ISSN: 1043-3546
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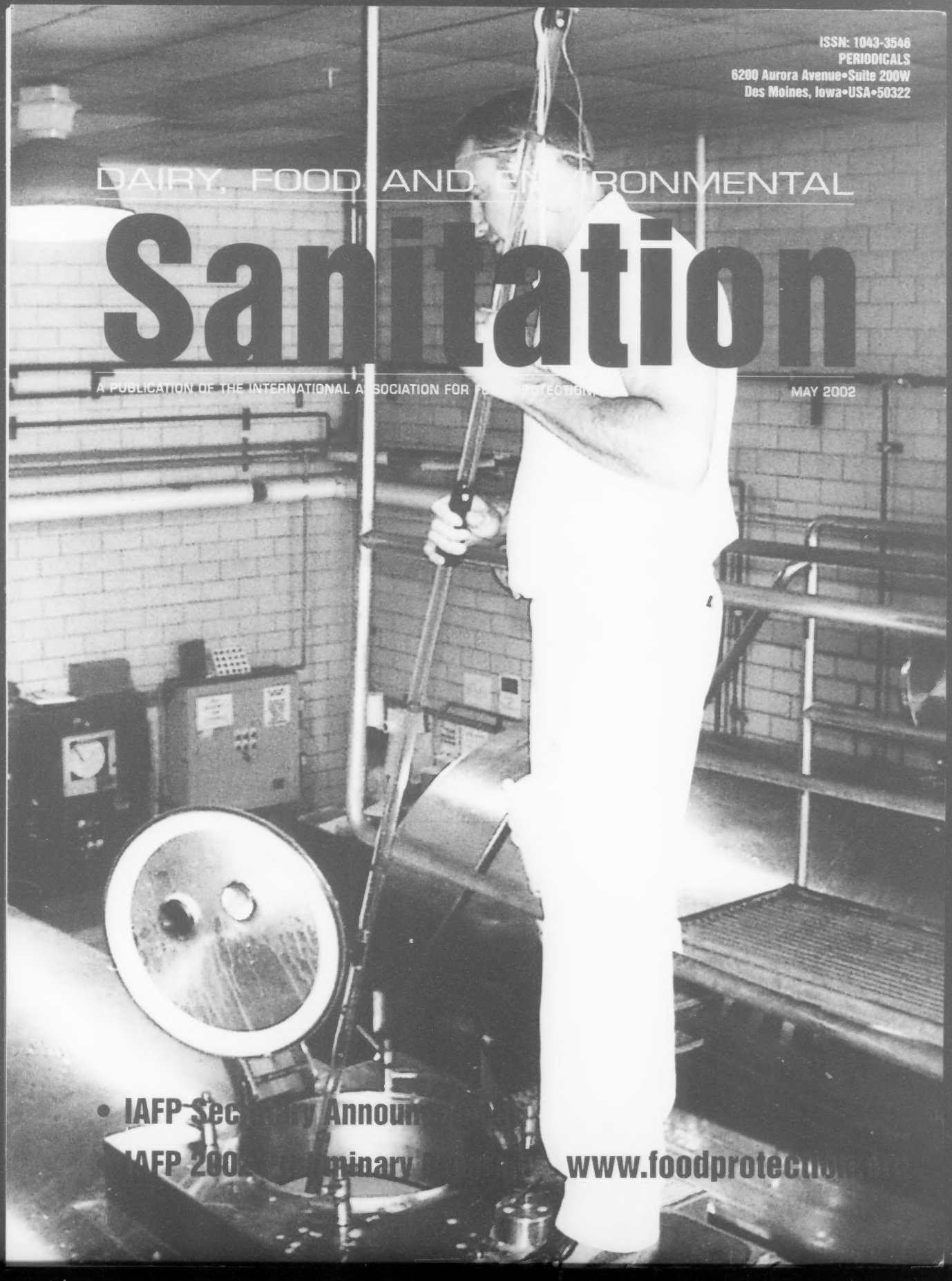
DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

A PUBLICATION OF THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

MAY 2002



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- ***Dairy, Food and Environmental Sanitation*** — Published as the general Membership publication, each issue contains refereed articles on applied research, applications of current technology and general interest subjects for food safety professionals. Regular features include industry and association news, an industry-related products section and a calendar of meetings, seminars and workshops.
- ***Journal of Food Protection*** — First published in 1937, the Journal is a refereed monthly publication. Each issue contains scientific research and authoritative review articles reporting on a variety of topics in food science pertaining to food safety and quality.
- ***Journal of Food Protection* Online** — Internet access to abstracts and full text articles. Full text searching, active reference links, multiple delivery options, and table of contents alerting at your fingertips.
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Sanitation

International Association for Food Protection

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Dairy, Food and Environmental Sanitation (ISSN-1043-3546) is published monthly beginning with the January number by the International Association for Food Protection, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2864, USA. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc., 911 N. Second Street, Ames, Iowa 50010, USA. Periodical Postage paid at Des Moines, Iowa 50318 and additional entry offices.

Manuscripts: Correspondence regarding manuscripts should be addressed to Donna A. Bahun, Production Editor, International Association for Food Protection.

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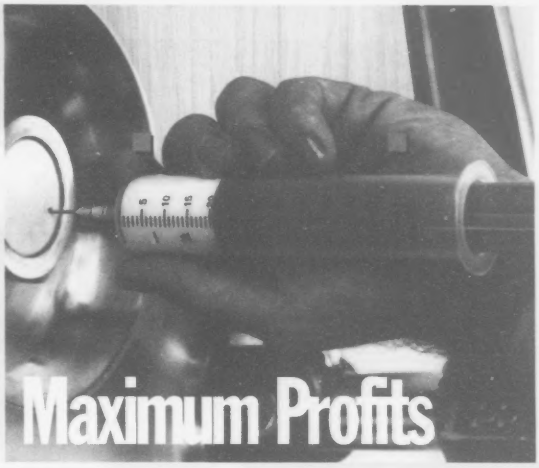

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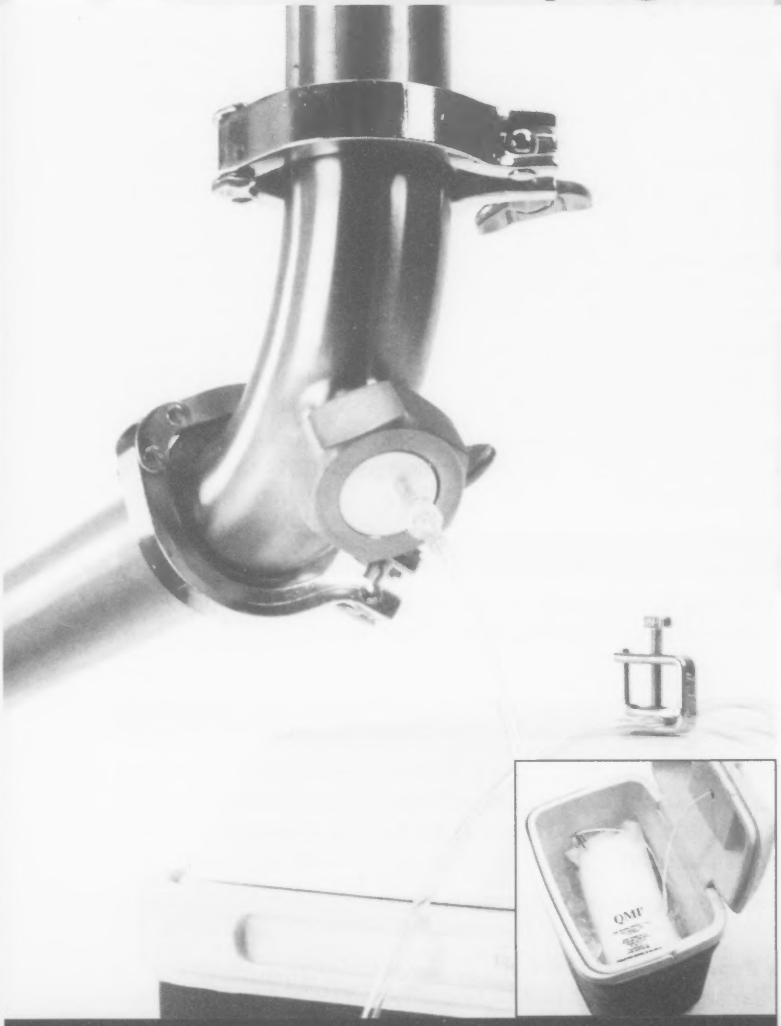

