place.

The difference I observed is that in the U.S. we emphasize food safety with HACCP. Though food safety is the basis of a HACCP program in Australia, quality is also an important part of the program.

ISO 9000, the international quality certification program, is just starting to get attention in the U.S. but few dairy processors are involved as yet. In Australia many processors have been certified or are (or will be) attempting to get certification.

No doubt your (Australia's) greater interest in, and reliance on, foreign markets has been a big influence in embracing this certification program.

No doubt the U.S. attitude will change with the international marketing agreements being formulated and U.S. companies looking toward export markets.

### Farm Milk Production

There is a big difference in milk production per cow; in Australia the average is near 9,400 pounds a year and in the U.S. it is 15,554 pounds (in 1993).

In the U.S. the cows are fed grains and other supplements as well as grass and hay to obtain maximum milk production per cow.

Bovine somatotropin (BST) has been approved for use in the U.S. Some farmers report 10 to 20% increase in milk production per cow; others declare they will not use it.

Many have a 'wait-and-see' attitude. Some processors claim to not knowingly accept milk from cows treated with BST and are advertising accordingly.

Most dairy farmers have a herd breeding program that allows calving throughout the year so milk is available for the market 12 months of the year from all dairy farms.

This means that the processing plants, both market milk and manufacturing plants, operate 12 months of the year.

The spring and early summer flush of milk is not as dramatic in the U.S. as in Australia, so the U.S. dairy plants do not have to be geared for such big peaks.

In the U.S. we have two grades or classes of milk, much like Australia.

Market milk, which commands about U.S. $1 more per 100 pounds, is classified as Grade A. It must meet the quality standards of the Food and Drug Administration's Pasteurized Milk Ordinance.

Most U.S. dairy farms qualify to produce Grade A milk, which means that more that 95% of the milk produced in the U.S. is eligible for fluid products.

However, only about one third of this milk is used for fluid products.

The rest is used for manufactured products such as butter, skim milk powder and cheese.

Farmers are paid on the basis of 100 pounds of milk.

Premiums are added for low somatic cell counts, low bacterial counts, freedom from antibiotics and higher amounts of protein. These premiums have significantly boosted milk quality improvement efforts in the U.S. in recent years.

Quality standards in the U.S. for manufacturing milk are nearly as rigid as for Grade A market milk.

The USDA has established quality standards for this grade of milk through a model ordinance that the states incorporate into their rules and enforce via the state departments of agriculture.

The main difference between the two milk standards is that Grade A dairy farms are inspected twice a year and manufacturing grade farms are visited only once.

Also, the bacterial standards are a bit less rigid for manufacturing grade milk.

Premiums for quality attributes of manufacturing milk have paid off in quality improvement.

### Dairy Foods

The Australian dairy industry impressed me with its inventiveness in development and marketing a wide variety of products.

I was particularly impressed with the wide assortment of flavored milks.

I have long thought flavored milks, in addition to chocolate, should have been in our markets for years to compete with the many types of soft drinks available.

Since returning to the U.S., I have noticed in the trade magazines more information about and apparent interest in flavored milks.

Maybe our dairy industry is starting to get a bit innovative in this regard. One dairy in Iowa recently offered strawberry-flavored milk. "Hope springs eternal."

The same can be said about cultured products, with your country's wide variety of yogurts and cultured foods.

'Drinkable' and 'mix your own ingredients' products are just entering the market in the U.S.

Packaging of fluid milk is similar in Australia and the U.S., with both plastic cartons the mainstay. There are still some plants bottling milk in glass bottles in both countries and some milk in plastic pouches but these packages are not common.

Plastic bottles seem to be pulling away from paperboard cartons in volume in most markets.

Both have their advantages but my preference is paperboard because of the colorful and informative panels and because of the protection paperboard cartons afford from light damage to milk flavor and vitamin content.

### Packaging Sizes

Package sizes are a bit different between our countries.

In the U.S., the plastic gallon jug is 'king' and has been for many years. For my money this container is too cumbersome to handle but is, however, very popular with most milk drinkers.

Recently, one-half gallon plastic bottles began to make an appearance in the market. Your (Australia's) liter and newer two-liter plastic bottles seem like a handy size to manage.

The half gallon gable top is the major carton package in the U.S. with quarts, pints and half-pints in their smaller niche. These are roughly equivalent to your (Australia's) 300 and 600 milliliter carton and the one liter and new 1.5 liter cartons.

The U.S. dairies have reasonably good control over the products after they leave the plant because deliveries are made by company employees.

Our milk processors have achieved a 'use by' date of 14 days and are showing interest in extended shelf life processing and packaging of 30-60 days with refrigeration.

The 10-day 'use by' date for most Australian milk processors may be able to be extended once the vendor system passes into history with regulation.

One can argue against longer 'use by' dates because of the consumer's preference for 'freshness.'

The U.S. dairies have reasonably good control over the products after they leave the plant because deliveries are made by company employees.

These employees have been trained and received continued training in proper refrigerated care and rotation for the products in their trucks and in the stores.

Unless UHT and aseptic packaging are used, refrigeration throughout the life of the product is essential for obtaining maximum shelf life and product quality.

To date, UHT has not been a major item in the U.S. dairy industry. I noted that in Australia, UHT is frequently part of a plant's roster of products.

The export market provides a logical reason and outlet for such products.

UHT provides a nice way to treat milk with lactose so as to allow lactose-intolerant people to use milk. There is a potentially large market in areas of the world where milk production is minimal and where much of the population may be lactose intolerant.

The wide variety of Australian manufactured products seemed much like the lineup in the U.S. The several cheese varieties I had the opportunity to eat were all excellent in flavor quality.

The time I spent in Australia was a great opportunity for me to expand my knowledge about the dairy industry.

The three weeks in Australia helped me realize what a dynamic and exciting industry with which we are involved.

Great opportunities lie ahead for both our great industries.

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# Waterless (Towelette) Emergency Sanitation System for Food-Serving Utensils and Equipment

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## ABSTRACT

The feasibility and efficacy of a waterless sanitation system (WSS) for cleaning food service utensils and removing bacteria were demonstrated in the laboratory and tested in the field during U.S. Army training exercises with Mobile Kitchen Trailers (MKT). The WSS employed three wipes used in sequence: (1) a detergent/degreaser wipe; (2) a deionized water wipe to rinse the surface; (3) a quaternary ammonium disinfectant/sanitizer wipe. *Escherichia coli* and *Staphylococcus aureus* cells in biofilms produced on food-soiled, stainless steel surfaces were reduced by 99.999% to 100% at 5°C and 26°C by the WSS. The sanitizer dilution used reduced the numbers of planktonic cells of several food poisoning bacteria by more than 6 log units. In the field, all surfaces of food-serving utensils and equipment examined were monitored for bacterial contamination using Difco Hycheck contact slides. Coliform bacteria were assessed using Millipore swab test kits. Total bacteria, coliforms, and molds on all utensils and equipment cleaned and sanitized by the WSS were reduced far below the Public Health Service limit for food-contact surfaces. Utensils and equipment were cleaned easily and effectively by the WSS. A waterless food-service sanitation capability will give the MKT an emergency backup cleaning and sanitation system when either hot water or a potable water supply is unavailable. Army mobile field feeding systems have a need for a field sanitation system that cleans and degreases food cooking and serving utensils without water. Because water may not be readily available in all theaters and scenarios, a waterless (towelette) food service sanitation capability will give the Mobile Kitchen Trailer (MKT) unprecedented range and independence and reduce its reliance on water. The towelettes also will serve as a backup sanitation system when either hot water or a potable water supply is unavailable or is being conserved for drinking.

Commercially available wipes previously tested were not suitable because they required water or the ingredients could not be used on food-contact surfaces *(17)*. Although a premoistened disposable wipe was successfully used to improve the quality of raw milk by cleaning cow teats *(2)*, the ingredients were also not suitable for food contact surfaces. More than 100 commercial cleaning/degreasing agents were investigated by Army scientists but all failed to remove grease from pots and pans at low temperatures *(14)*. More recently, this laboratory demonstrated that pots and pans could be successfully cleaned, degreased, and sanitized in water at 15°C by hand scrubbing in a Vesta-Power (VP) detergent solution, (Calgon Corporation, Pittsburg, PA) *(11)*. The pots and pans pans were then rinsed in water at the same temperature and sanititized by immersing in an aqueous solution of Syn-Cide Plus, now called Process QDS, (Calgon Vestal Laboratory, St. Louis, MO), a quaternary ammonium disinfectant sanitizer. Aqueous solutions of VP and Syn-Cide Plus were also successfully employed at 20°C by soldiers during a field exercise *(11)*.

The objective of this study was to develop and test a waterless sanitation system (WSS) that is effective in cold water by employing a combination of premoistened, disposable wipes used in sequence and incorporating the VP detergent/degreaser, deionized water, and the Process QDS sanitizer.

## MATERIALS AND METHODS

### Detergent/Degreaser

Vesta-Power is a detergent degreaser. It is authorized by the U.S. Department of Agriculture (USDA) for use in federally inspected meat and poultry plants. A 5% aqueous solution, pH 11, was used to saturate the wipes. Sodium metasilicate is the active ingredient incorporated to emulsify fat and grease.

### Sanitizer

Process QDS (formerly Syn-cide Plus, Calgon Vestal Laboratory, (St. Louis, MO) is a blended quaternary ammonium compound (QAC) with organic tolerance. The active ingredi-

ents are alkyl ($C_{14}$, 50%; $C_{12}$, 40%; $C_{16}$, 10%); dimethylbenzylammonium chloride, 3%; octyldecyldime-thylammonium chloride, 2.250%; didecyldimethylammonium chloride, 1.125%; and dioctyldimethylammoniumchloride, 1.125%. Process QDS was used to saturate the wipes at the recommended dilution of 1 fluid ounce in 4 gallons of water (1.92 ml/l). The concentration of active QAC was 150 ppm. No potable rinse is required. Process QDS is authorized by the USDA for use in Federally inspected meat and poultry plants.

### Preparation of Sanitation Wipes (Towelettes)

Three wipes were prepared with commercially available towelettes (see table 5). Wipe #1 was soaked to saturation with 5% VP detergent/degreaser. Wipe #2 was saturated with deionized water to rinse the surface of VP detergent. Wipe #3 was saturated with Process QDS quaternary ammonium sanitizer at the recommended dilution to obtain 150 ppm of the active QAC. Excess liquid was removed by allowing the towels to dry on a line at equilibrating temperatures of 5°C and 26°C, only to the point when they no longer dripped. The wipes were used immediately.

### Test Bacteria

Test bacteria included *Bacillus cereus*, Natick B6Ac; *Escherichia coli*, ATCC 11229 *(1)*; *Klebsiella terrigena*, ATCC 33257; *Listeria monocytogenes*, Natick N2-1; *Pseudomonas aeruginosa*, Natick QM-3-1517; *Staphylococcus aureus*, ATCC 6538 *(1)*; *Streptococcus faecalis*, ATCC 19433; and *Salmonella typhimurium*, ATCC 14028.

### Soiling Surfaces with Spoiled Foods

Cleaned stainless steel frying pans were sterilized by flooding the surface with 100% ethyl alcohol and flaming three times until the alcohol was completely burned off. A mixed inoculum was prepared by mixing equal volumes of *E. coli* and *S. aureus* cultures. Then one ml of the mixed inoculum was blended with 100 grams of the food sample by stomaching for one minute (22) to achieve approximately 10,000 bacteria per gram. The frying pans (12"×12") were soiled by spreading 100 g of the inoculated food over the bottom, inside surface of the pan. Pork chow mein was also inoculated with single cultures of *E. coli* and *S. aureus*. Soiled pans were incubated at 35°C for 24 hours to produce a biofilm. After gross residues of the spoiled food were removed from the pan by scraping and/or wiping with a dry paper towel, the surface was air dried at 5°C or at 26°C, for 1 to 3 h. When tests were conducted in skim milk inoculated with *E. coli*, 500 ml were added to the pans. The spoiled skim milk was poured off and the surface of the pan was dried only at 26°C. Bacteria were recovered from the pan by swabbing the surface (13,21). Total plate counts of the food before and after spoilage were conducted in plate count agar (PCA, Difco).

The bacteria inoculated into the foods were grown in trypticase soy broth (Difco, Detroit, MI) at 35°C for 22 to 24 h. Dilutions were made in Butterfields phosphate butter (22) and the inoculum of each culture was adjusted turbidimetrically (Ratio/XR Turbidimeter, Model 43900, Hach Company, P.O.Box 389, Loveland, Colorado).

### Cleaning and Sanitizing Surfaces

Gross food residues were first removed from the pans by scraping or wiping with a dry towel. The soiled surface was air dried at 5°C or 26°C, for 1 to 3 h and then cleaned with wipe #1 moistened with VP detergent until the surface appeared clean and greaseless. Residual detergent was removed by wiping the surface with wipe #2 moistened with deionized water. The surface was then sanitized by wiping for 1 min (wet contact time) with wipe #3 moistened with Process QDS sanitizer. All towelettes were equilibrated to the appropriate test temperature (5°C and 26°C) before application.

## ENUMERATION METHODS

### Inoculated and spoiled foods

Standard aerobic plate counts *(22)* in PCA were performed on foods used to soil the surfaces before and after the foods were deliberately spoiled. Differential counts were conducted on Baird-Parker agar (Difco) for recovery of *S. aureus (22)*, and on violet red bile agar (VRBA; Difco) for recovery of *E. coli (22)*. All plates were incubated at 35°C for 48 h.

### Swab Counts of Biofilms on Frying-Pans

Bacteria remaining on 40 $in^2$ of frying-pan surfaces preceding and following the application of each sanitation wipe (towelette) were determined by swabbing five, 8-square-inch areas with a single swab *(21)*. The swabs were deposited into buffer containing neutralizing agents (Swab Buffer Sets, Millipore Corporation, Bedford, MA) to counteract the adverse affect of any residual quaternary ammonium compounds that may have been present on surfaces after sanitation. After manually shaking the swab in the neutralizing buffer for 2 min, appropriate dilutions were made in Butterfields phosphate buffer *(22)*. One ml of each dilution was plated in duplicate and poured with PCA. Differential counts of injured as well as noninjured *S. aureus* cells, were made by spreading 1 ml of each dilution over 3 Baird-Parker agar (Difco) plates. Injured and noninjured *E. coli* were recovered on trypticase soy agar (TSA, Difco), incubated for 2 h at 35°C and then overlaid with VRBA. All plates were incubated at 35°C for 48 h *(22)*.

### Determining Efficacy of Sanitizers

**A. Planktonic cells.** Reagents, preparation of stock culture and operating technique were according to Association of Official Analytical Chemists (AOAC) Official Methods of Analysis, section 960.09, 1990 *(1)*. All cultures were activated by three daily transfers on nutrient agar (Difco). One milliliter of a turbidimetrically standardized phosphate buffer suspension of planktonic cells ($1 \times 10^{10}$/ml) was exposed to 99 ml Process QDS and Mandate (Klenzade, Division of Ecolab Incorporated, St. Paul, MN) sanitizers for 30 s *(1, 3)*. At the

end of the time period one milliliter of the cell suspension was immediately transferred to 9 ml (1:10 dilution) of neutralizing buffers to inactivate the sanitizers. Dilutions were also made in neutralizing buffers (Difco) and plate counts were made in D/E neutralizing agar (Difco) and PCA pour plates. A numbers control in which cells were not exposed to the sanitizers was also employed *(1)*.

**B. Biofilm bacteria on stainless steel chips.** *Staphylococcus aureus* was grown and cell suspensions were prepared as were the planktonic cells, above. However, the final dilution of the standardized cell suspension was made in 10% skim milk (Difco) to obtain $1 \times 10^8$ CFU's/ml for inoculation onto stainless steel chips (2 × 7/8 in). Five chips were inoculated with $10^6$ cells by evenly spreading 0.01 ml of the milk suspension on them with a calibrated loop. All chips were dried at room temperature for one hour. Three chips were immersed in 99 ml of the recommended dilution of the sanitizer (150 ppm QAC) and two chips were used as unexposed number controls. Biofilm cells on three stainless steel chips were exposed to the sanitizers for 10 min *(1,3)*. *Staphylococcus aureus* was recovered by swabbing the entire surface of the chip *(21)*. Swabs were deposited in the same neutralizing buffers used for planktonic cells. Dilutions were also made in the neutralizing buffers. Plate counts were made on D/E neutralizing agar and PCA pour plates. The unexposed number controls were diluted and plated in exactly the same manner.

### Stainless Steel Chips

Stainless steel chips (2 × 7/8 in) were fabricated from #304 steel. The chips were autoclaved in Alconox detergent, sonicated, brushed, rinsed in tap water, soaked in acetone, soaked in boiling distilled water, rinsed three times in tap water, rinsed 3 times in deionized water, soaked in absolute ethyl alcohol, and air dried. The chips were sterilized by autoclaving for 30 min at 121°C.

### Inactivation of Sanitizers

To avoid bacteriostatic or bactericidal conditions in growth media, the QAC in Process QDS, in which planktonic cells were suspended, was inactivated by transferring 1 ml of the treated cell suspension to 9 ml of neutralizing buffer (Difco). Mandate, a fatty acid sanitizer (22.5% phosphoric acid, 20.0% citric acid, 6.0% octanoic acid, and 2.0% decanoic acid) was neutralized in Sorensons buffer (4). Residual sanitizers on swabs used to recover biofilm bacteria from stainless steel chips were likewise inactivated. Dilutions were also made in neutralizing buffer (Difco) and plate counts were made in D/E neutralizing agar (Difco) and PCA (Difco). In the field, residual sanitizers on surfaces of food serving utensils and equipment sampled were inactivated by the D/E neutralizing agar in the Hycheck contact slides (Difco) used to quantitate total bacteria. Millipore swab buffer sets (to inactivate QAC's or chlorine) and coli count water testers were used in the field to recover coliforms on food serving utensils.

### Assessing the Microbiological Contamination on Food Contact Surfaces in the Field

All surfaces of food-serving utensils and equipment examined in the field were monitored for bacterial contamination by using Hycheck contact slides containing D/E neutralizing agar on both sides. Coliform bacteria were assessed by using Millipore swab test kits *(13)*.

### Determination of Concentration of Quarternary Ammonium Compound (QAC)

**A. Bromophenol blue method.** The concentration of QAC in Process QDS (Syncide Plus) was determined by a bromophenol blue method *(1, 10)*: 25 ml of chloroform, 25 ml salt buffer solution (7 g sodium carbonate, 100 g sodium sulfate and 1000 ml distilled water, pH 10), and three drops of 0.1% bromophenol blue indicator to 50 ml of sample in a 250 ml flask. The flask was stoppered and shaken vigorously. The mixture was titrated with 0.003 N sodium lauryl sulfate (SLS) dropwise. The endpoint was the first definite appearance of a violet color in the upper layer when viewed under direct light. The concentration of QAC was calculated by the following formula *(10)*:

$$\text{QAC ppm} = \frac{\text{SLS ml} \times \text{N} \times \text{MW} \times 10^3}{\text{ml of sample}}$$

**B. QT-30 test paper.** The test kit is available through customer service, Calgon Vestal Laboratories, St. Louis, MO 63166.

## RESULTS

Table 1 shows the efficacy of the three wipes (WSS), applied in sequence, on the reduction of bacteria in biofilms produced in food on stainless steel surfaces of an electric frying pan. The bacteria grew in the foods and milk to more than $10^9$ colony forming units (CFU's)/gram or ml respectively. The wipes (WSS) were effective in cleaning and sanitizing the pan at both 5°C and 26°C. After application of all 3 wipes, bacterial reduction was slightly greater at 26°C, where it exceeded the required 5 logs (99.999%) in all trials. At 5°C the bacterial reduction was slightly less than 5 logs in biofilms produced in beef stew and corn beef hash in which reductions were 99.98% and 99.99%, respectively. However the average reduction at 5°C was approximately 5 logs. The percent reduction was determined by comparing counts obtained before and after application of the WSS wipes. The effectiveness of wipe #1 (VP detergent/degreaser) followed by the water rinse in wipe #2 in cleaning the surfaces undoubtedly contributed to the successful reductions by the sanitizing wipe #3.

Table 2 shows the efficacy of the WSS on naturally soiled surfaces in a bakery and military kitchen. Surfaces were swabbed with Millipore buffer sets and aerobic plate counts were made in PCA pour plates. Bacterial reduction on stainless steel counter-tops was greater than on wood countertops. As expected, the wood surface was more difficult to clean and sanitize than stainless steel, because of cracks and crevices and the porous nature of wood. How-

ever, the wiping regimen effectively reduced indigenous counts on the wood surface by more than 96% after the final application of Process QDS. Indigenous counts on stainless steel were reduced by 98 to 100%.

The sanitizing action of Process QDS was tested against planktonic cells of four gram-negative bacteria and four gram-positive bacteria including a spore former (*B. cereus*) and was compared to a fatty acid sanitizer called Mandate. Results are shown in Table 3. To meet effectiveness standards, (99.999%) (5-log units) reduction in count must be achieved within 30 s *(1)*. Process QDS sanitizer achieved greater than a 6 log units (99.9999%) reduction of all 8 bacterial species within 30 s, except the sporeforming *B. cereus*. Mandate sanitizer was less effective than Process QDS against *K. terrigena* and *S. typhimurium*. Although Mandate met the standard for effectiveness (5 log reduction) for *K. terrigena*, it did not achieve the required reduction of *S. typhimurium*.

Table 4 shows the sanitizing effect of Process QDS and Mandate sanitizers on the reduction of biofilm cells of *S. aureus* on stainless steel chips. Process QDS sanitizer reduced *S. aureus* by 99.999% and was more bactericidal than Mandate which only achieved a 98.31% reduction.

Trials with *E. coli* were unsuccessful on stainless steel chips because *E. coli* did not sufficiently survive the 1 h drying time performed at room temperature before cells were exposed to the sanitizers. Figure 1 shows that only 24% of the *E. coli* biofilm cells survived drying after 30 min and only 4% after 1 h. A different substrate other than milk may be required.

Table 5 shows that the selection of the proper towel material for the wipes is very important to avoid inactivating the QAC. Cellulose (paper and cotton) towels reduced the QAC in the Process QDS sanitizer by 53% to 95%. Polypropylene and polyester reduced the QAC by only 8% to 30%, respectively. Therefore, polypropylene or polyester material must be used for sanitizer wipes containing QACs. Since some inactivation of the QAC can be expected, the sanitizer must be formulated overstrength to achieve the desired concentration of QAC in the wipe. The Process QDS wipe must contain 150 ppm QAC.

Foods served in the field at two breakfast and two dinner meals to soldiers during field maneuvers were as follows. Breakfasts: scrambled eggs, grits, potatoes, and Spam; and creamed ground beef (Traypack ration), egg and sausage omelet (Traypack), grits, and cake; dinners: beef stew, rice, green beans, and cake; and pork, mashed potatoes, gravy, corn, and peach cobbler. Utensils which were used to serve the food and which were cleaned and sanitized by the WSS in the field were: 3 cake cutters, 1 fork, 1 ice-cream scoop, 2 or 3 knives, 1 or 2 large thongs, and 1 whisk.

The WSS system reduced the total count of bacteria and mold on utensils previously sanitized by standard Army procedures *(19, 20)*, from 9.2/in² to only 2/in² on average. This represents a reduction of total CFUs on 20 surface samples from 184/in² to 42/in². Molds were reduced from an average of 4 to 0.06 CFU's/in². Coliform bacteria were not detected before or after applying the WSS. Utensils cleaned by standard Army procedures before and after application of the WSS were acceptable and in compliance with U.S. Public Health Service (PHS) requirements of total counts not greater than 12.5 CFUs/in² *(21)*.

Table 6 shows the bacterial and mold counts on soiled food service utensils used during breakfast and dinner meals in the field after applying the WSS. The surfaces were cleaned with only one of each wipe and all counts were far below the 12.5 CFUs/in² considered acceptable on sanitized surfaces *(21)*. Molds recovered were less than 1/in² and coliforms were absent.

The WSS was also very effective in sanitizing food-service equipment in the field as shown in Table 7. Microbiological samples were taken from surfaces before and after wiping with the WSS. Counts on all equipment surfaces were reduced below the maximum of 12.5 CFUs/in² allowed, with one exception: a table top sampled after the first dinner may

**TABLE 1.** Removal of *E. coli* and *S. aureus* in biofilms produced in selected foods on stainless steel surfaces by wipes of the waterless sanitation system (WSS).

| | | Average Reduction Bacterial Counts (%) | | | |
|---|---|---|---|---|---|
| | | 5°C | | 26°C | |
| Food | Inoculum $10^4$ g | Wipes 1 (VP) & 2 ($H_2O$) | Wipe 3 (QDS) | Wipes 1 (VP) & 2 ($H_2O$) | Wipe 3 (QDS) |
| Pork chow mein | *E. coli* (EC) | 99.98 | 99.99999 | 99.99995 | 99.99995 |
| | *S. aureus* (SA) | 99.59 | 99.999 | – | – |
| | EC + SA | 99.97 | 99.9993 | 99.987 | 100.00 |
| Beef stew | EC + SA | 81.7 | 99.98 | 98.4 | 100.0 |
| Chicken a la king | EC + SA | 99.92 | 99.999 | 99.98 | 99.9994 |
| Chicken stew | EC + SA | 99.7 | 100.0 | 99.78 | 99.999 |
| Corn beef hash | EC + SA | 99.75 | 99.99 | 99.999 | 100.0 |
| Escal. potatoes | EC + SA | 99.99 | 100.0 | 99.997 | 99.9993 |
| Tuna and noodles | EC + SA | 99.97 | 99.9998 | 99.999 | 100.0 |
| Skim milk | *E. coli* | – | – | 99.9984 | 99.99996 |
| Average | | 97.84 | 99.996 | 99.793 | >99.999 |

**Note:** VP, Vesta Power detergent; QDS, Process QDS Sanitizer; $H_2O$ deionized.

have been inadequately cleaned and sanitized. The tent was poorly lighted, and it was too dark to see the surface clearly. More importantly, the soldier did not apply the sanitizing wipe for the required 30s. However, the reduction of the bacterial count after applying the WSS was still substantial, going from greater than 200 CFUs/in$^2$ to only 48 CFUs/in$^2$. The WSS was also very effective on the large cake pan and frying grill. The bacterial count per square inch on the grill was reduced from 20 to less than 1. The grease was completely removed and undiscernible to touch and sight.

