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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION, INC.

SEPTEMBER 2001

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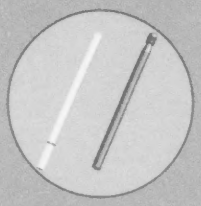

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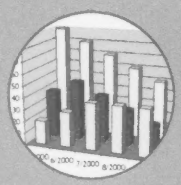

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DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

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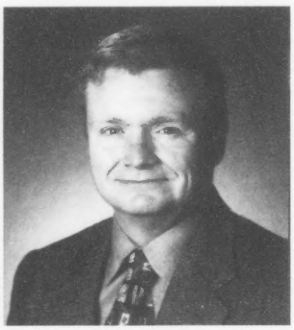


By JAMES DICKSON
President

"I think that IAFP is THE food safety organization and I would like to see it grow"

Wow! What a meeting! It seems to be almost a cliché to say that this was the "best meeting ever." But in many ways it was. We had another year of record-setting attendance, which has been the trend for the last several years. The technical sessions were exceptional, and the fellowship was what we have come to expect from IAFP meetings. In a very real sense, this was the "best meeting ever," which only makes me anticipate next year's meeting in San Diego even more.

Before I make any more comments about the meeting, though, I need to ask a question. Do you recognize the names of Donna, Karla, Beth, Donna, Pam, Bev, Didi, Shannon, Lisa, Julie or Lucia? How about David? These are the people that worked behind the scenes to make the meeting happen. There were many long days in Des Moines for weeks in advance of the meeting, and many days in Minneapolis that began before 6:00 a.m. and ended long after the sessions were finished. These people took care of all of the details, so that all you had to do was walk in and sit down at the sessions. If you have ever organized a meeting of any kind, imagine what it takes to organize and operate a 3-day meeting for 1,400 people. If you ever have the opportunity, a few simple words of appreciation to any of them would mean a lot.

As I thought about the meeting on the way home from Minneapolis, I thought about what makes the meeting so good. Why do I look forward to this meeting every year more than IFT or ASM? There are many reasons, but they all have a common theme, and that theme is the people. It is the IAFP Membership that makes the meeting what it is. All of the things that happen are because somebody, some IAFP Member, chose to make it happen. This includes everything from the individual abstracts submitted to the symposia and the Professional Development Groups. None of these would happen without one or more members saying, "I want to do this. I want to make this happen." And it does happen, year after year.

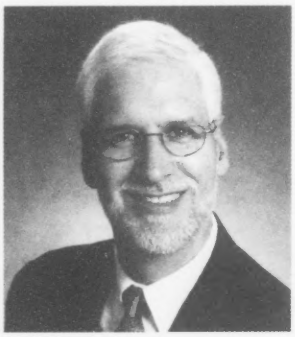
Although the formal programs are the strength of the Annual Meeting, I think that the informal aspects are equally important. I know that not only will I see the "cutting edge" of the science, I will also have the chance to visit with the individuals conducting the research, and find out what they have planned for the coming years. It is also a time for me to renew personal friendships with people I may only see once a year at the meeting. It is also through these personal interactions that new ideas are born, and future plans are made. Without these interactions, the meeting would certainly lose many of the qualities which makes it so attractive.

Finally, I wanted to give you some idea of what I would like the organization to accomplish over the next year. I think that IAFP is ***THE*** food safety organization and I would like to see it grow. I believe that there are a number of food safety professionals out there who either don't know of us, or know of us and have not decided to become a part of the organization. I would like to bring these people into the organization, so that we can all benefit from our shared knowledge. So how do we reach these people? I believe that our Members are our best representatives. A national conservation organization that I belong to recently challenged its members with an "each one, reach one" campaign. I would like to challenge you to identify one person that you know, and ask them to join IAFP. As the organization becomes stronger, we all benefit from the diverse knowledge of our Members. I really believe that we all benefit by bringing as many food safety professionals into the organization as we can, and so I'll talk about this often over the next year.

Same time, next month.

COMMENTARY

From the Executive Director



By DAVID W. THARP, CAE
Executive Director

"Won't you consider making a donation to the IAFP Foundation Fund?"

Have you felt just so-so about your support of the International Association for Food Protection – your Association? Are you looking for ways that you can really make a difference and help others while doing it? Well, I have something for you to consider. Won't you consider making a donation to the IAFP Foundation Fund? A contribution, no matter how large or small, can make a huge difference to many IAFP Members!

Let's take a few minutes to review the programs that the IAFP Foundation supports. First, the Foundation supports the Ivan Parkin Lecture at our Annual Meeting Opening Session. Funds are made available to enable the Association to attract the finest speakers on late-breaking topics of interest to food safety professionals. This year we were fortunate to have Dr. Linda Detwiler from USDA/APHIS present the lecture which was an update on Bovine Spongiform Encephalopathy. Just to set the record straight, Dr. Detwiler was unable to accept the travel support or honorarium that normally is made available to the Ivan Parkin Lecturer and asked that the monies be kept in the Foundation to further our efforts.

Another worthy program the Foundation entirely supports is the Developing Scientist Competition during the Annual Meeting. This is a student competition in which student participants are judged on their presentations, both poster and oral, then scored by a panel of anonymous judges. We have seen a steep increase in participation in the Developing Scientist Competition and are surely pleased the Foundation is willing to invest in the future of our students who are indeed, the future of the organization.

The Foundation completely supports the Audiovisual Library of video training and educational tapes for our Members' use. We are able to offer the use of these videotapes to our Members at no cost, absolutely free, because of the generosity of the Foundation.

Distribution of our journal overruns to developing nations through Food and Agriculture Organization (FAO) in Rome, Italy is also supported exclusively by the Foundation. Each year, we send a minimum of 25 complete volumes of both of our journals (*Dairy, Food and Environmental Sanitation* and *Journal of Food Protection*) to FAO. This effort helps to share the expertise of our contributing authors with scientists in needy countries.

And the last, on-going program supported by the Foundation is speaker support funding for travel to the Annual Meeting. Sometimes governmental speakers or speakers from education are willing to come present their research and experiences, but their employer's budget cannot support the travel. The Foundation is ready to step in to assist in such cases on a limited basis.

Now, every time that I mentioned "Foundation" above, re-read the text and replace "Foundation" with "IAFP Members." Do you see what I mean about the Foundation needing your support? The Foundation is supported by Members just like you. We receive a great number of contributions from individual Members in addition to the supporting funds from our Sustaining Members. We want to add your name to the list on the next page. Please send your check today!

$100,000

We reached our goal of $100,000 for the Foundation Fund, but we are not done yet. We want the Foundation to contine to grow and be able to support the IAFP mission. Your past support is appreciated; your future support is needed!

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Dairy, Food and Environmental Sanitation, Vol. 21, No. 9, Pages 742-748

Delamination in High Density Polyethylene Surfaces and the Influence of Multilayered Upper Surfaces on the Deterioration Process

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SUMMARY

Polyethylene, a thermoplastic discovered in 1933, is widely used in a variety of food equipment contact surfaces. Polyethylene has been shown to break down rapidly on the contact interface through a delamination mechanism. Previous observations of in-use samples indicate that delamination after the initial surface incision is an important factor in food contact surface deterioration. This deterioration can lead to a food safety risk, because it may not be possible to clean and sanitize such a surface completely. The molecular structure of polyethylene is a regular oriented crystal lattice, but if the molecules lose energy quickly during molding, the interconnected lattice does not form to the required degree. The reason for the deterioration pattern observed might be directly tied the molecular configuration of the crystal matrix. The objectives of this study were to (i) search for the presence of multilayered structures in the contact interfaces of polyethylene surfaces that may be contributing to rapid deteriorative changes of surface structures, (ii) evaluate the effects of various cleaning procedures following initial knife cuts into the upper surface layers, and (iii) compare samples to a refurbished sample (from which outer layers had been removed) to gain insight into the influence of multilayered structures on surface delamination. Understanding and verifying the link between the delamination phenomenon and the multilayered appearance of upper surface layers allow the control of deterioration by refurbishing the plastic links before use. These results could contribute significantly to food safety analysis of plastic food contact surfaces.

A peer-reviewed article.

*Author for correspondence: Phone: 612.624.3629;
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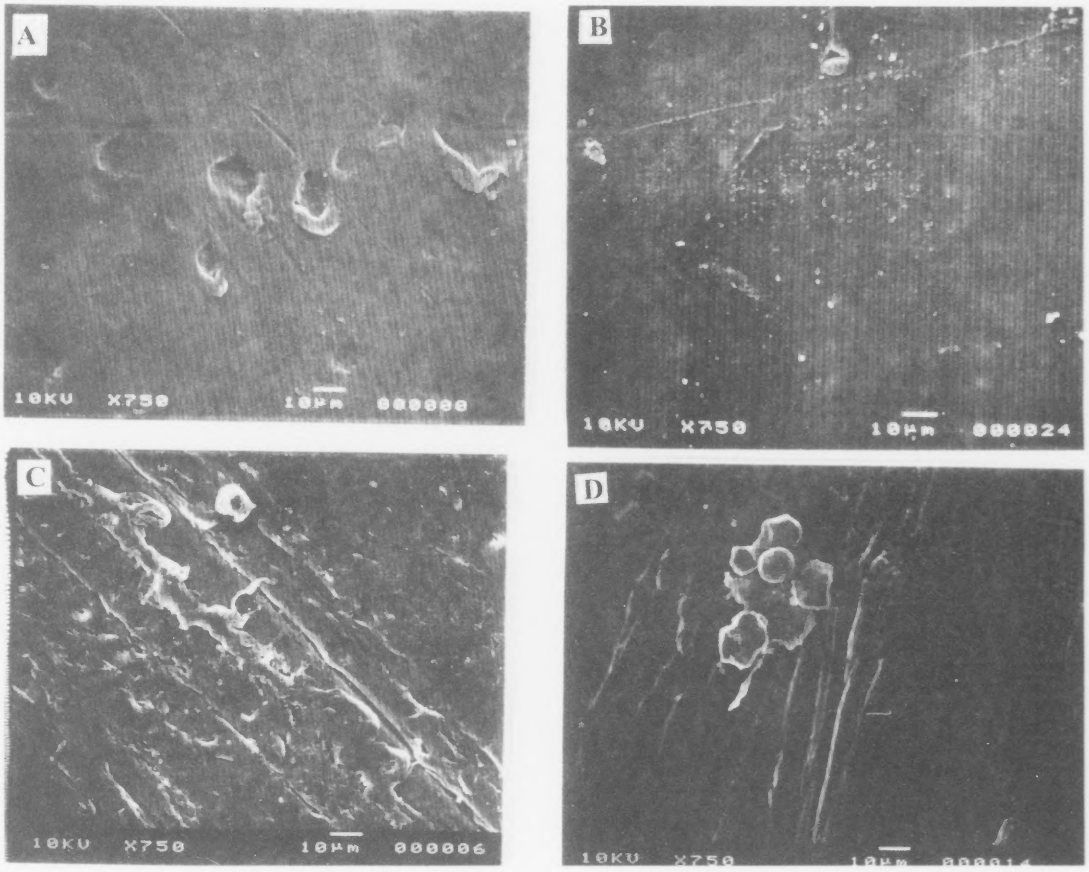
Figure 1. Sconning electron microscopy of new surfoce tapagraphy of High-Density Palyethylene canveyor belt links from three different manufacturers, designoted A, B, ond C. D is o refurbished HDPE somple from manufacturer C



INTRODUCTION

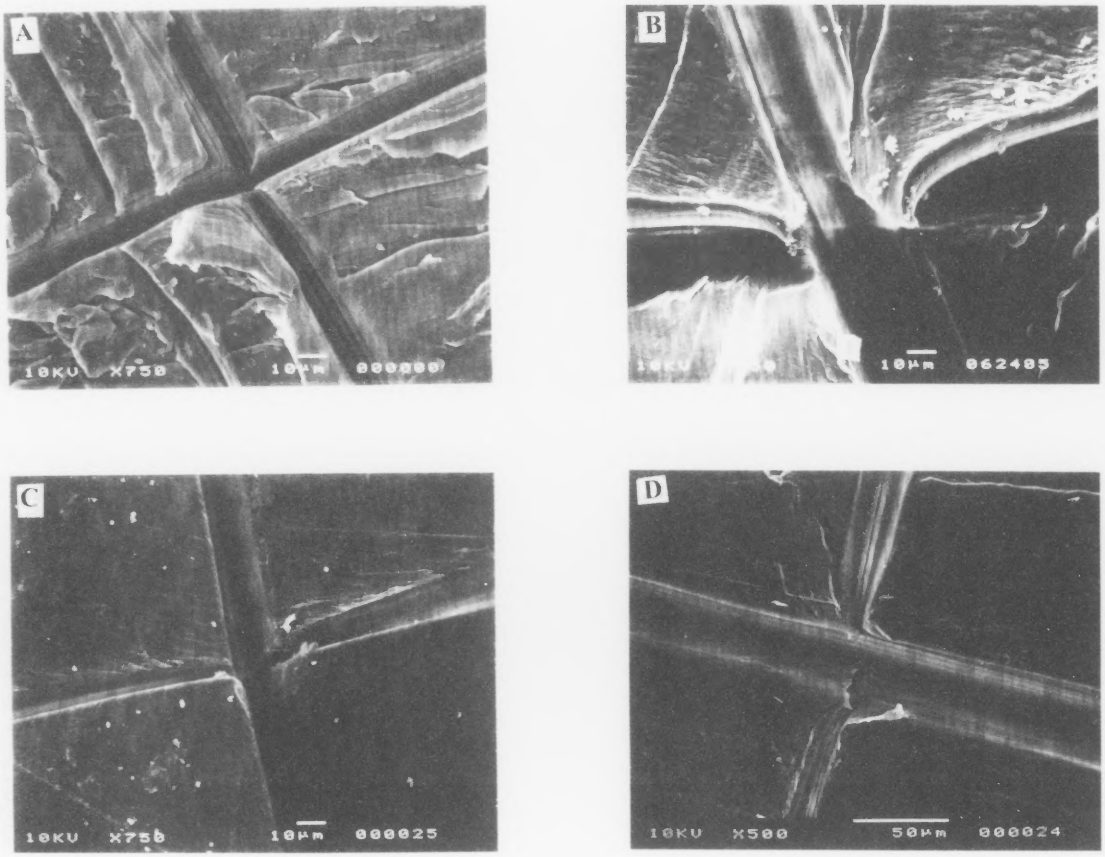
High-density polyethylene (HDPE) link conveyors play a major role in the food processing industry *(1, 2, 3)*, and it has been accepted without documented evidence that their use will not increase the risk of contamination of the food we eat. All food contact surfaces are prone to wear during use, and it is essential that minimal damage occur with normal processing and cleaning procedures over short periods of time. HDPE link surfaces did not meet this requirement in a previous study *(6)*. HDPE has been shown to break down rapidly on the contact interface through a delamination mechanism *(6)*. After the surface has received an initial incision, applied shear forces cause rapid delamination, forming frayed plastic fibers known as angel hair. This deterioration may be related directly to the molecular configuration that influences the crystal structure of the polymer matrix. Polyethylene is a semi-crystalline polymer with a distribution of amorphous (random ordered) phases in the polymer matrix *(8, 9)*. Formation of the amorphous phases may influence the deterioration process, because these random arrays of plastic molecules are weaker than the crystal structures. Injection molded links could be affected during the molding process by parameters such as flow stresses, orientation and rapid cooling *(4, 5, 8, 9)*. The potential exists for the outermost layers of the plastic object to be flat, linear-oriented molecular sheets with limited tie molecules between the crystal formations, which would weaken the outer surface layers and lead to delamination *(4)*. Scanning electron microscope analysis (SEM) was used to compare HDPE sample links from three different manufacturers with that of a refurbished sample (from which the outer surface had been removed) to verify the presence of multilayered formations in the outer surface and the effect of removing the outer layer on deterioration.