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Sanitation
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June 30-July 3

Manchester Grand Hyatt
San Diego
(Formerly Hyatt Regency San Diego)
San Diego, California

IAFP 2003
August 10-13

Hilton New Orleans Riverside
New Orleans, Louisiana

IAFP 2004
August 8-11

Marriott Desert Ridge Resort
Scottsdale, Arizona

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Sustaining Membership provides organizations and corporations the opportunity to ally themselves with the International Association for Food Protection in pursuit of Advancing Food Safety Worldwide. This partnership entitles companies to become Members of the leading food safety organization in the world while supporting various educational programs that might not otherwise be possible. Organizations who lead the way in new technology and development join IAFP as Sustaining Members.

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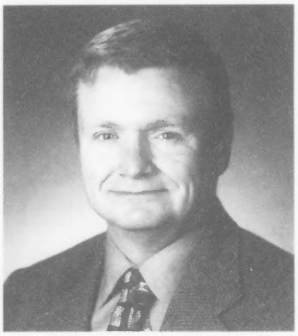

By JAMES DICKSON
President

"Are you registered for IAFP 2002 in San Diego?"

Hello! Are you registered for IAFP 2002 in San Diego? Do you have your hotel reservations? If not, why? Take a few minutes now and register online, or fill out the registration form on page 379 and send them in. We keep talking about IAFP 2002 because it is the highlight of our year. As you know, our Annual Meetings have had a steady increase in attendance year after year, and we expect that this year will continue the trend. If you have never attended an Annual Meeting, I can't think of a better one to begin with than the meeting in San Diego. Come to the meeting; you won't be disappointed.

I have had an opportunity to attend several of the Affiliate meetings over the last few months, and I have certainly enjoyed them. While the programs have been impressive, I must say that what most impressed me is the people. Our Affiliate members are the backbone of the Association, and their support is crucial for our future success. I admire those who volunteer to help organize the Affiliate meetings, for often they get little in the way of thanks, and yet they have to listen to every minor complaint. I have overheard people voicing what appear to be some of the most trivial complaints to the meeting organizers, without stopping to think how much time and effort the individual may have devoted to the meeting. The next time you attend your Affiliate meeting and find something not to your liking, ask yourself, "Could I have done this better?" and perhaps more importantly, "Am I willing to volunteer my time to do this?" Sometimes we focus on a very small negative while overlooking the overwhelming positive. At your next Affiliate meeting, be sure to tell those people who organized it, "thanks!" It really will mean a lot to them.

While we are on the subject of the Affiliates, now is an excellent time to be thinking about Affiliate donations to the Silent Auction. As you know, every dollar of the Silent Auction proceeds goes to the Foundation Fund, which helps support the Audiovisual Library, travel needs of some Annual Meeting speakers and the Ivan Parkin Lecture. Think about something that would be unique to your part of the world and bring an item with you to IAFP 2002 to donate to the auction. Individuals, companies and Affiliates are welcome to donate items. For example, the past several Silent Auctions have had pistachios from California, ham from Tennessee and ice wine from Ontario. While we welcome any donations to the Silent Auction, I think the regional specialties, donated by the Affiliates, are the most interesting. And at one of these meetings, I'm going to be the high bidder on the pistachios!

Recently I had the pleasure of notifying winners of the various Association Awards. I hold a tremendous amount of respect for the various award selection committees, as their job seems to become more difficult each year. The nominations are simply that

good! I have to say that just being nominated for an award is an honor, whether you are the final recipient or not. Often the difference between the awardee and the runner-up is so slight that you have to ask, if the award panel met on a different day or at a different hour, would the results have been different? This is not meant to take anything away from those who win the awards, but simply to highlight how difficult some of the decisions actually are. The award process reflects very well on both the quality of our Members, and on the quality of the nominations.

So much for this month's column. A little advice, for what it's worth: go outside, smell the spring air, look at the flowers, and enjoy life for a while.

Same time, next month.

Affiliate Educational Reception

Attention Affiliate officers and delegates! Gain insights on Affiliate organizational issues and be a leader for your Affiliate. Plan to participate in the Affiliate Educational Reception on Saturday, June 29, 2002 from 5:30 p.m. to 7:00 p.m. at the Manchester Grand Hyatt in San Diego, California.

Affiliate officers and delegates, watch your mail for your invitation.

Contact Lucia Collison at 800.369.6337 for additional information.

COMMENTARY

From the Executive Director

By DAVID W. THARP, CAE
Executive Director

"Encourage your employers and colleagues to place an ad in the *DFES* Career Services Section"

Have you searched for a new job recently? Has your employer announced layoffs or is someone you know affected by a layoff? Where would you turn if you had to look for new employment? This month I want to review with you an E-mail message that I received from an IAFP Member on the subject of "Career Services" sections of journals.

Steve Berry, Environmental Health Manager with the City of Plano Texas wrote to me with questions about our *Dairy, Food and Environmental Sanitation* Career Services Section. Apparently, the City of Dallas had just announced layoffs that included 30 to 35 health department employees. Steve had met with a concerned Plano staff member earlier that day who was worried for his own job. Steve stated in his message to me, "I tried to put myself in the shoes of a City of Dallas employee. Where would I turn if I knew my job with the City of Dallas was about to be history?" He said he would look first at career services sections of the major journals he receives to see what job listings were presented. Steve went on to say that he was amazed at the extremely low number of jobs listed each month in *DFES* and other journals and wondered what we were doing to increase the listings.

My response to Steve was that this situation has bothered me for a long time here at IAFP! It seems to me that we offer a cost-effective method for advertising position openings and in addition, we offer a means to immediately reach an audience of food safety professionals. But even with cost-effective means and immediate access to our audience, we have not attracted a significant number of job placement ads.

What can we do as an Association and as a group of interested Members? We can do our best to let potential employers know about our Career Services Section and try to encourage their ad placement and you as an IAFP Member can direct your company or agency to advertise position openings in *DFES*.

If we expect you to be able to "promote" IAFP's Career Services, we need to give you a little more information about the program. Ads in the Career Services Section are sold based on column inch at $25 per inch. The first two inches are FREE! No cost! The columns in the Career Services Section are one-half page wide allowing more text per inch than a three-column page would. Set up charges are free for text ads and a second insertion of the same ad can be placed for one-half the total ad fee. This translates into a full-column ad that can be presented to our 9,000 plus readers for about $150.

That is not the end of the deal either. I mentioned an immediate reach to our food safety audience. This is achieved through the IAFP Web site. On our Home Page, there is a button that takes you directly to our "Career Services" web page. There you will find position openings that have run

or will run in *DFES*. As soon as we receive your advertisement layout approval, the ad is placed on the IAFP Web site. There is no additional charge to have your advertisement placed on the Web site, but you do have to agree to print the ad in *DFES* to have it placed on the Web site. This opens your ad to an endless pool of interested food safety professionals.

One additional aspect of the Career Services Section applies to IAFP Members looking for employment. Unemployed Members are welcome to place an advertisement promoting their skills and abilities at no charge! Just contact our office if you are interested in placing a job search ad for yourself.