## DISCUSSION

Removal and penetration of biofilms on surfaces represent the worst possible challenge for cleaners and sanitizers. In this study, biofilms were deliberately produced on stainless steel surfaces by growing *E. coli* and *S. aureus* in thermostabilized military rations to very high numbers. These biofilms are formed by the attachment of microorganisms to surfaces and the accumulation of layers of fat, protein, polysaccharides, and other materials produced by microorganisms, as well as food debris *(5, 7, 8, 18)*. Biofilms provide attached pathogens protection against chemical sanitizers, and the attached cells are more resistant to chemicals *(5)*.

The three-wipe WSS was devised to remove and inactivate adherent microorganisms from food-contact surfaces. To be most effective, sanitizing agents must be preceded by effective cleaners *(7, 8, 16, 18)* as in the WSS. Detergents contain surfactants which reduce surface tension, thereby suspending and removing greasy soils. This enables the sanitizers which follow to inactivate microorganisms that remain behind. Rinsing the detergent residues from the food-contact surface before application of the sanitizer ensures that the detergent residue does not inactivate the sanitizer. The application of single wipes *(12,17)*, or cleaner only *(8, 18)* by other investigators was not effective.

Because the surface of bacteria is negatively charged and hydrophilic, QACs such as those found in Process QDS, adsorb to the cells, penetrate the cell wall and rupture the cytoplasmic membrane, thus killing the cell *(5, 15)*. However, this action may not occur if cells are protected by a biofilm that prevents penetration of the sanitizer into the cell.

The WSS was effective because the protective biofilm on both stainless steel surfaces and cells was disrupted and removed by application of wipe #1, containing VP detergent. VP detergent contains sodium metasilicate, which mixes with and emulsifies fats and grease, allowing the sanitizer in wipe #3 to penetrate and remove the adherent cells that remained behind. It is also suspected that adherent cells are more sensitive to sanitizers after removal from surfaces by a detergent *(5)*.

The WSS was also very effective under field conditions when used by soldiers to clean and sanitize surfaces of soiled food-service utensils and equipment. The total number of CFUs on all WSS sanitized utensils and equipment was less than the maximum PHS standard *(21)* of 12.5 CFUs/in$^2$. The detergent wipe was very effective in removing grease from the grill in the MKT as well as removing a mixture of fuel and grease on the stainless steel surface under the grill. Dried and burnt foods on surfaces were also effectively removed by the detergent wipe. Removal of such dried foods from surfaces can be expedited by first wetting the surface with the detergent wipe and then applying a dry scouring pad as one would do if water was used. A dry

**TABLE 2. Bactericidal efficacy of wipes on counter tops in food preparation areas.[a]**

| | Reduction Bacterial Counts on Countertops[b](%) | |
|---|---|---|
| Wipe | Wood | Stainless Steel |
| None | 0 | 0 |
| Vesta Power detergent | >75 | 78 ->96 |
| Process QDS sanitizer | >96 | >98 - 100 |

[a] Natick bakery and Headquarters Company dining hall kitchen.

[b] 40 in$^2$ of Countertop (5 x 8 in$^2$ areas swabbed).

**TABLE 3. Bactericidal efficacy of Process QDS and Mandate sanitizers on planktonic cells.**

| | Average Log Cycle Reduction After 30 s | |
|---|---|---|
| Bacteria ($10^{10}$ cells/ml) | QDS | Mandate |
| *B. cereus* (sporeformer) | 1.3 | 1.3 |
| *E. coli* | >6 | >6 |
| *K. terrigena* | >6 | 5.3 |
| *L. monocytogenes* | >6 | >6 |
| *P. aeruginosa* | >6 | >6 |
| *S. aureus* | >6 | >6 |
| *S. faecalis* | >6 | >6 |
| *S. typhimurium* | >6 | 4.6 |

paper towel was also used to remove gross food residues from all surfaces before using the WSS, in order to conserve the WSS wipes. In many cases, one wipe was used for several utensils, depending on the utensil's size and condition. Only one wipe of each type was required to clean and sanitize a table top (4 ft × 3 ft). However, if necessary, more than one rinse wipe can be used.

The sanitizer wipe, in addition to being biocidal, polished the utensils and surfaces in the MKT more than those sanitized by standard procedures. This was most likely due to the fact that the detergent water used in the standard Army field washing procedure *(20)* was too hot for hand washing. Hot water causes the proteins from food residues to "bake" on the utensil surface, producing a film that dulls the surface and is difficult to remove. Therefore, detergent water temperature for manual washing should be only as hot as the hands can stand, which ranges from 110°F to 125°F *(6, 9)*. Wash temperatures specified by Army Field Manual 21-10-1 range from 120°F to 150°F *(20)*. Thermometers should be provided to permit frequent checks of water temperature when water is used as the sanitizing agent *(21)*. Another advantage of the WSS is that thermometers to check temperatures are not needed since the detergent and sanitizing wipes are effective even at low temperatures.

## CONCLUSION

The feasibility and efficacy of the WSS developed were demonstrated in the laboratory and in the field during military exercises. The WSS exceeded the required reduction (99.999%) of test bacteria in biofilms produced on stainless steel surfaces. The Process QDS sanitizer, tested alone, effectively killed planktonic cells of seven food-borne bacterial pathogens and *K. terrigena* within 30 s. The WSS provides the MKT with an emergency backup system to clean and sanitize serving utensils and equipment when water is not available or must be conserved. The WSS wipes could also be used in an abbreviated emergency mode to clean and sanitize essential food-contact surfaces and equipment in the MKT itself, until a water supply was restored, thus allowing the MKT to complete its mission. The wipes could also be used for many surfaces in a traditional food-service facility, and certainly in a civilian application by campers when potable or hot water and detergents are unavailable.

**TABLE 4. Reduction of *S. aureus* on stainless steel chips immersed in Process QDS and Mandate sanitizers for 10 min at 25 C.**

| | | | CFU/chip after 10 min | |
|---|---|---|---|---|
| CFU | Inoculum per 0.01 ml | Numbers control/chip | QDS | Mandate |
| Maximum CFU | $1.6 \times 10^6$ | $1.5 \times 10^6$ | 18 | 59,000 |
| Minimum CFU | $8.2 \times 10^5$ | $1.2 \times 10^6$ | <18 | 420 |
| Average CFU | $1.1 \times 10^6$ | $1.2 \times 10^6$ | <18 | 17,772 |
| Ave % reduction | 0 | 0 | >99.999 | 98.31 |

[a] Average of 10 trials.

**TABLE 5. Inactivation of quaternary ammonium compound (QAC) in Process QDS by towel material.**

| Towel | Composition | Average[a] Reduction of QAC (%) |
|---|---|---|
| Kim towel | Cellulose | 53 |
| Sturdi-wipe | Cellulose | 89 |
| Webril towel | Cellulose | 95 |
| Texwipe 60/40 | Polyester/cellulose | 51 |
| Army cloth | Polypropylene | 8 |
| Army cloth | Polyester | 18 |
| Texwipe | Polyester | 20 |
| Exsorbx 400 | Polyester | 30 |

[a] Average of two to seven trials.

**TABLE 6. Bacterial and mold counts on food-serving utensils after cleaning and sanitizing soiled utensils in the field with the WWS.**

| | | | Average CFU/in² | |
|---|---|---|---|---|
| Meal | Utensils | Samples | Bacteria[a] | Molds |
| Breakfast | 10 | 20 | 4.0 | 0.2 |
| Breakfast | 11 | 22 | 0.73 | 0 |
| Dinner | 11 | 22 | 3.6 | 0.2 |
| Dinner | 10 | 20 | 2.6 | 0.5 |

[a] No coliforms found

**Figure 1.** Rate of decrease of *Escherichia coli* in a skim milk biofilm on stainless steel air dried at 26°C.

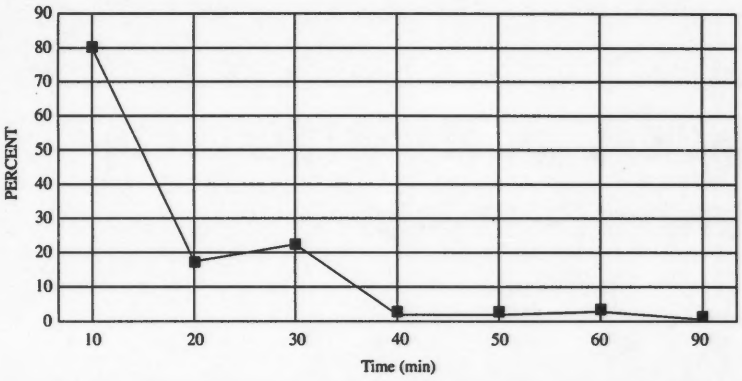


TABLE 7. Bioburden on soiled food service equipment and selected utensils in the field before and after application of the waterless sanitation system (wipes).

| | Average CFU/in² | | | |
|---|---|---|---|---|
| | Before WSS | | After WSS | |
| | Equipment | Bacteria | Molds | Bacteria |
| Molds | | | | |
| Cake Pan | 47 | 0 | 8 | 1 |
| Countertop | 10 | 0 | 8 | 2 |
| Grill | 20 | 1 | 0.3 | 0 |
| Pot (mashed potatoes) | – | – | 3 | 0.5 |
| Pot (rice) | – | – | 6 | 0 |
| Serving spoon (grits) | 11 | 0 | 2 | 0.3 |
| Table top | >200 | 0.25 | 2 | 0 |
| Table top | >200 | 4 | 48 | 1 |

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# Consumer Attitudes and Market Response to Irradiated Food

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## ABSTRACT

Results of consumer attitude and markets studies worldwide indicate consumers will accept irradiated food. Major studies in the United States indicate the number of consumers concerned about the safety of irradiated food has decreased in the last 10 years and continues to be less than the number of those concerned about pesticide residues, microbiological contamination, and other food-related concerns. The number of people reporting no concerns about irradiated food is among the lowest for food issues, comparable to that of people with no concern about food additives and preservatives. Numerous studies have demonstrated that acceptance increases when consumers are provided with information about specific advantages of the irradiation process. Consumers view irradiated meat and poultry products positively, with half or more interested in purchase. Concern about irradiation centers around safety, nutritional quality, potential harm to employees, and potential danger from living near an irradiation facility. Women, people with lower incomes, and those with less formal education are more likely to express concern. Marketing of irradiated food in the United States, although limited, has been successful. Irradiated foods marketed in numerous countries were judged superior by consumers and sold well. These studies indicate that the market potential for irradiated food is strong. Consumers should receive information about irradiation advantages and environmental and worker safeguards.

Irradiation of food offers advantages to the processor, retailer and consumer. At low doses, it delays senescence of fruits and vegetables and is an effective quarantine treatment; higher doses "pasteurize" meat, poultry, and seafood; still higher doses substitute for fumigants used to sterilize spices and dried vegetables (*25,49*). Despite these advantages, irradiation is not widely used because of uncertainty regarding consumer acceptance.

Although food irradiation has been studied since the 1950s, to the lay person it is a new technology. It is not unusual to express concern about technologies that are new. Even after more than 10 years of use, food technologies such as freeze-drying, freezing and microwaving generated major concern among a small percentage of consumers (*37*). Some persons are highly risk-averse. Therefore, one should expect that some consumers will express concern about the "new" technology of irradiation. Although irradiation is frequently described as "controversial," research in the United States and elsewhere indicates that when presented with information, acceptance is high. This paper reviews research on consumer attitudes and market response to irradiated food.

## CONSUMER CONCERN

Studies in the 1980s indicated that consumers were unfamiliar with food irradiation. Researchers recommended that consumers receive information about the process and be offered a choice of irradiated and nonirradiated foods in the marketplace (*1,16,50*). Information about food irradiation has led to a positive view by the public and health professionals. After interviewing 26 groups of women totaling 195 individuals, Bord and O'Connor (*13*) concluded that the extent to which the public accepts or rejects irradiated food depends on the presence or absence of information. Others found those who knew something about irradiation and responded correctly to information about the technology were significantly more accepting of it when consumer preference for irradiation and chemical treatments were compared (*30*). A 1988 survey of professional home economists revealed that few knew the facts about irradiation (*32*); however, viewing a 90-min teleconference significantly increased knowledge and acceptance.

In the late 1980s and 1990s, universities, professional societies and industry groups have included irradiation in their public-information programs, and information is slowly reaching the public. Coverage by the media, the primary source of consumer information, has frequently focused on special-interest groups who oppose irradiation. More recently, however, noteworthy pieces of investigative reporting, such as the *20/20* program on the ABC television network, have aired, and the public has received accurate infor-

mation regarding this topic. An article in *Today's Health* condensed in *Reader's Digest* (July 1993) and articles in women's magazines have increased public access to information.

The most recent nationwide consumer survey in the United States indicates that concern about irradiation is less than that for other food-related concerns (*11*). Additionally, the percentage concerned has decreased in the last two years, probably due to increased science-based media coverage of this technology. When potential food-related hazards are specifically identified, 79% of consumers classify pesticide and herbicide residues as serious hazards; 55% place antibiotics and hormones in poultry and livestock in this category, and 35% consider nitrites in food and irradiated foods as serious hazards. The percentage classifying irradiated foods as a serious hazard has remained at 35% for 2 years, a 7% reduction from the 1989 through 1991 level of 42%.

The number of people expressing no concern about irradiated foods has increased. Ten percent responded that irradiated foods were not a hazard in a recent national survey (*11*). The only category which received a higher confidence level was artificial coloring with 26% believing it is not a hazard. Another nationwide survey reached the conclusion that 22% of consumers believed irradiated foods are not a hazard, even though the question suggested hazard by asking, "What concerns do you have with buying irradiated fresh produce?" (*9*).

Similarly, a recent study in Georgia ($n$ = 446) found consumer concerns for pesticides, animal drug residues, growth hormones, food additives and bacteria were significantly higher than concern for irradiation (*43*). Concern ratings for irradiation and naturally occurring toxins were comparable. More persons believed irradiation was no more a problem than other potential food safety issues such as food additives, growth hormones, animal drugs and pesticides: 20% for irradiation compared to 11%, 8%, 7% and 7% for the others.

Many consumers still have not formed an opinion about irradiation and are seeking additional information (*9,11,41,43*). In 1993, 72% had heard of irradiation, although 88% of these said they did not know very much about the process, and 30% thought that irradiated food was radioactive (*43*).

When asked specifically about irradiation, people expressed concern about safety, nutritional quality, potential harm to employees and potential danger from living near an irradiation facility. These concerns appear to be derived from the association of irradiation with radioactivity and nuclear power plants.

Consumer studies consistently demonstrate that, when provided with science-based information, a high percentage of consumers are willing to buy and prefer irradiated foods (*17,19*). A recent study conducted at Purdue University was undertaken to observe the effects of information and product samples on consumer attitudes (*39*). About half of the sample of 178 residents were willing to buy irradiated foods based upon previous exposure to information about the process. After viewing a brief video, subjects demonstrated a significant positive change in knowledge, and willingness to buy increased to 90%. Among those who saw both the video and sampled irradiated strawberries, willingness to buy increased to 99%. These results cannot be generalized to the entire population, since a university community may have a disproportional number of people with more formal education; nevertheless, this study demonstrates high acceptance among specific segments of the population.

## CHARACTERISTICS OF ACCEPTORS AND REJECTERS

Adoption of new technologies is led by innovators. Early users of new technologies are often of higher income, display a higher level of living, have a more prestigious occupation, and possess a more positive self-identity (*44*). They also have a greater ability to deal with abstractions, greater rationality, higher intelligence scores, are more favorable toward change, and can cope better with uncertainty. Science literacy plays a significant role in greater acceptance of nuclear power and probably also influences acceptance of irradiated food. Those who viewed nuclear power positively were more likely to have education in the sciences as opposed to the humanities, to read the newspaper frequently, and to include science-related television programs in their leisure activities (*31*).

Although the majority of people respond positively to information about food irradiation, a minority oppose the technology. Those opposed to food irradiation, estimated at 5%–10% of the population, are highly concerned about the use of chemicals on food, place a high value on an "ecologically balanced world," oppose the use of nuclear technology, and prefer to eat only unprocessed or "organic" food (*2,16,18*).

Demographic factors have been related to views toward irradiation. Women are more concerned about all issues that may affect food safety, including irradiation (*7,10,11,47,48*). People with formal education at the high school level and above are more likely to purchase irradiated foods (*43,48*). Before receiving information, blacks were not as likely as whites to purchase irradiated produce at lower or identical prices, although they were equally likely at higher prices (*46*). After learning more about irradiation, whites were more likely to purchase at any price. Introductions of products in California, Florida, Illinois and Missouri found good acceptance in upscale markets (*15,35,41,42,46,48*).

## PRODUCT BENEFITS

Attitude studies demonstrate that label statements can serve as a source of information. Schutz, Bruhn, and Diaz-Knauf (*45*) measured consumer response to several label statements. Almost two-thirds of consumers considered products bearing the label statement "Irradiated to extend shelf life" or "Irradiated to retard spoilage" to be fresher than nonirradiated products, 22% were uncertain, and less than 4% thought the food would not store well. Products bearing the label "Irradiated to control microbes" were

thought to be safer than nonirradiated products by almost 42% of the sample, with 28% uncertain, and only 14% thinking that safety would be lower. Thirty-six percent of consumers also thought products with this label would be higher quality, 25% did not know, and 12% believed that quality would be lower. About half of consumers expected irradiated products to be more expensive, with 5% to 10% saying less, depending on the label statement. The label having the lowest impact was "Irradiated for quarantine control"; however, 42% were more willing to buy this product, with 23% being uncertain. All statements increased consumer interest in purchase, with the label "Irradiated to control microorganisms" generating the greatest interest.

Consumers also responded positively to the benefits of irradiation applied to specific products. Fifty-four percent were interested in purchasing irradiated tropical fruit, and 43% irradiated soft fruits (*45*). A majority of consumers preferred irradiated to nonirradiated pork and poultry (responses were 57% and 58%, respectively). Additionally, 58% preferred irradiated to fumigated spices. Uncertain consumers made up the next largest category; 17% to 36% checked this response.

Similar positive responses to irradiated foods were found in a study in Georgia (*43*). About half of the consumers expressed an interest in buying irradiated pork and poultry, with 27% and 34% respectively expressing uncertainty. Thirteen percent to 18% indicated they would buy more of these products if they were irradiated and properly labeled. Half of the consumers believed irradiation of fruits and vegetables was not necessary; however, 40% or more believed irradiation of pork, poultry, and seafood was "very necessary." Correspondingly, a nationwide survey found two-thirds or more of consumers believed irradiation was "very" or "somewhat necessary" for poultry, pork, beef and seafood (*10*). After hearing that scientific and health groups have endorsed the safety of irradiated foods, half preferred irradiated over nonirradiated meat.

Irradiated strawberries were rated comparable or superior to nonirradiated berries by Missouri consumers (*48*). Baskets of irradiated and nonirradiated strawberries were given to consumers in malls and supermarkets in the Kansas City, Missouri area. Some packages included educational information about irradiation whereas some did not. Consumers were asked to treat the strawberries as they normally would, then return a questionnaire. About 400 questionnaires were returned. People considered irradiated strawberries either comparable or superior in appearance and color to nonirradiated berries. Irradiated berries ranked well in freshness and firmness, with little difference in taste. Information about irradiation increased people's willingness to buy, both at equal prices and at a small premium. People were more willing to pay higher prices for irradiated berries when fact sheets about the process were included in the samples. In total, 80% of consumers reported they were pleased with irradiated strawberries; 67% were pleased with the nonirradiated berries. Half the consumers felt their supermarket should offer irradiated strawberries, about a third were uncertain, and 14% felt irradiated strawberries should not be featured in their supermarket.

A recent study used an auction technique to investigate consumer reaction to the benefits of irradiating pork (*29*). After auctioning a variety of products, students were given sandwiches made with irradiated or nonirradiated pork and were offered the opportunity to bid up for the product they did not have. The study indicated a very high level of acceptability for irradiated pork in a sample of 58 undergraduate students. Twenty-six of 29 subjects paid a premium for irradiated pork in order to reduce the risk of contracting trichinosis. Only one of 29 students paid to avoid the irradiated product based on an aversion to the irradiation process.

## INFLUENCE OF PRICE

Economic analysis indicates that price influences willingness to buy. Whereas lower income groups were sensitive to price, the higher income groups were likely to purchase irradiated food at lower, identical, or higher prices (*46,47*). Attitude studies demonstrate that over half of consumers expect and are willing to pay more for irradiated foods (*10,43,45*).

## MARKET EXPERIENCES

Consumer response to labeled irradiated food has been positive. Irradiated mangos sold well in Florida in 1986. In March 1987, irradiated Hawaiian papayas were available as a one-day trial at two markets in Southern California (*15*). Consumers could taste both the irradiated papaya and the traditional papaya. Leaflets were available explaining irradiation and knowledgeable persons were present to respond to questions. Interest in purchasing irradiated fruits in the future was high in both markets, 66% and 80%. Irradiated papayas outsold the identically priced nonirradiated counterparts by more than 10 to one. Additionally, irradiated apples marketed in Missouri were favorably received (*48*).

A record amount of irradiated strawberries was sold in a Florida produce market in the winter of 1992. On the first day of sales, 600 pints of irradiated berries priced at $2.00 each were sold compared to 450 pints of nonirradiated berries priced at $1.29. When prices were equal, the two berries sold equally. When irradiated berries were cheaper, they sold at a higher rate than the nonirradiated fruit. Consumers who did not find the berries too expensive, who trusted their retailer, distrusted activists, were more knowledgeable, and/or trusted health and scientific authorities were very likely to buy the irradiated strawberries (*35*).

In March of 1992, Carrot Top, a produce and grocery store in the Chicago area, featured irradiated strawberries, grapefruit, and juice oranges (*41*). Owner James Corrigan, in a newsletter survey of his customers, found that about 70% of his customers had heard about irradiation, but 90% felt that they had not received enough information. After investigat-

ing the process himself, he shared information with his customers via the newsletter and made both pro- and anti-material available at the point of sale.

Carrot Top sold 1,200 pints of strawberries, with approximately 90%–95% of them irradiated. The nonirradiated and irradiated berries were at the same price with a "buy one, get the other free" promotion. Corrigan had thought people would choose one of each and compare, but instead customers took both irradiated pints. Over the first weekend, he sold 172 cases of irradiated berries compared to only 6 cases of the nonirradiated. Grapefruit and juice oranges also sold well, with about 90% irradiated and 10% nonirradiated. Carrot Top has featured a variety of irradiated produce with similar sales success. In his second year of operation, Corrigan records that irradiated produce is outselling the non-irradiated by 20 to 1 [(Comments at safeguarding the Food Supply, October 1992, Orlando, FL)].

Irradiated poultry available in select markets has sold well. A Chicago produce market that had never offered produce before experienced brisk sales. Irradiated poultry represented about 10% of total poultry sales in a Florida supermarket, even though the irradiated poultry was more expensive and prepackaged whereas nonirradiated poultry was unpacked in a refrigerated case (*42*).

### Great Britain

Consumers in Great Britain appear lacking in knowledge about irradiation and few are interested in purchasing irradiated foods. Interviews with 198 shoppers in Manchester and Salford shortly after the Chernobyl nuclear power accident found 12% of consumers were prepared to buy irradiated foods, while 70% said they would not buy them (*28*). People under 25 years of age and women were most negative about the technology. Concern about health risks, including cancer, was the most prevalent reason for unwillingness to purchase irradiated food. Concern about nutrient value and general lack of information about the process was also expressed. Although educational attainment was related to knowledge about irradiation, there was no clear relationship between more knowledge and greater or lesser willingness to buy irradiated foods.

To further explore the relationship between knowledge and acceptance, consumers were asked about several common food terms, such as pasteurization, freeze-dried and vacuum-packed. People recognized the names of many food terms; however, no more than 63% knew their meaning. The authors noted that if a term was familiar, the consumer tended to accept it unquestioningly and was unconcerned about the process. The authors concluded that an educational program about irradiation is essential so people can make an informed choice.

In 1989, a survey conducted for the Association for Consumer Research found half of the people interviewed had not heard of food irradiation, fewer than one in five agreed that food irradiation prevents food poisoning, and over half of the people thought that irradiation should not be permitted in the U.K. (*5*). People wanted irradiated food labeled and they indicated they preferred conventional food preservation methods.

In a summary of research in Great Britain, P. A. Thomas at the University of Bradford noted that public knowledge of the process of irradiation has changed little from 1986 to 1988. Thomas believes the public must be assured that irradiated foods are safe and that the irradiation process is monitored for safety.

### The Netherlands

Consumer attitudes in the Netherlands have progressed from concern to acceptance of irradiation. In the early 1980s a small group of Dutch women were found to be very concerned about irradiation; however, when informed about the process, the women viewed its potential benefits favorably (*24*).

A questionnaire distributed to a panel of 1,158 found the percentage concerned about improperly processed foods and the use of irradiation were comparable (both at 26%), with slightly fewer concerned about pesticides and preservatives (*21*). Both concerned and less concerned consumers were most receptive to information that supported their point of view. Very concerned people were responsive to arguments that irradiated food is more hygienic. More extensive information about irradiation did not appear to lessen concern about the process; however, it increased sensitivity to the potential hazards of other food-handling methods. All consumers were given mushrooms, which they were told were irradiated. Actually, half of the consumers received irradiated and half nonirradiated mushrooms. Irradiation improved product quality to a degree recognized by the consumers. The mushrooms that were irradiated were judged significantly better by both the very concerned and the unconcerned consumers. Since the very concerned group was more sensitive to arguments that food becomes safer through irradiation, the authors concluded that concern may be more related to technical issues, such as fate of radioactive waste, rather than the food itself.

A 1992 survey of 1,200 households indicated that the number of Dutch consumers expressing a positive attitude toward irradiated foods had increased (*6*). When respondents were asked to choose between three different methods of preservation, heating, irradiation and preservatives, people preferred heating. Irradiation was preferred to preservatives, particularly among those with more formal education. When asked to interpret the meaning of irradiation, responses were varied, but the most frequent response, given by 25% of the respondents, was "good/excellent/positive." One-third or more of consumers were interested in buying irradiated products, with interest highest among those with the most education. If the whole produce item was irradiated, one-third said they would buy it, one-third would not buy, and the rest were uncertain. If the product contained irradiated ingredients, the percentage of respondents who would buy was slightly greater than those who would not.

When it was stated that irradiated products have been on the market for some time and are permitted by the authorities, an accurate description in the Netherlands, 48% said they would definitely/probably purchase irradiated foods and 23% would not. Interest in purchase was 53% among those in the higher education group.

### France

In the early 1980s, the French Higher Council for Public Hygiene and the Academy of Medicine accepted expert committee recommendations that food irradiation posed no toxicological or nutritional hazard (*14*). Subsequent test-marketing of irradiated food was successful. Two tons of irradiated strawberries, packed in covered plastic trays labeled "protected by ionization" and priced 30% higher than the nonirradiated product, sold well in May and June, 1987, in Lyon, France (*3*).