MATERIALS AND METHODS

Samples

New HDPE sample links were obtained from three different manufacturers, designated A, B, and C. A

Figure 2. Scanning electran micrascapy af surfaces af High-Density Palyethylene canveyar belt links, demanstrating the multilayered structures present when the plastic has been cut. The HDPE samples are fram three different manufacturers, designated A, B, and C. D is a refurbished HDPE sample fram manufacturer C



refurbished HDPE sample from manufacturer C, designated D, was obtained from a company holding a patented refinishing process.

Procedures

An "X" was cut with a scalpel blade across the new HDPE sample contact surfaces to allow the multilayered structure of the plastic to be reviewed. Samples for the deterioration tests had ten "X" cuts made into the surfaces and were then treated with the following procedures: (i) sample scrubbed with green scrub pads 10× in various directions, (ii) sample pressure-washed at a distance of 6-8 inches for 2 minutes at a pressure of 500-700 psi, or (iii) sample treated with a combination of both procedures. All samples were trimmed, attached to SEM stubs with double-sided tape (3M, St. Paul, MN), and sputter coated (Hummer VII, Anatech Ltd., Alexandria, VA) using gold-palladium to a thickness of 15nm, after which they were viewed under a JEOL JSM-T330 scanning electron microscope. Photographic series of 500×, 750× and 2000× magnifications were made for each sample at 10kv.

RESULTS

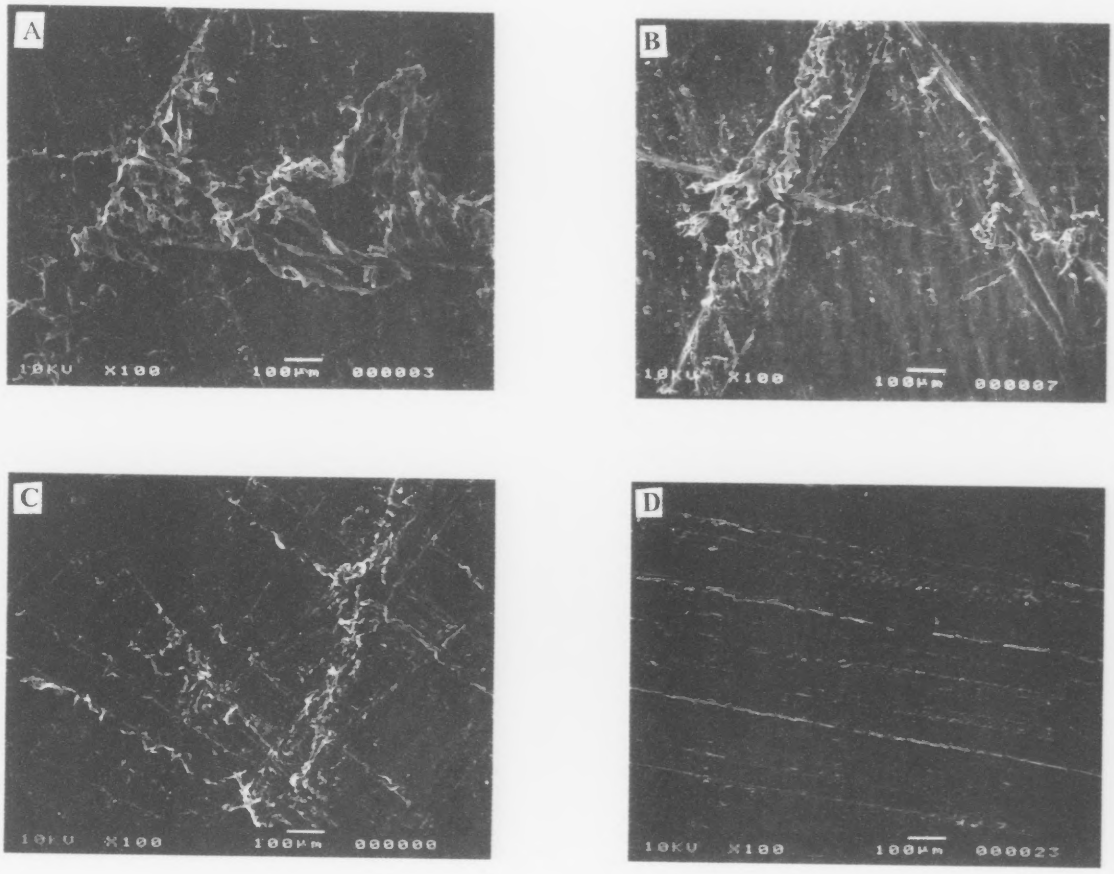
New surface topography

The sample A link showed two unique cavity structures, one a sinkhole and one with well defined peripheral lips (Fig. 1A). Sample B showed no cavity formations, but there were large scratches 1µm wide and 0.5µm deep (Fig. 1B). Sample C had no pore formations, but there was a high density of minor surface scratches (Fig. 1C). More particulate matter was attached to the surface of sample C than to the surface of either sample A or B. Sample D showed no cavity formations but had extensive parallel grooves produced by the refurbishing process (Fig. 1D).

Verification of multilayered structures

Sample A showed a well-defined multilayered upper surface structure. Extensive delamination of the

Figure 3. Sconning electron microscopy af surfoces af High-Density Polyethylene canveyor belt links after the surfaces hove been expased to cutting and scrubbing treatment. The HDPE samples are fram three different monufacturers, designoted A, B, ond C. D is a refurbished HDPE sample from manufacturer C



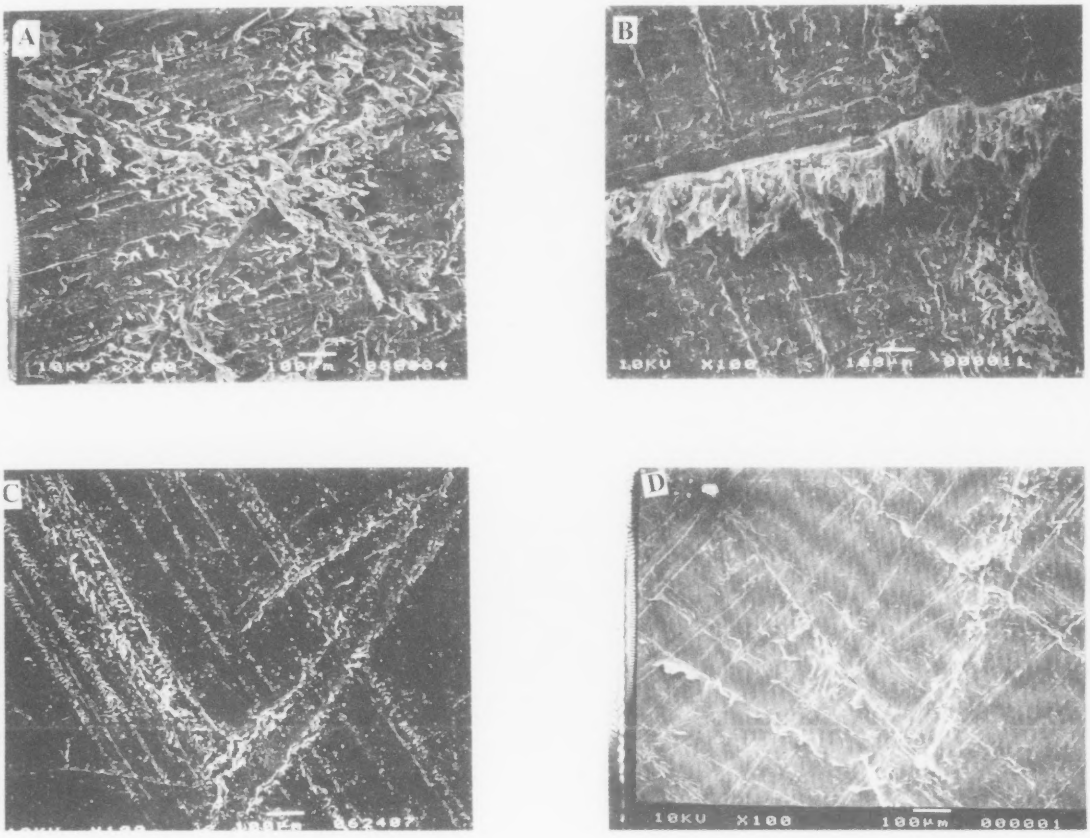
upper interface had occurred, producing structures that resembled the pages of a book. Clear separation and peeling of well-defined layers was evident (Fig. 2A). Sample B showed a small number of multilayered structures in the upper surface (Fig. 2B). Sample C showed a multilayered surface structure, but it was impossible to discern the depth to which the layered structures penetrated into the sub-surface. The lower sections of the scalpel incisions appeared to be solid in structure (Fig. 2C). Sample D showed variations in the upper layer structure; areas of the outermost surface of the sample appeared to be layered, but the formations appeared randomly distributed along the scalpel incision. Internal zones of the incision appeared to be solid and strongly bonded (Fig. 2D).

Deterioration testing results

Cut and scrub. Sample A showed the most extensive deterioration of the four samples (Fig. 3A). Along the incision boundaries extensive, long, frayed plastic fibers resulted from the scrubbing shear forces. Areas between the cut zones showed shorter frayed structures. Scrubbing produced many small surface scratches that could serve as primary sites of delamination. Sample B showed less deterioration than sample A, with fewer and shorter frayed structures at the incision boundaries (Fig. 3B). Sample C exhibited less surface delamination than the other samples, but a higher degree of surface scratching. The frayed plastic fibers were much shorter and fewer in number (Fig. 3C). Sample D showed very little change in surface topography and some areas of minor delamination; there was much less surface scratching compared to that of a new sample of this same link type, sample C.

Cut and pressure wash treatment. Sample A showed very heavy delamination at the incision boundaries, with massive dislocation of the upper surface layers from the cut zone (Fig. 4A). Sample B showed similar frayed formations but a lesser degree of dislocation from the cut incision (Fig. 4B). Minor damage occurred on both

Figure 4. Scanning electron microscopy of surfaces of High-Density Polyethylene conveyor belt links after the surfaces have been exposed to cutting and pressure wash treatment. The HDPE samples are from three different manufacturers, designated A, B, and C. D is a refurbished HDPE sample from manufacturer C



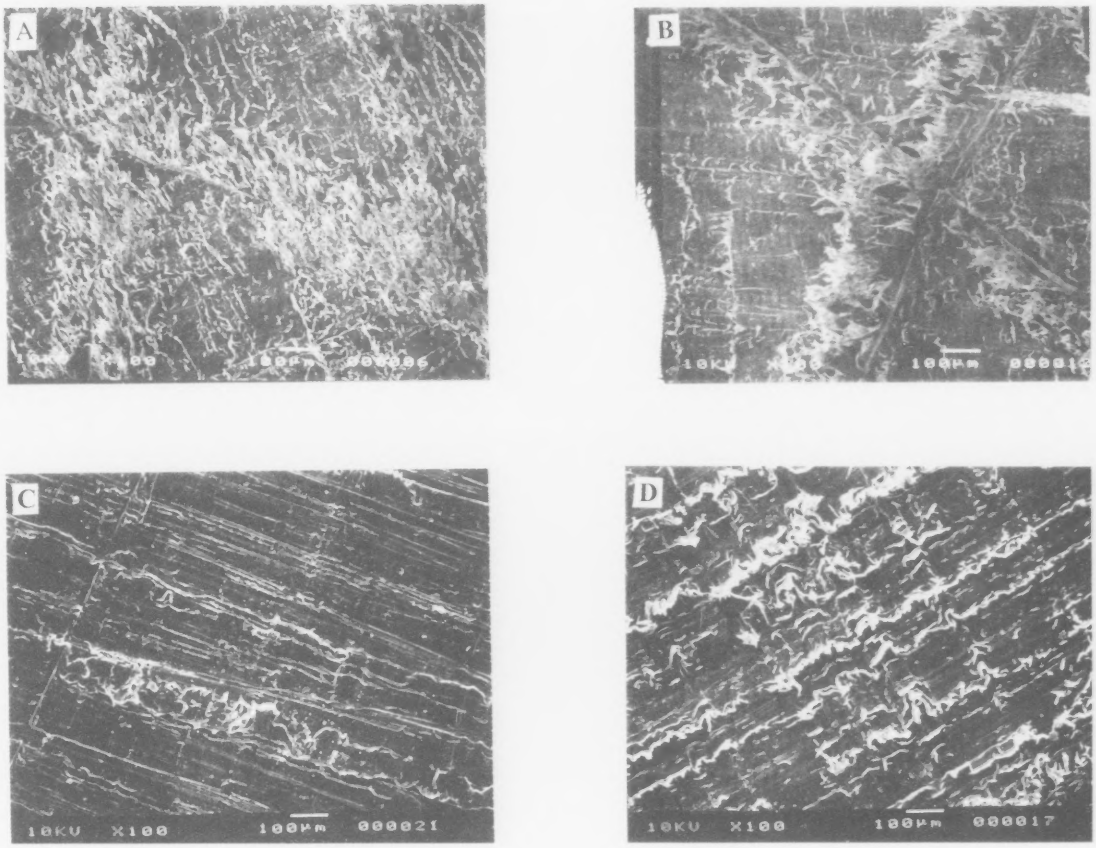
samples in the areas between the scalpel incisions, forming shorter, frayed formations. Among the frayed filaments bordering the scalpel incisions, some microparticulate materials were incorporated into the polymer composite, appearing as cuboid structures exiting from the break in the surface. The particles were found only in areas of damage, indicating their presence in the sub-surface upper layers. Sample C showed minor delamination at a few positions along the boundaries and only slight changes of other surface features (Fig. 4C). Compared to samples A and B, there was less deterioration in all respects. Microparticles were also incorporated into the composition for this link, but they appeared more rounded and rougher than those found in sample B. Sample D showed almost no delamination, and the microparticles found abundantly in sample C were found only infrequently on this sample (Fig. 4D).

Cut, scrub, and pressure wash treatment. Sample A showed massive surface damage that was clearly associated with the incision boundaries. The induced damage was greater than that caused by either the scrub or pressure wash alone (Fig. 5A). Sample B showed similar structures at the incision boundaries but to a lesser degree. Damage between the cut zones was much less than in sample A (Fig. 5B). Samples A and B appeared to have a more uniform dispersal of frayed fibers over the surface between incisions compared to sample C, which showed no significant damage in the zones between the cuts and very little damage at the incision boundaries (Fig. 5C). Sample D showed almost no delamination and minor damage at infrequent points along the incision boundaries (Fig. 5D).

DISCUSSION

Delamination damage, a major problem of food contact surfaces in meat processing environments, causes rapid and extensive deterioration *(6)*. Delamination has been demonstrated to some degree in all the link samples tested in this study but is variable among manufactur-

Figure 5. Scanning electran microscopy of surfoces af High-Density Palyethylene canveyar belt links after the surfaces have been expased ta cutting, scrubbing and pressure wash treatment. The HDPE samples are fram three different manufacturers, designated A, B, and C. D is a refurbished HDPE sample fram manufacturer C



ers. Delamination in plastic surfaces appears to be linked to modifications in crystal structures and may be due to the lack of tie molecules in the outer zone of the surface. Processing factors during injection molding such as flow rate, flow pressure, melt temperature, mold temperature and cooling rate will influence the degree of crystallization and tie molecule formation *(5, 8, 9)*.

The results clearly showed that a primary incision in the surface resulted in more extensive deterioration. Areas not previously damaged were influenced by the scrub and pressure wash procedures, but showed less delamination. All three cleaning protocols produced a marked degree of damage to the test surfaces. Scrubbing, pressure washing and a combination of both caused increasing amounts of deterioration, in that order. The time period of the treatment is small compared to the procedures used in the meat industry during cleaning operations. Numerous sub-variables associated with these results, such as pressure during pressure washing, angle of impact, distance, spray patterns, and type of scrubbing implements, must be further investigated before optimal application of these procedures can be determined.

Both samples that demonstrated the presence of microparticles showed marked resistance to the applied shear forces of the cleaning treatments. Microparticles incorporated either for their reinforcing potential or as nucleating agents *(8)* gave these two link types higher resistance to delamination even after the initial incision.