So there you have many benefits of placing an employment ad in *DFES*. Now, go out and encourage your employers and colleagues to place ads in the *DFES* Career Services Section. It is easy, economical, and can help to build the Career Services into the Member service that it should be!

Dairy, Food and Environmental Sanitation, Vol. 22, No. 5, Pages 326–332

Feeding Practices Associated with the Presence of *Listeria monocytogenes*: A Case-Control Study in New York State Dairies

Latiffah Hassan, Chuck L. Guard, and Hussni O. Mohammed*
Department of Population Medicine and Diagnostic Science
College of Veterinary Medicine, Cornell University, Ithaca, NY 14853

SUMMARY

We carried out a case-control study to investigate the association of several feeding and silage management practices to the presence of *Listeria monocytogenes* in milk filters. Case and control herds were selected from dairy farms enrolled in the Quality Milk Promotion Services (QMPS). Cases were defined as dairy farms in which *L. monocytogenes* was confirmed in milk filters. Control herds were selected randomly from farms that tested negative for the pathogen. A questionnaire was used to collect data on putative factors in feeding and silage management. The practices were grouped into two major categories, general farm feeding practices and silage-related factors, and the significance of association was evaluated using logistic regression analysis.

Five factors from the general feeding category were found significant. Component-fed herds, feeding of leftover feed to cows, plastic-type feed bunk, and lower frequency of feed bunk cleaning were positively associated with an increased likelihood of *L. monocytogenes*, while feeding of dry commercial grains was associated with reduced likelihood. From the silage-related factor category, the response 'never' to the question about observing spoilage in silage on the farms was positively associated with increased presence of *L. monocytogenes*.

A peer-reviewed article.

*Author for correspondence: Phone: 607.253.3566;
Fax: 607.253.3083; E-mail: hom1@cornell.edu

INTRODUCTION

In 1960, Gray reported an epidemiological relationship between silage feeding and listeriosis in infected sheep (*12*). Silage has since been identified as one of the principal reservoirs of *Listeria monocytogenes*, along with soil, forage, water and mud (*37, 38*). The association between silage feeding and listeriosis in farm animals was suggested because the incidence of listeriosis was reported to increase with increased use of silage as fodder (*31*).

Listeria monocytogenes is a saprophytic Gram-positive rod-shaped, facultative anaerobic, psychrotropic and salt-tolerant bacterium (*37*) that survives well in many harsh environments where other microbes may not. The prevalence of *L. monocytogenes* in farm soil makes it a common contaminant of silage and other feedstuffs (*5, 11, 21, 22*).

The predisposing role of feeding practices, specifically silage feeding, in the risk of listeriosis is not fully understood. Historically, outbreaks of listeriosis are most often linked to poor-quality silage (*11, 14, 33*), and the factor that has been investigated to explain the prevalence of this pathogen in silage was the feed pH (*23*). In contrast, other studies have found that under non-disease situations, pathogenic and clinical *L. monocytogenes* isolates may be obtained even in good quality silage. Arimi et al. (*2*) found that silage harbors four of the eight clinically important *L. monocytogenes* ribotypes (as defined by subtyping according to the standards of the World Health Organization) (*35*). In a number of listeriosis outbreak investigations, although the authors noted poor quality silage on the farm premises, they failed to establish an association between feeding such silage and the risk of listeriosis (*33, 40, 41*).

Type of silage has also been investigated as a factor in listeriosis. Corn silage was incriminated in several outbreaks (*7, 41, 42*). However, this probably reflects the fact that corn is such a common feed rather than a predilection of corn to harbor the pathogenic organism (*6*).

The objective of this study was to examine the association between feeding practices and the likelihood of isolating *L. monocytogenes* in farm milk filters. The focus was on specific silage management practices that may contribute to the risk of disease caused by *L. monocytogenes*, while other factors that might play a role in the likelihood and perpetuation of the pathogen were adjusted for.

MATERIALS AND METHODS

We carried out a nested case-control study based on a cross-sectional investigation of 404 dairy farms in New York State. Cases and control herds were selected from the population of farms enrolled in the cross-sectional study. The prevalence of *L. monocytogenes* was evaluated based on its isolation and PCR confirmation on the dairy farm in-line milk filter.

Target population and sampling. Description of the target and study population was provided previously (*18*). Briefly, the target population consisted of dairy farms that were enrolled in the Quality Milk Promotion Services (QMPS) in New York State. Samples of herds were randomly elected from the target population to determine the prevalence of *L. monocytogenes* (*18*). All positive herds were included as cases. Control herds were selected by use of a random number generator from herds that tested negative.

Data collection. A set of questions was developed that included information on feeding practices hypothesized to be associated with the presence of *L. monocytogenes* in the herds. The practices included were general management of feedstuffs, feed storage, feeding practices, and silage management practices. All respondents were specifically instructed to adhere to the seasonal changes of feeding practices on their farm in responding to the questionnaire. For example, farms sampled in spring for the cross-sectional investigation were asked to answer the questions based on spring feeding management practices.

The questionnaire was mailed to the farmers along with a cover letter and return envelope. The letter explained the objective of the study and solicited their participation. To enhance the participation rate, farmers that did not respond to the questionnaire within two months were contacted by telephone.

Data analysis on farm feeding factors in the likelihood of *L. monocytogenes*. To enhance statistical efficiency, data were grouped into two meaningful and related categories: general farm feeding practices and silage-related factors. General farm feeding management practices include type of farm produce, type of feed, frequency of feeding, method of feeding, type of feed bunk, cleaning frequency of feed bunks, and handling of feed leftovers. Silage management factors include silage-harvesting practices, type of silage storage, silage moisture content, and use of preservatives in silage production.

Initially, all hypothesized risk factors were individually screened for association with the likelihood of *L. monocytogenes*. Univariate logistic regression analysis was used for this process. The association was considered significant at $P = 0.20$. All variables significant at the screening stage were later considered in multiple logistic regression analysis for each category of the feeding data. Significant and/or biologically important factors were simultaneously considered in a backward logistic regression analysis at $\alpha = 0.10$.

In the final analysis, the general feeding practices and the silage-related factors were analyzed jointly. The final model for the likelihood of *L. monocytogenes* was evaluated using a goodness of fit test (*19*) and the validity of the model for the observations was tested using influence plots. All analyses were per-

TABLE 1. Significant bivariate association between feeding and silage factors, and the likelihood of *L. monocytogenes*

Variable	Variable ranges	Odds ratia	*P* value
Energy faad	cammercial dry grain	1.0	
	high maisture carn	1.6	0.037
Leftaver	discard	1.0	
	fed to other cows	3.8	0.005
Preservatives	yes	1.0	
	no	2.4	0.05

TABLE 2. Association between the general farm feeding practices and the likelihood of the presence of *L. monocytogenes* in logistic regression analysis, with odds ratio and 90% confidence interval

Variable	Coefficient	SE	*P* value	aOR	90% CI
Intercept	-2.56	1.07	NA	NA	NA
High-maisture carn	0.0			1.0	
°Camgrain	-1.63	0.72	0.03	0.19	0.08 - 0.49
Other feed bunk	0.0			1.0	
Plastic	0.75	0.32	0.02	2.11	1.26 - 3.54
Leftavers discarded	0.0			1.0	
Leftovers	1.51	0.55	0.006	4.55	1.84 - 11.22

°Comgrain, commercial dry grain

SE, standard error

aOR, adjusted odds ratio

CI, confidence interval

NA, not applicable

formed using SAS statistical software (version 6.09 SAS Institute, Cary NC).

Geographical region, type of milking system, milking practices (pre-milking teat disinfecting and forestripping), vaccination, and dry cow treatment have been shown to be associated with the presence of *L. monocytogenes* in farm milk filters (*17, 18*). We added those factors as confounders in the final analysis to determine if feeding practices remained significant. Backward elimination was used at a significance level of $P < 0.10$.