It is estimated that nearly 14,000 tons of various food items were irradiated in France in 1991. About 40% of these were spices, followed by dried fruit and vegetables and deboned poultry meat (*14*).

### Italy

Potatoes labeled "Irradiated for the purpose of preventing sprouting" were successfully marketed in 1976 in Bologna, Milan, Rome and Pescara (*12*). Those who purchased potatoes returned a postcard indicating their preference for the irradiated potatoes because quality and storability were better.

### Poland

Irradiated onions and potatoes sold well in market tests in two Polish cities (*27*). Four tons of onions and 3 tons of potatoes were stored in uncontrolled conditions for 9 months prior to sale. Ninety-seven percent of the consumers responding to a survey evaluated the products positively and indicated a desire to buy them again.

### China

Numerous irradiated foods have been market tested in China (*8*). Ten tons of irradiated apples sold in Shanghai in January 1992. Consumers purchasing the irradiated apples received a leaflet explaining irradiation and a consumer acceptance form. Over 1,000 forms were returned. Consumer acceptance was high with 84% finding quality and flavor acceptable. Ninety-three percent of consumers said they would purchase the produce again, and food irradiation should be further developed.

The Chengdu people's market and department stores have conducted continuous market testing of garlic, ginger, hot pepper and meat products with over 3,000 consumer evaluation forms completed. Consumer acceptance averaged 70% with students at a high of 74% and office workers recording 68%. Willingness to buy ranged from 68% for hot peppers to 72% for ginger.

In 1991–92 over 200 tons of seasonings and meat products and 2,500 tons of irradiated sweet-potato wine were supplied to ten cities for test marketing. The products sold well, but no mention was made of consumer surveys.

### Thailand

In the mid-1980s 160 tons of irradiated onions were sold at the rate of 4–10 tons per day at 14 shops (*38*). Consumers readily purchased irradiated onions even at a slightly higher price than the nonirradiated ones.

Nham, a fermented pork sausage consumed raw in Thailand, is often contaminated by *Salmonella* spp. and occasionally by *Trichinella spiralis* (*40*). In 1986, labeled irradiated nham was sold side-by-side with the traditional product. A consumer survey ($n$ = 138) showed that 34% of the buyers selected irradiated nham out of curiosity and 66% considered that it was less likely to contain harmful microorganisms. Satisfaction with the product was high, as 95% of the consumers indicated they would purchase irradiated nham again. During the 3-month test, irradiated nham outsold the nonirradiated product by a ratio of 10:1.

### Korea

A sample of radiation workers and the general public found that 94% of the workers ($n$ = 324) and 72% of the public ($n$ = 376) had heard of food irradiation; however, only 58% and 32% knew the process had been approved by the Korean government and international organizations. Additionally, 10% of radiation workers and 40% of the public either did not know or were uncertain if irradiated foods were the same as food contaminated by radionuclides.

Despite lack of information about irradiation, 67% of the workers and 55% of the public were willing to buy irradiated food when the process was used to improve microbiological safety. Consumers preferred irradiated to chemically preserved food. The authors concluded that, if the benefits and safety of food irradiation are explained, the public will accept the process.

### Philippines

Onions were irradiated, stored and marketed in a pilot test in 1985. Consumer attitudes were not obtained; however, the investigators observed customers and tracked sales volume (*34*). Reaction to irradiated onions differed in the market place. Most consumers picked up the bag, examined it briefly, and then purchased. Some consumers asked questions as to product safety, approval by government testing agencies, and product characteristics. Most of these customers purchased the irradiated products. A minority of customers, three in three years, refused to buy the product, saying it may cause cancer. Sales of irradiated onions ranged from 29% to 71% higher than nonirradiated, depending on variety. The authors concluded that irradiation permitted the grower to reduce losses by 32%, shipper by 47%, and retailers by 54%.

### Pakistan

One ton each of irradiated potatoes and onions were test marketed at a provincial fruit and vegetable show in January and February, 1991 (*33*). Only 15% of the 300 consumers who completed a survey form were aware of food irradiation and fewer still, 11%, knew that irradiation of potatoes, onions, and spices was per-

mitted in Pakistan. A high proportion, 70%, had doubts about the safety of irradiated foods; however, after seeing the display at the fruit and vegetable show, 69% indicated their concerns were resolved, 11% still had concerns, and 20% were uncertain. Thirty-nine percent said they were willing to buy irradiated food and convince others to buy, and 57% thought food irradiation should be commercialized.

### Bangladesh

Irradiated dried fish and onions were marketed through normal channels every 15 days from September through January (*36*). Fish were labeled "disinfected by gamma radiation" and onions were labeled "irradiated to prevent sprouting." Consumers preferred the irradiated products.

### Argentina

Irradiated onions and garlic were sold in a supermarket in the Buenos Aires area in 1985. Prior to the first marketing, consumers were told about food irradiation on the local TV, radio and in the press. Within 3 days of marketing, the entire 10 tons of irradiated product were sold (*22,23*). Consumers indicated product quality was the primary reason for purchase. In later years, irradiated onions continued to sell well (*51*). The investigators concluded that an education campaign and endorsement by the Ministry of Health were keys for acceptance by consumers. They predicted significant opportunities for irradiation of onions and other foods.

### South Africa

An extensive marketing and educational program was conducted in South Africa prior to the introduction of irradiated foods (*52*). In 1978 and 1979, 20 supermarkets sold labeled irradiated products, including 13 tons of potatoes, 20 tons of mangoes, 20 tons of papayas, and 7 tons of strawberries. The irradiated products were judged acceptable by 90% of buyers. Subsequently, researchers experimented with novel convenience foods processed through food irradiation (*26*). Approximately 200 members of the Defense Force tested the products and showed an overwhelming preference for the irradiated product over freeze-dried and canned counterparts.

### Other countries

Additional market trials which took place in Bangladesh, Cuba, Germany, Indonesia and Yugoslavia are summarized in the Food Irradiation Newsletter (*4*). There is no doubt that consumers will accept irradiated foods when given science-based information about the process and when the irradiated product offers clear advantages.

## CONCLUSIONS

Recognized health authorities in numerous countries consider irradiated foods safe and wholesome. The potential health benefits from this technology are substantial. Foodborne illness can be reduced by enhancing the sanitary quality of a product and by reducing the potential for cross-contamination in the home or food-service establishment. Since children under 5 years of age are most severely affected by microbiological pathogens, the moral obligation to increase protection is strong. Irradiation's potential to replace less safe chemical fumigants while maintaining food safety is also compelling.

The public's knowledge of food-processing methods in general and food irradiation in particular is very limited. Although accurate science-based information about food irradiation is now reaching consumers in the United States, there is still a long way to go, and the level of public knowledge in other countries is extremely low. If health professionals present accurate information about irradiation to the public, acceptance of the technology will likely increase. The potential for irradiation to increase the hygienic level of food could be realized.

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# *Do ISO Instead of Applying Baldrige Criteria...* NOT!

*Pat Townsend was active in the early efforts to establish the widely respected Malcolm Baldrige National Quality Award. He acted as an examiner for the Award in 1990 and in 1991. His first book,* Commit to Quality, *is now in its twelfth printing. His latest book,* Quality in Action: 93 Lessons in Leadership, Participation, and Measurement, *has been translated into four languages. Townsend and his co-author and partner Joan Gephardt, are frequent contributors to professional journals. They are working on a third book, on the subject of leadership. The followtng article is reprinted from, and with the permission of, the* Journal for Quality and Participation.

*Patrick L. Townsend and Joan E. Gephardt – Townsend and Gephardt*

While it's not true that "ISO" is a Latin acronym for "European trade barrier," if the Japanese had attempted to impose similar restrictions on the United States 15 years ago, Rep. Richard Gephardt (D-MO) would likely have called for a declaration of war.

The Japanese did, after all, have the measurement tool at hand; the Deming Prize criteria. In both cases, a set of highly prescriptive requirements are used by a group of outside consultants to judge the quality of an organization's procedures. In both cases, the results of those procedures are secondary.

Fortunately, for the sake of international trade relations, the Japanese chose to use the Deming Prize criteria as a means to identify a precious few top performers in Japan. They did not attempt to create an international standard. Judging by the results at Florida Power and Light, the American winner of the Deming Prize that views their experience as a mixed one, at best, this was a wise decision. The backers of ISO 9000 have no inhibitions.

## ISO 9000 VERSUS THE BALDRIGE

Perhaps the greatest harm currently being done to the business community by the ISO 9000 fad is its detrimental impact on the progress of the American quality revolution. This is happening because the senior management groups of too many companies, either because of basic misunderstanding of the intent/meaning of ISO 9000 vis-a-vis the Malcolm Baldrige National Quality Award or because of limited budgets combined with a specific customer demand, are postponing their Baldrige efforts and spending their quality budgets on ISO 9000. Dr. Curt Riemann and Harry S. Hertz of the Office of Quality Programs, National Institute of Standards and Technology sought to illustrate the dissimilarity between the two sets of standards in a paper titled *The Malcolm Baldrige National Quality Award and ISO 9000 Registration: Understanding Their Many Important Differences.*

Their conclusion? This information, procedures and material on which ISO 9000 certification requirements focus total to about 10 percent of what the Baldrige encompasses. Perhaps the most telling gap between the two is the Baldrige's insistence on customer-impacting results, and plans and methodology for continuous improvement versus ISO 9000's emphasis on current procedures and their documentation.

In that sense, there isn't a major conflict between Baldrige and ISO 9000; ISO 9000 is simply a minor subset of Baldrige. ISO 9000 established minimums while the Baldrige points the way for an organization to reach for maximums.

### The market's demands

There is a powerful argument in favor of investing time, money, and effort in the ISO 9000; many customers demand it as a pre-condition to doing business.

It is a Catch-22 situation; the best way to insure the continuous improvement of an organization is by using the Baldrige as the primary tool for aligning procedures... but one of the points stressed by the Baldrige is the need to listen to your customer and attempt to fulfill the customer expectations...and if one of those

stated requirements is ISO 9000 certification, then the logical thing for a company to do is to seek ISO 9000 certification...even if it diverts them for their efforts to study and pursue Baldrige criteria. The danger is that an organization may achieve ISO 9000 registration and equate it with quality. Some companies already do.

### Quality requires more than numbers and checklists

ISO 9000 also has served as the focus for a counter-revolution by old-line quality control practitioners, a sort of jobs program for a group of by-the-numbers career professionals who were passed by as the American quality revolution expanded beyond measuring manufactured products immediately prior to sale. When the quality field began to include such fuzzy elements as emotions and behavior, when the emphasis was shifted from detection and correction to prevention, these quality control practitioners were left behind. For them, ISO 9000 with its prescribed procedures and checklists – and requirements for annual re-certification – came as a welcome relief. It is so much less demanding.

## A REALISTIC VIEW

Ironically, the multi-faceted U. S. quality revolution of the last decade made it easier for companies who followed the Baldrige criteria to comply with ISO 9000. These U.S. exporters know that their services and products can compete with virtually anyone's – and particularly with most services and products with European origins. With the European market beckoning, ISO 9000 is seen as a bothersome form of dues to be paid in order to get in the door. A wise company views ISO 9000 as a starting place for an all-encompassing quality effort. In time, ISO 9000 will fade in importance and popularity as the still embryonic European quality revolution strengthens and expands beyond ISO 9000's limited criteria. This evolution has already begun and will accelerate as more and more European countries establish national quality awards that use the Baldrige as their model.

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# Dairy, Food and Environmental Sanitation Instructions for Authors

## NATURE OF THE MAGAZINE

*Dairy, Food and Environmental Sanitation* (DFES) is a monthly publication of the International Association of Milk, Food and Environmental Sanitarians, Inc. (IAMFES). It is targeted for persons working in industry, regulatory agencies or teaching in milk, food and environmental protection.

The major emphases include:

- practical articles in milk, food and environmental protection;
- new product information;
- news from activities and individuals in the field;
- news of IAMFES affiliate groups and their members;
- 3-A and Milk and Egg Sanitary Standards, amendments and lists of symbol holders;
- excerpts of articles and information from other publications of interest to the readership.

Anyone with questions about the suitability of material for publication should contact the editor.

## SUBMITTING ARTICLES AND OTHER MATERIALS

All manuscripts including, "Letters to the Editor" should be submitted in triplicate (original and two copies), in flat form (*not folded*), and by First Class mail to Editor, DFES, c/o IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2838, U.S.A.

When possible, authors are encouraged to submit a fourth copy of their manuscript on computer disk. Manuscripts submitted on disk should be saved as an ASCI file.

All reading matter dealing with affairs of IAMFES or with news and events of interest to members of IAMFES is published in DFES, and should be mailed to the above address. Correspondence dealing with advertising should also be sent to the address given above.

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## TYPES OF ARTICLES

Readers of DFES include persons working in industry, regulatory agencies or teaching in milk, food and environmental protection. DFES serves this readership by publishing a variety of papers of interest and usefulness to these people. The following types of articles and information are acceptable for publication in DFES.

### General interest

DFES regularly publishes nontechnical articles as a service to those readers who are not involved in the technical aspects of milk, food and environmental protection. These articles include such topics as the organization and application of milk or food control programs or quality control programs, ways of solving a particular problem in the field, organization and application of an educational program, management skills, use of visual aids and similar subjects. Often talks and presentations given at meetings of affiliate groups and other gatherings can be modified sufficiently to make them appropriate for publication. Authors planning to prepare general interest/nontechnical articles are invited to correspond with the editor if they have questions about the suitability of their material.

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Authors and publishers of books in the fields covered by DFES are invited to submit their books to the editor. Books will then be reviewed by a specialist in the field covered by the book, and the review will be published in an issue of DFES.

### Preparation of Articles

The editor assumes that the senior author has received proper clearance from his/her organization and from coauthors for publication of the manuscript.

All manuscripts should be typed double-spaced on 8-1/2 by 11 inch white bond paper. Onion skin or similar thin paper should not be used. *Lines on each page should be numbered to facilitate review of the manuscripts.* Use of paper with pre-numbered lines is satisfactory. *Manuscripts submitted on paper without numbered lines will be returned to authors for retyping prior to being sent out to review.* Margins on all sides should be at least one-inch wide and pages of the original manuscript should not be stapled together.

A manuscript should be read critically by someone other than the author before it is submitted. If English is not the author's first language, the manuscript should be reviewed by a colleague of the author who is fluent in written English to ensure that correct English is used throughout the paper. *The editor and editorial staff will not rewrite papers when the English is inadequate.*

Authors are encouraged to consult previously published issues of DFES to obtain a clear understanding of the style of papers published.

Brand names and manufacturers of research samples (i.e., specific products tested as in surveys, etc.) *should not* be used. It is the policy of DFES to not publish this information. Instead, refer to types of products or identify by letters or numbers.

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In order to decrease turnaround time authors may send a copy of their manuscript on computer disk as noted earlier in these instructions.

## ORGANIZATION OF ARTICLES

The title of the manuscript should appear at the top of the first page. It should be as brief as possible and contain no abbreviations.

The title should be indicative of the subject of the manuscript.

Authors should avoid expressions such as "Effects of," "Influence of," "Studies on," etc.

Names of each author (including first name and middle initial), and the name and address of the institution(s) where the work was done should appear on the title page. Footnotes can be used to give the current addresses of authors who are no longer at the institution(s) where the work was done. An *asterisk* should be placed after the name of the author to whom correspondence about the paper and proofs should be sent. The telephone and facsimile numbers of this author should be given at the bottom of the page. No text of the manuscript should appear on the title page.

The Abstract should appear on a separate piece of paper directly following the title page, and should not exceed 200 words. It should summarize the contents of the manuscript, and be meaningful without having to read remaining pages. The Abstract should *not* contain references, diagrams, tables or unusual abbreviations.

The references should be arranged in alphabetical order, by last name of first author and numbered consecutively. Only the first author's name and initial should be inverted. *Cite each reference in the text by number.* All references given in the list must be cited in the text. List references according to the style of the following examples.

### Paper in journal

Alberman, G. G. and E. H. Marth. 1974. Experimental production of aflatoxin in citrus juice and peel. J. Milk Food Technol. 37:308-313.

**Paper in book**

Marth, E. H. 1974. Fermentations. pp. 771-882. *In* B. H. Webb, A. H. Johnson and J. A. Alford. (eds.). Fundamentals of dairy chemistry. 2nd ed. AVI Publishing Co., Westport, CT.

**Book by author(s)**

Minor, T. E. and E. H. Marth. 1976. Staphylococci and their significance in foods. Elsevier Scientific Publishing Co., Amsterdam.

**Book by editor(s)**

Vanderzant, C. and D. F. Splittoesser. (eds.). 1992. Compendium of methods for the microbiological examination of foods. 3rd ed. American Public Health Association, Washington, DC.

**Patent**

Hussong, R. V., E. H. Marth and D. G. Vakaleris. 1964. Manufacture of cottage cheese. U.S. Pat. 3,117,870. Jan. 14.

**Publication with no identifiable author or editor**

Anonymous. 1977. Thermally processed low-acid foods in hermetically sealed containers. Code of Federal Regulations No. 21, U.S. Government Printing Office, Washington, DC.

References citing "personal communication" or "unpublished data" are discouraged, although it is recognized that sometimes it is unavoidable. An author may be asked to provide evidence of such references.

References consisting of papers that are "accepted for publication" or "in press" are acceptable, but the author may be asked to provide copies of such papers if needed to evaluate the manuscript in question.

References should follow the text, tables should follow references, and figures should follow tables in manuscript organization. Placement of each should be indicated in the text.

## ILLUSTRATIONS, PHOTOGRAPHS, FIGURES

Submission of photographs, graphics or drawings to illustrate the article will help the article. The nature of DFES allows liberal use of such illustrations, and interesting photographs and drawings often increase the number of persons who are attracted to and read the article.

*Photographs.* Photographs which are submitted should have sharp images with good contrast. A scale marker to indicate magnification should be on each photomicrograph. Color photographs should not be submitted for use inside of DFES, because they will be published in black and white, with a loss of detail. Photographs can be printed in color, but the additional cost of doing so must be borne by the author. Authors wishing to publish color photographs should contact the editor for cost estimates.

The editor also encourages the submission of photographs to be used on the cover of DFES. Photographs considered for the cover should be submitted in the form of a negative or slide, and should be four-color.

*Line drawings.* All line drawings (graphs, charts, diagrams, etc.) should be submitted as black and white glossy or matte finish photographs, which do not require any additional art work. *No part of a graph or drawing should be typewritten.* Use a lettering set or other suitable device for all labeling. If graphs are computer generated, printed copies of the graphs must be produced by a good quality laser printer, with sufficiently dark printing or appropriate size letters and numerals. Graphs produced by dot matrix printers or with very thick lines and lettering *are not* acceptable. Figures are commonly reduced to a 1 column width (85 mm) of printing. If the original figure can be reproduced to the size of a one-column width, further reduction will not be necessary, otherwise lettering should be of sufficient size to allow for reduction. If symbols are used, they must be identified on the figure and not in the legend. Data that are presented in figures should not be repeated in Tables. A well-prepared figure should be understandable without reference to the text of the paper.

*Labeling of figures.* All figures should be labeled lightly on back, using a soft pencil or a typed adhesive label. Labeling should include:

- figure number,
- last name of author(s),
- title of manuscript,
- the manuscript number (on revised copies),
- identification of the top of the figure.

## COMMON ABBREVIATIONS

Frequently used acceptable abbreviations may be used (i.e., using *wt* for the word *weight*, or *s* for the word *second*). For further details on abbreviations see the current edition of the *CBE Style Manual.* Note that a period is used with some but not all abbreviations.

For a complete listing of expressions to avoid in scientific writing, see pages 93-98 in O'Connor, M. and F. P. Woodford. 1976. *Writing Scientific Papers in English*. Elsevier, Amsterdam. Also, *How to Write a Scientific Paper*, by Day, Robert A., 3rd ed. 1988. Oryx Press, Phoenix, AZ.

Authors may also contact the editor if they are not sure about acceptable abbreviations.

# FederalRegister

## Food and Drug Administration

Advisory Committee Information Hotline

AGENCY: Food and Drug Administration, HHS.

ACTION: Notice

SUMMARY: The Food and Drug Administration (FDA) has established an Advisory Committee Information Hotline (the hotline) using a voice-mail telephone system. The hotline provides the public with access to the most current information available on FDA advisory committee meetings. The advisory committee hotline, which will disseminate current information and information updates, can be accessed by dialing a toll free number.

FOR FURTHER INFORMATION CONTACT: Donna M. Combs, Committee Management Office (HFA-306), Food and Drug Administration, 5600 Fishers Lane, Rockville, MD 20857, (301) 443-2765.

SUPPLEMENTARY INFORMATION: The Advisory Committee Information Hotline can be accessed by dialing (800)741-8138 or (301) 443-0572. Each advisory committee is assigned a 5-digit number. This 5-digit number will appear in each individual notice of meeting. The hotline will enable the public to obtain information about a particular advisory committee by using the committee's 5-digit number. Information in the hotline is preliminary and may change before a meeting is actually held. The hotline will be updated when such changes are made. The following is a list of each advisory committee's 5-digit number to be used when accessing the hotline:

**Office of the Commissioner**

Board of Tea Experts ..... 12601
National Task Force on AIDS Drug Development ..... 12602
Science Board to the Food and Drug Administration ..... 12603

**Center for Biologics Evaluation and Research (CBER) (All CBER committees use the same 5-digit number)**

Allergenic Products Advisory Committee ..... 12388
Biological Response Modifiers Advisory Committee ..... 12388
Blood Products Advisory Committee ..... 12388
Vaccines and Related Biological Products Advisory Committee ..... 12388

**Center for Drug Evaluation and Research**

Anesthetic and Life Support Drugs Advisory Committee ..... 12529
Anti-Infective Drugs Advisory Committee ..... 12530
Antiviral Drugs Advisory Committee ..... 12531
Arthritis Advisory Committee ..... 12532
Cardiovascular and Renal Drugs Advisory Committee ..... 12533
Dermatologic Drugs Advisory Committee ..... 12534
Drug Abuse Advisory Committee ..... 12535
Endocrinologic and Metabolic Drugs Advisory Committee ..... 12536
Fertility and Maternal Health Drugs Advisory Committee ..... 12537
Gastrointestinal Drugs Advisory Committee ..... 12538
Generic Drugs Advisory Committee ..... 12539
Medical Imaging Drugs Advisory Committee ..... 12540
Nonprescription Drugs Advisory Committee ..... 12541
Oncologic Drugs Advisory Committee ..... 12542

**Center for Food Safety and Applied Nutrition**



**Center for Devices and Radiological Health**



**Center for Veterinary Medicine**



**National Center for Toxicological Research**



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The hotline will provide the most recent information available on upcoming advisory committee meetings, guidance for making an oral presentation during the open public hearing portion, and procedures on obtaining copies of transcripts of advisory committee meetings. Because the hotline will communicate the most current information available about any particular advisory committee meeting, the establishment of this system will provide interested parties with timely and equal access to such information. The hotline should also conserve agency resources by reducing the current volume of inquiries individual FDA offices and employees must handle concerning advisory committee schedules and procedures.

****************

Dated: October 20, 1994; Linda A. Suydam, *Interim Deputy Commissioner for Operations.* [FR Doc. 94-26604 Filed 10-26-94; 8:45 am]

# NewMembers

## ALABAMA

**Jane Snow**
Jefferson Co. Health Dept.
Birmingham

## CALIFORNIA

**Jill McKeen**
Golden Cheese Co. of California
Riverside

**Milinda Singletary**
Pharmavite, San Fernando

**Ruell Torres**
Pocino Foods Co., Walnut

## CANADA

**Michelle Charlene Rymal**
Quality Fast Foods, Edmonton

**Johanne Tangjay**
A.M.P.A.Q., Quebec

## COLORADO

**Sherri Kochevar**
Colorado State University,
Fort Collins

## GEORGIA

**Kenneth Arnold**
General Mills Restaurant, Inc.
Doraville

**James Disco**
Non Destructive Testing, Atlanta

## GHANA

**Alice Hyjord**
Food Research Institute, Accra

## ILLINOIS

**Jon C. Cunningham**
Amtrak, Chicago

**Dr. Michael Curiale**
Silliker Laboratories Group, Inc.
Homewood

**Amy Taylor**
Otto & Sons, West Chicago

**Jim Youker**
Otto & Sons, West Chicago

## INDIANA

**Helen Piotter**
Indiana State Dept. Of Health
Indianapolis

## IOWA

**Leo Prochelo**
Fort Dodge

## KANSAS

**Lalit K. Bohra**
Kansas State University
Manhattan

## KOREA

**Do-Hee Cho**
Seoul

## MARYLAND

**Joel Santos**
Quest International
Owings Mills

## MICHIGAN

**Julie Dorn**
Comstock Michigan Fruit
Benton Harbor

**Y. Jennifer Lee**
Amway Corporation, Ada

## MINNESOTA

**Mark Stalboerger**
Dairyland Laboratories, Inc.
St. Cloud

## MISSISSIPPI

**Jaheon Koo**
Mississippi State University
Mississippi State

## THE NETHERLANDS

**H. W. Brinkman**
Cacao DeZaan B.V., Koogaandezaan

## NEW YORK

**Richard Craig**
Rochester Midland Corp.
Rochester

**Michelle Iannucci**
Kraft Foods, Harriman

**Michael J. Palmieri**
U. S. Food & Drug Administration
Brooklyn

## OHIO

**Debra Britton**
Mansfield-Richland Co. Health Dept.
Mansfield

## OREGON

**Rainer Greve**
Covert Engineers, Inc., Tualatin

## PENNSYLVANIA

**Stefan Martin**
Berks Packing Co., Inc., Reading

**David Nash**
Health Regulations Compliance
Hulmeville

**Pamela Wolfe**
Knouse Food Co-op Inc., Carlisle

## TEXAS

**Kevin McClavan**
City of Lubbock Health Dept. Lab.
Lubbock

**Paul Shirley**
City of Carrollton Environmental
Health, Carrollton

**Donna L. Wojcik**
Illes Food Ingredients
Dallas

## WISCONSIN

**Jeff Amenda**
Ace Chemical Products, Inc.
Milwaukee

**Dean Cliver**
University of Wisconsin-Madison
Madison

**Harry Gilmore**
Ace Chemical Products, Inc.
Milwaukee

**Glenn Goldschmit**
Wisconsin Dept. of Agriculture
Clintonville

**Kris Kanak**
Ace Chemical Products, Inc.
Milwaukee

**Dan Mielke**
Hunt-Wesson, Inc.
Menomonic

**Joe Zeamer**
Ace Chemical Products, Inc.
Milwaukee

## WASHINGTON

**Dr. Errol Raghubeer**
Nalley's Fine Foods, Tacoma

## DISTRICT OF COLUMBIA

**Charles S. Otto, III**
USPHS/FDA, Washington

# New IAMFES Sustaining Members

**Scott Fritschel**
DuPont
P. O. Box 80357
Wilmington, DE 19880

**Crista Green**
REMEL
12076 Santa Fe Drive
Lenexa, KS 66215

## First Pan American Conference on Food Safety

An important conference on Pan American food safety will explore current issues, new concepts, and future directions for food safety and quality in the Americas. Many food quality and safety issues arise from the increasingly complex marketplace within the region combined with rapid advances in food technology and the impact of the North American Free Trade Agreement (NAFTA), and other similar treaties, on trade and distribution. The presentations and discussions that will take place during the conference are aimed at advancing the harmonization of food safety throughout the Pan American region and beyond.