Multilayered formations found in the upper layers of samples A and B and minimally in sample C appeared to correlate well with the degree of deterioration. High levels of layering in the upper surface induced high levels of delamination with the applied shear forces. Sample D (refurbished sample C) showed few or no layered formations in the upper surface and insignificant amounts of deterioration via a delamination mechanism with the applied shear forces. Extensive multilayered formations and the absence of microparticles in sample

A suggest a link between the use of the microparticles and alterations in crystal structure.

Complete removal of the upper surface of sample C resulted in a surface very resistant to the abrasive influences applied with the cleaning treatments. These preliminary results provide an indirect verification that the internal crystal structures of the links may be distinctly different than the external interface. Sample C contained microparticles in the polymer composition, and although very few were found in the refurbished sample D as compared to the new sample C, they might be the potential link to the more abrasion resistant inner surface.

It is clear from these results that samples from different manufacturers of link conveyor systems differ in the degree of resistance to delamination-mediated deterioration under applied physical stress. The difference between the link HDPE compositions, processing parameters, and post processing treatments may be the factors that influence the resistance to deterioration. Compositional factors such as varying molecular weights and density influence the physical and chemical properties of the injection molded link *(7, 8)*.

CONCLUSIONS

Surfaces used in food processing operations must be smooth, non-porous, and resistant to change in surface topography if the surface is to remain easy to clean and to effectively sanitize. The rapid, extensive changes in surface topography observed in the samples tested in this study indicate that HDPE in the non-refurbished state as received from the link manufacturers will quickly become difficult to clean, which will increase the risk to foods contacting the surface. The preliminary results from this study demonstrated clearly that refurbished (outer layers removed) samples of sample C acquired a higher degree of resistance to the abrasive physical forces. Microparticles incorporated into two of the link samples studied demonstrated a higher resistance to the physical shear forces than sample A with no particles. More research is needed to verify the use of the refurbishing process on HDPE surfaces to improve abrasion resistance or to renew used surfaces in order to recycle the links back into the processing environment and reduce the overall expenditures by the food industry for conveyor systems. In order to minimize surface deterioration, which reduced the effectiveness of the sanitation program resulting in potential food safety hazards, more emphasis must be placed on the development of procedures that will provide effective cleaning and sanitizing while minimizing changes in the plastic surface.

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The Relationship between Standard Plate Counts and Coliform Counts in Raw Milk

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SUMMARY

The Standard Plate Counts (SPC) and coliform counts of 200 raw milk samples were determined. Analysis of the results showed an association between the SPC and the coliform counts. The relationship between SPC and coliform numbers was highly correlated (y= 0.864 × + 2.374; y= log CFU/ml for SPC and × = log CFU/ml for coliforms; $r = 0.82$). SPC numbers were classified into five categories; SPC class 1 (log CFU/ml < 2), class 2 (log CFU/ml ≥ 2 and < 3), class 3 (log CFU/ml ≥ 3 and < 4), class 4 (log CFU/ml ≥ 4 and < 5), and class 5 (log CFU/ml ≥ 5 and < 6). The average coliform counts were 0.0, 0.69, 1.17, 1.88, and 2.73 log CFU/ml in SPC class 1, 2, 3, 4, and 5, respectively. There was strong agreement between SPC classes and average coliform numbers. These data suggest that it is possible to estimate coliform counts based on SPC of raw milk.

INTRODUCTION

The standard plate count (SPC) is suitable for estimating bacterial populations in milk, and it is the reference method to be used to examine raw milk *(2)*. This procedure is also recommended for industry application to detect sources of contamination by testing line samples taken at successive stages of processing *(6, 8)*. Although the SPC has been of considerable value, questions continue to be raised concerning the procedure's ability to reflect completely the sanitary practices used in the production and handling of raw milk. Because coliform counts are an important index for the quality of raw milk, coliform counts have also been monitored along with SPC. Application of the test for coliforms is not intended to detect fecal pollution but rather to measure the quality of the practices used to ensure proper processing and to minimize bacterial contamination *(1, 2, 5, 8)*.

A peer-reviewed article.

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Figure 1. The linear relationship of log CFU/ml SPC to coliform counts from raw milk

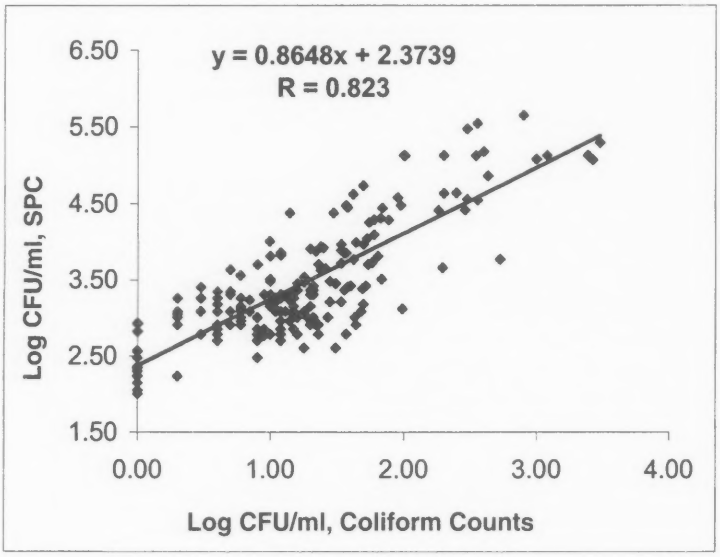
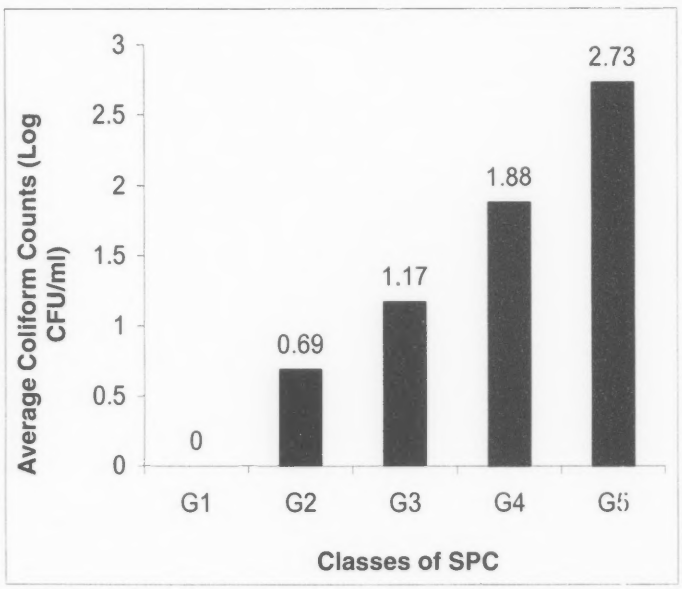


Figure 2. The relationship between classes of SPC and coliforms: G1; SPC class 1 (log CFU/ml < 2), G2; class 2 (log CFU/ml ≥ 2 and < 3), G3; class 3 (log CFU/ml ≥ 3 and < 4), G4; class 4 (log CFU/ml ≥ 4 and < 5), and G5; class 5 (log CFU/ml ≥ 5 and < 6)



In raw milk or beef carcasses, coliform contamination usually comes from animal feces. Siragusa et al. *(7)* demonstrated an association between the SPC class and the occurrence of *Escherichia coli*-positive samples in beef carcasses. According to the research work, the occurrences of *E. coli* and SPC in beef carcasses are strongly correlated. To date, no research has reported the relationship between SPC and coliform counts in raw milk. The purpose of this research was to ascertain this relationship.

MATERIALS AND METHODS

Sample preparation

Raw milk (Grade A) was obtained from the Washington State University (WSU) Dairy Creamery (Pullman, WA) each morning or every other morning, depending upon the daily needs of the WSU Creamery and the amount purchased by Darigold. The samples were collected by the tanker driver in sterile 1-ounce sample bottles. The milk was thoroughly agitated before sampling with a sterile ladle. The samples were packed in ice for transport back to the Creamery. Once in the Creamery, samples were kept in a 2°C refrigerator until assays were begun.

Microbiological analysis

Raw milk was serially diluted (10^{-1} to 10^{-4}) with sterilized phosphate buffer (pH 7.0) and pour plated. After dilution, 1-ml and 100-µl samples of raw milk or of diluents were transferred to petridishes and pour plated with Plate Count Agar (Difco Laboratories, Detroit, MI) and Violet Red Bile Agar (VRB; Difco) in duplicate for enumeration of SPC and coliforms, respectively. After thorough mixing, the plates were incubated at 32°C for 44 to 48 h and 32°C for 24 h, respectively. Numbers of SPC and coliform were then enumerated.

Statistical analysis

Bacterial populations (CFU/ml) were calculated and transformed to $\log_{10}$ values. Correlation coefficients and linear regression trend lines were calculated and plotted using Microsoft Excel 2000 or GraphPad InStat Ver. 3.00 (GraphPad Software, Inc., San Diego, CA). The SPC values were classified as follows: class 1 (log CFU/ml < 2), class 2 (log CFU/ml ≥ 2 and < 3),

class 3 (log CFU/ml ≥ 3 and < 4), class 4 (log CFU/ml ≥ 4 and < 5), and class 5 (log CFU/ml ≥ 5 and < 6). The average log CFU/ml of coliform in each SPC class was reported, and these averages were compared.

RESULTS AND DISCUSSION

A significant linear relationship was observed between SPC and coliform counts (Fig. 1). Response scatter plots indicated a high degree of association between SPC and coliform counts, $r = 0.823$, $y = 0.8648x + 2.3739$, y= log CFU/ml of SPC, x= log CFU/ml of coliform from raw milk.

Several studies have reported on the relationship between total SPC and coliforms/*Escherichia coli* from beef carcasses. Siragusa et al. *(7)* reported that total SPC numbers were strongly related to the occurrence of *E. coli* from beef carcasses. However, Gill et al. *(3, 4)* reported that the linear relationship of numbers of *E. coli* to SPC (both continuous variables) was weak or nonexistent, when microbial data from beef carcasses were analyzed by a linear regression model to test correlations. In the case of raw milk, no research has been reported to date on the correlation between SPC and coliform/*E. coli* numbers. Therefore, this data will be useful in showing correlation between SPC and coliforms in raw milk.

Figure 2 shows the relationship between the SPC classes and average coliform values. Class 1 (log CFU/ml < 2), class 2 (log CFU/ml ≥ 2 and < 3), class 3 (log CFU/ml ≥ 3 and < 4), class 4 (log CFU/ml ≥ 4 and < 5), and class 5 (log CFU/ml ≥ 5 and < 6) were related to average coliform numbers in the five SPC classes as 0.0, 0.69, 1.17, 1.88, and 2.73 log CFU/ml, respectively. The results show the strong relationship between SPC classes and average coliform numbers in the samples. These data suggest that it is possible to estimate coliform counts based on SPC of raw milk.

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Food Safety in Arizona: An Update

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SUMMARY

In Arizona, the Department of Health Services, in conjunction with 15 county health departments, operates sanitation programs that cover food, bottled water, hotels and motels, trailer parks, children's camps, public schools, and swimming pool maintenance. In 2000, food facilities represented two-thirds of all regulated facilities. The number of food establishments increased 10% over the previous year, with 70,000 inspections being conducted at more than 30,000 food establishments. An enforcement action to achieve regulatory compliance was required at only 1.5% of establishments, a reduction of approximately 40% from the previous year. The proposed Arizona Food Code 2000, a modified version of the FDA's 1999 Model Code, will go into effect in October 2001. The new Arizona Code will not allow direct bare hand contact with ready-to-eat foods except for washing raw produce or when otherwise approved, and Arizona's requirement for hot holding food will be 130°F. From the limited data available (1998 and 1999), the incidence of confirmed cases of illness due to selected pathogens appears to have declined, with the exception of campylobacteriosis in Arizona and salmonellosis at the FoodNet sites. Information on lab-confirmed cases of foodborne illness outbreaks in Arizona (1998 through 2000) indicates that the only fatalities observed were associated with listeriosis.

ANNUAL REPORT: FOOD SAFETY AND ENVIRONMENTAL SERVICES

The following information was obtained from the FY 1999/2000 Annual Report *(1)*. In Arizona, the Department of Health Services, in conjunction with health departments from 15 counties, operates sanitation programs that cover food, bottled water, hotels and motels, trailer parks, children's camps, public schools, and swimming pool maintenance. Food facilities represented two-thirds of all regulated facilities (Table 1). In 2000, the number of food establishments increased 10% over 1999. Approximately 70,000 food safety inspections were conducted at more than 30,000 food establishments. The largest percent (i.e., 85.7%) of food facilities consist of restaurants (48.20%), temporary food booths (15.48%), retail food facilities (13.74%), and mobile food service (8.28%). An enforcement action to achieve compliance with regulations was required at only 1.5% of food establishments, a reduction of approximately 40% from the previous year. This reduction was attrib-

A peer-reviewed article.

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TABLE 1. Percentage of regulated facilities in Arizona by type

FACILITY TYPE	PERCENT OF TOTAL (%)
Food	66.23
Pools	24.33
Trailer Parks	3.70
Hotels/Motels	2.83
Schools	2.82
Bottled Water	0.09

uted to a decrease in enforcement actions seen in Maricopa county (metropolitan Phoenix area) and was believed to have resulted from a number of actions, including a new requirement that persons in charge of food establishments meet educational requirements for their operation, the on-line publication of food establishment, inspection results, increased media attention being given to inspection results, and public information campaigns.

Eighty-five inspections were conducted at the 40 bottled water facilities in Arizona. This inspection frequency (2.1 per establishment) met the goal of at least two inspections per year. No enforcement actions were required at any of the bottled water facilities inspected in 2000.

ADOPTION OF THE FOOD CODE

On April 3, 2001, the Governor's Regulatory Review Council approved the adoption of the proposed Arizona Food Code 2000, which will go into effect on Oct.1 of this year. The new Arizona Food Code is a modified version of the FDA's 1999 Model Food Code. The FDA supports the adoption of its Model Food Code by local, state, tribal, and federal governments and encourages jurisdictions to voluntarily report their progress *(13)*. The last Food Code adopted by the state of Arizona was the 1976 edition. A significant change in the state's Food Code 2000 is the endorsement and use of Hazard Analysis Critical Control Point (HACCP) principles. This will provide a means for regulators to incorporate HACCP principles into inspections and allow operators the flexibility of process or procedural variances based upon the HACCP system. Unlike previous editions of the Arizona Code, this one has specific requirements regarding the food services managers' knowledge (e.g., prevention of foodborne disease, HACCP, Code requirements) and responsibility for ensuring that all employees as well as other persons associated with the facility, such as delivery personnel, maintenance contractors, and pest controllers, observe the principles of the new Code.

Food establishments to be covered by these regulations include food-processing plants, in-home delivery of grocery orders, and delivery services provided by common carriers in addition to more typical establishments such as restaurants, institutional food service operations, retail food stores, and vending machines. Excluded from the definition of food establishments are those that serve prepackaged food that is not considered to be potentially hazardous, such as canned soft drinks or chips. The new Arizona Code will not allow direct bare hand contact with ready-to-eat foods, with the exception of washing raw fruits and vegetables or when otherwise approved.

The new Arizona Code requires that refrigerated foods be maintained at 41°F or below when received at the food service facility, except for fluid milk and milk products, molluscan shell stock, and shell eggs, which may be received at temperatures dictated by regulations specific to these commodities. The new Code also requires 41°F for the cold holding of potentially hazardous foods; the old Code's requirement was 45°F. Operators will have 10 years from the date that the new Code is adopted to replace equipment that cannot meet the 41°F holding requirement.

Cook times and temperatures for raw animal foods specified in the new Arizona Code are consistent with those outlined in the FDA's Model Code. However, unlike the Model Food Code, Arizona's requirement for hot holding food is 130°F rather than 140° F. Fruits, vegetables, and commercially processed foods in hermetically sealed containers must be heated to a temperature of at least 130°F for hot holding. The new Arizona Code includes the Consumer Advisory requirements dictated by the Model Food Code.