RESULTS

Descriptive analysis of general farm feeding practices. A total of 94 herds, 47 cases and an equal number of controls, were enrolled in the study. Eighty-eight percent of farms produced forages (corn, alfalfa, grass/alfalfa mix) for their cows. Fifty-five percent fed commercial dry grain as energy feed while 45% fed high-moisture shelled corn (HMSC). More farms that were positive for *L. monocytogenes* (62%) fed HMSC to cows, compared to controls. Seventy-one percent of farms were total-mixed-ration (TMR) fed herds and 29% were component-fed (CF) herds. More cases were component-fed herds (57%), compared to controls. Eighty-eight percent of herds were fed two or more times a day, while 12% were fed once a day. Concrete and plastic were the most common feed bunk types (67% and 18% respectively); wood, tiles or other materials were less common. There were more cases (58%) than controls with plastic feed bunk type. Feed bunks were cleaned 1 to 2 times a day (64%), 2 to 5 times a week (14%), or less often (22%). Leftover feed was discarded (58%) or fed to other animals (42%). More cases (69%) than controls fed leftovers to other cows. The leftovers were also fed to heifers (59%) and dry cows (41%). More cases (85%) than controls fed feed leftovers to dry cows. The majority of the farms (91%) fed their cattle silage that was stored in upright silos (75%) or bunkers (25%).

Descriptive analysis of silage factors. Sixteen percent of all farm owners never noticed signs of spoilage in silage, 35% noted spoilage rarely, 45% sometimes saw spoilage, and 3% reported frequent spoilage in silage. The majority of respondents discarded the spoiled silage. Forty-three percent of farmers estimated their typical silage moisture content as 50-60% (76% cases and 24% control), 27% reported it as 60-70% (36% cases and 64% control), and 29% reported it as over 70% (59% cases and 41% control). Forty-five percent of farms used preservatives in silage making, with a noticeably higher frequency of usage among controls (61%) than among cases (39%). Forty-nine percent of respondents harvested hay crops three times a year, 25% harvested four times a year, 23% twice a year and 3% once a year. Harvesting for corn crop silage took one week (23%), two weeks (46%) or three to four weeks (31%) in the study population.

Logistic regression analysis for general farm feeding management. In a bivariate analysis, type of energy food (commercial

TABLE 3. Factors that were significantly associated with the likelihood of *L. monocytogenes* as determined by logistic regression for general feeding practices and silage factors

*Variables	Caefficient	SE	*P* value	aOR	90% CI
Intercept	-1.84	1.07	NA	NA	NA
High-maisture corn	0.0			1.0	
[a]Com grain	-1.30	0.62	0.03	0.27	0.10 - 0.75
Total mixed-ratian	0.0			1.0	
[b]Comfeed	0.75	0.39	0.05	2.1	1.12 - 4.01
Other feed bunk	0.0			1.0	
Plastic	0.76	0.32	0.02	2.13	1.26 - 3.60
Other	0.0			1.0	
[c]Twafive	0.57	0.30	0.06	1.78	1.01- 2.92
Nat fed leftavers	0.0			1.0	
Feed leftover	1.10	0.63	0.08	3.01	1.06 - 8.54
Observed silage spailage	0.0			1.0	
[d]Never	2.10	1.06	0.05	8.15	1.43 - 46.62

[a]Com grain, cammercial dry grain

[b]Com feed, campanent feed

[c]Twafive, 2-5x/week (frequency af feed-bunk cleaning)

[d]Never, silage spailage abservatian

*Hosmer and Lemeshow Goodness of Fit Statistics=9.39, 7df (*P* = 0.2254), Residual Chi-square = 7.26 with 12 df (*P* = 0.84)

TABLE 4. 90% Odds ratios for feeding and milking practices significantly associated with the probability of *L. monocytogenes* milk filter positive in dairy farms of New York State

Variable	Caefficient	SE	*P* value	aOR	90% CI
Intercept	0.75	1.07	NA	NA	NA
High-maisture carn	0.0			1.0	
[a]Cam grain	-1.55	0.56	0.006	0.21	0.08 - 0.54
Leftover discarded	0.0			1.0	
Feed leftaver	1.26	0.54	0.020	3.53	1.45 - 8.61
[b]Teat predip					
Na	0.0			1.0	
Yes	-1.70	0.70	0.015	0.18	0.06 - 0.58
[c]Forestrip					
Na	0.0			1.0	
Yes	-1.06	0.56	0.059	0.35	0.14 - 0.87

[a]Cam grain, cammercial dry grain

[b]Teat predip, pre-milking teat disinfection

[c]Farestrip, pre-milking examinatian far abnarmal appearances in milk

dry grain vs. HMSC) and handling of leftover feed (fed to other animals vs. discarded) were associated with high likelihood of presence of *L. monocytogenes* at $\alpha<=0.20$ (Table 1). In the multivariate logistic regression for this feeding data category, we found that feeding of commercial dry grains was associated with a reduced likelihood of *L. monocytogenes* compared to feeding HMSC ($P = 0.004$, OR = 0.20). Plastic feed bunk was associated with an increased likelihood of *L. monocytogenes* occurrence ($P = 0.02$, OR = 2.1) compared to other feed bunk types, and feeding of leftovers to other cows was associated with higher likelihood for *L. monocytogenes* ($P = 0.006$, OR = 4.5) (Table 2).

Logistic regression analysis for silage factors. Only one factor was found statistically significant in the bivariate analysis: the use of preservatives ($P = 0.05$, OR = 2.4)

(Table 1). When all of the silage-related factors were included in a multivariate logistic analysis, none of the factors were significant.

Final analysis of relationship between feeding and silage factors. All factors from general feeding practices and silage-related factors that were statistically significant or perceived to be important were included (Table 3). Several variables were found to be significant. Commercial dry grain, component-fed herds, plastic feed bunk, cleaning frequency of the feed bunk, handling of leftover feed and responding 'never' to silage spoilage observation were significantly associated with *L. monocytogenes*. Feeding commercial dry grain was associated with less likelihood of *L. monocytogenes* (OR = 0.21). Component-fed herds were twice as likely to be cases. Plastic feed bunk doubled the likelihood of *L. monocytogenes*. Feeding leftovers to other animals increased the likelihood of *L. monocytogenes* by three times and farms responding 'never' to the silage spoilage observation were eight times more likely to be a case. Table 3 summarizes the logistic regression analysis. None of the potential confounders were found to change the coefficient of the parameters meaningfully.

Adjusting for factors previously significant. When the significant feeding practices were analyzed with other reported risk factors for the likelihood of *L. monocytogenes* in milk filters, we found that plastic type feed bunk and component-fed herds remained significant. The addition of other risk factors to the factors in this study resulted in a loss of significance of a few of the feeding practices and a slight increase in the regression coefficient for plastic-type feed bunk and component-fed herds (Table 4).

DISCUSSION

In this study, we examined the association between several feeding practices and the likelihood of *L. monocytogenes*. We sought to uncover some feeding practices (silage-related or not) that may offer an explanation on how the factors contribute to the likelihood of *L. monocytogenes* for the purpose of making suggestions regarding managing risk at the source level, i.e., at the farm. We achieved this through an observational case-control study on selected dairy herds (*38*).

Backward elimination logistic regression was adopted for the analyses because it allows inclusion of a variable that may only appear to have a statistically significant effect when another variable is controlled or held constant (suppressor effect). With backward elimination, the risk of failing to find a relationship even though it exists is reduced, as the procedure allows both variables that are involved in the suppressor effect to be included, so that relationships that may be missed by another procedure may be uncovered (*29*). With this in mind, we jointly analyzed those factors that were statistically significant or otherwise perceived to be important (even when not statistically significant) in the final analysis.