A distinguished group of international experts will cover a wide spectrum of subjects related to food safety and quality including:

- Sanitary verification of foods, sanitary food packaging, controls in food preparation, HACCP, and street foods
- Chemicals in foods and water, microbiology, mycotoxins, food biotechnology, and food irradiation
- Legislation and the consumer, total quality control, quality control administration, and controls and challenges

This very exciting program will provide participants an opportunity to share perspectives and gain practical insights into this diverse issue through plenary presentations, poster sessions, technical exhibits and informal gatherings.

The conference is sponsored by the International Life Sciences Institute (ILSI) and ILSI Mexico in collaboration with numerous other international agencies and organizations.

For more information on participation or attendance, contact Lili Merritt, ILSI, 1126 Sixteenth Street, NW, Washington, DC 20036, USA; telephone: (202) 659-0074; fax: (202) 659-3859; Internet: meetings@dc.ilsi.org.


# NEWS

## Applications Accepted for the National Dairy Quality Award

Meeting consumer safety, quality and convenience demands – all at an affordable price – are challenging for today's dairy producers. Upjohn Worldwide Animal Health and Dairy Today magazine have teamed up to present the National Dairy Quality Awards which recognize dairy producers who are meeting these consumer demands through excellent management of their operations.

The award program, now in its second year, aims to highlight dairy operations that produce superior-quality milk using top-notch sanitation, animal husbandry and employee management.

Winning operations will receive an expense-paid trip for two to the 1995 World Dairy Expo in Madison, WI where the awards will be presented. Also included in the prize package are free Upjohn products for each winner, and a special feature section on the winning operations in the October 1995 issue of *Dairy Today*.

Dairy producers wishing to apply should do so jointly with their milk processor, veterinarian, extension agent or other advisors who can attest to the quality of their operations. Applications are due by May 31, 1995 and can be obtained by calling (800)753-3151, or writing National Dairy Quality Awards, 2845 N. Hamline Avenue, Suite 126, Roseville, MN 55113-7116.

## Robert C. Wiley Honored at Retirement Party

Robert C. Wiley was honored at a retirement party January 20, 1995 at the Rossborough Inn. His official date of retirement was February 1, 1995.

Bob had been involved since 1953 with teaching and research in the Food Science Program as a Horticulture and Landscape Architecture faculty member at UMPC.

Bob was named a Fellow of the Institute of Food Technologists in 1986, and he has lectured on food processing in several countries around the world. He is a past president of both the College of Agriculture Alumni Chapter and the University of Maryland Alumni Association-International.

## Consent Order Filed in Pet Product Case

On December 20, 1994, a Consent Order of Condemnation and Permanent Injunction was filed in the Pets Smellfree case. In this order, the U.S. Court of Appeals for the Tenth Circuit reversed an earlier grant of summary judgment in favor of Pets Smellfree.

In 1989, the Pets Smellfree product was seized at FDA's request. The government charged that this product was adulterated in that it contained chlortetracycline, an unapproved new animal drug, and was misbranded in various respects. The District court had initially declared the product not a drug, but a food.

In the December 1994 order, the Court of Appeals remanded the case to the District Court with directions to enter summary

judgement determining that Pets Smellfree is a drug under the Federal Food, Drug, and Cosmetic Act, and to conduct further proceedings consistent with this opinion.

The current consent order provides for destruction of the seized goods at the expense of the firm. In addition, it contains an injunction to prohibit future manufacturing or distribution of the same product, any other product containing chlortetracycline or chlortetracycline calcium complex, or any other antibiotic or animal drug, unless there is an approved New Animal Drug Application for the product.

## Long-Term Apple Storage Remains Core Research at Penn State

Researchers in Penn State's College of Agricultural Sciences have established guidelines for long-term storage of apples that could allow Pennsylvania food processing firms to take a bigger bite of the product pie by responding more quickly to consumer desires.

According to George Greene, associate professor of pomology at Penn State's Fruit Research and Extension Center in Biglerville, a better understanding of how different varieties of applies hold up in storage can save thousands of dollars in fruit losses per year for processors. In addition, long-term storage allows firms to keep adequate supplies of fruit on hand to respond to the demands of the marketplace.

Controlled atmosphere (CA) storage extends the shelf life of fruit in two ways. First, lower temperatures (approximately 32°F) retard ripening and reduce water loss. Second, lowering oxygen levels and raising the level of carbon dioxide in storage rooms enables fruit to be stored for up to 12 months.

Although controlled atmosphere storage has been used since the 1960s, Penn State's research indicates that growers and packing plants can still improve how they can store their fruit before shipping and processing.

## Label Check, Ltd.™ Brings New Approach to Food Label Compliance

On February 1, 1995, C. Graham Arnold and Edward W. Underriner announced the opening of Label Check, Ltd.™, a food product label review and consulting firm. Based in Baltimore, MD, Label Check, Ltd.™ provides clients with full and complete evaluation of food product labels to assure conformity and compliance with federal, state and local food labeling regulations.

Arnold and Underriner worked together for several years at McCormick & Company, Inc., the international spice and seasoning firm. Jointly, they bring to Label Check, Ltd.™ a combined 60 years of hand-on experience with food product labeling regulations, food ingredients and food product commercialization. Their expertise is both domestic and international in scope.

## ADPI Publishes Bilingual Ingredient Brochure

The American Dairy Products Institute (ADPI), national trade association of the processed dairy products industry, announces the availability of the Spanish translation of its popular publication "Ingredient Description Brochure – Dry Milks, Whey & Whey Products, Lactose." The translated edition was an important tool in the recently completed Mexican 'reverse' trade mission cosponsored by ADPI and Dairy Management Incorporated.

The 15-page publication provides definitions and compositional parameters for the dairy products represented by ADPI. Information on labeling, product applications and functionality, packaging, storage, and shipping, also is contained in this publication.

To obtain a copy of the Ingredient Description Brochure, which serves as a useful guide in selecting dairy products as functional and nutritious ingredients in a broad range of food products, contact the American Dairy Products Institute, 130 N. Franklin St., Chicago, IL 60606; telephone (312) 782-4888. Please specify whether the English or Spanish translation is desired.

## Farmers Take a Giant Step Toward Environmental Responsibility

The first farmer-led effort to address agricultural-related environmental issues with farm and non-farm audiences was launched on January 25, 1995, in Chicago. Foundation E.A.R.T.H. (Environment, Agriculture, Research & Technology in Harmony), a nonprofit organization supporting the adoption of technologically advanced, environmentally sound farming practices, was founded by a group of farmers with national leader experience.

Foundation E.A.R.T.H. will gather and exchange information among farmers through a clearinghouse, improve public understanding of new agricultural technologies and encourage the development of agriculture-based, environmentally friendly products.

The founding board includes farmers Randy Cruise, Pleasanton, NE; Alan Kemper, Lafayette, IN; Bill Mullins, Chicago, IL; Tim Trotter, Coal City, IL; and Steve Wentworth, Oreana, IL. Mary Gade, director of the Illinois Environmental Protection Agency, and farmer Jim Mosely of West Lafayette, IN are also board members.

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**Foodservice Managers and Employees** — The *Applied Foodservice Sanitation* course is the most recognized, widely accepted food safety training and certification program available for managers today. It is the first manager certification program to define and discuss the HACCP system. It's great as an introduction for new sanitarians with food program responsibilities. And SERVSAFE also includes a manager training video, instructor materials and employee videos and guides to streamline training.

**Sanitarians** — The *Managing a Food Safety System* HACCP-based course is designed specifically to meet the needs of sanitarians and industry professionals. It offers opportunitites for collaborative workshops between regulatory and industry professionals to discuss the practical implementation of the principles of HACCP consistent with the 1993 FDA Food Code. Some examples of past workshops include:

- *The Department of Commerce and FDA* use of the *Managing a Food Safety System* course as the HACCP curriculum for the National Seafood Foodservice Pilot Program.
- *The Department of Commerce and the Chicago Health Department* use of SERVSAFE programs to train field personnel.
- *National and state environmental health association* sponsorship of SERVSAFE programs for their members.

The *Managing a Food Safety System* course, as well as other SERVSAFE programs, can be presented as a seminar in your state. For more information on arranging a seminar, call **1-800-765-2122 ext. 772.**

Let us help you take the hassle out of HACCP with the most recognized, up-to-date food safety training available— **SERVSAFE Serving Safe Food.** For more information on our HACCP-based SERVSAFE programs, call **1-800-765-2122 today!**

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# Industry**Products**

## New *Listeria* Test from Unipath Speeds Detection

A new Oxoid *Listeria* Rapid Test yields clear and accurate results from both food samples and environmental swabs in only 43 hours, less than half the time required for traditional tests.

The new test is based on patented monoclonal anitbody technology and makes use of Unipath's Clearview Test Unit for the first time in food testing. Extensive evaluation of the test on more than 1,000 different sampoles representing a wide variety of foods has shown the accuracy of the test to be greater than 99%.

The test protocol has been developed to coincide conveniently with normal working hours. The culture involves two 21-hour enrichment stages using Oxoid Half Fraser Broth and Buffered *Listeria* Enrichment Broth, which have been selected for optimal recovery and growth of *Listeria* organisims. After enrichment, the sample is heated at 80°C to release *Listeria* flagella antigen. The sample is then cooled and 135µl is added to a Clearview Test Unit, which provides a clearly visible result within 20 minutes.

Each Oxoid *Listeria* Rapid Test pack contains sufficient Test Units, Half Fraser Supplement and Positive Clearview Control for 50 tests. Fully compatible Oxoid Fraser Broth and Buffered *Listeria* Enrichment Broth are available serparately from Oxoid. Only an incubator, water bath, and glass test tubes are required to perform this test.

Unipath – Nepean, Ontario

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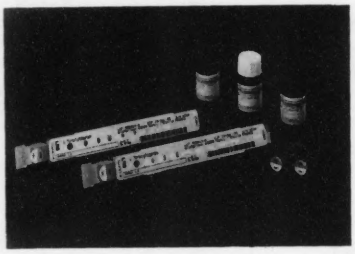


*bioMérieux Vitek, Inc.*

## New Assay Identifies *Listeria monocytogenes*

bioMérieux Vitek, Inc., has introduced a new LMO assay for use with their automated VIDAS® or mini VIDAS® microbiology instrument. The new product is an automated qualitative enzyme-linked fluorescent immunoassay (ELFA) for the detection of *Listeria monocytogenes* in food, food ingredients and environmental samples. This highly specific assay can be used as a complementary screen to the VIDAS *Listeria* genus assay or for the direct screening of *L. monocytogenes*. Test results are available in about 70 minutes following enrichments.

bioMérieux Vitek, Inc. – Hazelwood, MO.

**Reader Service** No. 351

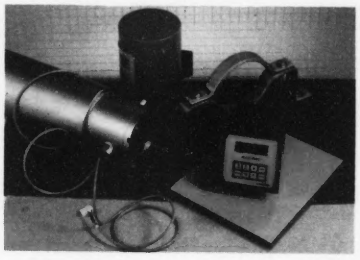
## Greater Measurement Span in Non-Contacting Continuous Gamma Level System

The Model 4790 non-contacting continuous gamma level system from Kay-Ray Sensall, Inc. now features multi-detector capability for an increased measurement span, up to 40 feet, in any shape vessel. The 4790 system also features password protection, automatic sample recording to store calibration data, and provisions for an interlock system to prevent vessel entry while the system is in use.

The Model 4790 uses gamma energy in providing non-intrusive measurements of liquids, slurries or solids accurate within ±1% span. It is unaffected by high process temperature, high pressure, corrosives, abrasives, vapors or dust, and the detectors are explosion proof as well as NEMA 4X approved. The system's self-diagnostics continually ensures sytem integrity and confirms status to the transmitter's display.

Kay-Ray Sensall, Inc., Mount Prospect, IL.

**Reader Service** No. 371



*Kay-Ray Sensall, Inc.*

## Improved Magnetic Field Strength

The permanent Magnet Interpole Pulley, a new and powerful magnetic pulley, is now available from Eriez Magnetics.

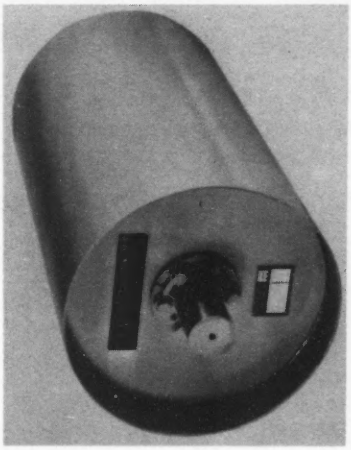
The pulley features a new circuit design. Four main axial poles and four interpoles improve magnetic field strength dramatically when compared with current magnetic pulley designs. The stronger magnetic field strength permits belt speeds up to 440 fpm (134 mpm) with higher capacities.

Standard pulley diameters

range from 8 to 36 inches (203 to 914mm) while available belt widths range from 8 to 60 inches (203 to 1524mm). Larger sizes can be built to order.

Eriez Magnetics, Erie, PA.

**Reader Service No. 372**



*Eriez Magnetics*

## New Abrasion Resistant Peristaltic Pump Tubing

BPT (Biologically Perfect Tubing) manufactured by the Sani-Tech Group, is an excellent choice for peristaltic pump applications where the ultimate in purity, chemical and abrasion resistance are required. BPT has a significantly longer life span than tubing made from silicone, up to 10 times. Temperatures for process applications range from -70°F to as high as 220°F. BPT tubing meets USP, NF and Pharmacopoeia Class VI requirements, as well as, complying with FDA 21 CFR 177.2600 and USDA standards.

Sani-Tech's BPT is available in the full range of peristaltic pump sizes. This tubing can be assembled with unitized sanitary ends which assures a full flow (S.I.B.) Smooth Inner Bore, bacteria-free connection in lengths up to 50' long or can be purchased in bulk. Bulk tubing is supplied in validatable packaging.

Sani-Tech Corporate, Lafayette, NY.

**Reader Service No. 376**

## Inspector™ Luminometer Provides Rapid Microbiological Testing for HACCP Compliance

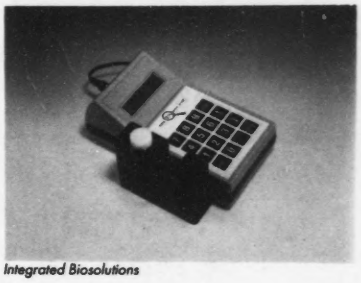
The Inspector Luminometer from Integrated Biosolutions is the first comprehensive, rapid microbiological testing system that meets all of the requirements for implementing and maintaining the food industry's HACCP Program. Designed to be used in the lab or the plant, the Inspector permits fast, accurate monitoring of critical control points which, in the event of contamination confirmation, allows for quick corrective action. The system records and stores test results and provides an interface port to permit downloading to a printer or computer.

The Inspector Luminometer is highly flexible, totally portable and easy to operate. Automatic injection of test reagent reduces the number of assay steps and eliminates the risk of operator error. The Inspector enables a number of different tests to be performed including rapid sanitation control checks, rinse water analysis, and total bacteria screens.

Integrated Biosolutions – Monmouth Junction, NJ.

**Reader Service No. 374**

*Sani-Tech Corporate Communications*



*Integrated Biosolutions*

## PARADIGM™ 2000 Redifines Dairy Plant Sanitation

Challenges including reducing overall operating costs, reducing water use, related surcharges, worker safety issues and cleaning efficiently call for new solutions. The Klenzade PARADIGM™ 2000 product line tackles these problems from new perspectives, offering processors a number of unique benefits.

The Paradigm 2000 products help lower the pH of cleaning solutions and wastewater, have the potential for reducing rinse water volumes and related cleaning cycle times, and also help enhance worker safety, based on the product line's unique chemistry.

Klenzade developed this unique chemistry to address the needs expressed by the dairy industry. The patent pending Paradigm 2000 chemistry uses a proteolytic enzyme to replace chlorine, a surfactant/alkaline builder system to replace caustic, and an organic chelating agent to replace phosphates, for water conditioning, to prevent mineral film redeposition and minimize calcium phosphate formation. A sanitation program using Paradigm 2000 products in conjunction with an acid or peracid sanitizer greatly reduces corrosion potential, helping to minimize surface corrosion which can lead to microbial biofilm development.

Klenzade, a Division of Ecolab, St. Paul, MN.

**Reader Service No. 375**

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*Dairy, Food and Environmental Sanitation, Vol. 15, No. 4, Pages 246-252*


# 3-A Accepted Practice for Supplying Air Under Pressure in Contact with Milk, Milk Products and Product Contact Surfaces

## Number 604-04

Formulated By
International Association of Milk, Food and Environmental Sanitarians
United States Public Health Service
The Dairy Industry Committee

It is the purpose of the IAMFES, USPHS, and DIC in connection with the development of the 3-A Sanitary Standards Program to allow and encourage full freedom for inventive genius or new developments. Air under pressure specifications heretofore or hereafter developed which so differ in design, materials, and fabrication or otherwise as not to conform to the following practices, but which, in the fabricator's opinion, are equivalent or better, may be submitted for the joint consideration of the IAMFES, USPHS, and DIC at any time. **NOTE:** Use current revisions or editions of all referenced documents cited herein.

A **SCOPE**

A1 These 3-A Accepted Practices shall pertain to the sanitary aspects of the equipment and filters used in the supplying of air under pressure in contact with milk or milk products or product and solution contact surfaces. The system shall begin with the air intake filter and end at the point(s) of application.

A2 In order to conform with these 3-A Accepted Practices, equipment for the supplying of air as defined herein shall comply with the following design, material, fabrication, and installation criteria and the applicable special requirements.

B **DEFINITIONS**

B1 *Air Under Pressure:* Shall mean air, the pressure of which has been increased by mechanical means to exceed atmospheric pressure, and which is in contact with milk or milk products or product or solution contact surfaces, or used for the automatic opening of containers, the drying of product contact surfaces, and for other purposes where specifically directed at a product contact surface.

B2 *Low Pressure Air:* Shall mean air under pressure which does not exceed 150 psig or 1034 kPa (10.3 bar[1]).

B3 *High Pressure Air:* Shall mean air under pressure which is in excess of 150 psig or 1034 kPa (10.3 bar).

B4 Air systems are of two categories:

B4.1 *Central System:* Shall mean those which furnish air to more than one piece of equipment. (See Figure 1.) Such systems usually require the use of an air storage tank.

B4.2 *Individual System:* Shall mean those which furnish air to one piece of equipment and which may be an integral part of a given piece of equipment. (See Figures 2, 3, 4 and 5.)

B5 *Product:* Shall mean milk and milk products.

B6 *Container:* Shall mean a single-service package or material being formed into the package or a packaging construction including one or more of a package body, cap, closure, cover, supplementary device such as a dispensing fitment or other structure capable of holding the product.

B7 *Supplementary Fitment or Device:* Shall mean any component or assembly which is attached to the container. Examples include but are not limited to: pour spouts, closures, handles and tamper evident seals.

B8 **Surfaces**

B8.1 *Product Contact Surfaces:* Shall mean all surfaces which are exposed to the product and surfaces from which liquids (materials) may drain, drop, or be drawn into the product or into the container, and surfaces that touch the product contact surfaces of the container.

B4.2 *Solution Contact Surfaces:* Shall mean the interior surfaces of the system which are used exclusively for supply and recirculation of cleaning and/or sanitizing solutions, except those used to supply concentrated cleaning and/or sanitizing materials to the point of use.

B4.3 *Nonproduct Contact Surfaces:* Shall mean all other exposed surfaces.

C **MATERIALS**

C1 **Metals**

C1.1 Product contact surfaces shall be of stainless steel of the American Iron and Steel Institute (AISI) 300 Series[2] or corresponding Alloy Cast Institute[3] (ACI) types (See Appendix, Section H.), or metal which under conditions of intended use is at least as corrosion resistant as stainless steel of the foregoing types, and is nontoxic and nonabsorbent, except that:

C1.2 Rubber and rubber-like materials may be used for gaskets, flexible tubing and parts having the same functional purposes.

C1.2.1 Rubber and rubber-like materials when used for the above specified application(s) shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Rubber and Rubber-Like Materials Used as Product Contact Surfaces in Dairy Equipment, Number 18-.

C1.3 Plastic materials may be used for gaskets, flexible tubing and parts having the same functional purposes.

C1.3.1 Plastic materials when used for the above specified application(s) shall conform with the applicable provisions of the 3-A Sanitary Standards for Multiple-Use Plastic Materials Used as Product Contact Surfaces for Dairy Equipment, Number 20-.

C1.4 Rubber and rubber-like materials and plastic materials having product contact surfaces shall be of such composition as to retain their surface and conformational characteristics when exposed to the conditions encountered in the environment of intended use and in cleaning and bactericidal treatment.

C2 **Filters and Filter Media**

C2.1 All filters shall consist of materials which, under the conditions of intended use, are nontoxic, nonmedia releasing, and do not release toxic volatiles or other contaminants including those which may impart any flavor or odor to the product or to the air.

C2.2 Bonding materials[4] in the media, if used, shall be nontoxic, nonvolatile and insoluble under all conditions of use.

C2.3 Electronic air cleaners utilizing electrostatic precipitation principles to collect particulate matter may be used.

D **FABRICATION**

D1 **Surface Texture**

D1.1 All product contact surfaces shall have a finish at least as smooth as a No. 4 ground finish on stainless steel sheets and be free of imperfections such as pits, folds and crevices in the final fabricated form. (See Appendix, Section I.)

D2 **Joining**

D2.1 All permanent joints in metallic product contact surfaces shall be continuously welded. Welded areas on product contact surfaces shall be at least as smooth as a No. 4 ground finish on stainless steel sheets, and be free of imperfections such as pits, folds, and crevices.

D3 **Fittings**

D3.1 All sanitary fittings and connections shall conform with the applicable provisions of the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products (Formerly 08-17, As Amended), Number 63-.

D4 **Air Supply Equipment**

D4.1 Air supply shall be taken from a clean space or from relatively clean outer air and shall pass through a filter upstream from the compressing equipment. This filter shall be so located and constructed so that it is easily accessible for examination, and the filter media are easily removable for cleaning or replacement. The filter shall be protected from environmental and physical damage.

D4.2 Air under pressure shall be oil free. Oil free air may be produced by one of the following methods or their equivalent:

D4.2.1 Use of carbon or teflon ring piston, or diaphragm type, or water lubricated compressors.

D4.2.2 Use of lubricated compressors with effective provisions for removal of oil by condensation and coalescing filtration or absorption.

D4.2.3 Water lubricated or nonlubricated blowers.

D5 **Air Under Pressure**

D5.1 Air under pressure systems in excess of 15 psig or 103 kPa or 1.03 bar shall be provided with methods of moisture removal. The removal of moisture may be achieved by condensation and coalescing filtration or absorption or equivalent to prevent free water in the system.

D6 **Filters**

D6.1 Filters shall be constructed and installed so as to assure effective passage of air through the filter media only.

D6.2 Intake air filter efficiency shall be at least 98% SAE J726, June 1987[5] using AC coarse test dust.

D6.3 The coalescing filter and any traps as referenced in D4.2.2 and D5, when used, shall be located in the air pipeline downstream from the compressing equipment and from the air tank, if one is used (See Figure 1, 3 and 5). The filter shall be readily accessible for examination, cleaning and for replacing the filter media. The moisture trap shall be equipped with a petcock or other means for draining accumulated water.

D6.4 The final filter media shall be disposable. The filter media shall be located in the air line upstream from, and as close as possible to the point of application (See Figures 1, 2, 3 and 5.) except that a final filter shall not be required where the compressing equipment is of a fan or blower type and operating at a pressure of less that 5 psig or 34 kPa (0.346 bar). (See Figure 4.)

D6.4.1 Final filter efficiency shall be at least 99% as measured by the DOP test[6]. When commercially sterile air is required the final filter efficiency shall be at least 99.999% as measured by the DOP test.

D6.4.2 Disposable filter media shall not be cleaned and reused.

D7 **Air Piping** -. **NOTE:** The requirements of D7 which follow do not apply where the compressing equipment is of the fan or blower type, nor do they apply to high pressure lines.

D7.1 The air piping from the compressing equipment to the filter and any trap described under D6.3 shall be readily drainable.

D7.2 A product check valve which complies with the applicable criteria in the 3-A Sanitary Standards for Vacuum Breakers and Check Valves for Milk and Milk Products, Number 58- shall be installed in the air piping downstream from the final filter described in D6.4 to prevent backflow of product into the air pipeline, except that:

D7.2.1 A check valve shall not be required if the air piping enters the product zone from a point higher than the product overflow level which is open to atmosphere or is for dry product applications or for other dry application where liquids are not present.

D7.3 Air distribution piping and fittings between the final filter and the inlet to the sanitary check valve shall be of corrosion-resistant materials.

D7.4 Air distribution piping, fittings and gaskets between the discharge of the sanitary check valve to the processing equipment shall conform with the 3-A Sanitary Standards for Sanitary Fittings for Milk and Milk Products (Formerly 08-17, As Amended), Number 63-, except that:

D7.4.1 Where a check valve is not required, (See D7.2 and D7.2.1.) plastic or rubber or rubber-like tubing and suitable compatible fittings and connections made of plastic or stainless steel may be used between the final filter and the point of application.

E **SPECIAL REQUIREMENTS OF AGITATION BY AIR**

E1 Tubing used to introduce air into the product and/or product zone shall conform with the 3-A Sanitary Standards for Polished Metal Tubing for Dairy Products, Number 33-.

E2 There shall be no threads on product contact surfaces.

E3 When drilled or perforated pipe is used, internal drilling burrs shall be removed and the orifices shall be chamfered on the outer surface of the pipe.

E4 If the volume of the air from the compressing equipment is in excess of that required for satisfactory agitation, suitable means shall be employed to eliminate the excess volume.

E5 If the product to be agitated is in an enclosed tank, adequate means to allow the air used for agitation to escape shall be provided.