The section of the new Arizona Code involving compliance and enforcement represents a significant change from previous editions. This section now provides information that will allow food service operators to understand what is necessary to comply with the code. Plan review submission must now contain HACCP plans, including written information on menus, recipe standard operating procedures, records, training programs, and alternative actions for failed procedures, all of which must be approved by the regulatory authority. The permit holder can submit modifications and waivers to any of

TABLE 2. Reported confirmed cases of selected communicable diseases in Arizona commonly associated with water and/or foodborne outbreaks[a]

ORGANISM/ ILLNESS	YEAR										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000[b]
Amebiosis	21	67	95	70	60	80	66	28	19	23	39
Botulism	0	0	1	1	0	2	1	1	0	0	0
Botulism, infant	0	0	0	0	0	0	0	2	0	0	0
Campylobacteriosis	567	610	632	557	467	533	565	537	419	594	646
Cholero	0	0	0	0	0	0	0	1	0	2	0
Cryptosporidiosis	1	0	0	0	7	21	8	20	19	16	11
E. coli O157:H7[c]	-	-	-	-	-	-	-	41	46	35	57
Giordiosis	629	533	492	366	329	314	311	309	250	255	315
Hepatitis A	1522	1121	1225	1493	2147	1362	1767	2330	1841	700	510
Listeriosis	8	10	18	4	7	15	13	16	23	19	20
Salmonellosis	569	657	551	519	420	512	613	852	886	915	810
Shigellosis	1504	1103	815	693	672	1606	1125	1077	642	600	603
Typhoid Fever	11	7	0	3	4	5	0	2	5	2	4
Vibriosis[c,d]	-	-	-	-	-	-	-	6	8	5	3
Yersiniosis[c,e]	-	-	-	-	-	-	-	1	7	6	4

[a]Data provided by the Arizona Department of Health Services, Bureau of Epidemiology and Disease Control, Infectious Disease Epidemiology Section

[b]Provisional data

[c]Become reportable in 1997

[d]Illness due to *Vibrio* sp. other than *V. cholerae*

[e]Illness due to *Yersinio* sp. other than *Y. pestis*

the Code requirements. Such a submission should include a statement of the proposed change, citing the appropriate Code section number(s); the rationale for the proposed change; and an updated HACCP plan demonstrating how the proposed change will be monitored. This section also details provisions that must be followed by the regulatory official, including such matters as the confidentiality of trade secrets and the ability to alter inspection frequencies based on a risk-based HACCP plan. Requirements outside the Code can be instituted by a regulatory official to control a public health hazard if the need for such actions can be documented and supported by the appropriate rationale. The new Code contains specific information on what is required on every inspection form, thus providing guidelines for inspection report design and promoting uniformity of inspection reports.

OCCURRENCE OF FOODBORNE AND WATERBORNE ILLNESS IN ARIZONA

The number of reported confirmed cases of selected communicable diseases in Arizona (1990-2000) that are commonly associated with waterborne and/or foodborne outbreaks are listed in Table 2. Although suspect sources, e.g., poultry for campylobacteriosis and daycare attendance or travel for Hepatitis A, may be associated with specific cases, these are not re-

TABLE 3. Incidence rates (per 100,000 population) of confirmed cases reported in Arizona compared to the five original FoodNet sites

ORGANISM/ILLNESS	ARIZONA[a]		FOODNET SITES[b]	
	1998	1999	1998	1999
Campylobacteriosis	8.9	12.1	21.4	17.5
Cryptosporidiosis	0.4	0.3	3.4	2.4
E. coli O157:H7	1.0	0.7	2.8	2.1
Listeriosis	0.5	0.4	0.6	0.5
Solmonellosis	18.8	18.5	12.3	13.6
Shigellosis	13.6	12.2	8.5	5.0
Vibriosis	0.2	0.1	0.3	0.2
Yersiniosis	0.1	0.1	1.0	0.8

[a]Doto provided by the Arizono Deportment of Heolth Services, Bureau of Epidemiology ond Diseose Control, Infectious Diseose Epidemiology Section

[b]CDC 2000[a]

corded unless the cause is confirmed. Of the disease agents listed in Table 2, Hepatitis A was the most common cause of disease, averaging 1,456 cases over the 11-year period, followed by *Shigella* (949), *Salmonella* (664), *Campylobacter* (557), and *Giardia* (373). Illnesses associated with *E. coli* O157:H7, *Vibrio* sp. other than *V. cholerae*, and *Yersinia* sp. other than *Y. pestis* did not become reportable until 1997.

Table 3 compares the incidence (cases per 100,000 population) for illnesses in Arizona with the five original Foodborne Disease Active Surveillance Network (FoodNet) sites *(5)*. The five original FoodNet sites include the states of Minnesota and Oregon; two counties in the San Francisco Bay area of California; and three counties in Connecticut and 8 in Georgia *(8)*. The incidence rates seen for vibriosis and listeriosis were comparable, while campylobacteriosis, cryptosporidiosis, *E. coli* O157:H7 were lower, and salmonellosis and shigellosis were higher, in Arizona compared to the FoodNet sites.

The limited data available (1998 and 1999) appear to indicate a general decline in the incidence of confirmed cases of illness due to the pathogens listed in Table 3 ,with the exception of campylobacteriosis in Arizona and salmonellosis at the FoodNet sites. In the later, the occurrence of salmonellosis from *S.* Typhimurium was steady, and disease caused by *S.* Enteritiditis declined; however, several large outbreaks in 1999 involved produce (unpasteurized orange juice and *S.* Muenchen; mangos and *S.* Newport; sprouts and *S.* Mbandaka) *(9)*.

Information on lab-confirmed cases of foodborne illness outbreaks in Arizona in 1998 through 2000 is provided in Table 4. The only fatalities associated with these outbreaks were those involving *Listeria moncytogenes* and its nationwide outbreak in Sara Lee deli meat *(7)*. Although not as common as some foodborne illnesses, listeriosis is associated with a high case fatality rate *(15)*. At least three of the outbreaks listed in Table 4 were associated with the consumption of contaminated raw produce. The increased role of these items in foodborne disease is well recognized *(2, 3, 10, 18)*

COMMENTS

Ensuring safe food and water is a recognized priority and expectation of public health programs *(6)*. A primary component of these programs involve the collection, analysis, interpretation, and dissemination of surveillance data *(19, 20)*. Although the reporting of and the response to foodborne and waterborne illnesses remain problematic, improvements have been seen over the past five years with the institution of several multi-agency programs, including FoodNet (www.cdc.gov/foodnet) and PulseNet (www.cdc.gov/ncidod/dbmd/pulsenet.html).

The decision to adopt the 1999 Food Code in Arizona will provide the impetus for food safety to continue to move forward, particularly as all food-related industries, including food service/retail facilities, are directed toward the implementation of HACCP-based safety programs *(11, 12)*. One of the primary intervention strategies for food safety programs is inspection *(14)*. Although studies indicate that routine inspections are likely to reduce the risk of foodborne illness, it is

TABLE 4. Lab-confirmed cases of foodborne illness outbreaks in Arizona in 1998 through 2000[a]

Dote of first illness	No. ill	Lob confirmed coses	Implicated orgonism	Identified foctors specific to outbreok	Median incubotion (hrs) & durotion (doys)
7/14/98	58	22	*E. coli* O157:H7	Contominoted from onimol or environment; bore hond contoct by preporer; temp. abuse; insufficient time/temp during reheoting; commercially processed in Mexico – (Chile Relleno)	37 ond 77
10/26/98	18	10	*Listerio monocytogenes*	Sora Lee Brand Deli Meots – 3 fotolities	Unknown for both
12/18/98	13	13	*Salmonella Baildon*	Ingestion of contominoted row product (tomotoes)	Unknown and 7
12/24/99	10	8	*Solmonello Norwich*	Unknown	24 ond 5
4/3/00	3	3	*Solmonello Enteritidis*	"Noked" Juice	84 and 5.7
4/19/00	6	4	*Solmonello* E1	Unknown	Unknown for both
6/12/00	45	38	*Solmonello Muenchen*	Contominotion from onimol or environment; ingestion of contominoted row product (oronge juice)	Unknown for both
7/15/00	6	6	*Solmonello Thompson*	Bore hond contact of (hamburger) by person carrying pothogen	24 ond 17
9/8/00	72	7	*Solmonello Reoding*	Food hondling by person corrying pathogen	Unknown and 3.4

[a]Doto provided by the Arizono Deportment of Heolth Services, Bureou of Epidemiology ond Diseose Control, Infectious Disease Epidemiology Section

anticipated that HACCP-based inspections will be more effective because they address critical control factors and epidemiologically implicated risk factors *(4)*.

Arizona will be only the second jurisdiction, after South Carolina, to institute 130°F as the minimum hot hold temperature, although Utah and New York are reportedly considering this temperature *(16)*. This issue has been debated for several years by the Conference on Food Protection, and at the most recent meeting a proposal to switch to 130°F from 140°F was narrowly defeated, by a vote of 23 to 21.5 *(17)*. It was reported that although the science supports the use of 130° F, some delegates felt that the lower temperature does not provide a sufficient margin of safety.

ACKNOWLEDGMENTS

Thanks to Shoana Anderson, MPH, and Diane Vertz, Arizona Department of Health, Infectious Disease Epidemiology Section, for providing data and information on communicable and foodborne diseases in Arizona.

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International Association for
Food Protection®

Award Nominations

The International Association for Food Protection welcomes your nominations for our Association Awards. Nominate your colleagues for one of the Awards listed below. You do not have to be an IAFP Member to nominate a deserving professional. To request nomination criteria, contact:

International Association for Food Protection
6200 Aurora Ave., Suite 200W
Des Moines, Iowa 50322-2863
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655
Web site: www.foodprotection.org
E-mail: info@foodprotection.org

Nominations deadline is February 18, 2002. You may make multiple nominations. All nominations must be received at the IAFP office by February 18, 2002.

- Persons nominated for individual awards must be current IAFP Members. Black Pearl Award nominees must be a company employing current IAFP Members. NFPA Food Safety Award nominees do not have to be IAFP Members.
- Previous award winners are not eligible for the same award.
- Executive Board Members and Awards Committee Members are not eligible for nomination.
- Presentation of awards will be during the Awards Banquet at IAFP 2002 - the Association's 89th Annual Meeting in San Diego, California on July 3, 2002.

Nominations will be accepted for the following Awards:

Black Pearl Award – Award Showcasing the Black Pearl

Presented in recognition of a company's outstanding achievement in corporate excellence in food safety and quality.

Sponsored by Wilbur Feagan and F&H Food Equipment Company.

Fellow Award – Distinguished Plaque

Presented to Member(s) who have contributed to IAFP and its Affiliates with quiet distinction over an extended period of time.

Honorary Life Membership Award – Plaque and Lifetime Membership in IAFP

Presented to Member(s) for their devotion to the high ideals and objectives of IAFP and for their service to the Association.

Harry Haverland Citation Award – Plaque and $1,000 Honorarium

Presented to an individual for years of devotion to the ideals and objectives of IAFP.

Sponsored by DiverseyLever/U.S. Food Group.

Harold Barnum Industry Award – Plaque and $1,000 Honorarium

Presented to an individual for outstanding service to the public, IAFP and the food industry.

Sponsored by NASCO International, Inc.

Educator Award – Plaque and $1,000 Honorarium

Presented to an individual for outstanding service to the public, IAFP and the arena of education in food safety and food protection.

Sponsored by Nelson-Jameson, Inc.

Sanitarian Award – Plaque and $1,000 Honorarium

Presented to an individual for outstanding service to the public, IAFP and the profession of the Sanitarian.

Sponsored by Ecolab, Inc., Food and Beverage Division.

Maurice Weber Laboratorian Award – Plaque and $1,000 Honorarium

Presented to an individual for outstanding contributions in the laboratory, recognizing a commitment to the development of innovative and practical analytical approches in support of food safety.

Sponsored by Weber Scientific

International Leadership Award – Plaque and $1,000 Honorarium

Presented to an individual for dedication to the high ideals and objectives of IAFP and for promotion of the mission of the Association in countries outside of the United States and Canada.

Sponsored by Kraft Foods

NFPA Food Safety Award – Plaque and $3,000 Honorarium

Presented to an individual, group, or organization in recognition of a long history of outstanding contribution to food safety research and education.

Sponsored by National Food Processors Association.

International Association for Food Protection®

Call for Nominations 2002 Secretary

A representative from government will be elected in March of 2002 to serve as IAFP Secretary for the year 2002-2003.

Send letters of nomination along with a biographical sketch to the Nominations Chairperson:

Randall Daggs
State of Wisconsin
6699 Prairie View Drive
Sun Prairie, WI 53590-9430
Phone: 608.266.9376
Fax: 608.267.3241
E-mail: daggsra@dhfs.state.wi.us

The Secretary-Elect is determined by a majority of votes cast through a mail vote taken in March of 2002. Official Secretary duties begin at the conclusion of IAFP 2002. The elected Secretary serves as a Member of the Executive Board for a total of five years, succeeding to President, then serving as Past President.

For information regarding requirements of the position, contact David Tharp, Executive Director, at 800.369.6337 or 515.276.3344; Fax: 515.276.8655; E-mail: dtharp@foodprotection.org.

Nominations close November 2, 2001.

Call for Abstracts

IAFP 2002
The Association's 89th Annual Meeting
June 30–July 3, 2002
San Diego, California

General Information

1. Complete the Abstract Submission Form.
2. All presenters must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
3. There is no limit on the number of abstracts registrants may submit. However, the presenter must present their presentations.
4. Accepted abstracts will be published in the Program and Abstract Book. Editorial changes will be made to accepted abstracts at the discretion of the Program Committee.
5. Photocopies of the abstract form may be used.
6. Membership in the Association is not required for presenting a paper at IAFP 2002 – the Association's 89th Annual Meeting.

Presentation Format

1. Technical – Oral presentations will be scheduled with a maximum of 15 minutes, including a two to four minute discussion. LCD and 35-mm slide projectors will be available. Other equipment may be used at the presenter's expense. Prior authorization from the office must be obtained. Overhead projectors will not be allowed.
2. Poster – Freestanding boards will be provided for presenting posters. Handouts may be used, but audiovisual equipment will not be available. The presenter will be responsible for bringing pins and velcro.

Instructions for Preparing Abstracts

1. Title – The title should be short but descriptive. The first letter in each word in the title and proper nouns should be capitalized.
2. Authors – List all authors using the following style: first name followed by the sur name.
3. Presenter Name & Title – List the full name and title of the person who will present the paper.
4. Presenter Address – List the name of the department, institution and full postal address (including zip/postal code and country).
5. Phone Number – List the phone number, including area, country, and city codes of the presenter.
6. Fax Number – List the fax number, including area, country, and city codes of the presenter.
7. E-mail – List the E-mail address for the presenter.
8. Format preferred – Check the box to indicate oral or poster format. The Program Committee makes the final decision on the format of the abstract.
9. Developing Scientist Awards Competitions – Check the box to indicate if the paper is to be presented by a student in this competition. A signature and date is required from the major professor or department head. See "Call for Entrants in the Developing Scientist Awards Competitions."
10. Abstract – Type abstract, Double-spaced in the space provided or on a separate sheet of paper using a 12-point font size. No more than 250 words.

Abstract Submission

Abstracts submitted for IAFP 2002 – the Association's 89th Annual Meeting in San Diego, California, June 30–July 3, 2002 will be evaluated for acceptance by the Program Committee. Please be sure to follow format instructions above carefully; failure to do so may result in rejection. Information in the abstract data must not have been previously published in a copyrighted journal.

Submit your abstract to the office. Abstracts must be received no later than January 7, 2002.

Return the completed abstract form through one of the following methods:

1. Regular mail: Abstracts may be sent by post or express courier along with a disk copy (text or MS Word™ format) to the following address:

   Abstract Submission
   International Association for Food Protection
   6200 Aurora Avenue, Suite 200W
   Des Moines, Iowa 50322-2863, USA
2. E-mail: Submit via E-mail as an attached text or MS Word™document to abstracts@foodprotection.org.
3. Online: Use the online abstract submission form located at www.foodprotection.org.