The influence of silage feeding on listeriosis has been well documented. There is consensus among workers that feeding silage somehow bears an intimate relationship with listeriosis outbreaks, although reasons for silage involvement in the pathogenesis of listeriosis are unknown. Many workers have related outbreaks to feeding of poor quality silage (*9, 12, 13, 16, 30, 33*). However, because most of these investigations were in response to an outbreak (post facto), the isolation of *L. monocytogenes* in silage was circumstantial, as the organism, in some instances a clinical isolate (*36*), could be found in a high percentage of even the best-quality silage (*4, 34*). Further, no information is available on the prevalence of poor-quality silage in non-outbreak situations; i.e., how commonly degraded silage was observed and fed to farm animals without disease consequences. It is known that the disease itself has never been reproduced experimentally by feeding ruminants poor quality silage per se. Diagnostic testing of laboratory animals for case confirmation has been of little success (*12*).

It has been assumed that consumption of poor-quality silage leads to listeriosis because spoiled silage allows exponential propagation of *L. monocytogenes*, so that animals are exposed to huge doses of the bacteria at one feeding. A less-accepted concept among investigators is that spoiled silage may actually induce physiological changes in animals, which aid in clinical disease formation (*14, 15, 31*). It is also possible that certain factors in spoiled silage increase bacterial resistance to the body's natural defense system. It has been postulated that exposure to weak acids (e.g., as those in silage) increase the resistance of *L. monocytogenes* to gastrointestinal acidity, thereby increasing its survival in the gastrointestinal environment.

Gronstol and Nicolas pointed out that silage could have an effect on listeriosis other than as a vehicle for *L. monocytogenes* (*14, 15, 31*). The authors reported that silage-fed animals had reduced lymphocyte numbers, glucocorticoids, and total serum protein values and increased total serum iron values. These findings are highly indicative of immune system suppression. Silage-fed animals were also reported to be predisposed to acidosis due to the high D-lactate in the silage, which would lead to immunosuppression and thus favor *Listeria* invasion of the system (*31*). Previous experiments indicated that sheep fed silage have a reduced degree of immunity compared to those not fed silage (*24*). This finding is consistent with the findings of this study. It was reported that component-fed herds are more inclined to develop acidosis (usually subclinical), compared to TMR-fed herds (*32*). Our results suggested that component-fed herds were at a higher risk for *L. monocytogenes*. Because component-fed cows were more likely to consume concentrate mixtures or grains than the TMR-fed herds, component-fed cows are more predisposed to acidosis. The

effect of TMR-feeding and component feeding to ruminal pH has been demonstrated. The time from feeding to the drop of ruminal pH is twice as rapid for component-fed ruminants than for TMR-fed herds (*32*). Moreover, *L. monocytogenes* is able to survive in the rumen longer than other pathogens (*28*). These factors, singly or in combination, may increase the chance for *L. monocytogenes* to invade the body system. Animals may or may not succumb to the disease, depending on other factors necessary to disease development. However, fecal or milk shedding without clinical signs is commonly seen (*39*). Shedding of the organism may assist in the perpetuation of the organism in the dairy environment. Ryser noted an increased fecal prevalence of *L. monocytogenes* in late winter and early spring compared to other seasons, correlated with an increased number of *Listeria* in feces of silage-fed animals (*37*).

Listeria species are part of the normal flora of vegetation and have been recovered in high numbers from soil and fresh grass (*12, 20*). Only effective silage processing could halt the pathogen overgrowth. Strict anaerobic conditions allow lactic acid bacteria to predominate and produce organic acids that decrease the pH to below the critical pH value (5.0 to 5.5) for growth of *L. monocytogenes* (*10*). However, it is also important to note that *L. monocytogenes* has been isolated from the best quality silage at pH values as low as 2.7 (*4, 13*). Aerobic deterioration during ensiling has been associated frequently with higher numbers of *L. monocytogenes* in silage (*8*), and oxygen-degraded silage, or 'spoiled silage,' has been linked to many listeriosis outbreaks. Most farms in this study fed silage as the primary forage in the diet. We found that respondents who did not discard feed leftovers, but rather fed them to other cows, had a higher likelihood of *L. monocytogenes*. This finding made biological sense; *Listeria monocytogenes* is ubiquitous, and transmission of the pathogen is fecal-oral (*6*). Therefore, feeding leftover feed or silage that was potentially oxygen-degraded as well as contaminated by feces would enhance the likelihood of infection in dairy cattle. Therefore, although leftover feed was fed mainly to heifers and dry cows, these cows may carry and shed the pathogen into the environment, thus transmitting it to other dairy animals.

Plastic or polyethylene/polypropylene/polyurethane surfaces are the hardest to clean in food industries (*1, 3, 25, 26, 27*). These reports support our findings that herds with plastic feed bunk were at an increased risk of exposure to *L. monocytogenes*. Ak et al. reported that the total recovery of the pathogen is greatest for plastic surfaces, compared to other surfaces; bacteria inoculated onto plastic blocks were readily recovered for intervals of minutes to hours and multiplied if held overnight (*1*). *Listeria monocytogenes* is able to form biofilms, which have a tremendous advantage for pathogen persistency (*3*). Biofilm formation in *L. monocytogenes* enabled the microorganisms to attach and grow on food-contact surfaces under favorable conditions (*25*). It has been reported that biofilms are extremely difficult to remove once they are established. This strengthens our findings that less-frequent cleaning of feed bunk was associated with a higher likelihood that the organism would be present.

It was interesting to note that farms of respondents who never noticed apparent spoilage of silage had a higher likelihood of *L. monocytogenes* presence. It is tempting to speculate that farmers who never noticed spoiled silage were either not aware of the physical appearance of spoiled silage, or not observant because they were uninformed about the potential herd health hazard in feeding degraded feed.

The significance of feeding commercial dry grains as energy feed in this study is not understood. It may be suggested that commercial grains are less heavily contaminated with *L. monocytogenes*, which is prevalent in the dairy environment. Thus, feeding commercial grains was associated with reduced probability that *L. monocytogenes* would be present.

Because organisms are widely found in soil and are distributed by fecal carriers and possibly by the practice of mechanically spreading manure on pastureland, farm grown produce may become contaminated. *Listeria monocytogenes* may easily survive the harvesting, storage, and processing of feed before it is fed to cows. Depending on the animals' immune system, the organism may then establish itself in the cow's gut, with or without causing clinical disease.

In conclusion, component-fed herds, feeding of leftover feed to other cows, plastic-type feed bunks, and lower frequency of cleaning the feed bunk increased the likelihood of *L. monocytogenes* being isolated in our study population, while the use of commercial grains decreased the likelihood. The likelihood of *L. monocytogenes* contamination in barns appeared to increase with poor milking hygiene, presumably because of the numerous sources of these microorganisms in the farm environment. *Listeria monocytogenes* survival and maintenance in the animal gut was assumed to be a mechanical process, and a pathological process may not be necessary for fecal-oral cycle maintenance within a herd. However, these assumptions are based on lack of apparent clinical presentations of the animals. Therefore, the authors suggest that further studies on the premises in this manuscript might be worthwhile in shedding light on the roles of silage in *L. monocytogenes* perpetuation in the dairy environment and/or disease promotion.

ACKNOWLEDGMENTS

The authors are very grateful to all the dairy farmers in New York State who participated in this study.