F **SPECIAL REQUIREMENTS FOR AIR DIRECTED AT CONTAINERS, CLOSURES AND SUPPLEMENTARY FITMENTS**

F1 When air under pressure is directed at product contact surfaces of containers, closures and supplementary fitments, air passage from the final filter to the point of application shall be of a nontoxic, relatively nonabsorbent material.

F2 Check valves are not required.

F3 The final filter shall be located as close as practical to the point of application. (See Figures 1, 2, 3, 5 and 6.)

G **SPECIAL REQUIREMENTS FOR HIGH PRESSURE AIR WHICH IS TO BE INCORPORATED IN PRODUCTS**

When high pressure air is to be incorporated in products:

G1 Stainless steel piping, tubing, and fittings in conformity with applicable ASA Standards for high pressure air shall be used downstream from the filter.

G2 A high pressure stainless steel check valve shall be installed upstream from and as near as possible to the point of introduction of air to the product line.

**APPENDIX**

H **STAINLESS STEEL MATERIALS**

Stainless steel conforming to the applicable composition ranges established by AISI for wrought products, or by ACI for cast products, should be con-sidered in compliance with the requirements of Section C1.1 herein. Where welding is involved, the carbon content of the stainless steel should not exceed 0.08%. The first reference cited in C1.1 sets forth the chemical ranges and limits of acceptable stainless steel of the 300 Series. Cast grades of stainless steel corresponding to types 303, 304, and 316 are designated CF-16F, CF-8, and CF-8M, respectively. The chemical compositions of these cast grades are covered by ASTM specifications[7]. A351/A351M, A743/A743M and A744/A744M.

I **PRODUCT CONTACT SURFACE FINISH**

Surface finish equivalent to 150 grit or better as obtained with silicon carbide, properly applied on stainless steel sheets, is considered in compliance with the requirements of Section D1.1 herein. A maximum Ra of 32 µin. (0.80 µm), when measured according to the recommendations in ANSI/ASME[8] B46.1 - Surface Texture, is considered to be equivalent to a No. 4 finish.

J **FILTER REPLACEMENT**

The final filter should be provided with a method to indicate the need for filter replacement by using established empirical techniques, differential pressure or other integral test methods.

K **DIAGRAMS**

These diagrams are intended to demonstrate general principles only, and are not intended to limit individual ingenuity. The design used should conform with the sanitary requirements set forth in these 3-A Accepted Practices. The following examples are included in this Appendix:

K1 Drawings of 3-A Pressurized Air Systems

| Drawing Name | Figure | 3-A Drawing | Page |
|---|---|---|---|
| Central System | 1 | 3-A 604-04-01 | 6 |
| Individual System | 2 | 3-A 604-04-02 | 7 |
| Individual System | 3 | 3-A 604-04-03 | 8 |
| Individual System | 4 | 3-A 604-04-04 | 9 |
| Rotating Mandrel Assembly | 5 | 3-A 604-04-05 | 10 |
| Blowmoulder Air Piping | 6 | 3-A 604-04-06 | 11 |

**These 3-A Accepted Practices shall become effective November 20, 1994 at which time, 604-03 shall become null and void.**

[1] *One bar equals 0.967 atm or 14.5 psig under standard temperature and pressure conditions.*

[2] *The data for this series are contained in the AISI Steel Products Manual, Stainless & Heat Resisting Steels, November 1990, Table 2-1, pp. 17-20. Available from the American Iron and Steel Society, 410 Commonwealth Drive, Warrendale, PA 15086 (412) 776-1535.*

[3] *Steel Founders Society of America, Cast Metal Federation Building, 455 State Street, Des Plaines, IL 60016 (708) 299-9160.*

[4] *Adhesives shall comply with 21 CFR 175 - Indirect Food Additives: Adhesives and Components of Coatings. Document is available for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (202) 783-3238.*

[5] *Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001 (412) 776-4841.*

[6] *MIL-STD-282, February 1989 - Military Standard 282: Method 102.9.1: Dioctylphthalate Fog Method (DOP). Available from Standardization, Document Order Desk (Department of Navy), 700 Robbins Avenue, Building 4, Section D, Philadelphia, PA 19111-5094 (215) 697-4737.*

[7] *Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187 (215) 299-5400.*

[8] *Available from the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017-2392 (212) 705-7722.*

3-A PRACTICE
PRESSURIZED AIR SYSTEMS
3-A-604-04-01

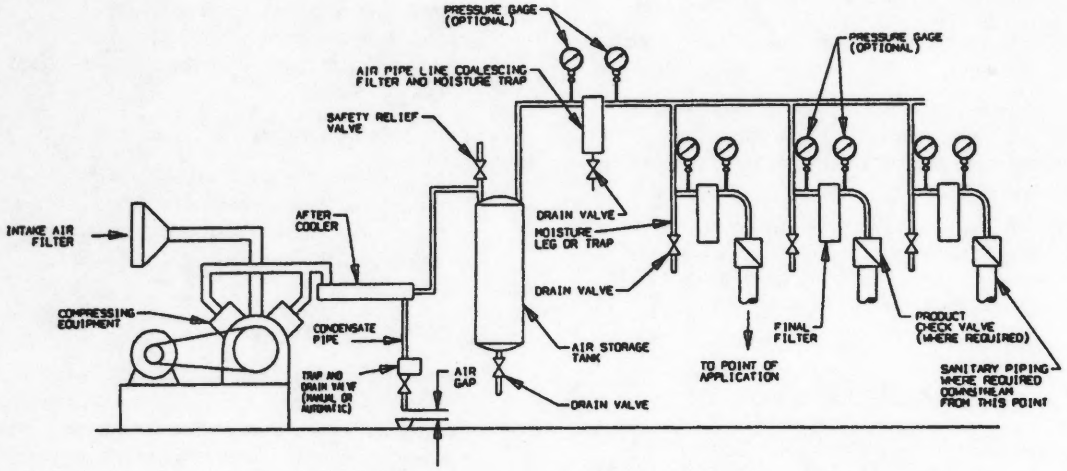


FIG. 1 CENTRAL SYSTEM

3-A PRACTICE
PRESSURIZED AIR SYSTEMS
3-A-604-04-02

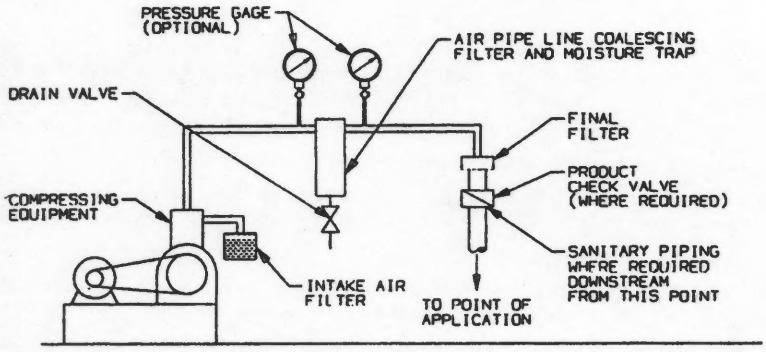


FIG. 2 INDIVIDUAL SYSTEM

3-A PRACTICE
PRESSURIZED AIR SYSTEMS
3-A-604-04-03

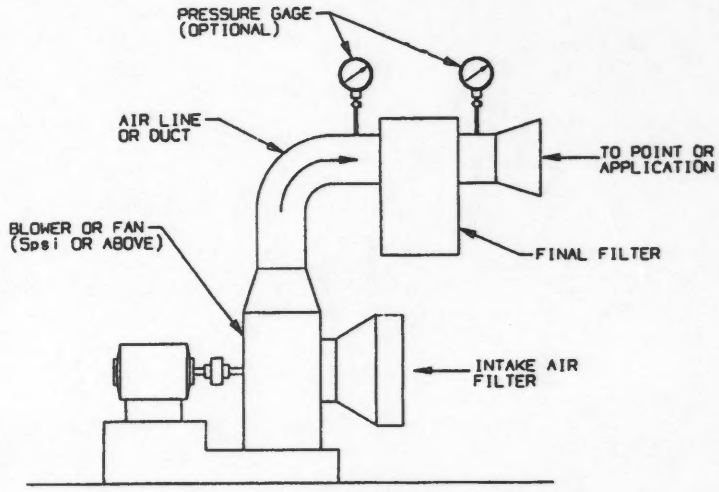


FIG. 3 INDIVIDUAL SYSTEM

3-A PRACTICE
PRESSURIZED AIR SYSTEMS
3-A-604-04-04

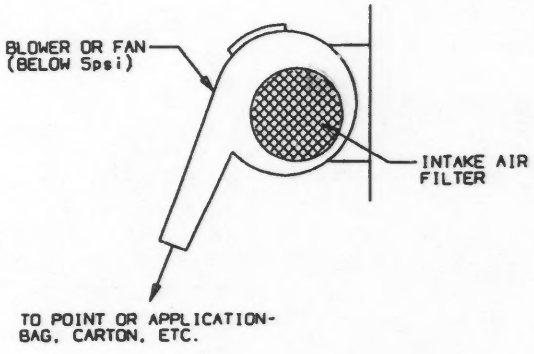


FIG. 4 INDIVIDUAL SYSTEM

3-A PRACTICE
PRESSURIZED AIR SYSTEMS
3-A-604-04-05

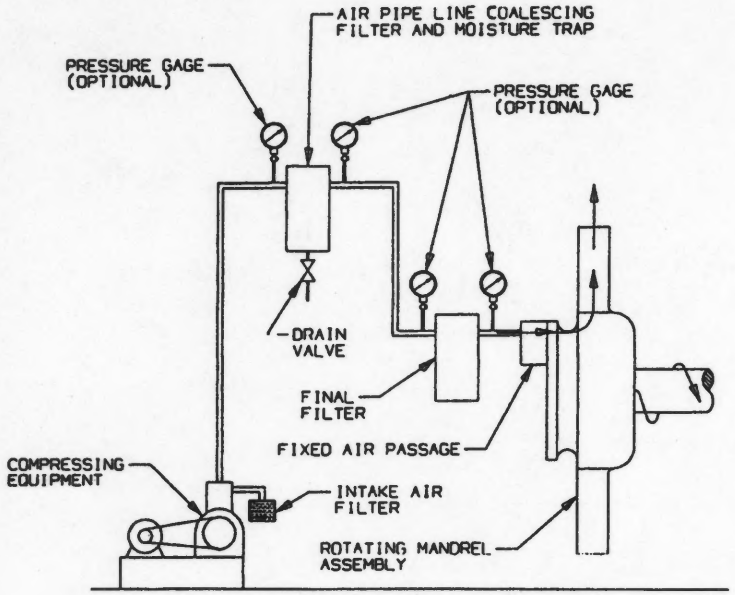


FIG. 5
ROTATING MANDREL ASSEMBLY

3-A PRACTICE
PRCSSURIZED AIR SYSTEMS
3-A-604-04-06

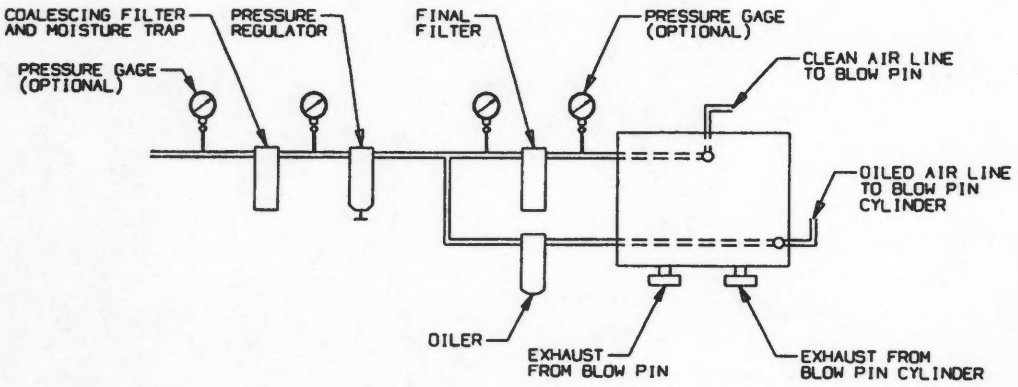


FIG. 6
LOCATION OF FINAL FILTER ON BLOW MOLDER

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**Westbrook, ME 04092**
**(207) 856-0300; (800) 321-0207; Fax: (207) 856-0630**

LIGHTNING™, a new ATP-bioluminescence test, is the easiest and most portable cleaning validation system available. SNAP™ is a simple and portable antibiotic residue test for milk.

**International BioProducts, Inc.**
**14780 NE 95th Street**
**Redmond, WA 98052**
**(206) 883-1349; (800) 729-7611; Fax: (206) 881-6880**

International BioProducts offers TECRA products for detection of pathogens and toxins and 1,000 laboratory supplies including BioPro Premium dehydrated media.

**Klenzade, Division of Ecolab, Inc.**
**Ecolab Center**
**St. Paul, MN 55102**
**(612) 293-2233; Fax: (612) 293-2260;**

Klenzade provides sanitation products, systems and services.

**Michelson Laboratories Inc.**
**6280 Chalet Dr.**
**Commerce, CA 90040**
**(310) 928-0553; (714) 971-0673; Fax: (310) 927-6625**

Full service analytical food and environmental testing laboratory, offering nutritional labeling programs, QA/QC programs, chemical and microbiological analysis.

**Nasco**
**901 Janesville Avenue**
**Fort Atkinson, WI 53538**
**(414) 563-2446; Fax: (414) 563-8296**

Nasco manufactures Whirl-Pak, sterile, sample bags which have both "Puncture Proof Tabs" and sterility documentation. Four new bags will be shown at the annual meeting.

**Nelson-Jameson, Inc.**
**PO Box 647**
**Marshfield, WI 54449**
**(715) 387-1151; (800) 826-8302; Fax: (715) 387-8746**

Nelson-Jameson, supplying the food and dairy industry for almost 50 years, offers a wide range of unique products to help food and dairy processors integrate QA/QC with plant operations.

**Neogen Corporation**
**620 Lesher Place**
**Lansing, MI 48912**
**(517) 372-9200; (517) 372-2006**

Neogen Corporation is scheduled to exhibit.

**Organon Teknika**
**100 Akzo Avenue**
**Durham, NC 27712**
**(919) 620-2000; (800) 682-2666; Fax: (919) 620-2107**

Organon Teknika offers rapid identification tests for food pathogens including *Salmonella*-Tek, *Listeria*-Tek, and EHEC-Tek (for *E. coli* O157:H7).

**Pfizer Animal Health**
**812 Springdale Drive**
**Exton, PA 19341**
**(610) 363-3100; (800) 877-6250; Fax: (610) 363-3284**

Pfizer Animal Health offers technology to enable food and milk processors to test products for antibiotic residues. The Penzyme Farm Test and Penzyme III Antibiotic Residue Test detects beta-lactam antibiotics in milk. Both of these products are AOAC certified.

**Prism**
**8300 Executive Center Drive, Suite 400**
**Miami, FL 33166**
**(305) 592-6312; (800) 677-7476; Fax: (305) 594-9280**

Prism is scheduled to exhibit.

**Q. C. Inc.**
**1205 Industrial Hwy.**
**Southampton, PA 18966**
**(215) 355-3900; (800) 289-TEST; Fax: (215) 355-7231**

Q. C. Inc. provides food and dairy analysis to include chemical and microbiological analysis.

**Q Laboratories, Inc.**
**2014 Harrison Avenue**
**Cincinnati, OH 45214**
**(513) 662-1300; Fax: (513) 662-1380**

Q Laboratories, Inc. is an independent testing and consulting laboratory providing microbiological and analytical support to the food, beverage, cosmetic, pharmaceutical and dairy industries.

**R-TECH**
**PO Box 116**
**Minneapolis, MN 55440**
**(612) 481-2207; (800) 328-9687; Fax: (612) 486-0837**

R-TECH is a contract food research and testing laboratory offering professional, cost effective, analytical, nutrition labeling, product development, pilot plant and sensory services.

**REMEL**
**12076 Santa Fe Drive**
**Lenexa, KS 66215**
**(913) 888-0939; Fax (800) 447-5750**

Microbiology products including prepared culture media (plate and tubes), sterility testing media and contact plates for environmental sampling.

**Silliker Laboratories Group**
**900 Maple Road**
**Homewood, IL 60430**
**(708) 957-7878; Fax: (708) 957-8449**

For over 27 years, Silliker Laboratories has been the nation's leading food testing and consulting organization. New for '95: Audit services, Food Safety for Product Developers short course, and "The Heart of HACCP" training video.

**Spiral Biotech, Inc.**
**7830 Old Georgetown Road**
**Bethesda, MD 20814**
**(301) 657-1620; Fax: (301) 652-5036**

Spiral Biotech will feature its complete system of instruments

and software for automating microbiological testing, including spiral platers, diluters, colony counters and air samplers.

**3-A Sanitary Standards Symbol Adminstrative Council**
**3020 Bluff Road**
**Columbia, SC 29209**
**(803) 783-9258; Fax: (803) 783-9265**

The 3-A Symbol Council authorizes the voluntary use of the 3-A Symbol to manufacturers of dairy equipment to assure users, sanitarians and manufacturer that the equipment is of sanitary design.

**3M Microbiology Products**
**3M Center, Building 275-4E-01**
**St. Paul, MN 55144-1000**
**(800) 228-3957; Fax: (612) 733-9596**

Petrifilm™ plates increase efficiency to raise your productivity. They reduce microbial testing to three simple steps.

**Troy Biologicals, Inc.**
**1238 Rankin Street**
**Troy, MI 48083**
**(800) 521-0445; (810) 585-9720; Fax: (810) 585-2490**

Troy Biologicals is a distributor of microbiological products for industry and research.

**Unipath Co.,** Oxoid Division
**217 Colonnade Road**
**Nepean Ontario, Canada K2E 7K3**
**(800) 567-8378; (613) 226-1318; Fax: (613) 226-3728**

Anaerogen™ – an anaerobic generating system. Campygen™ and Chremogenic media.

**VICAM, L.P.**
**313 Pleasant Street**
**Watertown, MA 02172**
**(617) 926-7045; (800) 338-4381; Fax: (617) 923-8055**

VICAM develops and manufactures rapid mycotoxin and microbiological testing systems for the food and feed industry.

**Warren Analytical Laboratory**
**PO Box G, 650 - "O" Street**
**Greeley, CO 80631**
**(800) 945-6669; (970) 351-6344; Fax: (970) 351-6648**

Call Warren today for microbiological testing, shelf life studies, nutritional labeling analysis and residue chemistry for antibiotics, hormones and pesticides.

**Weber Scientific**
**2732 Kuser Road**
**Hamilton, NJ 08691**
**(800) 328-8378 (609) 584-7677; Fax: (609) 584-8388**

Weber Scientific specializes in equipment for bacteria and antibiotic residue detection, butterfat, temperature and sanitation testing, as well as general laboratory equipment.

**ZEP Manufacturing Co.**
**1310 Seaboard Industrial Blvd.**
**Atlanta, GA 30318**
**(404) 352-1680; Fax: (404) 350-6232**

National Manufacturer of specialty chemicals, acid sanitizers, peroxide and quats, hand cleaners, dispensers and cleaners.

# ComingEvents

## MAY

• **1-3, NIR Technology,** a short course offered by the American Association of Cereal Chemists (AACC) in Chicago, IL. For more information, contact Marie McHenry, Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250; fax (612) 454-0766.

• **1-3, Clean Room Technology,** Chicago, IL; a short course provided by the Institute of Applied Pharmaceutical Sciences. This course reviews the current state of technology associated with pharmaceutical and medical device clean rooms. For more information, contact the Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816-1052; telephone (908) 613-4500; fax (908) 238-9113.

• **1-3, Current Good Manufacturing Practice (cGMP) for the Pharmaceutical and Allied Industries,** Fort Lauderdale, FL. Topics covered will include not only the legal requirements for cGMP in the Federal Food, Drug, and Cosmetic Act but primarily the "how tos" of purchasing, manufacturing, packaging, labeling and QA/QC, as well as training production personnel in cGMP. For more information, contact the Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816-1052; telephone (908) 613-4500; fax (908) 238-9113.

• **1-4, Downstream Processing in Biotechnology,** East Brunswick, NJ. From isolation to validation, this course provides practical information for designing and implementing downstream processes. Topics include primary isolation, recovery, and concentration techniques. For more information, contact the Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816-1052; telephone (908) 613-4500; fax (908) 238-9113.

• **2-3, AIB Regional Updates in Food Plant Sanitation,** San Jose, CA. The program will include new topics in addition to the basic key elements for any viable sanitation program, as well as sessions on the basic principles of HACCP and sanitary design standards. Tuition fees are $300 per person for members of the American Institute of Baking, and $325 for non-members. For further information, write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502, or call (913) 537-4750 or (800) 633-5137.

• **2-3, Shelf Life Extension for Baked Goods Seminar,** Embassy Suites, KCI, Kansas City, MO. Conducted by the American Institute of Baking, this seminar will give participants the understanding of formulation and ingredient functions that affect shelf life extension as well as the importance of proper processing and packaging. Tuition fees are $525 per person, from companies who are members of the Institute, and $575 for non-members. For further information, write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502, or call (913) 537-4750 or (800) 633-5137.

• **2-4, Seafood Quality Evaluation Workshop for Analytical Laboratories and the Seafood Industry,** National Marine Fisheries Service Western Inspection Branch, Bell, CA. Cosponsored by the Univ. of CA Sea Grant Extension Program, U.S. Food and Drug Administration, U.S. Dept. of Commerce, and National Food Processors Association. For more information, contact Pamela Tom, Food Science and Tech. Dept., UC Davis, Davis, CA 95616-8598; telephone (916) 752-3837; fax (916) 752-4759; e-mail pdtom@ucdavis.edu.

• **4-5, Writing Standard Operating Procedures to Meet cGMP Requirements,** Fort Lauderdale, FL. During this course, participants will acquire a better understanding of what the FDA is looking for, methods used for compiling information, assignment of responsibility for departmental procedures, instruction on technical writing, new plant start-up, and plant revision, or companies experiencing rapid growth or expansion. For more information, contact the Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816-1052; telephone (908) 613-4500; fax (908) 238-9113.

• **8-10, Introduction to Food Chemistry,** a short course offered by the American Association of Cereal Chemists (AACC) in Chicago, IL. For more information, contact Marie McHenry, Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250; fax (612) 454-0766.

• **9-12, Future Trends in Environmental Health,** Cocoa Beach, FL. Now is the time to plan to attend the 47th Florida Environmental Health Association Annual Education Meeting and Trade Show. This is a fantastic opportunity to network with environmental health professionals from across the state and nation to discuss issues and solutions, discover new products and services. In addition, there will be three pre-conference training courses and a NAI Food Managers examination given on May 9. For more information contat B. G. Tennant, Executive Director, P.O. Box 1495, Pensacola, FL 32597; telephone (904) 455-2764 or (904) 477-1611.

• **14-15, 15th Annual Environmental Resources Expo Set,** Orange County Convention Center, Orlando, FL. Over 250 companies will be on hand to display the latest environmental technology and discuss their technical capabilities and service offerings. For more information, contact The Florida Environmen-

tal Resources Expo, P.O. Box 2027, Winter Park, FL 32790-2027; telephone (407) 740-7950; fax (407) 740-7957.

·**14-16, Natural Packaging in the Cold Storage of Food,** Montreal, Quebec, Canada. Program 1: Production and Characteristics of Natural Packaging; Program 2: Use of Natural Packaging for Refrigerated Products; Program 3: Disposing of Natural Packaging; and Program 4: Natural Packaging – Irradiation and Refrigeration Technology. For more information, contact Mr. Marco Lagimoniére, Co-coordinator, Food Research and Development Center, 3600 Casavant Blvd. West, St. Hyacinthe, Quebec, Canada; telephone (514) 773-1105; fax (514) 773-8461.

·**14-19, The First Pan American Conference on Food Safety,** Mexico City, Mexico. For more information, contact Lili Merritt, Director Meetings and Conferences, International Life Sciences Institute, 1126 Sixteenth St., NW, Washington, DC 20036; telephone (202) 659-0074; telex 6814107 NUFOUND; fax (202) 659-3859.

·**16-17, AIB Regional Updates in Food Plant Sanitation,** San Antonio, TX. The program will include new topics in addition to the basic key elements for any viable sanitation program, as well as sessions on the basic principles of HACCP and sanitary design standards. Tuition fees are $300 per person for members of the American Institute of Baking, and $325 for non-members. For further information, write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502, or call (913) 537-4750 or (800) 633-5137.

·**16-19, Water Activity and Stability of Drugs, Foods, and Biologics,** a short course offered by the American Association of Cereal Chemists (AACC) in St. Paul, MN. For more information, contact Marie McHenry, Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250; fax (612) 454-0766.

·**22-25, Wet Milling,** a short course offered by the American Association of Cereal Chemists (AACC) in Champaign-Urbana, IL. For more information, contact Marie McHenry, Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250; fax (612)454-0766.

·**22-26, Training Course in Food Microbiology and Safety: An International perspective,** A short course sponsored by the University of Wisconsin-River Falls and the Eijkman Foundation, University of Utrecht, the Netherlands, will be held in U. W. River Falls. The course emphasizing systems and methods for the microbiological safety and quality assurance of foods will consist of lectures, case studies, and laboratory work to accomplish training in microbiological sampling, method validations, and quality assurance in food microbiology laboratory as well as fundamentals of microbial ecology, hurdle concept for food protection, and predictive microbiology. Both U.S. and European control systems will be covered by an international faculty, including Professors Corry Struijk and D. A. A. Mossel of Utrecht University, Netherlands. The course fee of $450.00 includes course materials, opening reception and a banquet dinner. For further information contact: Dr. Purnendu C. Vasavada, Dept. of Animal & Food Science, University of Wisconsin – River Falls, WI 54022; telephone (715) 425-3150; fax (715) 425-3785.

## JUNE

·**5-7, Current Good Manufacturing Practice (cGMP) for the Pharmaceutical and Allied Industries,** Fort Lauderdale, FL. Topics covered will include not only the legal requirements for cGMP in the Federal Food, Drug, and Cosmetic Act but primarily the "how tos" of purchasing, manufacturing, packaging, labeling and QA/QC, as well as training production personnel in cGMP. For more information, contact the Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816-1052; telephone (908) 613-4500; fax (908) 238-9113.

·**6-7, AIB Regional Updates in Food Plant Sanitation,** Atlanta, GA. The program will include new topics in addition to the basic key elements for any viable sanitation program, as well as sessions on the basic principles of HACCP and sanitary design standards. Tuition fees are $300 per person for members of the American Institute of Baking, and $325 for non-members. For further information, write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66502, or call (913) 537-4750 or (800) 633-5137.