Selection Criteria

1. Abstracts must accurately and briefly describe:
   (a) the problem studied and/or objectives;
   (b) methodology;
   (c) essential results; and
   (d) conclusions and/or significant implications.
2. Abstracts must report the results of original research pertinent to the subject matter. Papers should report the results of applied research on: food, dairy and environmental sanitation; foodborne pathogens; food and dairy microbiology; food and dairy engineering; food and dairy chemistry; food additives and residues; food and dairy technology; food service and food administration; quality assurance/control; mastitis; environmental health; waste management and water quality. Papers may also report subject matter of an educational and or nontechnical nature.
3. Research must be based on accepted scientific practices.
4. Research should not have been previously presented nor intended for presentation at another scientific meeting. Papers should not appear in print prior to the Annual Meeting.
5. Results should be summarized. Do not use tables or graphs.

Rejection Reasons

1. Abstract was not prepared according to the "Instruction for Preparing Abstracts."
2. Abstract does not contain essential elements as described in "Selection Criteria."
3. Abstract reports inappropriate or unacceptable subject matter, is not based on accepted scientific practices, or the quality of the research or scientific approach is inadequate.
4. Work reported appears to be incomplete and/or data are not presented. Indication that data will be presented is not acceptable.
5. The abstract was poorly written or prepared including spelling and grammatical errors.
6. Results have been presented/published previously.
7. The abstract was received after the deadline for submission.
8. Abstract contains information that is in violation of the International Association for Food Protection Policy on Commercialism.

Projected Deadlines/Notification

Abstract Submission Deadline: January 7, 2002.
Acceptance/Rejection Notification: March 1, 2002.

Contact Information

Questions regarding abstract submission can be directed to Bev Corron, 515.276.3344 or 800.369.6337; E-mail: bcorron@foodprotection.org.

Program Chairperson:

Frank Yiannas
Walt Disney World
P.O. Box 10000
Lake Buena Vista, FL 32830
Phone: 407.397.6622
Fax: 407.397.6630
E-mail: frank.yiannas@disney.com

Abstract Form

DEADLINE: Must be Received by January 7, 2002

(1) Title of Paper _____

_____

(2) Authors _____

_____

(3) Full Name and Title of Presenter _____

_____

(4) Institution and Address of Presenter _____

_____

(5) Phone Number: _____

(6) Fax Number: _____

(7) E-mail: _____

(8) Format preferred: ☐ Oral ☐ Poster ☐ No Preference

NOTE: Selected presentations may be recorded (audio or visual). The Program Committee will make the final decision on presentation format.

(9) Developing Scientist Awards Competitions ☐ Yes Graduation date: _____

Major Professor/Department Head approval (signature and date): _____

(10) TYPE abstract, DOUBLE-SPACED, in the space provided or on a separate sheet of paper using a 12-point font size. No more than 250 words.

Call for Entrants in the Developing Scientist Awards Competitions

Supported by the International Association for Food Protection Foundation

The International Association for Food Protection is pleased to announce the continuation of its program to encourage and recognize the work of students and recent graduates in the field of food safety research. Qualified individuals may enter either the oral or poster competition.

Purpose

1. To encourage students and recent graduates to present their original research at the Annual Meeting.
2. To foster professionalism in students and recent graduates through contact with peers and professional Members of the Association.
3. To encourage participation by students and recent graduates in the Association and the Annual Meeting.

Presentation Format

Oral Competition – The Developing Scientist Oral Awards Competition is open to graduate students enrolled or recent graduates from M.S. or Ph.D. programs or undergraduate students at accredited universities or colleges. Presentations are limited to 15 minutes, which includes two to four minutes for discussion.

Poster Competition – The Developing Scientist Poster Awards Competition is open to students enrolled or recent graduates from undergraduate or graduate programs at accredited universities or colleges. The presenter must be present to answer questions for a specified time (approximately two hours) during the assigned session. Specific requirements for presentations will be provided at a later date.

General Information

1. Competition entrants cannot have graduated more than a year prior to the deadline for submitting abstracts.
2. Accredited universities or colleges must deal with environmental, food or dairy sanitation, protection or safety research.
3. The work must represent original research completed and presented by the entrant.
4. Entrants may enter only one paper in either the oral or poster competition.
5. All entrants must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
6. Acceptance of your abstract for presentation is independent of acceptance as a competition finalist. Competition entrants who are chosen as finalists will be notified of their status by the chairperson by June 3, 2002.
7. All entrants with accepted abstracts will receive complimentary, one-year Association Membership, which includes their choice of *Dairy, Food and Environmental Sanitation* or *Journal of Food Protection*.
8. In addition to adhering to the instruction in the "Call for Abstracts," competition entrants must check the box to indicate if the paper is to be presented by a student in this competition. A signature and date is required from the major professor or department head.

Judging Criteria

A panel of judges will evaluate abstracts and presentations. Selection of up to five finalists for each competition will be based on evaluations of the abstracts and the scientific quality of the work. All entrants will be advised of the results by June 3, 2002.

Only competition finalists will be judged at the Annual Meeting and will be eligible for the awards. All other entrants with accepted abstracts will be expected to be present as part of the regular Annual Meeting. The presentations will not be judged and they will not be eligible for the awards.

Judging criteria will be based on the following:

1. Abstract - clarity, comprehensiveness and conciseness.
2. Scientific Quality - Adequacy of experimental design (methodology, replication, controls), extent to which objectives were met, difficulty and thoroughness of research, validity of conclusions based upon data, technical merit and contribution to science.
3. Presentation - Organization (clarity of introduction, objectives, methods, results and conclusions), quality of visuals, quality and poise of presentation, answering questions, and knowledge of subject.

Finalists

Awards will be presented at the International Association for Food Protection Annual Meeting Awards Banquet to the top three presenters (first, second and third places) in both the oral and poster competitions. All finalists will receive a complimentary Awards Banquet ticket and are expected to be present at the banquet where the awards winners will be announced and recognized.

Awards

First Place - $500 and an engraved plaque
Second Place - $300 and a framed certificate
Third Place - $100 and a framed certificate

Award winners will also receive a complimentary, one-year Membership including *Dairy, Food and Environmental Sanitation* and *Journal of Food Protection*.

Policy on Commercialism

for Annual Meeting Presentations

1. INTRODUCTION

No printed media, technical sessions, symposia, posters, seminars, short courses, and/or all related type forums and discussions offered under the auspices of the International Association for Food Protection (hereafter referred to as to Association forums) are to be used as platforms for commercial sales or presentations by authors and/or presenters (hereafter referred to as authors) without the expressed permission of the staff or Executive Board. The Association enforces this policy in order to restrict commercialism in technical manuscripts, graphics, oral presentations, poster presentations, panel discussions, symposia papers, and all other type submissions and presentations (hereafter referred to as submissions and presentations), so that scientific merit is not diluted by proprietary secrecy.

Excessive use of brand names, product names or logos, failure to substantiate performance claims, and failure to objectively discuss alternative methods, processes, and equipment are indicators of sales pitches. Restricting commercialism benefits both the authors and recipients of submissions and presentations.

This policy has been written to serve as the basis for identifying commercialism in submissions and presentations prepared for the Association forums.

2. TECHNICAL CONTENT OF SUBMISSIONS AND PRESENTATIONS

2.1 Original Work

The presentation of new technical information is to be encouraged. In addition to the commercialism evaluation, all submissions and presentations will be individually evaluated by the Program Committee chairperson, technical reviewers selected by the Program Committee chairperson, session convenor, and/or staff on the basis of originality before inclusion in the program.

2.2 Substantiating Data

Submissions and presentations should present technical conclusions derived from technical data. If products or services are described, all reported capabilities, features or benefits, and performance parameters must be substantiated by data or by an acceptable explanation as to why the data are unavailable (e.g., incomplete, not collected, etc.) and, if it will become available, when. The explanation for unavailable data will be considered by the Program Committee chairperson and/or technical reviewers selected by the Program Committee chairperson in order to ascertain if the presentation is acceptable without the data. Serious consideration should be given to withholding submissions and presentations until the data are available as only those conclusions that might be reasonably drawn from the data may be presented. Claims of benefit and/or technical conclusions not supported by the presented data are prohibited.

2.3 Trade Names

Excessive use of brand names, product names, trade names, and/or trademarks is forbidden. A general guideline is to use proprietary names once and thereafter to use generic descriptors or neutral designations. Where this would make the submission or presentation significantly more difficult to understand, the Program Committee chairperson, technical reviewers selected by the Program Committee chairperson, session convenor, and/or staff will judge whether the use of trade names, etc., is necessary and acceptable.

2.4 "Industry Practice" Statements

It may be useful to report the extent of application of technologies, products, or services, however, such statements should review the extent of application of all generically similar technologies, products, or services in the field. Specific commercial installations may be cited to the extent that their data are discussed in the submission or presentation.

2.5 Ranking

Although general comparisons of products and services are prohibited, specific generic comparisons that are substantiated by the reported data are allowed.

2.6 Proprietary Information (See also 2.2.)

Some information about products or services may be proprietary to the author's agency or company, or to the user and may not be publishable. However, their scientific principles and validation of performance parameters must be described. Conclusions and/or comparisons may only be made on the basis of reported data.

2.7 Capabilities

Discussion of corporate capabilities or experiences are prohibited unless they pertain to the specific presented data.

3. GRAPHICS

3.1 Purpose

Slides, photographs, videos, illustrations, art work, and any other type visual aids appearing with the printed text in submissions or used in presentations (hereafter referred to as graphics) should be included only to clarify technical points. Graphics which primarily promote a product or service will not be allowed. (See also 4.6.)

3.2 Source

Graphics should relate specifically to the technical presentation. General graphics regularly shown in, or intended for, sales presentations cannot be used.

3.3 Company Identification

Names or logos of agencies or companies supplying goods or services must not be the focal point of the slide. Names or logos may be shown on each slide so long as they are not distracting from the overall presentation.

3.4 Copies

Graphics that are not included in the preprint may be shown during the presentation only if they have been reviewed in advance by the Program Committee chairperson, session convenor, and/or staff, and have been determined to comply with this policy. Copies of these additional graphics must be available from the author on request by individual attendees. It is the responsibility of the session convenor to verify that all graphics to be shown have been cleared by Program Committee chairperson, session convenor, staff, or other reviewers designated by the Program Committee chairperson.

4. INTERPRETATION AND ENFORCEMENT

4.1 Distribution

This policy will be sent to all authors of submissions and presentations in the Association forums.

4.2 Assessment Process

Reviewers of submissions and presentations will accept only those that comply with this policy. Drafts of submissions and presentations will be reviewed for commercialism concurrently by both staff and technical reviewers selected by the Program Committee chairperson. All reviewer comments shall be sent to and coordinated by either the Program Committee chairperson or the designated staff. If any submissions are found to violate this policy, authors will be informed and invited to resubmit their materials in revised form before the designated deadline.

4.3 Author Awareness

In addition to receiving a printed copy of this policy, all authors presenting in a forum will be reminded of this policy by the Program Committee chairperson, their session convenor, or the staff, whichever is appropriate.

4.4 Monitoring

Session convenors are responsible for ensuring that presentations comply with this policy. If it is determined by the session convenor that a violation or violations have occurred or are occurring, he or she will publically request that the author immediately discontinue any and all presentations (oral, visual, audio, etc.), and will notify the Program Committee chairperson and staff of the action taken.

4.5 Enforcement

While both technical reviewers, session convenors, and/or staff may check submissions and presentations for commercialism, ultimately it is the responsibility of the Program Committee chairperson to enforce this policy through the session convenors and staff.

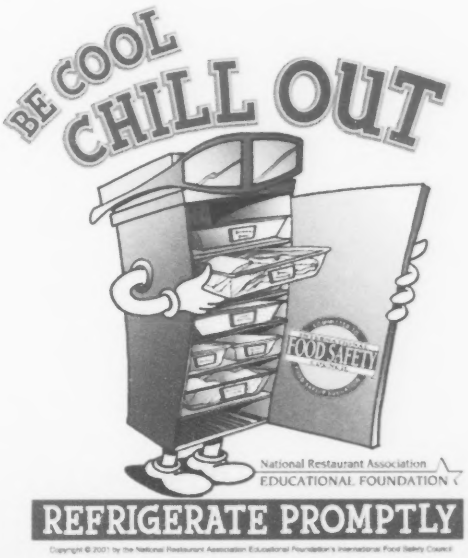
4.6 Penalties

If the author of a submission or presentation violates this policy, the Program Committee chairperson will notify the author and the author's agency or company of the violation in writing. If an additional violation or violations occur after a written warning has been issued to an author and his agency or company, the Association reserves the right to ban the author and the author's agency or company from making presentations in the Association forums for a period of up to two (2) years following the violation or violations.

National Food Safety Education Month℠ September 2001

"Be Cool, Chill Out — Refrigerate Promptly" is the theme for the seventh annual National Food Safety Education Month℠ in September. Launched in 1993 by the National Restaurant Association Educational Foundation's International Food Safety Council, a strategic initiative promoting the awareness of food safety education. National Food Safety Month has become an important awareness campaign to demonstrate the industry's commitment to serving food safely.

The purpose of National Food Safety Education Month is to educate and train the industry on food safety. Restaurant, foodservice operations, supermarkets, hospitality associations, colleges and universities, state and local health departments across the country participate in this awareness campaign in a variety of ways each year. We encourage every organization working with or around food products to get involved and make this year's campaign the biggest and best ever.



New Members

ARGENTINA

Ana Maria DeGuzman
Universidad Nacional De San Luis
Bioquimica Y Farmacia, San Luis

CANADA

Sonia Akbarzadeh
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Ismail Fliss
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Janice Futz
Maple Leaf Pork – Winnipeg
Winnipeg, Manitoba

Julia Hendry
Trochu Meat Processors
Trochu, Alberta

Julie Jean
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Beatrice Leung
Canadian Food Inspection Agency
Port Moody, British Columbia

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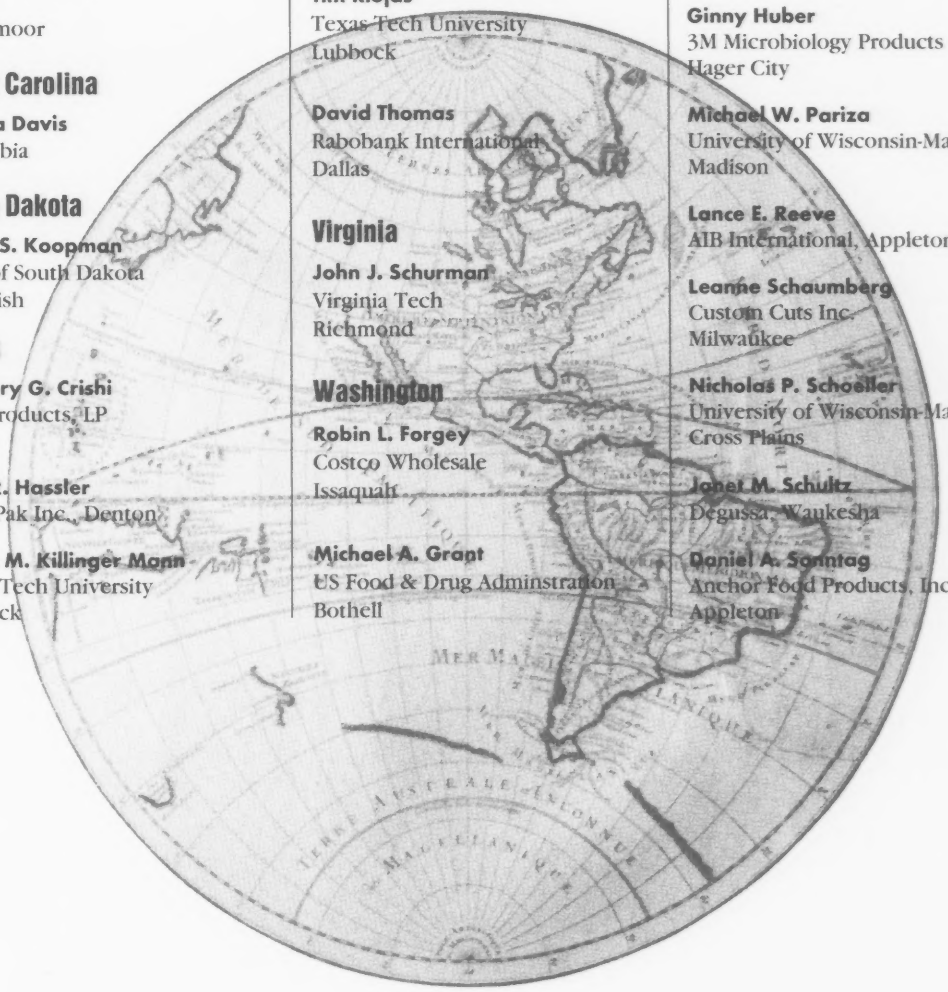

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UpDates

BISSC Elects Officers, Sets Strategy for Year Ahead

The Baking Industry Sanitation Standards Committee (BISSC), at its annual Board of Directors meeting in Chicago, elected its officers for 2001. Re-elected as chairman is Sigismondo De Tora (Nabisco Biscuit Company). Jim Diver (Sasib North America) was elected vice-chairman and Bonnie Sweetman continues both as secretary-treasurer and executive director, providing management and headquarters services to the organization.