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Dairy, Food and Environmental Sanitation, Vol. 22, No. 5, Pages 333-339

Evaluation of Food Processor Environmental Sampling Data and Sampling Plans

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SUMMARY

Processors increasingly rely on microbiological sampling of the plant environment to determine if their products or processes are at risk of containing or transmitting pathogens. Sampling and analytical tests may be conducted for specific pathogens such as *Salmonella* or *Listeria monocytogenes*. Aerobic plate counts and ATP bioluminescence assays are often used to identify areas that need additional cleaning and sanitation. Frequently, food processors react to unacceptable test results through additional sampling or sanitation procedures. However, continual, long-term evaluation of environmental sampling plans and test results should be performed to determine if there are trends in microbial detection. The evaluation of the sampling plan and the test data over extended times may lead to changes in the test sample frequency, location and analysis performed, or in the plant's corrective actions. A spreadsheet template was developed to aid these evaluations. The template provides a format for recording sample collection day, date, shift, hour, sample location, analytical test (qualitative or quantitative) and test result. A data set of 2,000 samples was constructed and analyzed using the "PivotTable" feature in Microsoft Excel. This feature creates an interactive data table that quickly summarizes large data sets or subsets.

A peer-reviewed article.

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INTRODUCTION

Numerous food processing plants produce ready-to-cook or ready-to-eat products that cannot be guaranteed to be free of microbial pathogens. Sometimes, the processing or formulation of the product may not be sufficient to inactivate or kill all microorganisms that may be present. Also, during the processing and packaging of these foods there may be opportunities for the products to become contaminated by the processing plant environment including plant workers. Nevertheless, the presence or concentration of pathogenic organisms should be minimized. This goal can be achieved with the use of microbiological profiling. To enhance food safety, microbiological profiles of foods, ingredients, processes and process environments should be developed to determine or verify that microorganisms of concern are being controlled *(2)*.

Processing plants can analyze the pathogen incidence or concentration levels in their finished products before shipment, but this effort is usually considered impractical. The cost of testing a representative number of finished goods is prohibitive, as is the cost of holding product in distribution channels while awaiting the results of these tests. While processors justifiably test a small fraction of finished product, they increasingly rely on microbial sampling of the plant environment to determine if their products or processes are at risk of containing or transmitting pathogens. Plant environment locations tested may include floors, walls, machinery, workers' hands, air, and food-contact surfaces such as conveyor belts and tables.

Analytical tests may be conducted for specific pathogens such as *Salmonella* or *Listeria monocytogenes*. Also, sampling and testing can target indicators of pathogen presence such as *Listeria* spp. to determine whether *Listeria monocytogenes* is present. Other common environmental sampling analyses for non-pathogenic organisms are the aerobic plate count enumeration test and generic *E. coli* enumeration test, which are considered indicators of a lack of proper sanitation and which may reveal areas where pathogens may be found. Quantitative tests for adenosine triphosphate (ATP) through bioluminescence assays are also used to detect areas that need additional cleaning and sanitation *(1, 3, 7, 10)*.

Many processors have developed an environmental sampling plan that describes the frequency of the appropriate microbiological tests to be conducted at various locations within the plant. Ideally, a corresponding corrective action plan would detail what activity would be conducted in response to unacceptably high levels of an indicator organism or the detection of a pathogen. Often, an effort is made to report and react to isolated microbiological test results. For example, these action plans could include procedures for retaining or destroying product, or for additional sanitation. Ultimately, the benefit of environmental sampling is to determine if there are any trends or recurring patterns in microbial detection. This may help identify problem areas that need to be addressed differently. Also, evaluation of the sampling plan and the test data over time may lead to changes in the test sample frequency, location and analysis. A thorough evaluation of the data can lead to increased sampling frequencies for potential problem areas and decreased sampling frequencies for areas that have generally negative test results.

The continual evaluation of environmental sampling data and optimization of the sampling plan can be a difficult task. The tremendous amount of information that can be collected daily must be sorted and summarized. While many processors will use computer spreadsheets to record the data, they may not be able to summarize and evaluate the information easily. This article provides a guide for handling a large volume of sample collection and analytical information to facilitate extraction of information for reacting to the test results and optimizing the sampling plan.

SELECTION AND ANALYSIS OF ENVIRONMENTAL SAMPLES

Each processing facility must select appropriate sample types (e.g., food, surfaces, air) and sample collection schedules that will provide them sufficient information to maintain or improve the level of plant hygiene or reduce the presence of pathogenic bacteria. Samples that are typically collected for microbiological analysis include raw products or ingredients, equipment surfaces, processing water, walls, floors, drains and air *(3, 8, 9)*. For each sample, the time of collection, location sampled, collector's name, sample type, analysis required, and any other pertinent information must be recorded.

Microbiological samples collected from a processing plant environment can be analyzed for specific human pathogenic organisms, including *Salmonella* and *Listeria monocytogenes*; organisms that are typically considered indicators of pathogen presence (e.g., generic *E. coli*, *Listeria* spp., *Enterobacteriaceae*); or organisms that lead to spoilage of foods (e.g. aerobic plate count, yeast & mold count). Whether a qualitative or quantitative test is used, the test result must be accurately recorded and reported. The report of the analytical test result should include a measurement of the sample quantity analyzed; in other words, the analytical count or determination of pathogen presence should be reported as per volume, per weight, per surface area, or per swab.

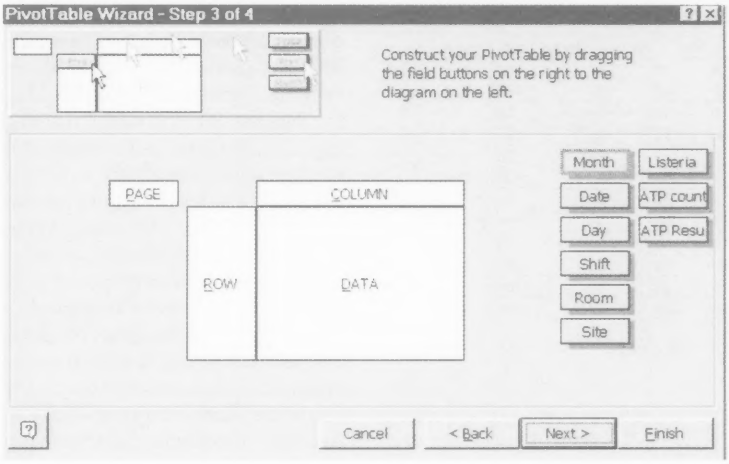
The frequency of sample collection for specific sample types or locations can be based on several factors, including traffic patterns in the plant, production volume, sanitation procedures and frequencies,

Figure 1. Environmental sampling data example format

=IF(H5>1000,"Fail",IF(H5>400,"Marg","Pass"))

Month	Date	Day	Shift	Room	Site	Listeria	ATP count	ATP Result
Aug-00	1	Tu	First	Chill	d4		275	Pass
Aug-00	1	Tu	First	Chill	d6		729	Marg
Aug-00	1	Tu	First	Chill	d9		276	Pass
Aug-00	1	Tu	First	Cut	b1		1188	**Fail**
Aug-00	1	Tu	First	Cut	b3		561	Marg
Aug-00	1	Tu	First	Cut	b9		823	Marg
Aug-00	1	Tu	First	Pack	L 1 conv	0	709	Marg
Aug-00	1	Tu	First	Pack	L 2 conv	0	292	Pass
Aug-00	1	Tu	First	Pack	L 3 conv	0	1099	**Fail**
Aug-00	1	Tu	First	Recv	a7		81	Pass
Aug-00	1	Tu	First	Recv	a8		451	Marg
Aug-00	1	Tu	First	Recv	a9		324	Pass
Aug-00	1	Tu	Mid	Chill	d1	0	1053	**Fail**
Aug-00	1	Tu	Mid	Chill	d9	0	851	Marg
Aug-00	1	Tu	Mid	Chill	d10	1	589	Marg
Aug-00	1	Tu	Mid	Cut	b4		1290	**Fail**
Aug-00	1	Tu	Mid	Cut	b6		1136	**Fail**
Aug-00	1	Tu	Mid	Cut	b7		449	Marg
Aug-00	1	Tu	Mid	Pack	L 1 conv	0	1017	**Fail**

Figure 2. Construction of a PivotTable



previous history of sample analysis data, and microbiological guidelines or action levels. The frequency of sample collection can vary for different plant locations or surfaces. For example, a plant may randomly collect four samples at specific locations from a pool or list of twelve possible locations in a defined area.