·**8-9, Writing Standard Operating Procedures to Meet cGMP Requirements,** East Brunswick, NJ. During this course, participants will acquire a better understanding of what the FDA is looking for, methods used for compiling information, assignment of responsibility for departmental procedures, instruction on technical writing, new plant start-up, and plant revision, or companies experiencing rapid growth or expansion. For more information, contact the Center for Professional Advancement, P.O. Box 1052, East Brunswick, NJ 08816-1052; telephone (908) 613-4500; fax (908) 238-9113.

·**14-15, 15th Annual Environmental Resources Expo Set,** ERE'95, Florida's largest annual environmental industry trade show and conference, is scheduled for June 14, and 15, 1995, at the Orange County Convention Center in Orlando, Florida. Over 250 companies will be on hand to display the latest environmental technology and discuss their technical capabilities and service offerings. In addition to the ERE Conference, pre-conference workshops will be presented by the university of Florida TREEO Center, the Environmental Resources Center and TEST Institute. For more information, contact Trish Forhane, P. O. Box 2027, Winter Park, FL 32790-2027; telephone (407) 740-7950; fax (407) 740-7957.

• **18-20, Dairy-Deli-Baker '95,** IDAA's 31st Annual Seminar and Expo, San Jose, CA.; featuring special Bakery Symposium. For people registering for the Bakery Symposium on or before May 20, 1995, Course 1, "Service That Sells" will be provided as a gift to you. For more information, contact IDDA, P.O. Box 5501, Madison, WI 53705; telephone (608) 238-7908; fax (608) 238-6330.

• **19-30, Postharvest Technology Short Course,** UC Davis Campus. Topics include an overview of harvesting and postharvest handling systems, preparation for market, storage methods and equipment, transport systems and environmental control, energy use in postharvest procedures, and appropriate technology for postharvest handling of horticultural crops in developing countries. The fees are $475 for one week, and $725 for both weeks. For more information or to enroll, call toll free in CA (800) 752-0881; outside CA call (916) 757-8777.

• **20-21, Starch: Structure, Properties, and Food Uses,** a short course offered by the American Association of Cereal Chemists (AACC) in Heverlee, Belgium. For more information, contact Marie McHenry, Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250; fax (612) 454-0766.

• **22-23, Batter and Breading Technology,** a short course offered by the American Association of Cereal Chemists (AACC) in Chorleywood (London) UK. For more information, contact Marie McHenry, Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250; fax (612) 454-0766.

• **26-27, Chemical Leavening,** a short course offered by the American Association of Cereal Chemists (AACC) in Chorleywood (London) UK. For more information, contact Marie McHenry, Short Course Coordinator, 3340 Pilot Knob Road, St. Paul, MN 55121-2097; telephone (612) 454-7250; fax (612) 454-0766.

## JULY

• **11-12, AIB Regional Updates in Food Plant Sanitation,** Cherry Hill, NJ. The program will include new topics in addition to the basic key elements for any viable sanitation program, as well as sessions on the basic principles of HACCP and sanitary design standards. Tuition fees are $300 per person for members of the American Institute of Baking, and $325 for non-members. For more information, write to the Registrar, American Institute of Baking, 1213 Bakers Way, Manhattan, KS 66052, or call (913) 537-4750 or (800) 633-5137.

## SEPTEMBER

• **25-29, The 12th European Symposium on the Quality of Poultry Meat and the 6th European Symposium on the Quality of Eggs and Egg Products,** Zaragoza, Spain., Auditorium/Congress Palace. Working languages will be English, Spanish and French. Simultaneous translations will be organized in plenary sessions. For more information, please contact the Symposia Secretariat, Ricardo Cepero Briz, Veterinary Faculty, Miguel Servet 177, 50013 Zaragoza SPAIN.

## NOVEMBER

• **4-6, 6th Egyptian Conference of Dairy Science and Technology,** Cairo, Egypt. Organized by The Egyptian Soc. of Dairy Science. For more information, contact Dr. M. H. Abd El-Salam, National Research Center, Dokki, Cairo, Egypt; telephone (20-2-625 026) or fax (20-2-700 931).

# Advertising Index

# IAMFES

# Preliminary Program

## *82nd Annual Meeting of the International Association of Milk, Food and Environmental Sanitarians, Inc.*

In Cooperation with Pennsylvania Association of Milk, Food and Environmental Sanitarians

**Hilton Hotel & Towers, Pittsburgh, PA**
**July 30 — August 2, 1995**

### REGISTRATION TIMES

| | |
|---|---|
| Saturday, July 29 | 1:00 p.m. - 5:00 p.m. |
| Sunday, July 30 | 8:30 a.m. - 7:00 p.m. |
| Monday, July 30 | 8:00 a.m. - 4:00 p.m. |
| Tuesday, August 1 | 8:00 a.m. - 4:00 p.m. |
| Wednesday, August 2 | 8:00 a.m. - 12:00 p.m. |

### EXHIBITORS HOURS

| | |
|---|---|
| Sunday, July 30 (Following the Opening Session) | 8:00 p.m. - 10:00 p.m. |
| Monday, July 31 | 9:30 a.m. - 3:30 p.m. |
| Tuesday, August 1 | 9:30 a.m. - 3:30 p.m. |

### IAMFES BOARD MEETING

| | |
|---|---|
| Friday, July 28 | 2:00 p.m. - 6:00 p.m. |
| Saturday, July 29 | 8:00 a.m. - 1:00 p.m. |
| Monday, July 31 | 7:00 a.m. - 9:00 a.m. |
| Wednesday, August 2 | 11:30 a.m. - 2:00 p.m. |
| Thursday, August 3 | 8:00 a.m. - 12:00 p.m. |

### COMMITTEE/PROFESSIONAL DEVELOPMENT GROUP MEETINGS

#### SUNDAY, JULY 30

| | |
|---|---|
| 7:00 - 10:00 a.m. | Affiliate Council |
| 10:00 - 11:00 a.m. | Dairy Quality & Safety (Farm Section) |
| 9:30 - 11:00 a.m. | Audio Visual Library |
| 10:00 - 11:00 a.m. | Baking Industry Sanitary Standards |
| 10:00 - 11:00 a.m. | Past Presidents Advisory |
| 10:00 - 12:00 p.m. | Poultry Safety and Quality |
| 10:00 - 5:00 p.m. | Communicable Diseases Affecting Man |
| 11:00 - 12:00 p.m. | Dairy Quality and Safety (Plant Section) |
| 11:00 - 12:00 p.m. | Foundation Fund |
| 11:00 - 12:00 p.m. | Nominating |
| 1:30 - 2:30 p.m. | Constitution and By-Laws |
| 1:30 - 2:30 p.m. | Sanitary Procedures |
| 1:30 - 3:30 p.m. | Meat Quality and Safety |
| 1:30 - 3:00 p.m. | Dairy, Food & Environmental Sanitation Management |
| 1:30 - 3:30 p.m. | Seafood Safety and Quality |
| 1:30 - 3:30 p.m. | Applied Laboratory Methods |
| 1:30 - 3:30 p.m. | Food Sanitation |
| 3:00 - 4:00 p.m. | Environmental Issues in Food Safety |
| 3:00 - 4:30 p.m. | Journal of Food Protection Management |
| 3:00 - 5:00 p.m. | Food Safety Network |
| 4:00 - 6:00 p.m. | Program Advisory |

#### WEDNESDAY, AUGUST 2

12:00 - 4:00 p.m. Program Advisory (members only)

## Sunday Evening — July 30, 1995

### Opening Session

7:00 **Welcome to the 82nd Annual Meeting** — C. D. Clingman, President of IAMFES and P. Hoge, Chairperson, of the Local Arrangements Committee.

7:15 **Introduction of the Ivan Parkin Lecture** — F. A. Draughon, President-Elect of IAMFES

7:20 **Ivan Parkin Lecture** — James M. Jay, PhD, Wayne State University, Detroit, MI

**The Ivan Parkin Lecture is sponsored by the IAMFES Foundation Fund and is supported by the Sustaining Members**

8:00 **Cheese and Wine Reception** — Held in the Exhibit Hall. An opportunity to greet old friends, make new ones and view the excellent technical displays.

## Monday Morning — July 31, 1995

### Practical Approach to Quality Milk — General Session

8:30 NCIMS Update and Structure of NCIMS — D. RACKLEY, Oklahoma Dept. of Agricultural, Oklahoma City, OK

8:55 3-A Sanitary Standards — Now and in the Future — T. GILMORE, Dairy and Food Industries Supply Association, McLean,VA

9:20 Laying the Groundwork for HACCP and ISO 9000 — J. ADAMS, National Milk Producers Federation, Arlington, VA

9:45 Dairy Product Shelf Life Tests for Quality Control and Research and Development — T. GRUETZMACHER, Dean Foods Company, Rockford, IL

10:10 Break

10:30 National Mild Drug Residue Database — J. SMUCKER, FDA, Washington, DC

10:55 Practical Solutions to Pathogens from Milk and Other Animal Products — S. KNABEL, Pennsylvania State University, University Park, PA

11:20 Design, Installation, and Maintenance of Plate Heat Coolers — D. COLE, Alfa Laval Agri., Newbury, PA

### Technical Session — Control of Food-borne Microorganisms

8:30 Shelf Life Extension and Safety of Fresh Pork Treated with High Hydrostatic Pressure — V. ANANTH, E. Murano, and J. Dickson, Iowa State University, Ames, IA

8:45 Microbial Monitoring of Irradiated, Commercially-Prepared, Chub-Packed Ground Beef — S. GAMAGE, J. Luchansky, and S. Ingham, University of Wisconsin-Madison, Madison, WI

9:00 Reduction of *Salmonella typhimurium* on Chicken Carcasses Using Pulsed Electricity — Y. LI, H. Xiong, P. Mastler, and M. Slavik, University of Arkansas, Fayetteville, AR

9:15 Isolation and Characterization of Gram-negative Bacteria, Isolated from Ground Beef, that Exhibited Inhibition of *Escherichia coli* O157:H7 — T. BRIDGEMAN and E. Zottola, University of Minnesota, St. Paul, MN

9:30 Inhibition of a Psychrotrophic *Clostridium* Species by Sodium Diacetate and Sodium Lactate in a Cook-in-the-Bag, Refrigerated Turkey Breast Product — J. MEYER, J. Cerveny, and J. Luchansky, University of Wisconsin-Madison, Madison, WI

9:45 Inhibitory Effects of Sucrose Fatty Acid Esters, Alone and in Combination with EDIA and Organic Acids, on *Listeria monocytogenes* and *Staphylococcus aureus* — J. MONK, L. Beuchat, and A. Hathcox, University of Georgia, Griffin, GA

10:00 Break

10:20 Evaluation of Colicins for Inhibition Against Diarrheagenic Verotoxigenic *Escherichia Coli* Strains — S. MURINDA and R. Roberts, Pennsylvania State University, University Park, PA

10:35 Inhibition of *Listeria monocytogenes* and *Aeromonas hydrophila* on Cooked Beef by Plant Extracts Combined with Dried Whey Preparations of Antagonistic Bacteria — P. YORK, Y. Hao, R. Brackett, and M. Doyle, University of Georgia, Griffin, GA

10:50 Control of *Listeria monocytogenes* on Catfish Fillets (Ictalurus punctatus) Using Food Grade Antimicrobials — A. DEGNAN, M. Tamplin, R. Murphree, C. Kaspar and J. Luchansky, University of Wisconsin-Madison, Madison, WI

11:05 Microbial Decontamination of Fecally Contaminated Carcasses as Affected by Various Temperature Water Sprays and Steam — W. DORSA, C. Cutter, G. Siragusa, and M. Koohmaraie, USDA-ARS, Clay Center, NE

11:20 Disinfection of Cutting Boards by Microwave Energy — P. PARK and D. Cliver, University of Wisconsin-Madison, Madison, WI

### International Approaches to Meat Safety and Quality

8:30 Why Should a Food Producer/Processor Become ISO 9000 Certified? — R. RALYEA, U.S. Army, Converse, TX

9:00 Integrated Quality Control in the Pig Sector – B. LAUTHER, National Pork Producers Council, Des Moines, IA

9:30 General Principles of ISO 9000 and ISO 45000: HACCP, TQM and ISO Links – L. PEDROSO, Fricarnes, S. A. Portugal

10:00 Break

10:20 An Integrated System of ISO 9000 and ISO 45000 Certificates in the Control of Food Hygiene – F. VAN ROSSEM, Food Quality Systems, The Netherlands

10:50 Quality Systems in a Canadian Meat Processing Operation – P. DODSWORTH, J.M. Schneiders Inc., Kitchener, Ontario, Canada

11:20 Application of HACCP Principles and Beyond: Beef Slaughter and Fabrication – J. SOFOS, Colorado State University, Ft. Collins, CO

**An Introduction to Molecular Typing Methods for the Food Microbiologist (Sponsored by ILSI)**

8:30 A General Introduction to the Hows and Whys of Molecular Typing – J. FARBER, Health Canada, Ottawa, Ontario, Canada

9:00 Riboprint – A Novel Automated Ribotyping Method for Molecular Typing of Food-borne Microorganisms – J. WEBSTER, Dupont, Wilmington, DE

9:30 RAPD Typing of Food-borne Pathogens – An Overview – J. MCLAUCHLIN, Public Health Laboratory Service, London, United Kingdom

10:00 Break

10:20 The Use of PFGE for the Molecular Typing of Food-borne Pathogens – J. LUCHANSKY, University of Wisconsin-Madison, Madison, WI

10:50 Methods for Data Capture, Analysis, and Interpretation of Electrophoretic Gels – B. SWAMINATHAN, CDC, Atlanta, GA

**Posters – Growth/Behavior of Food-borne Microorganisms**

- Growth of *Listeria monocytogenes* and Listeriolysin O Secretion in Broth Containing Salts of Organic Acids – Y. KOUASSI and L. Shelef, Wayne State University, Detroit, MI
- Heat-resistance of *Listeria monocytogenes* Increases when Production of Osmoprotectants is Induced – Y. LOU and A. Yousef, Ohio State University, Columbus, OH
- The Incidence of Pathogenic Microorganisms in Aquacultured Rainbow Trout (*Oncorhynchus mykiss*) – T. MCADAMS, R. Reinhard, G. Flick, G. Libey, and S. Smith, Virginia Tech, Blacksburg, VA
- A Comparision of Quantitative Levels of *Escherichia coli* O157:H7, *Klebsiella pneumoniae*, *Campylobacter*, and *Salmonella* in Fresh Blue Crab (*Callinectes sapidus*) – R. REINHARD, T. McAdams, G. Flick, A. Diallo, R. Croonenberghs, and R. Whittman, Virginia Tech, Blacksburg, VA
- Survival and Growth of *Escherichia coli* O157:H7 on Produce – K. RICHERT, J. Albrecht, S. Sumner, and L. Bullerman, University of Nebraska, Lincoln, NE
- Competitive Growth of Enterohemorrhagic *Escherichia coli* in Ground Beef at 9.5°C – O. SANTOS, T. Schwach, and E. Zottola, University of Minnesota, St. Paul, MN
- Thermal Resistance of *Aeromonas hydrophila* in Liquid Whole Egg – J. SCHUMAN and B. Sheldon, North Carolina State University, Raleigh, NC
- The Incidence of Pathogens in Aquaculture Recirculation Water Systems and a Comparision of Their Presence to Fish Size and Stocking Densities – D. STREBEL, R. Reinhard, T. McAdams, and G. Flick, Virginia Tech, Blacksburg, VA
- Growth and Survival of *Listeria monocytogenes* in Minimally Processed Green Beans as Influenced by Modified Atmosphere Packaging, NaCl Treatment and Storage Temperature – W. TAN, D. Grinstead, J. Mount and F. Draughon, University of Tennessee, Knoxville, TN
- Radiosensitivity of *Listeria monocytogenes* Following Split-Dose Application of Gamma Radiation – L. ANDREWS, R. Grodner and P. Wilson, Louisiana State University, Baton Rouge, LA
- Growth of *Yersinia enterocolitica* on Osmotically Dehydrated Broccoli Packaged in Modified Atmospheres and Stored at 10°C – P. BODNARUK, F. Draughon, and J. Mount, University of Tennessee, Knoxville, TN
- Survival/Growth of Gram Positive Bacteria in Reconditioned, Potable, and Non-chlorinated Water – J. CALL, S. Palumbo, B. Huynh, J. Fanelli, and P. Jackson, USDA-ARS, ERRC, Philadelphia, PA
- Presence of *Listeria* Species in Market Beef – C. CHUNG, D. Jeong and D. Gu, Kon-Kuk University, Seoul, Korea
- Susceptibility of Pre-evisceration Washed Carcasses to Contamination by *Escherichia coli* O157:H7 and Salmonellae – J. DICKSON, Iowa State University, Ames, IA

- The Potential of Danish Market Cheeses to Support Growth of Food-borne Pathogens – K. JENSEN and S. Knochel, RVAH Centre for Food Research, Frederiksberg, Denmark
- Influence of Temperature Abuse on Growth of *Clostridium perfringens* from Spores in Cooked Turkey – V. JUNEJA and B. Marmer, USDA-ARS, ERRC, Philadelphia, PA
- Effect of High pH on the Survival of *Salmonella typhimurium, Salmonella newport* and *Campylobacter jejuni* in Poultry Scald Water at 55°C – A. MENDONCA and J. Njoroge, North Carolina A&T State University, Greensboro, NC
- Potential for Growth, Injury, and Survival of Food-borne Pathogens in a Model Propylene Glycol Product Cooling System – A. MILLER, C. Paska, and B. Eblen, USDA-ARS, ERRC, Philadelphia, PA
- Growth of *Salmonella* & *Vibrio cholerae* in Reconditioned Water – K. RAJKOWSKI, E. Rice, and B. Huynh, USDA-ARS, ERRC, Philadelphia, PA
- Nebraska Survey of Organic and Coventionally Grown Produce for *Escherichia coli* O157:H7, *Salmonella*, and *Shigella* – S. SUMNER, K. Richert, J. Albrecht, and L. Bullerman, University of Nebraska, Lincoln, NE
- Survival and Injury of Selected Isolates of *Listeria* in Ground Pork Following Electron Beam Irradiation or Heating at 55°C – R. TARTE, E. Murano, and D. Olson, Iowa State University, Ames, IA

## Monday Afternoon – July 31, 1995

### Practical Approach to Quality Milk – Plant Session

1:30 Basic Technical Challenge in Progressing from Conventional Milk Processing to Aseptic Processing – B. RITSCHARD, Parmalat, Inc., Spring City, PA

2:00 Issues of Using Reclaimed Water – Speaker to be announced

2:30 Crisis Management and Product Recalls – G. PRINCE, Kroger Co., Cincinnati, OH

3:00 Break

3:20 Innovations in Plant Design and Processing – D. SIEBERLING, Sieberling Association, Inc., Roscoe, IL

3:50 Public Health and Regulatory Aspects of Emerging Milk Plant Technology – S. SIMS, FDA, Washington, DC

### Practical Approach to Quality Milk – Producer Session

1:30 Dairy Farmstead Evaluation as a Response to Environmental Issues – University Viewpoint – L. LANYON, Pennsylvania State University, University Park, PA

2:00 Environmental Issues – Dairy Producer View point – L. JONES, Lester C. Jones & Sons, Inc., Massey, MD

2:30 Design Challenges in Modern Milking Equipment – S. SPENCER, Pennsylvania State University, University Park, PA

3:00 Break

3:20 Current Cleaning Chemical Technology & Recommendations for Maximum Cleaning Effectiveness – D. SIMYAK, Diversey Corp., Livonia, MI

3:50 Futuristic Dairy Farm Design – D. WAYBRIGHT, Mason Dixon Farms, Inc., Gettysburg, PA

### Technical Session – Detection and Enumeration Methods

1:30 Rapid Multianalyte Immunoassay to Screen for Antibiotic Residues in Milk – A. KUMAR, K. Hara, S. Kharadia, D. Leung, M. Piani, R. Rocco, and C. Yu, Idetek, Inc., Sunnyvale, CA

1:45 The Rapid Charm Phosphatase Test Conforms with USDA Requirements for Cooked Meat and Gauges Microbial Log Reduction – E. ZOMER, J. Scheemaker, and S. Trivedi, Charm Sciences, Inc., Malden, MA

2:00 Specificity of Four Monoclonal Antibodies Produced Against *Salmonella typhimurium* – Z. JARADAT and J. Zawistowski, University of Manitoba, Winnipeg, Manitoba, Canada

2:15 Antigenicity of 35 and 24 kDa Outer Membrane Proteins of *Salmonella* – Z. JARADAT and J. Zawistowski, University of Manitoba, Winnipeg, Manitoba, Canada

2:30 A New Petrifilm™ Method for *Enterobacteriaceae* Testing – P. MACH and G. Sandberg, 3M Company, St. Paul, MN

### Quality Assurance

2:45 Ontario's Inspection Protocol for Undrawn Dressed Poultry (UDP): A Model for Standards Development for Ethnic Markets – T. BAKER and P. Johnson, Ontario Ministry of Agriculture, Guelph, Ontario, Canada

3:00 Break

3:20 Re-engineering of Licensing Audit for Ontario Abattoirs – P. JOHNSON and T. Baker, Ontario Ministry of Agriculture, Guelph, Ontario, Canada

3:35 The Application of Risk Assessment and Standard Audit Principles for Compliance Verification in Ontario Inspected Abattoirs – T. BAKER and P. Johnson, Ontario Ministry of Agriculture, Guelph, Ontario, Canada

3:50 Advances in Laboratory Information Managements Systems (LIMS) in Dairy Quality Control Labs – D. BLOMQUIST and R. Bakka, Klenzade, Tampa, FL

4:05 A Computer Program for Managing a Food-borne Disease Surveillance Network & Compiling Surveillance Data – J. GUZEWICH and D. Sackett, New York State Department of Health, Albany, NY

4:20 International Trends in HACCP – I. HIGUERA-CIAPARA, L. Noriega, and G. Arteaga, Research Center for Foods & Development, Hermosillo, Sonora, Mexico

**Posters – Control of Food-borne Microorganisms**

- Modeling the Effect of Temperature on Growth Rate and Lag Time of *Bacillus Stearothermophilus* Using Vanance Stabilizing Transformations – R. DOGRA and D. Schaffner, Rutgers University, New Brunswick, NJ
- Antimicrobial Action of a Nisin-Based Treatment Against *Salmonella typhimurium* in Fresh Pork Loin – N. LLORCA and B. Sheldon, North Carolina State University, Raleigh, NC
- Effect of Trisodium Phosphate on *Listeria monocytogenes* Attached to Rainbow Trout – D. MU and Y. Huang, University of Georgia, Athens, GA
- *Nannocystis exedens* as a Potential Biocompetitive Agent Against Toxigenic *Aspergillus flavus* and *Aspergillus parasiticus* – W. TAYLOR and F. Draughon, University of Tennessee, Knoxville, TN
- Determination of Purging Rate of *Escherichia coli* O157:H7 Contamination from a Model Meat Grinding System – A. TINDLE, R. Phebus, C. Kastner, J. Marsden, D. Fung, H. Thippareddi, R. Prasai, and K. Karr, Kansas State University, Manhattan, KS
- Reduction of Food-borne Pathogens on Beef Carcass Tissue Using Sodium Bicarbonate and Hydrogen Peroxide – K. YOST and S. Sumner, University of Nebraska, Lincoln, NE
- Efficacy of Trisodium Phosphate for Killing *Salmonella* on Tomatoes – L. BEUCHAT, University of Georgia, Griffin, GA
- Expanded Models for Predicting the Non-Thermal Inactivation of *Listeria monocytogenes* – R. BUCHANAN and M. Golden, US FSIS, Washington, DC
- Effect of Chlorine Dioxide Spray Washes for Reducing Fecal Contamination on Beef – C. CUTTER and W. Dorsa, USDA-ARS, Clay Center, NE
- Antimicrobial Properties of Volatile Horseradish Distillates – P. DELAQUIS, H. Graham, and G. Mazza, Agriculture and Agri-Food Canada, Summerland, British Columbia, Canada
- Effect of Citricidal, Chloride, and Benomyl on *Vibrio Cholerae* Growth in Vitro – M. DIAZ-CINCO, R. Troncoso-Rojas, V. Mata-Haro, and E. Acedo-Felix, CIAD, A.C., Hermosillo, Sonora, Mexico
- Effect of Processing Protocols on the Quality of Aquacultured Fresh Catfish Fillets – C. FERNAUDES, G. Flick, Jr., J. Silva, T. McCaskey, and A. Hood, Virginia Polytechnic Institute and State University, Blacksburg, VA
- A Model for the Effects of Temperature, pH and Lactate on the Survival of *E. coli* O157:H7 – M. GOLDEN and R. Whiting, USDA-ARS, ERRC, Philadelphia, PA
- Intervention Through the Use of Hand-trimming, Chemical Sanitizers, and Hot Water Spray-Washing to Remove Fecal and Microbiological Contamination from Beef Adipose Tissue – B. GORMAN, J. Sofos, J. Morgan, G. Schmidt, and G. Smith, Colorado State University, Ft. Collins, CO
- Influence of Fat Content in Pork Liver Sausage on Growth of *Listeria monocytogenes* and Its Inhibition by Lactate and Sorbate – A. HU and L. Shelef, Wayne State University, Detroit, MI
- Destruction of *Listeria monocytogenes* on Catfish Fillets Using Lactic Acid and Monolaurin – D. MARSHALL, E. Verhaegh, and D. Oh, Mississippi State University, Mississippi State, MS
- Sensitization of *Escherichia coli* to Nisin and Lysozyme by High Hydrostatic Pressure, EDTA and Chitosan – C. MICHIELS, K. Versyck, K. Hauben, and E. Wuytack, Katholieke University, Heverlee, Belgium
- Effects of Lactate, Spice Oil, and pH Levels on the Growth and Survival of *E. coli* O157:H7 at 35 and 4°C – J. PRICE, J. Cherry-Merritt, A. Orta-Ramirez, E. Tindall, and L. Gilbert, Michigan State University, East Lansing, MI
- Comparison of Mathematical Models to Estimate Growth Rate of *Escherichia coli* O157:H7 at Fluctuation Temperatures – K. RAJKOWSKI, USDA-ARS, ERRC, Philadelphia, PA
- A Survey of College Students' Knowledge of Food Safety & Home Food Preparation Practices – M. SALAMANCA, R. Gravani, Cornell University, Ithaca, NY
- Feasibility of Using Food Grade Food Additives to Control the Growth of *Clostridium perfringens* – A. SIKES, U.S. Army, Natick, MA