Sven Sjogren, President, Process Technology Division

Sven Sjogren has held the position as president of the Alfa Laval Process Technology Division based in Richmond Virginia, since September 2000.

A native of Sweden, Sven joined Alfa Laval Lund, Sweden, in 1976 as a sales engineer. He moved to the USA in 1981 to assume a position as sales and marketing manager with the thermal division of Alfa Laval Inc. and was named manager of the industrial division in 1990. From 1995 to 1998 he served as manager of the worldwide heat transfer components division in Lund, Sweden, before returning to the USA to become president of Alfa Laval Thermal Inc., a position he held until his present appointment.

Sven holds a master's of science degree in chemical engineering from the Lund Institute of Technology, Lund, Sweden. He is a member of HTRI (Heat Transfer Research Institute), PEMA (Process Equipment Manufacturing Association), and the American Institute of Chemical Engineers.

IFT'S Food Technology Names New Editor and Director of Publications

Neil H. Mermelstein, a 30-year veteran staff member of the Institute of Food Technologists (IFT), has been named editor of *Food Technology* magazine, replacing Frances R. Katz who recently retired from her editorial duties.

Mermelstein joined the IFT staff in 1971 as associate editor of *Food Technology*, before becoming senior associate editor in 1984. Since 1998, he has been senior editor of the magazine.

Before joining the IFT staff in 1971, Mermelstein worked for six years in products research for Procter & Gamble Co. He holds a master's degree in chemical engineering from Iowa State University.

Long-time publisher, Roy G. Hlavacek, was named director of publications at the Institute of Food Technologists, and named associate publisher of *Food Technology*.

As associate publisher of *Food Technology*, Hlavacek will oversee editorial content as well as the business and design operations of the publication.

Hlavacek is a former project engineer involved in research and development within the food industry. He received a BS degree from the University of Illinois, and a masters degree from the University of Chicago. He has also played an active role in community service as a resident of Oak Park, IL.

As Tastes for Exotic Foods Increase, so do Health Risks

Foodborne pathogens long considered rare on North American plates are an emerging problem, and restaurant and home chefs should be more diligent about washing their fresh produce, University of Illinois food scientists say. Such is the message gleaned from follow-up work on a *Shigella*-infected bean salad that sickened customers at a Chicago restaurant in 1999.

"Recent nationwide outbreaks in 1998, particularly in California, and in 1999 in Chicago suggest that *Shigella* may be an emerging pathogen in the United States," said Meredith E. Agle, a doctoral student in food microbiology. "With the globalization of food and more people having more exotic tastes, we believe pathogens will be showing up more regularly from developing countries where poor sanitation and water quality make the shipment of bacteria-free produce very difficult."

Agle has been studying the bean salad recipe and *Shigella*'s ability to survive in it. She shared preliminary data June 26 at the Institute of Food Technologists annual meeting in New Orleans. Among her findings: A commercial produce wash was no more effective than water for removing the Chicago outbreak strain, *Shigella boydii*, from parsley and cilantro.

In addition, she said, *Shigella* in the infected bean salad, re-created in the lab, did not grow but remained at infectious levels for up to six days of normal temperature storage in a refrigerator. At room temperature, *Shigella* grew rapidly, she said. Agle said parsley and cilantro were suspected in the Chicago case because the infected plants in the 1998 outbreaks, which involved *Shigella sonnei*, had been traced to a Mexican farm. Many of the ingredients in the Chicago case were from Mexico and were not washed before being put in the bean salad.

International Association for Food Protection

Shigella, which comes in four strains and is similar to *E. coli*, causes shigellosis, an infectious disease that leads to diarrhea, fever and stomach cramps, beginning about 24 hours after exposure and continuing for a week. *Shigella sonnei* is the most common strain associated with disease each year in the United States. *Shigella boydii* is associated with Mexico and South America.

Why *Shigella* is so difficult to remove from parsley and cilantro is being studied. The pathogen may create a biofilm, similar to dental plaque, which clings firmly to the produce, Agle said. Irradiating parsley successfully removed pathogens but left it with a slightly cooked texture that many people may not find as palatable as raw parsley, she said. "The message from this research is pretty clear," said Hans P. Blaschek, head of the UI department of food science and human nutrition, who supervises the lab where Agle works. "People need to properly store their fruits and vegetables in a refrigerator and, more importantly, wash them thoroughly. The actual physical manipulation of the produce during the washing process appears to be the most important factor in removal of the pathogen."

FAO/WHO Call for More International Collaboration to Solve Food Safety and Quality Problems

The UN Food and Agriculture Organization (FAO) and the World Health Organization (WHO) have called upon countries to apply international food safety and quality standards to protect health and trade in food. Clear, science-based and universally known standards will also assist in restoring consumer confidence. "As the movement of people, trade of foods, including ingredients and food animal feeding stuffs – becomes more and more global, it turns out to be more and more difficult to solve food safety problems by one country without international collaboration and a consolidated strategy to combat problems," said WHO director-general Dr. Gro Harlem Brundtland in her opening speech at the Codex Alimentarius Commission meeting in Geneva (July 2-7). "In a globalized world, we all swim in a single microbial sea," FAO assistant director-general Hartwig de Haen said in his statement that public awareness of food safety issues has increased dramatically, especially in developed countries. "Concern over BSE disease, the dioxin crisis in 1999, numerous outbreaks of foodborne illnesses due to microbiological contamination of foods, and the appearance in human food of a genetically modified maize approved only for animal feeding has strongly influenced public opinion. FAO urges governments to take consumer concerns seriously and not to play them down and they should apply and enforce Codex standards more rapidly and effectively," Mr. de Haen said.

The Codex Alimentarius Commission is the highest international body on food quality and safety standards. The Commission is a subsidiary body of FAO and WHO. It has currently 165 mem-

ber countries. Governments across the globe urgently need to upgrade their domestic food safety systems, WHO and FAO said. In many developing countries, there is often no comprehensive food safety system in place at all. These countries have an opportunity to "leap-forward" up to current food-safety systems, skipping over all the decades of gradual progress and hard-earned experiences of industrialized countries and adapt modern food safety systems that work well.

The "leap-forward" approach will promote the efficient and effective development of food safety systems, incorporating preventive, risk-based approaches, comprising surveillance, risk assessment and implementation of risk management strategies. This is a win-win situation. Industrial countries will get better reassurances that food imports are safe, while developing countries will improve both domestic food production standards and be able to expand their export markets.

Dr. Brundtland asked the Codex Alimentarius Commission to "improve the systems we use to ensure food safety and re-establish consumer confidence. We must reassess them all the way from the farm to the table." According to Dr. Brundtland, the Codex Commission needs to "ensure that there are clear and useful international guidelines for genetically modified food."

Dr. Brundtland called for a fast and science-based process that encourages input from both developing countries and consumers. According to Dr. Brundtland, the WHO is analyzing the possibility of establishing a trust fund to support improved participation of all developing countries.

"We also need to inform the public about the work of the Commission better than we currently do," she added. Dr. Brundtland noted that despite the stories that circulate in the mass media, the majority of food safety problems do not even make it into reporting systems.

"People have a right to food which is nutritious and safe," Hartwig de Haen said. "Consumers have repeatedly expressed that for them factors most important to their choice of food are nutritional value, safety, and quality such as freshness and taste. FAO gives equal importance to all of these factors. Agricultural producers and food processors share the responsibility to ensure that these choices are guaranteed throughout the food chain. To meet this objective, FAO has increased its support to member countries."

Mr. de Haen also appealed to scientists worldwide to increase research on not sufficiently understood food safety issues such as microbiological food contamination, BSE and genetically modified organisms (GMOs). FAO is setting up an Internet-based information system on food safety, plant and animal health with other UN agencies and partners. This will include a rapid alert system on food safety issues. "There is a need for governments and the public to have quick access to the Codex Alimentarius standards and to information on new hazards caused by plant pests and animal diseases as well as foodborne diseases affecting humans," Mr. de Haen said. He emphasized that all countries should actively participate in Codex Alimentarius. To be prepared for this, countries need efficient and functioning food control systems, he said. "It is important to avoid that ill informed to pressure from interest groups."

Developing countries are particularly in need of capacity building. FAO is currently initiating a Global Facility on Food Safety and Quality for Least Developed Countries. The facility aims at strengthening developing countries' own food regulatory systems, their competitiveness in international food trade and their preparedness for the participation in Codex. WHO is fully committed to promoting health and equity through increasing the safety of food. The emphasis is on actions that reflect people's health priorities in resource-limited settings. Sufficient and safe food is a prerequisite for health. The Organization's focus is on actions that reflect people's health priorities in resource-limited settings. Therefore, WHO is building its contributions to food safety with particular emphasis on risk assessment. It will continue to support health action within Codex in ways that best serve Member States and their people, particularly in developing countries.

According to WHO, an estimated 2 million children die every year from diarrheal diseases caused by food and water. In addition, it is estimated that thousands of millions of cases of foodborne disease occur every year. Even in industrialized countries, it is estimated that one third of the population has a foodborne disease event every year, and up to 20 people per million die from such diseases. These estimates relate primarily to microbiological problems. If diseases stemming from chemical hazards in food are included, the total disease burden is even higher.

USDA Launches New Information-based Web Site on Food Safety Research Programs

The US Department of Agriculture has launched a new Web site (www.nal.usda.gov/fsrio) aimed at providing a database of food safety research projects to the research community and the general public. The Web site provides detailed information on food safety research projects, spending, and accomplishments by US federal agencies, along with links to other important food safety research information. "This Web site is a tool that researchers and policy makers can use to examine research needs and priorities in food safety. The goal is to measure

the progress of our food safety research and continue efforts to educate the public about these important issues," said agriculture secretary Ann M. Veneman.

The searchable database provides information on nearly 500 food safety research projects dating from 1998 to the present including research done or funded by: USDA Agricultural Research Service; USDA Cooperative State Research, Education, and Extension Service; the Food Safety Consortium (researchers from the University of Arkansas, Iowa State University, and Kansas State University); and the US Department of Health and Human Services' Food and Drug Administration. Also on the Web site are: program and planning information, as well as various food safety reports, food safety news and information, and more than 100 links to Web-based food safety research information provided by US and foreign governments, and educational and professional organizations.

The new Web site was created by the Food Safety Research Information Office at USDA's National Agricultural Library with information from related government food safety agencies. The National Agricultural Library, part of the Agricultural Research Service, is the world's largest and most accessible agricultural research library, and the principal resource in the United States for information about food, agriculture, and natural resources.

Salmonella Typhimurium Outbreak in Sweden from Contaminated Jars of Helva (or Halva)

In early June 2001, at least 10 people resident in the south of Sweden were found to be infected with *Salmonella* Typhimurium definitive phage type (DT)104. They were mostly children with a predominance of Arabic names. An earlier outbreak of *S.* Typhimurium infection, involving both DT9, DT30, and probably also not specifically typeable (NST) strains of *S.* Typhimurium that had a common phage type pattern, was associated with the consumption of tahini (sesame paste), with most cases also in the south of Sweden. It was therefore suspected that the new cases had acquired the infection in a similar way. The first interviews showed, however, that the cases had not been eating tahini, but imported helva (or halva) – a type of dessert or sweet made from sesame seeds.

The first case in the recent outbreak of *S.* Typhimurium DT104 infection fell ill on April 13 and the latest reported case on June 19. The investigation showed that 27 people (23 from the south of Sweden – two of them asymptomatic – and four from another county) had become infected after consuming helva. Three of the four people in the nearby county belonged to the same family. The phage typing has been completed for all but two of the patients, and all 25 have *S.* Typhimurium DT104. The age of the cases ranged from 5 months to 50 years, with 15 of the cases being younger than 10 years. Eleven of the cases were men and 16 women, none of whom died. *Salmonella* of the same type has also been directly isolated from five jars of helva, four with pistachio and one with cocoa flavoring. Information about *Salmonella* isolated from helva (pistachio flavor) was first disseminated by the Swedish Food Administration on June 11, with notification on June 20 that cocoa flavored helva was also contaminated. Initial information about the product stated that it had been distributed solely in the very south of Sweden, but the appearance of four cases from another county showed that this was incorrect. This uncertainty about the distribution area underlines the difficulty of informing all at risk, particularly those who may still have the product at home. Language problems also added to the difficulties of disseminating prevention information. Full details of the contaminated helva product, which was distributed in 350 g and 750 g jars, are available on the Web site of the Swedish Food Administration (www.slv.se/livstecknet/).

On June 19, an international alert notification was distributed through the European Commission's Rapid Alert System for Food. The extent of international distribution of the contaminated product is unclear at present. In recent years, Smittskyddsinstitutet (SMI, Swedish Institute for Infectious Disease Control) has seen an increase of *Salmonella* infection – from outbreaks and from food samples associated with different types of imported vegetables, spices, and seeds, including tahini, fresh and dry spices, banana leaves, and bean sprouts.

Listeria Risk Assessment is a Dynamic Work in Progress, not a Finished Product, American Meat Institute (AMI) Says

The Food and Drug Administration (FDA)/USDA Food Safety and Inspection (FSIS) *Listeria* risk assessment is a dynamic risk assessment that should be continually updated so that it can yield helpful information in the effort to prevent foodborne illness, according to

the American Meat Institute (AMI). In comments submitted to the agencies, the Institute also commended their diligent efforts in producing a thorough draft assessment. Along with the comments, AMI submitted new data to help fill some of the information gaps that the agencies noted when they first published the draft risk assessment. The draft risk assessment attempted to split the frankfurter category into two separate categories based on consumers who reheat hot dogs and consumers who do not. The draft risk assessment also lacked good data on the length of time consumers store frankfurters and deli meats in their refrigerators.

To help close the data gaps, the AMI Foundation contracted with Wirthlin Worldwide to collect data from consumers. The Foundation then asked Novigen Inc. to recalculate the risk ranking data published in the draft assessment using the new variables. The Wirthlin data show that 84 percent of respondents report storing their deli meats for seven days or less, which is significantly less storage time than the agencies had estimated. In addition, 72 percent of consumers report never having consumed an unreheated hot dog, while only 1 percent said they always eat hot dogs without reheating them. Based on these data, Novigen estimates that the average probability of consuming a frankfurter without reheating was seven percent.

The Novigen review "sheds light on how modifications to some of the assumptions with new and more complete data can produce significant changes in the relative risk of certain products," AMI vice president of scientific and technical affairs Randy Huffman, Ph.D., said. "This indicates the importance of seeking additional data for certain categories and provided insight into how confident one can be in the final risk rankings." Huffman also noted that meat and poultry processing technologies can change over time – changes that affect the chances that *Listeria* will be present on foods. An example of such a change might include the use of antimicrobial ingredients in meat and poultry products to reduce *Listeria* growth, were it present. Huffman asked that any future *Listeria monocytogenes* risk assessments provide detail on specific product types, processes and risk reduction strategies to allow for more precise discrimination of the risk a certain product may pose to human health. In the comments, AMI said that it supports the concept of risk assessments and subsequent risk management plans, but that FDA and USDA should proceed carefully in this case.