The USDA Food Safety and Inspection Service (FSIS) recently issued a proposed rule that would require all establishments that produce RTE meat and poultry products to conduct environmental testing of food-contact surfaces for *Listeria* spp., after lethality treatment and before final product packaging. Establishments that have identified *L. monocytogenes* as a hazard reasonably likely to occur in their HACCP plans, and that have established critical control points for *L. monocytogenes*, would be exempt from this mandatory testing requirement. The proposed frequencies of testing food-contact surfaces for *Listeria* spp. (1 to 4 tests per line per month) are based on establishment size *(6)*. Food contact surfaces that could be sampled include conveyor belts, table tops, peeler equipment, slicing equipment, packaging equipment, chill water or brines that directly contact unpackaged product, and any difficult-to-clean product contact surface areas along a processing line *(4, 5)*.

USE OF SPREADSHEETS IN EVALUATING ENVIRONMENTAL SAMPLING DATA

The increased processing speed, memory capacity and affordability of personal computers have facilitated the use of spreadsheets to record numerical or other data. A spreadsheet is a collection of cells or pieces of information that are linked and organized into rows and columns. Spreadsheet formats are often used to record microbiological test data, including environmental sampling test data. The following example describes a spreadsheet template for recording and evaluating environmental sampling data. This template provides a format for recording sample identification information including time of collection (day, date, shift), plant area location, sample location, analytical test (qualitative or quantitative), and test result. A data set of 2,000 environmental samples was constructed and analyzed using the "PivotTable" feature in Microsoft® Excel. A PivotTable is an interactive table that quickly summarizes, or cross-tabulates, large amounts of data. The user can rotate the rows and columns to see different summaries of the source data, filter the data by displaying different pages, display the details for areas of interest, and ultimately chart the PivotTable data.

The data set constructed for this example contains 2,000 line entries with test results for 2,000 quantitative (ATP) tests and 651 qualitative (*Listeria*) tests. The examples displayed and data analyses were conducted with Microsoft

Figure 3a. PivotTable construction: *Listeria* tests by day and shift

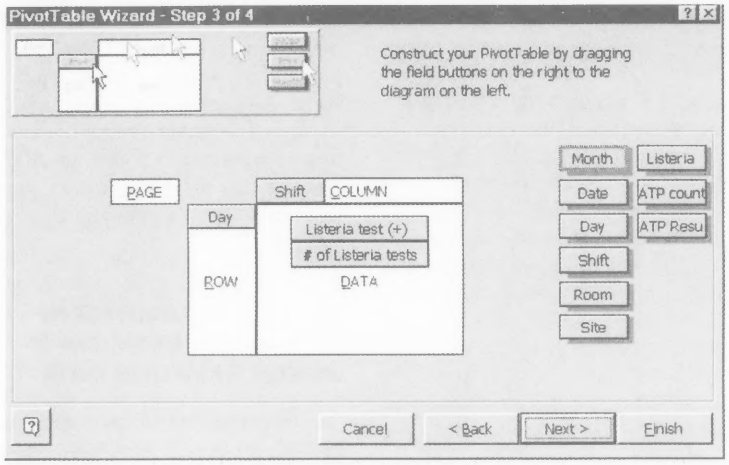


Figure 3b. PivotTable: *Listeria* tests by day and shift

=PRODUCT(1/C14)*C13*100

Day	Data	Shift PreOp	First	Mid	Secnd	Grand Total	% pos.
Mon	Listeria test (+)	8	1	6	0	15	
	# of Listeria tests	44	23	42	0	109	13.8
Tue	Listeria test (+)	14	0	10	2	26	
	# of Listeria tests	54	24	53	4	135	19.3
Wed	Listeria test (+)	12	4	9	0	25	
	# of Listeria tests	48	27	55	0	130	19.2
Thu	Listeria test (+)	9	4	5	0	18	
	# of Listeria tests	53	27	54	0	134	13.4
Fri	Listeria test (+)	9	0	8	1	18	
	# of Listeria tests	54	28	58	3	143	12.6
Total Listeria test (+)		52	9	38	3	102	
Total # of Listeria tests		253	129	262	7	651	15.7
	% positive	20.6	7.0	14.5	42.9	15.7	

Sheet 1.1 Time + Listeria

Excel version "Excel 97". The updated "Excel 2000" facilitates the creation of charts from PivotTables. A portion of the data table, shown in Fig. 1, includes the following "Fields" and accompanying data ranges.

Month: August or September 2000

Date: Mondays thru Fridays for each month above (August 1 - September 29)

Day: Monday, Tuesday, Wednesday, Thursday, or Friday

Shift: Pre-operational, First, Midday, Second

Room: Receiving, Cutting, Packing, and Chilling

Site: locations coded for each of the four rooms; sites in Receiving begin

with "a", sites in Cutting begin with "b", sites in Packing are noted

as Line 1, 2 or 3 conveyor, and sites in Chilling begin with "d"

Listeria: Positive test sample marked with "1", negative test with "0", and

no test with a blank space

ATP Count: ATP bioluminescence test count values (e.g., relative light units) in the range of 10 to 1,999.

ATP Result: ATP count classified as "Fail" if > 1,000, as "Marginal" if < 1,000

but > 400, and as "Pass" if < 400 using an Excel logical test ("IF, THEN") function.

Creating a PivotTable

To create and customize a PivotTable from a spreadsheet, the user should highlight the data and column headings they wish to analyze. From the "Data" drop-down menu, select "PivotTable and PivotChart Report" (Excel 2000) to find the PivotTable Wizard, which will lead the user to numerous formatting options. Alternatively, the Wizard can be accessed from the PivotTable toolbar in Excel. The data "Fields" (column headings in Fig. 1) can be used to design a new summary data table, or PivotTable (Fig. 2). Some or all of the "Field" name buttons must be dragged and dropped into the appropriate section of the PivotTable template. The user has numerous options for arranging, sorting and summarizing the data set. We encourage readers, especially those who have not worked with PivotTables, to try the following examples first before attempting more elaborate Pivot Tables and PivotChart Reports.

The PivotTable protocol uses the Sum function to calculate data fields that contain numeric data, and uses the Count function to calculate cells that contain text. A different summary function – such as Average, Maximum, Minimum, or Standard Deviation – can be used to further analyze and customize data reports. Formulas can be created that use elements of the PivotTable or other worksheet data, which are described as creating a calculated field or a calculated item within a field. The Excel "Help" menus for PivotTables provide detailed instructions about these and other options.