- Effect of Time of Exposure of Beef Fat Fascia to *Escherichia coli* ATCC 11370 on Its Removal by Spray-Washing with Chemical Solutions and 35° or 74° Water – J. SOFOS, L. Cabedo, J. Morgan, G. Schmidt, and G. Smith, Colorado State University, Ft. Collins, CO
- Radiation Resistance of Pathogenic *Escherichia coli* Serotypes – D. THAYER and G. Boyd, USDA-ARS, ERRC, Philadelphia, PA
- Sensitivity of Six Strains of *Listeria monocytogenes* to Nisin in Broth at pH 5, 6, and 7 – D. UKUKU and L. Shelef, Wayne State University, Detroit, MI
- Ecology and Control of Bread Spoilage by Rope – A. von HOLY, C. Bailey, C. McNaughton, and L. Kirschner, University of the Witwatersrand, South Africa
- Effect of Polyvalent Metal Ions on Growth Inhibition of *Listeria monocytogenes* by Sodium Polyphosphate – L. ZAIKA, O. Scullen, and J. Fanelli, USDA-ARS, ERRC, Philadelphia, PA

## Tuesday Morning — August 1, 1995

### Hurdles to Improve Safety and Quality of Ready-To-Eat (RTE) Meats

8:30 Pretreatment of Meat in the Slaughter Process – J. DICKSON, Iowa State University, Ames, IA

9:00 Food Additives in Processed Meats – R.TOMPKIN, Armour Swift-Eckrich, Inc., Downers Grove, IL

9:30 Packaging and Storage Conditions to Enhance Meat Safety – S. INGHAM, University of Wisconsin, Madison, WI

10:00 Break

10:20 Elimination of Pathogens on Red Meats with Irradiation – D. THAYER, USDA-ARS, ERRC, Philadelphia, PA

10:50 Novel Approaches in Hurdles Technology – C. CUTTER, USDA-ARS, Clay Center, NE

11:20 Hurdles in Getting Hurdle Approval – D. BERNARD, National Food Processing Association, Washington, DC

### Technical Session — Growth/Behavior of Food-borne Microorganisms

8:30 Influence of pH and Incubation Temperature on Virulence and Fatty Acids of *Yersinia enterocolitica* – P. BODNARUK and D. Golden, University of Tennessee, Knoxville, TN

8:45 Growth of *Listeria monocytogenes* and *Yersinia enterocolitica* on Cooked Poultry Stored Under Modified Atmosphere at 3.5, 6.5, and 10°C – L. HARRIS and R. Barakat, University of Guelph, Guelph, Ontario, Canada

9:00 Natural Occurrence of *Listeria monocytogenes* in Fresh Blue Crab (*callinectes sapidus*) Meat & Its Growth Characteristics at Refrigeration Temperatures – D. DIEZ de MEDINA, G. Flick, R. Whittman, R. Croonenberghs, and A. Diallo, Virginia Tech, Blacksburg, VA

9:15 The Effect of Iron Levels on Growth, Toxicity and Adherence of Enterohemorrhagic *Escherichia coli* – T. SCHWACH and E. Zottola, University of Minnesota, St. Paul, MN

9:30 Acid Adaptation in *Listeria monocytogenes* Scott A – V. SCOTT, R. Buchanan, and D. Westhoff, National Food Processors Association, Washington, DC

9:45 Stress Protein and Fatty Acid Composition Effects on Heat Resistance of *Escherichia coli* O157:H7 – H. THIPPAREDDI, D. Fung, R. Phebus, I. Jeon, and R. Thakur, Kansas State University, Manhattan, KS

10:00 Break

10:20 Survival Characteristics & Injury of *Escherichia coli* O157:H7 During Conventional & Micro wave Heating at Constant Temperatures –S. CZECHOWICZ and E. Zottola, University of Minnesota, St. Paul, MN

10:35 Comparison of $D_{55C}$ Values of Antibiotic-resistant and Antibiotic-sensitive Strains of *Salmonella* – P. DAVIDSON and T. Henson, University of Idaho, Moscow, ID

10:50 Dose-response of *Salmonella* in Cheese – E. TODD, R. Szabo, J. D'Aoust, A. Sewell, C. McDonald, A. Ellis, B. Miller, and P. Stone, Health Canada, Ottawa, Ontario, Canada

11:05 Biological Characterization of *Enterobacter sakazakii* – M. NAZAROWEC-WHITE and J. Farber, Health Canada, Ottawa, Ontario, Canada

11:20 Spoilage Ecology of Vacuum-Packaged Vienna Sausages – A. von HOLY, C. Franz, M. Papathanasopoulos, and G. Dykes, University of the Witwatersrand, South Africa

### Emerging Issues in Microbiological Food Safety (Sponsored by ILSI)

8:30 Bovine Spongiaform Encephalopathy – Potential Risk from Foods – Speaker to be announced

9:00 Survival of *Cryptosporidium oocystes* in Beverages – Speaker to be announced

9:30 Growing Concerns and Recent Outbreaks of Enterohemorraghic *E. coli* - non-O157:H7 Serotypes – Speaker to be announced

10:00 Break

10:20 *Staphylococcus* – Are There Coagulase Negative Toxigenic Strains on the Horizons? Speaker to be announced

10:50 *Arcobacter* and *Helicobacter* - Risks for Food and Beverages – Speaker to be announced

11:20 Dealing with an Expanding, Global Food Supply – Speaker to be announced

**Poster Session — Detection and Enumeration Methods**

- Transformation of Bacterial Luciferase DNA into *Escherichia coli* O157:H7 for Use as a Marker in a Ground Beef System – R. PANCHEV and S. Sumner, University of Nebraska, Lincoln, NE
- Genomic Fingerprinting of *Bifidobacterium* spp. from an Infant – S. TSAI and J. Luchansky, University of Wisconsin, Madison, WI
- Evaluation of Universal Preenrichment Versus Lactose Broth Plus Various Plating Media for Isolating Salmonellae from Naturally Contaminated Fresh Chicken and Pork Sausage – E. VESTERGAARD and L. Restaino, Northern Illinois University, De Kalb, IL
- Evaluation of an Automated Assay for the Detection of *Listeria monocytogenes* in Food Products – T. ARMSTRONG, L. Brusatti, F. Prost-Gorse, and R. Johnson, bioMérieux Vitek, Inc., Hazelwood, MO
- Optimization of Polymerase Chain Reaction Parameters Utilizing an Experimental Design Approach – J. BASS and G. Tice, R. Jackson, DuPont, Wilmington, DE
- Antibiotics and Sulfonamides in Meat Samples Destined for Human Consumption – M. BERMUDEZ-ALMADA and L. Vazquez-Moreno,Centro de Investigacion en Alimentacion y Desarrolio, Hermosillo, Sonora, Mexico
- Biodegradation of Aflatoxins by *Flavobacterium aurantiacum* in Culture Media – L. BOHRA, R. Phebus, J. Smith, and B. Ioerger, Kansas State University, Manhattan, KS
- Lightning™: Introduction of a Machine-Side Rapid Hygiene Monitoring System – E. EHRENFELD, S. Miller, K. Barber, and C. Carpenter, IDEXX Labs, Westbrook, ME
- Evaluation of Microbial Swabs for Releasing HCMC and Their Viability on Ice Using 3M™ Petrifilm™ – C. FERNANDES, G. Flick, Jr., J. Silva, T. McCaskey, and A. Hood, Virginia Polytechnic Institute & State University, Blacksburg, VA
- A New Rapid Method for the Detection of *Escherichia coli* O157 in Raw Meat – R. FIRSTENBERG-EDEN, M. Averill, S. Allen, and N. Sullivan, Difco Laboratories, Ann Arbor, MI
- The Use of a Single Tablet for Delivery of Critical Reagents to a Polymerase Chain Reaction – G. TICE, O. Rubino, and R. Jackson, DuPont, Wilmington, DE
- A Membrane-lift Method for Rapid Detection of *Escherichia coli* O157:H7 Contaminating Chicken Carcasses – H. TSAI and M. Slavik, University of Arkansas, Fayetteville, AR
- Detection of *Escherichia coli* O157:H7 in Foods by Multiplex PCR – P. FRATAMICO and M. Deng, USDA-ARS, ERRC, Philadelphia, PA
- Determination of Trace Elements in Muscle, Liver & Kidney from Pork Produced in Sonora, Mexico – L. GARCIA-RICO, M. Jara-Marini, and L. Vazquez-Moreno, CIAD, A. C., Hermosiollo, Sonora, Mexico
- Evaluation of a Rapid Screening Kit for the Detection of *Escherichia coli* O157:H7 in Foods – J. GEBLER, and C. Chambers, Murray Goulburn Co-op Co., Yarram, Victoria, Australia
- Chemical and Mineral Analysis of Surimibased Seafood Products – Y. HUANG, A. Aal, and A. Awad, University of Georgia, Athens, GA
- Comparison of ISO-Grid™, DRBC, Petrifilm™, and PDA Pour Plate Methods for Enumerating Yeasts and Molds on Shredded Cheese – S. INGHAM and J. Ryu, University of Wisconsin-Madison, Madison, WI
- Use of Blue Lake as an Indicator of Bacterial Penetration into Eggs – J. KIM, M. Slavik, and J. Walker, University of Arkansas, Fayetteville, AR
- Rapid Estimation of Raw Milk Quality – W. LACHOWSKY, M. Griffiths, L. Harris, J. Odumeru, and L. Szijarto, Ontario Ministry of Food & Agriculture, Guelph, Ontario, Canada
- Evaluation of a Miniaturized Microbial Inhibition Assay for Screening of Antimicrobial Residues in Animal Tissues – M. MITCHELL, J. Samoluk, and A. Yee, Ontario Ministry of Agriculture, Guelph, Ontario, Canada
- Comparison of Five Media for Enumeration of *Escherichia coli* O157:H7 – A. ORTA-RAMIREZ, J. Price, and J. Cherry-Merritt, Michigan State University, East Lansing, MI

- The Charm Alkaline Phosphatase Test: Rapid Bioluminescence Method for the Determination of Alkaline Phosphatase in Pasteurized Milk and Other Dairy Products – Collaborative Study – G. RUTH, and E. Zomer, Charm Sciences, Inc., Malden, MA
- Charm Cloxacillin Antibody Performance Validated for Bulk Tank Milk – R. SALTER, P. Donahue, J. Cunningham, and S. Charm, Charm Sciences, Inc., Malden, MA
- A New Rapid Method for Detection & Enumeration of *Listeria monocytogenes* in Food Samples – L. SHELEF and G. Eden, Wayne State University, Detroit, MI
- Validation of Predictive Mathematical Models to Demonstrate Applicability to Foods – I. WALLS, V. Scott, and D. Bernard, National Food Processors Association, Washington, DC
- Detection by PCR of *Campylobacter jejuni* in Contaminated Chicken Products – D. WINTERS, A. O'Leary, X. Wang, and M. Slavik, University of Arkansas, Fayetteville, AR
- E*Colite, The New Standard in Monitoring Coliforms & *Escherichia coli* Contamination in Water – E. ZOMER and R. Lifshitz, Charm Sciences, Inc., Malden, MA
- Detection of *Salmonella* in Foods by Transduction of Ice Nucleation Genes – P. WOLBER and R. Green, Idetek, Inc., Sunnyvale, CA

## Tuesday, August 1, 1995 — Afternoon

### General Session — Equivalency of Inspection — Impact of NAFTA and GATT

1:30 Equivalency of Inspection – Practical Realities in the Real World – I. KIRK, Agriculture and Agrifood Canada, Guelph, Ontario, Canada

2:00 The European Perspective on Equilibrating International Meat and Poultry Inspection Systems – L. PEDROSO, Fricarnes, S.A., Portugal

## Wednesday, August 2, 1995 — Morning

### Current Issues in Food Services A Practical Symposium — Part 1

8:30 Food Code – A Practical Approach – E. JULIAN, Rhode Island Department of Health, Providence, RI

9:00 Food Service Plan Review – Standardization for Efficiency – F. PETERSEN, City of Stamford, Stamford, CT

9:30 Integrated Pest Management (IPM) in Food Facilities – R. GARDNER, Cornell University, Ithaca, NY

10:00 Break

10:20 Equipment Cleaning and Sanitization – C. PARKER, Ecco Lab., Inc., Mendota Heights, MN

10:50 Overcoming the "All or Nothing Approach" to HACCP Implementation at the Retail Level – J. MARCELLO, The Educational Foundation of the National Restaurant Association, Chicago, IL

### Fresh-Cut Packaged Vegetables

8:30 Fresh Produce Processing – A Global Industry Perspective – K. OLSON, Dole Foods, San Jose, CA

8:55 The Effect of Farm Management Practices on the Microbial Condition of Fresh Minimally-Processed Vegetables – Speaker to be announced

9:20 Fresh Produce Processing – Retail Industry Perspective – Speaker to be announced

9:45 Factors Important in Determining Shelf Life of Minimally-Processed Vegetables – Speaker to be announced

10:10 Break

10:30 What's New in Modified-Atmosphere Packaging of Fresh Cut Packaged Vegetables – D. ZAGORY, Postharvest Technology Consultants, Davis, CA

10:55 Presence and Public Health Implications of Food-borne Pathogens on Minimally-Processed Packaged Vegetables – J. FARBER, Health Canada, Ottawa, Ontario, Canada

11:20 Present and Emerging Control Measures for Minimally-Processed Packaged Vegetables – L. BEUCHAT, University of Georgia, Griffin, GA

### Alternative Processing Strategies for Pasteurization of Foods

8:30 Radurization – The Pasteurization of Foods by Ionizing Radiation – J. DICKSON, Iowa State University, Ames, IA

9:00 High Pressure Processing as an Intervention Strategy for Food Safety – E. MURANO, Iowa State University, Ames, IA

9:30 Chemical Treatments for Decontamination of Poultry – A. WALDRUP, University of Arkansas, Fayetteville, AR

10:00 Break

10:20 Electrical Properties of Foods and the Application of High Voltage Pulsed Electric Fields Technology – H. ZHANG, The Ohio State University, Columbus, OH

10:50 Oscillating Magnetic Field Stabilization of Foods – B. SWANSON, Washington State University, Pullman, WA

11:20 Product Development Considerations for Ohmic Processing – P. SWEARINGEN, Land O'Lakes, Arden Hills, MN

**New Emerging Food-borne Disease Agents – Are They for Real?**

8:30 The *Campylobacter* Family *(Arcobacter, Campylobacter, and Helicobacter)* – R. GRAVANI, Cornell University, Ithaca, NY

9:00 The Mycobacteria Group (*Mycobacterium Avium, Paratuberculosis and Tuberculosis*) – A. LAMMERDING, Agriculture Canada, Guelph, Ontario, Canada

9:30 New Issues in Food and Environmental Virology – D. CLIVER, University of Wisconsin-Madison, Madison, WI

10:00 Break

10:20 Food and Waterborne Parasites in the 90's – D. JURANEK, CDC, Atlanta, GA

10:50 What's new in Food-borne Diease Around the World – E. TODD, Health Canada, Ottawa, Ontario, Canada, and M. POTTER, CDC, Atlanta, GA

## Wednesday, August 2, 1995 – Afternoon

**Current Issues in Food Services**
**A Practical Symposium – Part 2**

1:30 Current Food-borne Pathogen: *Escherichia coli* O157:H7 – A Current Review – J. SCHRADE, FDA, Brooklyn, NY

2:00 Communicable Diseases - Bare Hand Contact With Food "Why Isn't Hand Washing Good Enough"? – J. GUZEWICH, New York State Department of Health, Albany, NY

2:30 Microbiological Concerns with Vacuum Packaging – E. RHODEHAMEL and L. Jackson, FDA, Washington, DC

3:00 Break

3:20 OSHA in the Foodservice Industry – R. HARRINGTON, National Restaurant Assciation, Washington, DC

**Seafood Symposium**

1:30 Update on Seafood HACCP and Current Regulations – Speaker to be announced

2:00 HACCP Training for Seafood Processors – G. FLICK, Virginia Polytech Institute University, Blacksburg, VA

2:30 Microbiological Seafood Safety: What's New – C. HACKNEY, Virginia Polytech Institute University, Blacksburg, VA

3:00 Break

3:20 The Seafood Hotline: What Questions Do Consumers Ask? – R. WELCH, FDA, RFPD, Washington, DC

3:50 The Safety of Mail Order Seafood – T. SCHWARZ, FDA, Washington, DC

**ILSI N.A. – Sponsored Research Update**

1:30 Use of Carrot Extract to Control *Listeria monocytogenes* – L. BEUCHAT, University of Georgia, Griffin, GA

1:50 Development of a Simple, Sensitive, Quantitative Procedure for Enumerating *Listeria monocytogenes* – M. DOYLE, University of Georgia, Griffin, GA

2:10 Use of *in vitro* Primer-Directed Enzymatic Amplification of DNA for Rapid Detection of *Listeria monocytogenes:* Studies with Food Samples – R. ELLISON, III, University of Massachusetts, Amherst, MA

2:30 Establishment of a Bovine Surveillance Program for *Escherichia coli* O157:H7 in Washington State – D. HANCOCK, Washington State University, Pullman, WA

2:50 Break

3:10 Lipid Compounds as Novel Barriers for Control of *Listeria monocytogenes* – E. JOHNSON, University of Wisconsin-Madison, Madison, WI

3:30 Application of Novel Bacteriocins as Biocontrol Agents Towards *Listeria monocytogenes* in Foods: Properties and Inhibitory Effectiveness – P. MURIANA, Purdue University, West Lafayette, IN

3:50 Evaluation of Penicillin Binding Proteins for Subtyping *Listeria monocytogenes* – M. REEVES and D. REINHARDT, CDC, Atlanta, GA

4:10 Insertion Sequence Finger-Printing: A New Subtyping System for *Escherichia coli* O157:H7 Strains – T. WHITTAM, The Pennsylvania State University, University Park, PA

# The Workshops

## Workshop 1 — Applications and Development of Microbiological Criteria for Foods

**Workshop Instructors**

John H. Silliker
Russell S. Flowers

**Fees**

Member: $375; After June 30, 1995: $405
Non-member: $440; After June 30, 1995: $470

**Workshop Agenda**

**Saturday, July 29, 1995**
8:00 am - 5:00 pm

**Sunday, July 30, 1995**
8:30 am - 12:00 pm

**Workshop Overview**

The workshop begins with a series of presentations relating to various aspects of microbiological criteria. Each of these will be approximately 45 minutes in length, with 15 minutes allowed for questions and discussion following the formal presentation. The topics are as follows:

1. **Introduction to Microbiological Criteria:** This will include a definition of microbiological criterion with a definition of its elements. The various types of criteria will be delineated. The relationship between risk, product use and sampling plan will be discussed.

2. **Attributes vs. Variables—Sampling Plans:** This will include a description of the two types of sampling plans. Consideration will be given as to purpose, i.e., whether for regulatory or process control, raw material evaluation, in-process control or finished product analysis. Under what circumstances are variables, plans and attributes most appropriate?

3. **Development of Indicator and Utility Criteria:** Under what circumstances are tests for indicator organisms useful in monitoring processing effectiveness? To what degree do tests for indicator organisms give reliable information relative to produce safety, e.g., as substitute for direct tests for pathogens? What types of criteria may be used to access the utility of a finished product or raw material for a particular purpose, e.g., the analysis of starch for thermophilic spores, the testing of beds from which shellfish are harvested for fecal coliforms? How are the criteria for these purposes developed?

4. **Development of Microbiological Criteria for Pathogens:** Where are criteria involving direct tests for pathogens warranted, e.g., the testing of raw materials and finished product for salmonellae using the sampling plans recommended by the Committee on *Salmonella* of the National Research Council? Under what circumstances are their use probably not cost effective, e.g., the routine testing meat for *Escherichia coli* O157:H7? How are such criteria developed?

5. **The Relationship of Microbiological Criteria to GMPs and HACCP:** To what extent are criteria useful in accessing conformance to GMPs? What are the limitations of criteria for this purpose? How are such criteria developed? To what extent are microbiological criteria useful in the development of HACCP programs? Where are they useful in monitoring CCPs? What role do they play in verification?

Following the above presentations, the participants will be divided into working groups, one of the presenters being assigned to each group as a facilitator. Each of the groups will be given a flow sheet in connection with the steps involved in the manufacture of a particular product. The groups will study the process and determine where criteria are appropriate. They will determine how the criteria would be developed and how applied.

The work groups will be assembled with the class as a whole. A member of each group will then present to the class the results of its deliberations, including justification for its findings.

Each participant will receive a workbook with detailed outlines of the presentations, copies of overheads presented, and references to pertinent reading material.

The workshop will conclude with a short wrap-up session.

### About the Instructors

**Dr. John H. Silliker** is the founder of Silliker Laboratories Group, Inc., one of the nation's leading independent food testing and consulting laboratories, and a widely respected food industry consultant.

In a food science career spanning five decades, Dr. Silliker has made valuable contributions to the food industry as an educator, researcher, writer, and private entrepreneur. Prior to founding Silliker Laboratories in 1961, he served as Chief Microbiologist and Associate Director of Research for Swift & Company in Chicago, IL. During the early 1960s, Dr. Silliker gained national and international acclaim for his groundbreaking research studies on *Salmonella*.

**Dr. Russell S. Flowers** is president of Silliker Laboratories Group, Inc., and a leading researcher, lecturer, and writer on the development of rapid methods for the detection of food-borne pathogens.

Dr. Flowers received his Ph.D. in food science and microbiology from the University of Illinois and joined the Silliker organization in 1979. Prior to joining Silliker Laboratories, he served as an Assistant Professor of Microbiology at the University of Arizona. Dr. Flowers has authored or co-authored over 30 scientific refereed research articles, presented over 100 seminars and scientific presentations to professional associations, and participated in a number of collaborative studies.

## Workshop 2 — Microbial Food Safety Risk Assessment Workshop

### Workshop Agenda

**Saturday, July 29, 1995**
8:00 am - 5:00 pm

### Fees

Member: $180; After June 30, 1995: $210
Non-Member: $245; After June 30, 1995: $275

### Workshop Instructors

Charles N. Haas
Christopher Crockett
Anna M. Lammerding

The application of risk assessment principles in microbial food safety provides a systematic, objective framework for the compilation and evaluation of data to describe and quantify the risks associated with foods and food manufacturing processes.

Risk assessment is an applied discipline based on scientific principles, and a new approach in microbial food safety. The process can facilitate consistent and uniform decisions on the safety of foods in determining optimal intervention strategies, establishing critical control points in a HACCP Program, and defining priorities for resource allocation. Microbial risk assessment is needed to achieve the goals of the Codex Alimentarius Commission and international food trade agreements.

This workshop will present an overview of the risk analysis process, encompassing risk assessment, risk management, and risk communication, and introduce participants to the elements of risk assessment: hazard identification, dose-response assessment, exposure assessment, and risk characterization. Topics will include: a description of dose-response models and curves and how to use them; an introduction to the Maximum Likelihood Estimation method: identifying and understanding sources of uncertainty and variability in data sets and quantitative microbial risk assessment models; techniques of pooling and separating data to evaluate statistical differences within and between data sets; growth modeling applications; the use of Monte Carlo analysis to integrate uncertainty of multiple inputs in dose-response and exposure estimates. Supporting computer programs will be demonstrated, and case studies of waterborne and food-borne outbreaks presented for discussion. Participants will be provided with a comprehensive workshop manual.

### About the Instructors

**Charles N. Haas** is LD Betz Professor of Environmental Engineering at Drexel University. He received his BS and MS degrees at Illinois Institute of Technology and his Ph.D. at the University of Illinois at Urbana-Champaign. He has been involved in quantitative microbial risk assessment work since 1982, and also has interests in water and waste treatment and disinfection.

**Christopher Crockett** received his M.S. at Drexel University, and is currently an Assistant Engineer for McLaren Hart Environmental Engineering ChemRisk Division in Warren, NJ. He also received his B.S. from Drexel University. His graduate research emphasized microbial occurrence and risk in water and food, including fitting, development and verification of dose-response models.

**Anna M. Lammerding** is Chief, Food Safety Risk Assessment (FSRA) Unit, Agriculture and Agri-Food Canada (AAFC). She received her B.Sc. and M.S. at the University of Guelph, and her Ph.D. at the University of Wisconsin-Madison.

# 82nd IAMFES Annual Meeting
# Spouse/Companion
## *Tours and Special Events*

**A Day of Discovery**
**Monday, July 31 - 9:00 a.m. — 3:00 p.m.**
**Cost: $30 ($35 on-site) Lunch on your own**

Our tour begins atop Mt. Washington, where the spectacular view of the whole Pittsburgh scene unfolds, a view that prompted Frank Lloyd Wright to call this the world's most beautiful setting for a city. Tourgoers may ride down the hill in an incline, a veritable museum on wheels, and be picked up by the coach at the base.

The Strip, center of the wholesale produce market in Pittsburgh, offers a true potpourri of scents, sights, and sounds. The Society for Art in Crafts, recently moved to The Strip, exhibits an international array of crafts in clay, fiber, metal, wood and a variety of other materials, all created since 1985.

The North Side of Pittsburgh was originally platted as Depreciation Land Grant settlement. Later, in 1848, a group of streets was laid out and named to commemorate battles and personalities of the Mexican War of 1846...Taylor, Resaca, Palo Alto, Buena Vista, Monterey, Sherman and the like. Known as the MEXICAN WAR STREETS, the area was a pleasant, middle-class, residential area with distinctive row-like homes reflecting Italienate, Second Empire, Queen Anne, Richardsonian Romanesque and other Victorian architectural styles. A major decline within the area was reversed in the 1960s to the point that this intriguing neighborhood was placed on the National Register of Historic Places by 1975.

Before returning to the Hilton, one further stop is made: at THE AVIARY, the world's largest birdhouse, where free flying feathered friends in brilliant hues present a dazzling display. Now, whoever said Pittsburgh was for the birds is proven to be correct!

**Amish Country**
**Tuesday, August 1 - 9:00 a.m. - 5:00 p.m.**
**Cost: $30 ($35 on-site) Lunch on your own**

The Amish is one of the most distinctive societies in America today. In 1693 Jacob Amman, their founder, brought these gentle people to this country from Switzerland. By the mid-18th century, hundreds had settled in Pennsylvania. The rolling countryside of this area of the state attracted the Amish with its fertile land. They befriended the Lenape Indians who had long ago settled here, and today you can witness their still-thriving existence.

This visit among the Amish includes shopping at an Amish home where quilts made by the Amish from as far away as Wisconsin are displayed to tempt the discriminating buyer. In nearby Volant, a 19th Century mill now serves as a country store containing toys, gifts, Amish quilts and furniture sharing space with old mill machinery. In addition to the mill there are over 80 shops and small restaurants that will meet anyone's needs.

Five miles south, the holidays come early at the Country House Christmas Shop, a restored Victorian home brimming with enough ornaments, gifts and decorations to make one forget December is several months away. A cool drink is served on the return trip to Pittsburgh.