"The concept behind establishing relative risk rankings is that resources can be directed toward those risks that are greatest. However, when the assigned rankings reflect significant fundamental uncertainties, the rankings cannot provide a sound foundation for effective risk management," Huffman said, AMI's comments are posted on www. meatami.com.

Outbreak of Listeriosis Associated with Homemade Mexican-style Cheese

On November 13, 2000, health-care providers at a hospital in Winston-Salem, NC contacted the local health department about three cases of listeriosis within a 2-week period in recent Mexican immigrants. The North Carolina General Communicable Disease Control Branch, in collaboration with the Forsyth County Health Department, the North Carolina Departments of Agriculture and Consumer Services (NCDA&CS) and Environment and Natural Resources, the Food and Drug Administration (FDA), and CDC investigated this outbreak of *Listeria monocytogenes* infections. This report summarizes the results of the investigation, which implicated noncommercial, homemade, Mexican-style fresh soft cheese produced from contaminated raw milk sold by a local dairy farm as the causative agent. Culturally appropriate education efforts are important to reduce the risk for *L. monocytogenes* transmission through Mexican-style fresh soft cheese.

A case was defined as *L. monocytogenes* (isolated from a normally sterile site or with placental tissue staining positive using immunohistochemical techniques) in a mother of a stillborn or premature infant (<37 weeks gestation), or a mother with a febrile illness, who was a Winston-Salem resident during October 24, 2000 – January 1, 2001. Through active case finding, 12 cases were identified. On initial interview, most patients reported eating unlabeled Mexican-style fresh soft cheese bought at local markets or from door-to-door vendors. A case-control study was conducted to determine risk factors for illness; the questionnaire addressed symptoms, diet, and grocery-shopping histories during the month preceding illness. *L. monocytogenes* isolates from patients, raw milk, and cheese were tested using pulsed-field gel electrophoresis (PFGE). Environmental inspections of homes, local markets, and dairy farms were conducted.

All 12 patients were Hispanic; 11 were women with a median age of 21 years (range: 18 to 38 years), and one was a 70-year-old immunocompromised man. All but one infection were laboratory confirmed. The 11 women did not speak English, were born in Mexico, and had resided in the United States for a median of 2 years (range: 0 to 5 years). One had traveled outside Forsyth County during the month preceding illness. Ten women were pregnant, and infection with *L. monocytogenes* resulted in five stillbirths, three premature deliveries, and two infected newborns. The 11th woman was 5 months postpartum when she presented to a local hospital with meningitis caused by *L. monocytogenes*. She had no preexisting medical conditions. The male patient, who presented with a brain abscess, was receiving corticosteroid therapy after brain tumor surgery. On hospital admission, the 11 women reported symptoms that included fever (nine), chills (nine), headache (nine), abdominal cramps (five), stiff neck (five), vomiting (three), and photophobia (two).

The male patient was excluded from the case-control study because of difficulty finding suitable controls. In the case-control study, a mother and her fetus or newborn were counted as one case-patient. Controls were identified at a women, infants, and children program office and through the county's record of women enrolled in the state's Baby Love Program, which provides outreach and prenatal-care home visits. A median of four controls (range: three to six controls) per case was selected. Controls were restricted to female Hispanic Winston-Salem residents and matched to patients by age and pregnancy status.

Patients were more likely than controls to have eaten any cheese purchased from door-to-door vendors (matched odds ratio [MOR]=17.5; 95% confidence interval [CI]=2.0–152.5); queso fresco, a Mexican-style fresh soft cheese (MOR=7.3; 95% CI=1.4–37.5); and hotdogs (MOR=4.6; 95% CI=1.1–19.4). Illness was not associated with purchases at specific markets or supermarkets, eating raw fruits or vegetables, deli products, other cheeses (e.g., American, cheddar, mozzarella, and blue/Gorgonzola), or other dairy products.

Various members of the Hispanic immigrant community made the Mexican-style fresh soft cheese from raw milk in their homes. Inspectors found unlabeled homemade cheese in all three of the small local Latino grocery stores they visited in Winston-Salem. In addition, many persons regularly sold the cheese in parking lots and by going door-to-door. Owners of two local dairies reported selling raw milk. Milk samples were obtained from these two Forsyth County dairies and from three dairies in neighboring counties. *L. monocytogenes* isolates were obtained from nine patients, three cheese samples from two stores, one cheese sample from the home of a patient, and one raw milk sample from a manufacturing grade dairy. All 14 isolates had indistinguishable PFGE patterns, indicating a common link.

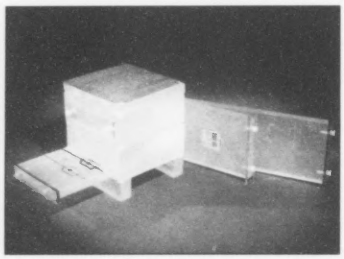
NCDA&CS conducted an investigation at a manufacturing grade dairy farm to determine the potential source of *L. monocytogenes* contamination. NCDA&CS collected milk samples from all 49 cows in the herd and samples from the bulk milk storage tanks. Milk from each cow was tested for somatic cell count to identify mastitic cows. Milk from each cow also was tested for presence of *L. monocytogenes*. Repeated testing did not identify any cow with milk confirmed positive for *L. monocytogenes*, suggesting that the cows were not infected and that *L. monocytogenes* may have originated from environmental contamination.

As a result of this outbreak, North Carolina health authorities stopped the sale of raw milk by the dairy farm to noncommercial processors and educated store owners that it is illegal to sell unregulated dairy products. Officials cited the outbreak as sufficient reason to strengthen laws prohibiting the sale of raw milk except to regulated processors. Using already established programs (e.g., Baby Love Program), North Carolina officials recommended reinforcing and expanding the community awareness of the hazards of eating unpasteurized fresh cheese while pregnant.

Finally, steps were taken to add listeriosis to the list of reportable diseases in North Carolina.

Reported by: J. D. Boggs, R. E. Whitwam, L. M. Hale, M.D., R. P. Briscoe, S. E. Kahn, M.D., Forsyth County Health Dept., Winston-Salem, North Carolina; J. N. MacCormack, M.D., J. M. Maillard, M.D., General Communicable Disease Control Br., Section of Human Ecology and Epidemiology, Div. of Public Health; S. C. Grayson, K. S. Sigmon, North Carolina Dept. of Environment and Natural Resources; J. W. Reardon, J. R. Saah, M. S., North Carolina Dept of Agriculture and Consumer Svcs., Raleigh, North Carolina. Foodborne and Diarrheal Diseases Br., National Center for Infectious Diseases; and EIS officers, CDC.

Industry Products



Nuclear Associates

Nuclear Associates' Digital Subtraction Angiography (DSA) Phantom

Nuclear Associates' DSA Phantom (model 76-710) evaluates digital functions of DSA systems, checks contrast range, resolution, linearity, uniformity, amplifier dynamic range, registration accuracy and subtraction effectiveness, quantitatively measures high- and low-contrast spatial resolution and provides easy-to-interpret results.

The DSA Phantom offers a dramatic improvement in the quality of the subtracted image, due to improved phantom stability and increased homogeneity of bone material in bone blocks. Retaining hasps ensure a tight fit between the step blocks for reduced artifacts. A specially-designed "stop" on the end of the slot reduces the number of DSA frames that must be acquired. The U-block provides a very sturdy support when entrance exposures are being measured with a dosimeter ion chamber. This new design eliminates occurrence of mis-registration artifacts caused by inadvertent movement of the phantom components during image acquisition.

The DSA Phantom includes the following components: Registration Plate, Bone Block, Slot Block, Step Block, U-Block Base, 15 mg/mi Artery Block, 150 mg/ml Artery Block and Retaining Hasps. A 300 mg/ml Stenosis/ Aneurysm Artery block (model 76-710-7300) is available as an option.

Nuclear Associates, Carle Place, NY

Reader Service No. 298

Silliker Introduces New GMO Services

To help processors grappling with GMO export regulations and product labeling claims, Silliker has added a new GMO Integrity Program in North America and Europe. To help companies ensure the integrity of their products, Silliker's Cergy, France and Cedar Rapids, IA, are offering real-time PCR GMO testing, educational consultations and audits.

After an extensive scientific review of existing GMO testing technology, Silliker licensed technology from the Danone Group, a leading international food company. Danone's biotechnology lab developed a specialized method, which is more sensitive than others on the market. The key to this method is the development of very precise, efficient extraction protocols. In addition, Danone conducted extensive validation tests on numerous products with difficult matrices like chocolate, beer and baby foods.

"With this technology, Silliker offers food processors an unparalleled degree of confidence in terms of sensitivity and accuracy," Dr. Jodene Jurgens, director of Silliker's Iowa lab and a molecular biologist.

"With our huge database of more than 10,000 tests performed on a wide range of food products, we can establish matrix specific detection thresholds which are extremely low."

Real-time PCR is a superior state-of-the-art testing detection method and provides two basic types of results for the detection of GMOs: screening and quantitative. Depending on the food matrix, the screening method and quantitative method can provide detection limits as low as 0.001% and 0.01%, respectively. The more specific quantitative method, most commonly applied to soy and corn, provides processors

with all the necessary data to meet current global regulations.

"We're prepared to help companies meet the challenges posed by GMOs through a total program approach," says Dr. Russell S. Flowers, president and CEO of Silliker Laboratories Group, Inc. "In addition to our testing services, we can help companies ensure the integrity of their products through training programs, supplier audits, and sampling programs. Our international experts can also provide assistance on the legal and scientific aspects of GMOs."

According to a recent report published by Strategic Consulting Inc., the demand for GMO testing is expected to increase significantly over the next few years to keep pace with an anticipated explosion of GM-crops. The report states that roughly 43 million hectares of crops were planted worldwide in 2000 and predicts that it will almost double to 85 million hectares in 2005.

Silliker Laboratories, New Orleans, LA

Reader Service No. 299

TotalStat® Liquid Coating Systems Delivers Uniform Spray to Baking Surfaces and Food Products

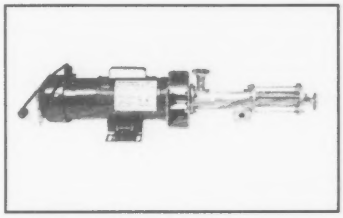
TotalStat® liquid coating systems use electrostatic principles to spray release agents, specialty oils and post-bake oils in a precise and uniform manner. TotalStat coats baking surfaces such as oven bands, bread pans, cake pans and muffin pans with release agents and sprays products such as breads, cakes, crackers, processed cheeses and snacks for the food industry.

Developed and patented by United Air Specialists, Inc. (UAS), TotalStat provides repeatable, accurate liquid deposition with ultra-low spray capability to eliminate waste of valuable oil. As a reliable spray system that applies the same consistent coverage, TotalStat eliminates the need for mist collectors and requires less housekeeping maintenance – cutting overhead costs.

The patented TotalStat nozzle has no moving parts to wear out, uses no mechanical force (which causes over spray) and targets just the product, with uniform and precise edge-to-edge coverage. TotalStat sprays the exact amount of coating to meet the most stringent quality specifications.

TotalStat, Cincinnati, OH

Reader Service No. 300



seepex, Inc.

seepex New CIPable Metering Pump is Easier to Repair and has High Performance Drive

Seepex now has a new metering pump, the MDC. This new model features molded-to-size stators and the mechanical seal is directly in the fluid flow to ensure full clean-in-place. seepex has a new universal joint that allows complete drive train disassembly without compromising component life or cleanability. A variety of electrical and mechanical drives are available that offer 4-20ma control and turndowns of >50:1. The pumps carry the 3A sanitary symbol.

seepex, Inc., Enon, OH

Reader Service No. 301

Rugged Hammer Union Pressure Transmitter from Sensotec

Sensotec's new WJAF Hammer Union pressure transducer is an extremely rugged sensor designed specifically for use with both 1502 and 2202, two-inch wing unions in the demanding environment of land-based and offshore drilling installations. Typical high-pressure applications include mud logging, cementing, drilling, fracturing, acidizing, and other wellhead measurements.

WJAF is available in ranges from 0-5,000 to 0-20,000 psi and delivers accuracy of 0.2% (BFSL). Standard output is 4-20 mA (2-wire) with a supply voltage of 9-28 VDC, and the unit is RFI/EMI protected. Operating temperature is from -45° to 200°F.

The WJAF is an all-welded unit and uses a proprietary deep penetration weld process to ensure hermetic integrity and enhanced resistance to vibration and shock. The isolated pressure sensing diaphragm minimizes zero shift during installation and eliminates long-term signal drift.

This unit is constructed from Inconel X-750 for service with highly abrasive and corrosive media and complies with NACE standard MR-01-75 (1980). The WJAF is intrinsically safe with approvals from CSA, CENELEC, FM and CE. DNV approval is also available.

Sensotec, Inc., Columbus, OH

Reader Service No. 302

Sloan Valve Company Announces New Dual Filter Rings for Retrofitting Sloan Flushometers Manufactured Prior to 1964

Sloan Valve Company now has a Dual Filter Ring for use with Sloan Royal® Flushometers manufactured prior to 1964. This allows for the use of Sloan's revolutionary new Dual Filtered Diaphragm Kit® in older Royal® Flushometer designs. Since it is not uncommon for a Sloan Royal Flushometer to remain in operation for 40 or 50 years (or even longer), Sloan has now engineered a method of retrofitting its latest technology into the older products.

Sloan engineers specifically designed a Dual Filter Ring that will accommodate the pre-1964 Flushometer design specifications. Schools, hospitals and other facilities built during the 1930s, 1940s, 1950s and 1960s can now incorporate the performance and water-saving features provided by the Dual Filtered Diaphragm Kit. The new Dual Filter Ring is blue in color to distinguish it from the standard white Filter Ring currently used in a Dual Filtered Diaphragm Kit. When using a Royal Performance Kit or a Sloan Optima Plus® with an older Sloan Flushometer, simply change the white filter ring underneath the diaphragm to the new blue Dual Filter Ring.

The new Dual Filter Ring for pre-1964 Flushometers is identified as part number A-108-A (code number 530183). Dual Filter Rings are available from Sloan Authorized Distributors in packages of 6. The A-108-A Dual Filter Ring can be used with Sloan Royal Performance Kits and Optima Plus' that feature the Dual Filtered Bypass Diaphragm and must be ordered separately.

Sloan's exclusive Dual Filtered By-Pass® diaphragm helps prevent valve run-on and ensures extended performance even in water conditions with high contents of sand and other particulates. The diaphragm is molded from Sloan's Permex® rubber, a patented rubber compound formulated to also withstand the deteriorating effects of ammonia and chloramine, which are often used in water treatment facilities.

Sloan Valve Co., Franklin Park, IL

Reader Service No. 303

New AC/DC Specialty Gas Monitors from CEA Instruments, Inc.

The TG-KA series of portable toxic gas detectors are direct reading, compact instruments with digital display that use patented gas membrane galvanic sensors available for Formaldehyde, Ozone, Hydrogen Chloride, Phosgene, Hydrogen Fluoride, Phosphine, and many others. These unique sensors are unaffected by normal interfering gases and can detect as little as 0.01 ppm. Adjustable audible and visual alarms can be set as low as 0.1 ppm.

The TG-KA is quick responding, very specific, and weighs less than one pound. Each unit is completely self-contained and comes with battery charger, AC power supply, carrying case, recorder output and all other necessary accessories. The unit will operate for thirty hours between charges or continuously on AC power.

CEA Instruments has other units available for almost any toxic, combustible, or oxygen gas application in single or multichannel portable, personal size, or fixed system monitors.

CEA Instruments, Inc., Emerson, NJ

Reader Service No. 304

Neogen Creates Comprehensive Food Allergen Monitoring

The FDA's study of unlabeled food allergens appearing in unexpectedly large numbers, and the media's notice, has increased scrutiny on the food industry. In sum, the recently released study clearly states that food manufacturers should verify their allergen control programs through product and/or sanitation testing.

This letter is a reminder that simple and inexpensive solutions exist to greatly reduce your company's risk of shipping product with unlabeled food allergens and receiving unwanted media attention.

Neogen, with the University of Nebraska's Food Allergy Research & Resource Program (FARRP), has developed quick and simple test kits for the detection of peanut, egg and milk residues, in both fully quantitative and simple screening formats. With minimal training, these tests can be performed by your staff for on-site, rapid ingredient verification, sanitation monitoring or final product testing.

In addition to testing products, Neogen also offers comprehensive on-site training and consultation for food allergen monitoring.

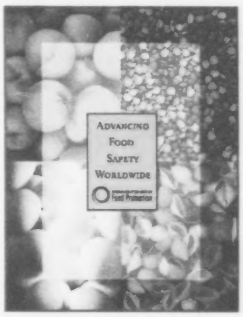
Neogen Corporation, Lansing, MI

Reader Service No. 305

ATTENTION AUTHORS

The Editors are seeking articles of general interest and applied research with an emphasis on food safety for publication in:

Dairy, Food and Environmental Sanitation



Submit your articles to:

Donna Bahun, Production Editor
Dairy, Food and Environmental Sanitation
c/o International Association for Food Protection
6200 Aurora Ave., Suite 200W
Des Moines, Iowa 50322-2863, USA

Please submit three copies of manuscripts along with a fourth copy on a disk saved as text format.

Meeting Announcement

Food Microbiology Research Conference XVII

November 4-7, 2001

Ramada Inn – O'Hare, Rosemont, IL

Please plan on joining us for this prestigious biennial conference covering the most up-to-date basic and applied microbiological food safety research. This is your chance to participate with food safety professionals from academia, government and industry in a highly interactive setting. Sessions for FMRC XVII include:

- **Molecular Detection of Slow-growing and Problem Organisms**
- **Workshop on Industrial Food Safety Objectives**
- **Epidemiology of Foodborne Disease**
- **Transmissible Spongiform Encephalopathies (TSEs)**
- **Evolving Food Microbiology Issues**
- **Banquet Speaker — Dr. Christine M. Bruhn, UC-Davis, speaking on "Communicating the Science of Food Safety to Consumers"**

Conference Registration Fee: Please mail a check in the amount of $250.00 made out to the Food Microbiology Research Conference by October 20, 2001 to:

Paul A. Hall
Kraft Foods
801 Waukegan Road
Glenview, IL 60025

Hotel Accomodations: Please call the Ramada Inn – O'Hare (800) 272-6232 or (847) 827-5131 directly to reserve your room under FMRC. Room rates are $135.00 King/Double per night. Room reservations must be made by October 20, 2001.

Remember to register and book your room early!

Coming Events

OCTOBER

·**1-2, Sanitary Design: A Practical Perspective,** Guelph Food Technology Centre (GFTC), Guelph, Canada. For further information, contact GFTC at 519.821.1246; E-mail: gftc@uoguelph.ca.

·**2-5, Better Process Control School (BPCS),** University of Nebraska/Kansas State University, Lincoln, NE. For further information, contact Rose White at 402.472.9751; E-mail: rwhit1@unl.edu.

·**8-10, Hazard Analysis and Critical Control Point,** Michigan State University, East Lansing, MI. For further information, contact Lilly Mitchell at 800.355.0983.

·**8-10, Wyoming Environmental Health Association Annual Meeting,** Radisson Hotel, Casper. Contact Sherry Maston at 307.322.9671.

·**9-13, Association of Water Technologies (AWT) Annual Convention,** The Wyndham Anatole, Dallas, TX. For further information, call 800.858.6683; E-mail: awt@awt.org.

·**10-11, Iowa Association for Food Protection Annual Meeting,** Starlite Village, Ames, IA. For further information, contact Monica Streicher at 712.324.0163.

·**11-12, Advanced HACCP,** Michigan State University, East Lansing, MI. For further information, contact Lilly Mitchell at 800.355.0983.

·**13-17, Anuga 2001, The Entire World of Food,** Cologne, Germany. For additional information, call 212.974.8835; fax: 212.974.8838; E-mail: info@citf.com.

·**15-16, International Fresh-cut Produce Association (IFPA) 9th Annual Fall Seminar,** Charleston, SC. For further information, contact Seneta Burns at 703.299.6282.

·**15-17, European Hygienic Equipment Design Group (EHEDG) with AINIA 11th Annual Conference and Workshop, Food in Europe: Building in Safety,** Valencia, Spain. For further information, visit www.ainia.es/safetycongress.

·**15-18, North Dakota Environmental Health Association Fall Conference,** Best Western Doublewood Inn, Bismarck, ND. For further information, contact Deb Larson at 701.328.1292.

·**16-18, 1st International Symposium on the Spray Drying of Milk Products,** Rennes, France. For additional information, E-mail: sympo2001@rennes.inra.fr.

·**16-19, NFPA Auditor Training Course,** Hershey, PA. For further information, contact Rich Salotto at 202.639.4808; E-mail: rsalotto@nfpa-food.org.

·**18-21, Worldwide Food Expo,** McCormick Place, Chicago, IL. For additional information, call 202.371.9243.

·**21-25, 129th American Public Health Association Annual Meeting,** Atlanta, GA. For further information, contact Ashell Alston at 202.777.2470; Fax: 202.777.2531.

·**22-24, The National Restaurant Association Educational Foundation Presents the International Food Safety Congress,** Palmer House Hilton, Chicago, IL. For additional information, call 312.715.1010 ext. 727.

·**24-25, Associated Illinois Milk, Food and Environmental Sanitarians Annual Meeting,** Stoney Creek Inn, East Peoria, IL. For further information, contact Pat Callahan at 217.854.2547.

NOVEMBER

·**4-7, Food Microbiology Research Conference XVII,** Ramada Inn, O'Hare, Rosemont, IL. For further information, contact Paul Hall, Kraft Foods, 801 Waukegan Road, Glenview, IL 60025.

·**5-7, Hazard Analysis and Critical Control Point Workshop,** University of California-Davis, Davis, CA. For further information, contact Sharon Munowitch at 530.757.8899.

·**5-8, Better Process Control Schools (BPCS),** Rutgers University, Cook Campus, New Brunswick, NJ. For further information, contact Keith Wilson at 732.932.9271; E-mail: ocpe@aerp.rutgers.edu.

·**5-8, Better Process Control Schools (BPCS),** University of Arkansas, Fayetteville, AR. For further information, contact Mike Heilman at 501.575.2978.

·**6-7, Sensory Evaluation: Real World Techniques and Applications,** Rutgers University, New Brunswick, NJ. For further information, contact Keith Wilson at 732.932.9271; E-mail: ocpe@aerp.rutgers.edu.

·**7-8, Alabama Association for Food Protection Annual Meeting,** Homewood Holiday Inn, Birmingham, AL. For further information, contact Karen Crawford at 205.554.4546.

·**9-10, Mexico Association for Food Protection Annual Meeting,** Guadalajara Mission-Carlton Hotel, Guadalajara. Contact M. Refigio Torres-Vitela at 011.523.619.8158, ext. 16.

·**9-10, 3rd International Food Safety Conference,** Sponsored by University of Guadalajara, Mexico and Mexico Association for Food Protection. For additional information, contact Dr. M. Refugio Torres-Vitela, phone: 523.619.8158 ext. 16; E-mail: torres@ccip.udg.mx.

·**12-15, Dairytech 2001,** The China International Exhibition Center, Beijing, China. For further information, contact Messe Dusseldorf North America at 312.781.5180; E-mail: info@mdna.com.

·13-14, Food Plant Sanitation, Best Western Carlton Place, Toronto, Ontario, Canada. For further information, contact Guelph Food Technology Center at 519.821.1246; E-mail: gftc@uoguelph.ca.

·14-16, Florida Association for Food Protection Annual Education Conference, FFA Leadership Training Center, Haines City, FL. For further information, contact Frank Yiannas at 407.397.6060.

·14-17, Agritrade 2001, Hyatt Regency Convention Center, Guatemala City, Mexico. For additional information, call 502.362.2002 ext. 163; Fax: 502.362.1950; E-mail: agritrade@agexpront.org.gt.

·15, Ontario Food Protection Association Annual Meeting, Delta Meadowvale Hotel, Mississauga, Ontario. For further information, contact Glenna Haller at 519.823.8015.

·21-24, 3rd International Dairy and Food Technology Expo 2001, Mumbai, India. For further information, call 49.0.221.8210; Fax: 49.0.221.821.2092; E-mail: idftexpo@kmi.koelnmesse.de.

·21-24, Food Technology Expo 2001, Xiamen International Conference & Exhibition Center, Fujian, China. For further information, contact Mr. Louis Leung at 852.2865.2633; Fax: 852.2866.1770; E-mail: enquiry@bitf.com.hk.

·21-24, Better Process Control Schools (BPCS), Clemson University. For further information, contact Dr. Felix Barron at 864.656.5694.

DECEMBER

·4-5, Food Service HACCP to Ensure Food Safety, Rutgers University, New Brunswick, NJ. For further information, contact Keith Wilson at 732.932.9271; E-mail: ocpe@aerp.rutgers.edu.

·5-6, Developing and Implementing HACCP for the Fresh-cut Industry Workshop, Holiday Inn Airport North, Atlanta, GA. Co-sponsored by International Fresh-cut Produce Association (IFPA) and the University of Georgia College of Agricultural and Environmental Sciences. For further information, contact the IFPA office at 703.299.6282; E-mail: info@fresh-cuts.org.

JANUARY 2002

·9-11, Frontiers in Microbial Fermentation and Preservation. Joint meeting of the Society for Applied Microbiology and The Netherlands Society for Microbiology. Wageningen, The Netherlands. We invite you to submit an extended abstract of your recent research activities. We need your contribution(s) before October 1, 2001, together with your booking form. See details at www.foodmicro.nl; booking form downloading at www.foodmicro.nl.

FEBRUARY

·20-21, California Association of Dairy and Milk Sanitarians Annual Meeting, Holiday Inn Capitol Plaza, Sacramento. Contact John Bruhn at 530.752.2192.

ADVERTISING INDEX

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Research Notes

* Asterisk indicates author for correspondence.

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- ❒ F2125 Food Safety Zone: Basic Microbiology
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- ❒ F2127 Food Safety Zone: Personal Hygiene
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- ❒ F2140 GMP Basics: Employee Hygiene Practices
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- ❒ F2330 Sanitation for Seafood Processing Personnel
- ❒ F2340 Sanitizing for Safety
- ❒ F2350 SERVSAFE® Steps to Food Safety (6 Videos)
- ❒ F2430 Smart Sanitation: Principles & Practices for Effectively Cleaning Your Food Plant
- ❒ F2370 Supermarket Sanitation Program - "Cleaning & Sanitizing"
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- ❒ F2410 Wide World of Food-Service Brushes
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OTHER

- ❒ M4010 Diet, Nutrition & Cancer
- ❒ M4020 Eating Defensively: Food Safety Advice for Persons with AIDS
- ❒ M4030 Ice: The Forgotten Food
- ❒ M4046 Legal Aspects of the Tampering Case
- ❒ M4050 Personal Hygiene & Sanitation for Food Processing Employees
- ❒ M4060 Psychiatric Aspects of Product Tampering
- ❒ M4070 Tampering: The Issue Examined

Visit our Web site at www.foodprotection.org for detailed tape descriptions

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The Association is comprised of a diverse membership of 3,000 people from 50 nations. The International Association for Food Protection Members belong to all facets of the food protection arena, including Industry, Government and Academia.

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Journal of Food Protection — An international, refereed scientific journal of research and review papers on topics in food science and food aspects of animal and plant sciences. This journal is available to all individuals who request it with their Membership.

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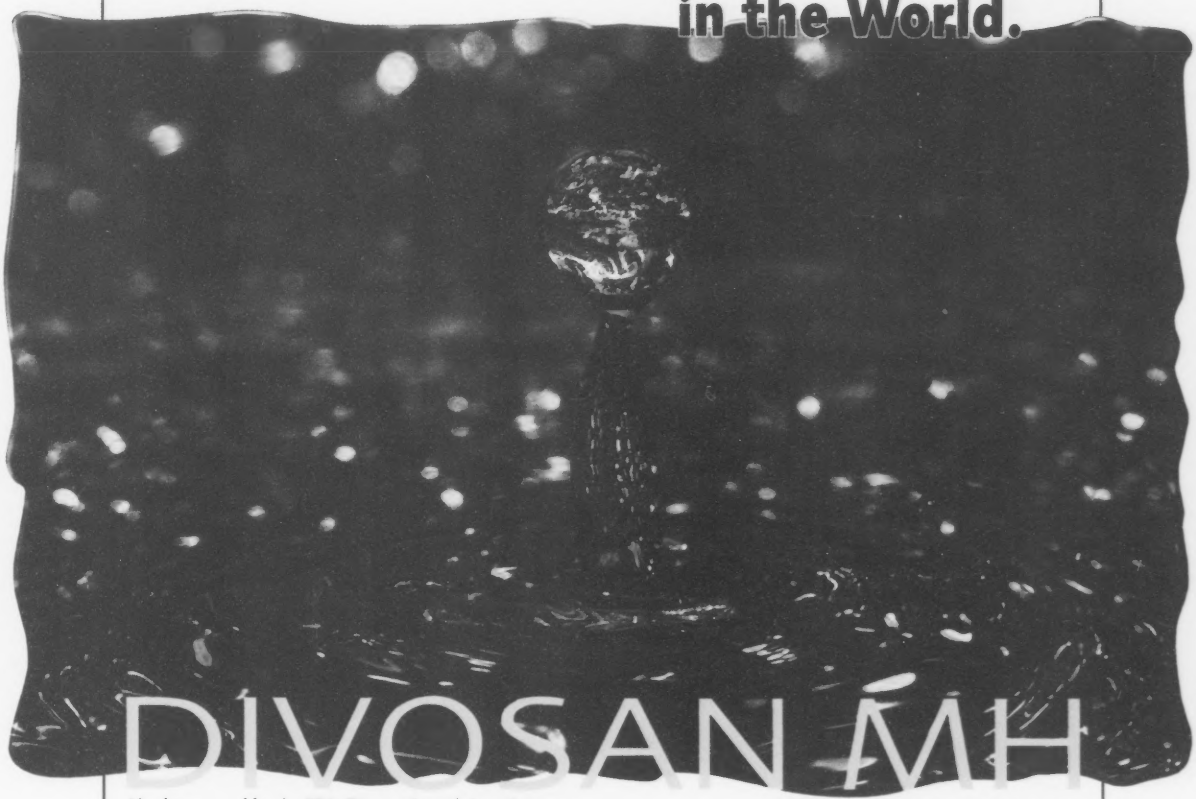

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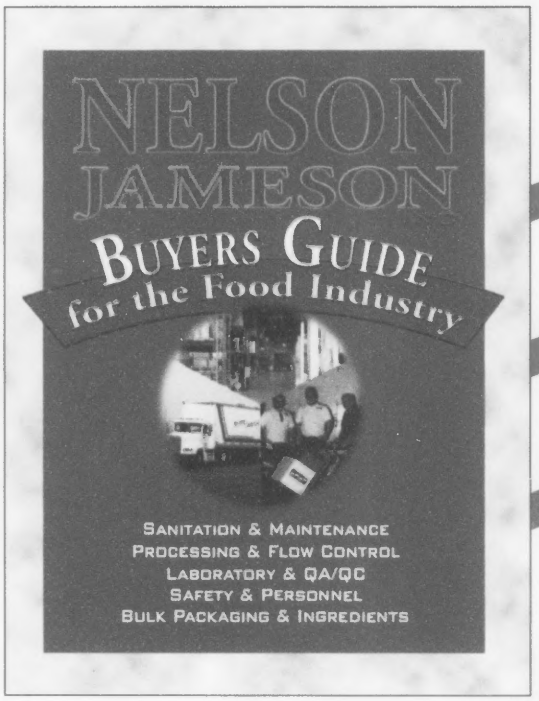

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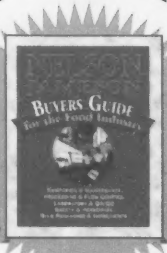

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