**A Day at the Carnegie & Station Square**
**Wednesday, August 2 - 9:00 a.m. - 3:00 p.m.**
**Cost: $30 ($35 on-site) Lunch on your own**

Andrew Carnegie's gift to the people of Pittsburgh, THE CARNEGIE, houses four cultural centers under one roof. The MUSEUM OF ART is highly regarded for its permanent collection ranging from the old masters to the contemporary, with a fine representation of The Impressionists. A specially-arranged one hour tour, conducted by a trained museum docent, gives insight and enhancement to the fabulous works of renowned artistic masters. With time to explore on one's own (one-half hour) following the tour, a wealth of treasures await at The Carnegie. The Hillman Hall of Minerals and Gems displays over 2000 dazzling specimens and the world famous dinosaur collection is but a short walk away.

Then it's All Aboard for STATION SQUARE, the lively riverfront restoration of the former P. & L.E. Railroad, now a complex of exciting shops, boutiques, historic memorabilia and fine restaurants.

Following this delightful respite, guests will enjoy shopping on their own in the Freight House Shops before returning to the Hilton.

**Children's Activity Room**
**July 31 - August 2 - 8:30 a.m. - 4:00 p.m.**
**Cost: Free**

A children's activity room will be available for children ages 4 - 12. The children's room will consist of adult supervision and structured activities.

**Monday Night Social Event**
**An Ethnic Evening on the Three Rivers**
**July 31 - 6:00 p.m. - Cruise until 10:30 p.m.**
**Cost: $45 ($50 on-site)**

The ethnic variety of Pittsburgh's people contributes to its cultural richness. Influenced by the more than seventy distinct nationality groups that have claimed Pittsburgh as their home, an unforgettable dinner cruise has been created to combine the music and food representing a selection of the countries that have so enhanced this area.

At the Hilton, we will escort you through Point State park to board the magnificent sternwheeler, the Gateway Clipper Fleet's Party Liner. Pittsburgh's three rivers set the stage for an unforgettable event, as the evening sun, glistening on the waters and reflecting on the majestic buildings of this vital city, creates a rare backdrop for this festive evening.

Following dinner, guests will be entertained by Don Brockett's Company, an action packed frolicking family variety show that everyone is sure to enjoy?

The evening draws to a close as guests view the spectacular evening lights of the city and are returned to Point State Park for the guided walk back to the Hilton.

**Traditional IAMFES Gatherings**
**Ivan Parkin Lectureship**
**Sunday, July 30 - 7:00 p.m.**

Followed by the Cheese and Wine Reception for the Opening of the Education Exhibits. An opportunity to greet old friends, make new ones and view the excellent technical displays.

**IAMFES Annual Awards Reception and Banquet Wednesday, August 2**
**Reception: 6:00 p.m. Banquet: 7:00 p.m.**
**Cost: $30 ($35 on-site)**

**IAMFES Kids Pizza Banquet**
**Wednesday, August 2 - 6:30 p.m. - 9:30 p.m.**
**Cost: $15 ($20 on-site)**

Adult supervised for children ages 4 and up. Pizza, pop and activities will be provided.

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# 82nd IAMFES Annual Meeting Registration Form

**Hilton Hotel & Towers — Pittsburgh, PA — July 30 - August 2, 1995**
**(Use photocopies for extra registrations)**

FOR OFFICE USE
Date Rec'd. _____ First initial _____ Last name
Registration # _____

First Name (will appear on badge) (please print) Last Name

Title Employer

Mailing Address (Please specify: Home or Work)

City State Country Postal/Zip Code

( ) ( )
Telephone # Fax #

**Please check where applicable:**

___ IAMFES Member
___ Non-Member
___ Local Arrangements
___ 30 Yr. Member
___ 50 Yr. Member
___ Past President
___ Executive Board
___ Speaker
___ Honorary Life Member
___ Exhibitor
___ IAMFES Sustaining Member
___ IAMFES Program Advisory Committee

**Credit Card payments may be sent via Fax today!**
**515-276-8655**

**Sign up to become a NEW member**
**and take advantage of the member discount.**

| REGISTRATION: | MEMBERS | NON-MEMBERS | AMOUNT |
|---|---|---|---|
| Registration (Banquet included) | $170 ($205 on-site) | $250 ($285 on-site) | _____ |
| Student Member | $ 20 ($ 25 on-site) | Not Available | _____ |
| One Day Registration (Circle: Mon/Tues/Wed) | $ 90 ($110 on-site) | $120 ($140 on-site) | _____ |
| Spouse/Companion (Name): _____ | $ 25 ($ 25 on-site) | $ 25 ($ 25 on-site) | _____ |
| Children (14 & Under), Name: _____ | FREE | FREE | _____ |

| NEW MEMBERSHIP FEES: | | |
|---|---|---|
| Membership with *Dairy, Food & Environmental Sanitation* | $ 60 | _____ |
| Membership with *Dairy, Food & Env. Sanitation & Journal of Food Protection* | $ 90 | _____ |
| •Student Membership ❒ *Dairy, Food & Env. San.* or ❒ *Journal of Food Protection* | $ 30 | _____ |
| •Student Membership with *Dairy, Food & Env. San. & Journal of Food Protection* | $ 45 | _____ |
| *•Full-time student verification required.* | | |
| **SHIPPING CHARGES: OUTSIDE THE U.S. - SURFACE RATE** | $ 22.50 per journal | _____ |
| **AIRMAIL** | $ 95.00 per journal | _____ |

| OTHER FEES: | PER PERSON | | |
|---|---|---|---|
| Cheese and Wine Reception (Sun., 7/30) | FREE | _____ | _____ |
| An Ethnic Evening on the Three Rivers (Mon., 7/31) | $ 45 ($ 50 on-site) | _____ | _____ |
| IAMFES Awards Banquet (Wed., 8/2) | $ 30 ($ 35 on-site) | _____ | _____ |
| Children's Banquet (Wed., 8/2) | $ 15 ($ 20 on-site) | _____ | _____ |

| SPOUSE/COMPANION EVENTS: | PER PERSON | | |
|---|---|---|---|
| A Day of Discovery (Mon., 7/31) | $ 30 ($ 35 on-site) | _____ | _____ |
| Amish Country (Tues., 8/1) | $ 30 ($ 35 on-site) | _____ | _____ |
| A Day at the Carnegie & Station Square (Tues., 8/2) | $ 30 ($ 35 on-site) | _____ | _____ |

❒ Please indicate here if you have a disability requiring special accommodations.

Credit Card Payments: Please Circle: VISA/MASTERCARD/AMERICAN EXPRESS

Card # _____ Exp. Date _____

Name on Card _____ Signature _____

Total Amount Enclosed $_____
**U.S. FUNDS DRAWN ON U.S. BANK**

### Registration Information

Send payment with registration to IAMFES, 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2838. Make checks payable to IAMFES. Pre-registration must be post-marked by June 30, 1995. The pre-registration deadline will be strictly observed. For additional information contact Julie Heim at 1-800-369-6337.

### Refund/Cancellation Policy

The IAMFES policy on refunds and/or cancellations is as follows: Registration fees, minus a $35 processing fee, will be refunded for written cancellations post-marked by July 15, 1995. No refunds will be made for cancellations post-marked after July 15, 1995, however, the registration may be transferred to a colleague with written notification to IAMFES.

### Exhibitor Information

An exhibition of products and consulting services will be at the Hilton Hotel & Towers. For more information on exhibiting at the conference, please contact Rick McAtee at 1-800-369-6337.

# 1995 IAMFES Workshops
## · Registration Form ·

❑ **WORKSHOP 1: Applications and Development of Microbiological Criteria for Foods**
Hilton Hotel and Towers, Pittsburgh, PA — Saturday, July 29, and Sunday July 30, 1995

First Name (will appear on badge) PLEASE PRINT Last Name

Title Employer

City State/Province ZIP/Postal Code

Area Code & Telephone # FAX #

**Charge Card Payments:** VISA • MASTERCARD • AMERICAN EXPRESS

Account #: _____

Name on Card: _____

Expiration Date: _____

Signature: _____

**For further information, please contact IAMFES at (800) 369-6337 (U.S. and Canada), (515) 276-3344, FAX (515) 276-8655.**

❑ **WORKSHOP 2: Microbial Food Safety Risk Assessment Workshop**
Hilton Hotel and Towers, Pittsburgh, PA — Saturday, July 29, 1995

First Name (will appear on badge) PLEASE PRINT Last Name

Title Employer

City State/Province ZIP/Postal Code

Area Code & Telephone # FAX #

**Charge Card Payments:** VISA • MASTERCARD • AMERICAN EXPRESS

Account #: _____

Name on Card: _____

Expiration Date: _____

Signature: _____

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## · REGISTRATION ·

**WORKSHOP 1: Applications and Development of Microbiological Criteria for Foods**

| | Before 6/30/95 | After 6/30/95 |
|---|---|---|
| IAMFES Member | $375 | $405 |
| Non-Member | $440 | $470 |

**WORKSHOP 2: Microbial Food Safety Risk Assessment Workshop**

| | Before 6/30/95 | After 6/30/95 |
|---|---|---|
| IAMFES Member | $180 | $210 |
| Non-Member | $245 | $275 |

**NOTE:** IAMFES reserves the right to cancel workshops if minimum enrollment is not met by **June 30, 1995.**

**TOTAL AMOUNT ENCLOSED: $**
**(U.S. Funds on U.S. Bank)**

**Guest Room Commitment**
**GOOD UNTIL JUNE 30, 1995**
**Make Your Reservation Now**

# HOTEL RESERVATIONS
# IAMFES

**82nd Annual Meeting**
**July 30-August 2, 1995**
**Hilton Hotel & Towers**
**Pittsburgh, PA**

Please check accommodation requested:

❑ Single (1 person) ❑ Triple (3 persons)
❑ Double (2 persons) ❑ Quad (4 persons)

Bed type:

❑ King Bed
❑ 2 Queen Beds

Special Requests _____

❑ Please indicate here if you have a disability requiring special accommodations.
All room rates are subject to prevailing taxes.
Reservations must be received by hotel prior to arrival.

NAME _____

SHARING WITH (Name) _____

COMPANY NAME _____

ADDRESS _____

_____ CITY _____

STATE/PROVINCE _____ COUNTRY _____ ZIP _____

TELEPHONE _____

ARRIVAL DATE _____ (Check-In Time is after 3 p.m.) DEPARTURE DATE _____ (Check-out Time is 12 p.m.)

SPECIAL REQUESTS _____

After June 30, 1995 reservations will be accepted on a space availability basis only. Reservations will be held until 6:00 p.m. on the date of arrival, unless guaranteed by one night advance deposit, payable by certified check or a Major Credit Card.

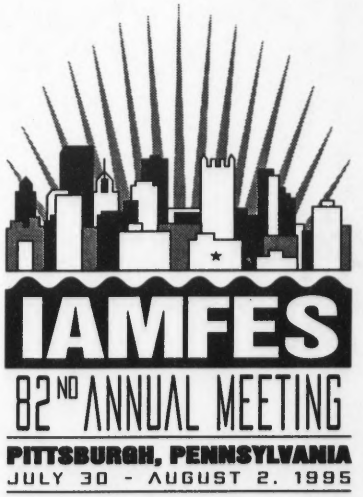
CREDIT CARD #_____ CREDIT CARD_____

EXPIRATION DATE _____

CARD HOLDERS SIGNATURE_____

**SPECIAL ROOM RATES for this convention:**
**$99 per night, plus tax**
**Single, Double, Triple or Quad Occupancy**

For Reservations Call:1(800) Hiltons or (412)391-4600
Or FAX: (412)594-5161




MAIL DIRECTLY TO:

**HILTON HOTEL & TOWERS**
*C/O RESERVATIONS*
GATEWAY CENTER
PITTSBURGH, PA 15222

# IAMFES Offers the Dairy Practices Council
## *"Guidelines for the Dairy Industry"*

IAMFES has agreed with the Dairy Practice Council to distribute their *"Guidelines for the Dairy Industry."* DPC is a non-profit organization of education, industry and regulatory personnel concerned with milk quality and sanitation throughout 15 northeastern/mid-Atlantic states. However, its membership and subscriber rosters list individuals and organizations throughout the United States, Canada and Japan.

For the past 25 years, DPC's primary mission has been the development and distribution of educational guidelines directed to proper and improved sanitation practices in the production, processing, and distribution of high quality fluid milk and manufactured dairy products.

The DPC Guidelines are written by professionals who comprise five permanent Task Forces. Prior to distribution, every Guideline is submitted for approval to the key milk control sanitarian in each of the 15 states which are now active participants in the DPC process. Should any official have an exception to a section of a proposed guideline, that exception is noted in the final document.

The Guidelines are renown for their common sense and useful approach to proper and improved sanitation practices. We think that they will be a valuable addition to your professional reading library.

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***The entire set consists of 48 guidelines including:***

1 Dairy Cow Free Stall Housing
2 Effective Installation, Cleaning and Sanitizing of Milking Systems
3 Selected Personnel in Milk Sanitation
7 Sampling Fluid Milk
8 NE Ext. Publ., Conferences, Short Courses, Correspondence Courses and Visual Aids in Dairying
9 Fundamentals of Cleaning and Sanitizing Farm Milk Handling Equipment
10 Fluid Milk Shelf-Life
11 Sediment Testing and Producing Clean Milk
13 Environmental Air Control & Quality for Dairy Food Plants
14 Clean Room Technology
16 Handling Dairy Products From Processing to Consumption
17 Causes of Added Water in Milk
18 Abnormal Milk--Fieldman's Approach
21 Raw Milk Quality Tests
22 Control of Antibacterial Drugs and Growth Inhibitors in Milk and Milk Products
23 Preventing Rancid Flavors in Milk
24 Troubleshooting High Bacteria Counts of Raw Milk
25 Cleaning and Sanitizing Bulk Pickup and Transport Tankers
28 Troubleshooting Residual Films on Dairy Farm Milk Handling Equipment
29 Cleaning and Sanitizing in Fluid Milk Processing Plants
30 Potable Water on Dairy Farms
31 Composition and Nutritive Value of Dairy Products
32 Fat Test Variations in Raw Milk
33 Brucellosis and Some Other Milkborne Diseases
34 Butterfat Determinations of Various Dairy Products
35 Dairy Plant Waste Management
36 Dairy Farm Inspection
37 Planning Dairy Stall Barns
38 Preventing Off-flavors in Milk
39 Grade A Fluid Milk Plant Inspection
40 Controlling Fluid Milk Volume and Fat Losses
41 Milkrooms and Bulk Tank Installation
42 Stray Voltage on Dairy Farms
43 Farm Tank Calibrating and Checking
44 Troubleshooting Dairy Barn Ventilation Systems
45 Gravity Flow Gutters for Manure Removal in Milking Barns
46 Dairy Odor Control
47 Naturally Ventilated Dairy Cattle Housing
48 Cooling Milk on the Farm
49 Postmilking Teat Dips
50 Farm Bulk Milk Collection Procedures
51 Controlling the Accuracy of Electronic Testing Instruments for Milk Components
52 Emergency Action Plan for Outbreak of Milkborne Illness in the Northeast
53 Vitamin Fortification of Fluid Milk Products
54 Selection and Construction of Herringbone Milking Parlors
56 Dairy Product Safety (Relating to Pathogenic Bacteria)
57 Dairy Plant Sanitation
58 Sizing Dairy Farm Water Heater Systems

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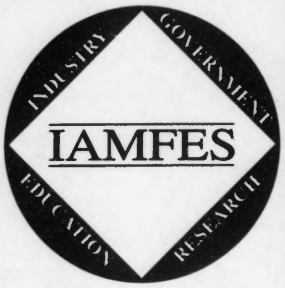
If purchased individually, the entire set would cost $174. We are offering the set, packaged in three loose leaf binders for $125 plus $9 shipping and handling (outside the U.S., $21 for shipping and handling).
Information on how to receive new and updated Guidelines will be included with your order.
To purchase this important source of information, complete the order form below and mail or FAX (515-276-8655) to IAMFES.

Please enclose $125 plus $9 shipping and handling for each set of Guidelines. Shipments outside the U.S. are $125 plus $21 shipping and handling.

Payment in U.S. $ drawn on a U.S. Bank or by credit card.

Name: _____ Phone No. _____
Company: _____
Street Address: _____
City, State/Province, Code: _____
VISA/MC/AE No.: _____ Exp. Date: _____




# This is Your Personal Invitation to Join

The International Association of Milk, Food and Environmental Sanitarians, founded in 1911, is a non-profit educational association of food protection professionals. The IAMFES is dedicated to the education and service of its members, specifically, as a well as industry personnel in general. Through membership in the Association, IAMFES members are able to keep informed of the latest scientific, technical and practical developments in food protection. IAMFES provides its members with an information network and forum for professional improvement through its two scientific journals, educational annual meeting and interaction with other food safety professionals.

## Who are IAMFES Members?

The Association is comprised of a diverse membership of over 3,500 from 75 nations. IAMFES members belong to all facets of the food protection arena. The main groups of Association members fall into three categories: Industry Personnel, Government Officials and Academia.

## Why are They IAMFES Members?

The diversity of its membership indicates that IAMFES has something to offer everyone involved in food protection and public health.

## Your Benefits as an IAMFES Member

***Dairy, Food and Environmental Sanitation*** — Published monthly, this is the official journal of IAMFES. Its purpose is the disseminating of current information of interest to the general IAMFES membership. Each issue contains three to five informational applied research or general interest articles, industry news and events, association news, columns on food safety and environmental hazards to health, a food and dairy industry related products section, and a calendar of upcoming meetings, seminars and workshops. All regular IAMFES members receive this publication as part of their membership.

***Journal of Food Protection*** — A refereed monthly publication of scientific research and authoritative review articles. Each issue contains 12 to 15 technical research manuscripts and one to five articles reporting a wide variety of microbiological research pertaining to food safety and quality. The *Journal of Food Protection* is internationally recognized as the leading publication in the food and dairy microbiology field. This journal is available to all individuals with the Member *Plus* option.

**The IAMFES Annual Meeting** — Held in a different city each year, the IAMFES Annual Meeting is a unique educational event. Three days of technical sessions, scientific symposia and commercial exhibits provide members and other industry personnel with over 200 presentations on the most current topics in food protection. It offers the opportunity to discuss new technologies and innovations with leading authorities in various fields concerned with food safety. IAMFES members receive a substantially reduced registration fee.

## To Find Out More...

To learn more about IAMFES and the **many** other benefits and opportunities available to you as a member, please call (515) 276-3344.

*"The mission of IAMFES is to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply"*

MEMBERSHIP APPLICATION

# International Association of Milk, Food and Environmental Sanitarians

6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2838 • (515) 276-3344 OR (800) 369-6337

## MEMBERSHIP

☐ Membership with JFP and DFES $90
(12 issues of the *Journal of Food Protection* and *Dairy, Food and Environmental Sanitation*)

◀ BEST VALUE

☐ Membership with DFES $60
(12 issues of *Dairy, Food and Environmental Sanitation*)

☐ Check here if you are interested in information on joining your state/province chapter of IAMFES

## SUSTAINING MEMBERSHIP

☐ Membership with BOTH journals $450
(Includes exhibit discount, July advertising discount, company monthly listing in both journals and more)

## STUDENT MEMBERSHIP

☐ Membership PLUS including both journals $45

☐ Membership with *Journal of Food Protection* $30

☐ Membership with *Dairy, Food and Environmental Sanitation* $30

*FULL-TIME STUDENT VERIFICATION MUST ACCOMPANY THIS FORM

Shipping Charges: Outside U.S. _____ Surface ($22.50 per journal) _____ AIRMAIL ($95.00 per journal)

**PRINT OR TYPE...ALL AREAS MUST BE COMPLETED IN ORDER TO BE PROCESSED**

Name_____ Company Name_____

Job Title_____ Office Phone #_____

Address_____ FAX #_____

City_____ State/Province _____ Country_____ Postal Code_____

Membership: ___ New ___ Renewal

**Mail Entire Form to:**
IAMFES
6200 Aurora Ave, Suite 200W
Des Moines, IA 50322-2838
USA

_____ Check or Money Order
_____ Master Card
_____ VISA
_____ American Express

U.S. FUNDS on U.S. BANK

**OR Use Your Charge Card:**
(800) 369-6337 (U.S. & Canada)
(515) 276-3344
FAX (515) 276-8555

Card #_____

Exp. Date_____

Signature _____

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

## IAMFES Booklets

| Quantity | | Total $ |
|---|---|---|
| _____ | Procedures to Investigate Waterborne Illness<br>$6.00 member or government; $9.00 non-member | _____ |
| _____ | Procedures to Investigate Foodborne Illness - 4th Edition<br>$6.00 member or government; $9.00 non-member | _____ |
| _____ | Procedures to Investigate Arthropod-borne and Rodent-borne Illness<br>$6.00 member or government; $9.00 non-member | _____ |
| _____ | Procedures to Implement the Hazard Analysis Critical Control Point System<br>$6.00 member or government; $9.00 non-member | _____ |
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| 103 | 118 | 133 | 148 | 164 | 178 | 193 | 208 | 223 | 238 | 253 | 268 | 283 | 298 | 313 | 328 | 343 | 358 | 373 | 388 |
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| 107 | 122 | 137 | 152 | 168 | 182 | 197 | 212 | 227 | 242 | 257 | 272 | 287 | 302 | 317 | 332 | 347 | 362 | 377 | 392 |
| 108 | 123 | 138 | 153 | 169 | 183 | 198 | 213 | 228 | 243 | 258 | 273 | 288 | 303 | 318 | 333 | 348 | 363 | 378 | 393 |
| 109 | 124 | 139 | 154 | 170 | 184 | 199 | 214 | 229 | 244 | 259 | 274 | 289 | 304 | 319 | 334 | 349 | 364 | 379 | 394 |
| 110 | 125 | 140 | 155 | 171 | 185 | 200 | 215 | 230 | 245 | 260 | 275 | 290 | 305 | 320 | 335 | 350 | 365 | 380 | 395 |
| 111 | 126 | 141 | 156 | 172 | 186 | 201 | 216 | 231 | 246 | 261 | 276 | 291 | 306 | 321 | 336 | 351 | 366 | 381 | 396 |
| 112 | 127 | 142 | 157 | 172 | 187 | 202 | 217 | 232 | 247 | 262 | 277 | 292 | 307 | 322 | 337 | 352 | 367 | 382 | 397 |
| 113 | 128 | 143 | 158 | 173 | 188 | 203 | 218 | 233 | 248 | 263 | 278 | 293 | 308 | 323 | 338 | 353 | 368 | 383 | 398 |
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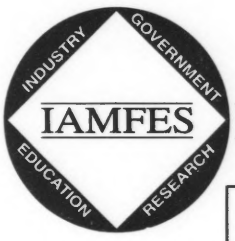


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| 102 | 117 | 132 | 147 | 163 | 177 | 192 | 207 | 222 | 237 | 252 | 267 | 282 | 297 | 312 | 327 | 342 | 357 | 372 | 387 |
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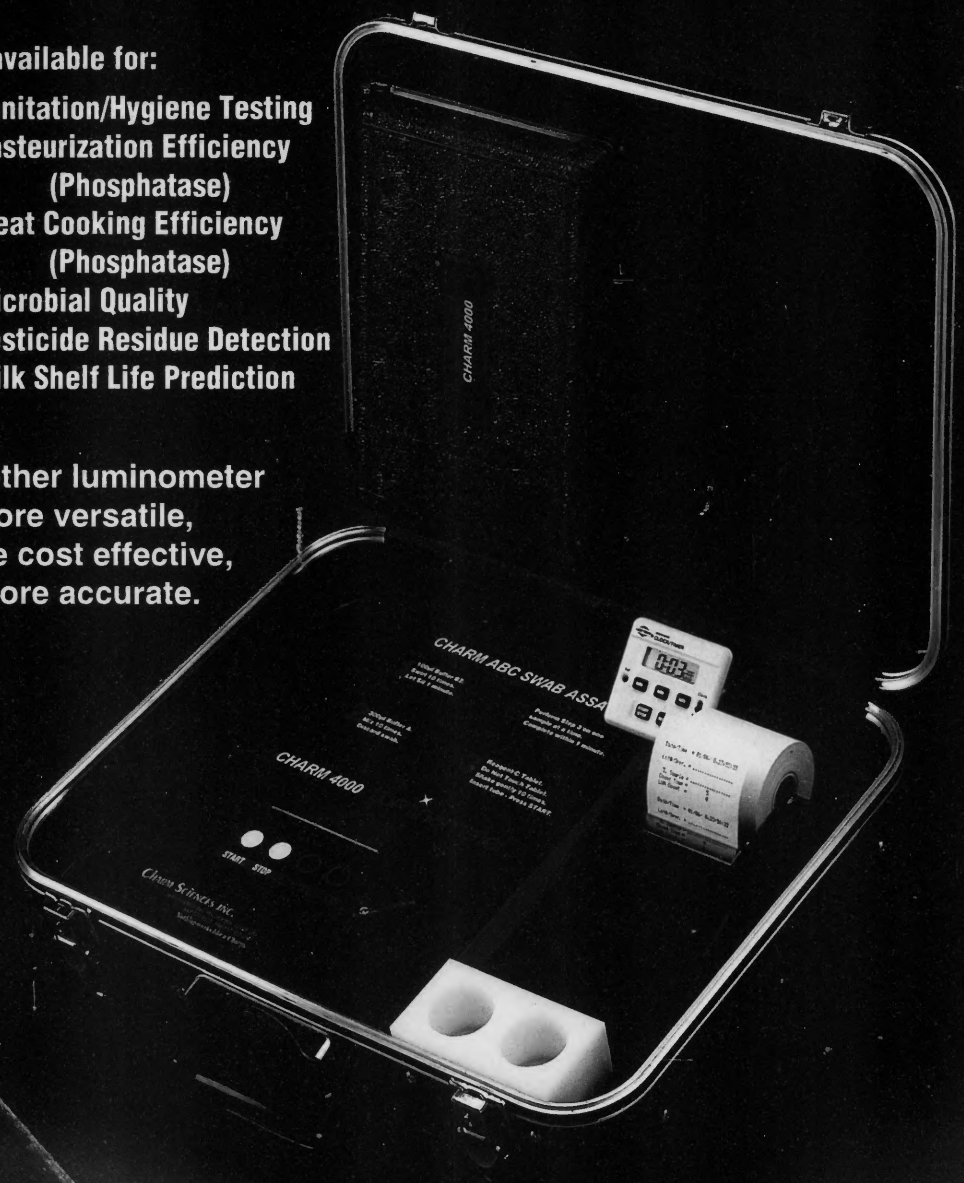


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