The examples in Figures 3, 4 and 5 illustrate examples of summarizing and evaluating environmental sampling data across sampling times (Figures 3, 5) and sampling locations (Fig. 4). Figure 3a displays

Figure 4a. PivotTable Construction: ATP tests by location

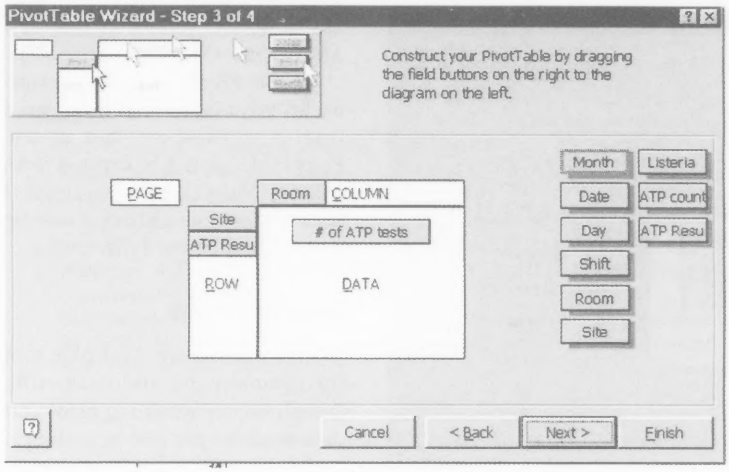


Figure 4b. PivotTable: ATP tests by location

Arial Save 10 B I U $ % ,

I5 = =IF(H5>40,"ALERT","OK")

	A	B	C	D	E	F	G	H	I	J
1	# of ATP tests		Room							
2	Site	ATP Result	Recv	Cut	Pack	Chill	Grand Total	% Fail		
3	a1	Pass	10				10			
4		Marg	23				23			
5		Fail	18				18	35.3	OK	
6	a1 Total		51				51			
7	a2	Pass	15				15			
8		Marg	26				26			
9		Fail	18				18	30.5	OK	
10	a2 Total		59				59			
11	a3	Pass	8				8			
12		Marg	14				14			
13		Fail	11				11	33.3	OK	
14	a3 Total		33				33			
15	a4	Pass	8				8			
16		Marg	22				22			
17		Fail	13				13	30.2	OK	
18	a4 Total		43				43			
19	a5	Pass	7				7			
20		Marg	15				15			
21		Fail	19				19	46.3	ALERT	
22	a5 Total		41				41			
23	a6	Pass	9				9			
24		Marg	19				19			
25		Fail	21				21	42.9	ALERT	
26	a6 Total		49				49			
27	a7	Pass	25				25			

the creation of a PivotTable using the PivotTable Wizard. The Pivot Table (Fig. 3b) summarizes the results of all 651 *Listeria* tests by day of week and by shift (time of day). Figure 4a displays the creation of another PivotTable using the PivotTable Wizard. Only a portion of the PivotTable is shown in Figure 4b. The results of all 2000 ATP are organized by sampling location (room and site within room). The percentage of test results that "Fail" at each site are displayed outside the PivotTable.

Figures 5a & 5b are an example that summarizes test results by time (day of week and shift) and also includes evaluation by both qualitative (*Listeria*) and quantitative (ATP) testing. Many processors are interested in comparing quantitative test results from environmental sampling with qualitative pathogen test results to develop a correlation or relationship between the two analyses. While it is unlikely that the presence of pathogens could be predicted from quantitative testing for something other than a pathogen (e.g. APC, ATP, generic *E. coli*), the processor may be able to observe a trend by comparing the two types of tests. For example, processors may notice a much higher level of positive qualitative tests when the average quantitative test results are above a certain threshold. Or, they may notice a relatively low level of positive qualitative test results when average quantitative test results are low.

Customizing PivotTable design

Many options are available for sorting and summarizing data with PivotTables. Examples of useful ways to customize reports or PivotTable designs (Figures 3, 4, 5) include:

Qualitative test report. For the PivotTables using *Listeria* data (Figures 3, 5), the field name "Sum of *Listeria*" was changed to "*Listeria* test (+)". The Summary function was used to sum the number of positive *Listeria* tests. Also, the name "Count (Nums) of *Listeria*" button name was replaced with the name "# of *Listeria* tests" to calculate the total number of *Listeria* tests conducted. Note that "Count of *Listeria*" would count all rows in the *Listeria* column, including the blank cells that represent no test conducted.

Quantitative test report. As an alternative to ATP light unit counts, a microbial count such as an aerobic plate count (APC) could be listed. Test results could be grouped as "< 10 CFU/ml", "< 100 CFU/ml" or "< 1000 CFU/ml", using a logical test function similar to the one shown in Fig. 1.

Figure 5a. PivotTable construction: *Listeria* and ATP tests by day and shift

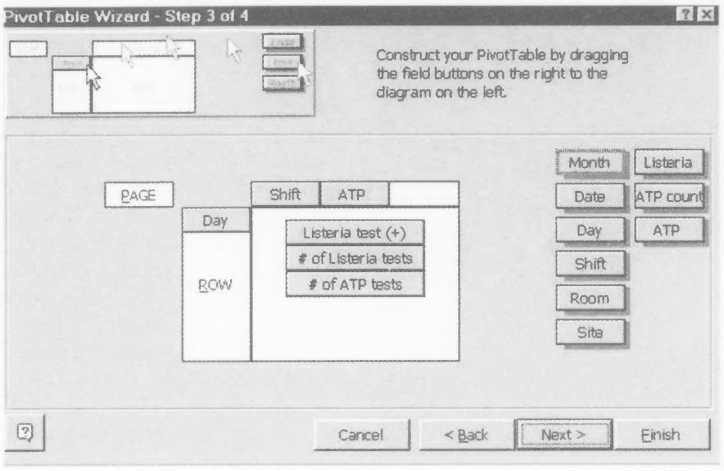


Figure 5b. PivotTable Construction: *Listeria* and ATP tests by day and shift

		Shift	ATP											
		PreOp			First			Mid			Secnd			Grand Total
Day	Data	Pass	Marg	Fail	Pass	Marg	Fail	Pass	Marg	Fail	Pass	Marg	Fail	
Mon	Listeria test (+)	4	3	1	0	1	0	1	5	0	0	0	0	15
	# of Listeria tests	14	26	4	6	16	1	11	25	6	0	0	0	109
	# of ATP tests	26	50	8	29	48	7	25	48	11	35	43	6	336
Tue	Listeria test (+)	4	8	2	0	0	0	3	4	3	1	1	0	26
	# of Listeria tests	21	20	13	5	15	4	10	26	17	1	3	0	135
	# of ATP tests	32	48	28	34	47	17	24	46	26	20	45	31	398
Wed	Listeria test (+)	3	5	4	2	1	1	2	1	6	0	0	0	25
	# of Listeria tests	11	9	28	7	7	13	8	18	29	0	0	0	130
	# of ATP tests	20	22	54	21	32	53	17	35	53	21	30	45	403
Thu	Listeria test (+)	5	4	0	0	3	1	2	3	0	0	0	0	18
	# of Listeria tests	15	28	10	3	13	11	12	24	18	0	0	0	134
	# of ATP tests	24	44	39	25	44	39	21	39	48	31	47	38	431
Fri	Listeria test (+)	3	1	5	0	0	0	2	2	4	0	1	0	18
	# of Listeria tests	9	17	28	7	9	12	10	16	32	1	1	1	143
	# of ATP tests	16	34	58	22	33	53	17	37	54	21	28	59	432
Total Listeria test (+)		19	21	12	2	5	2	10	15	13	1	2	0	102
Total # of Listeria tests		70	100	83	28	60	41	51	109	102	2	4	1	651
Total # of ATP tests		118	198	187	131	204	169	104	205	192	128	193	171	2000

Sheet1 6 Time + ATP_Listeria

Charts. Charts of PivotTables can be constructed using the PivotTable Chart Wizard. Charts can be designed to further summarize or limit the information presented in the PivotTable.

Calculations from PivotTables. Additional calculations of Pivot Table totals may be performed and recorded outside of the PivotTable. In Figure 3b, a percentage of positive test results from samples collected on a specific day of week or shift are displayed outside the PivotTable. The calculation is performed by dividing the values within cells that represent "Total *Listeria* test (+)" by values for "Total # of *Listeria* tests".

Corrective Action Flags. A logical test (IF, THEN) function can be added to a PivotTable to signal when a particular set of test results exceeds a predetermined limit. In Figure 4b, the word "ALERT" appears when more than 40% of the ATP test results are in the fail range for a particular sample location.

Custom Listing Order. In these PivotTable examples, items were listed in an order other than alphabetical. For example, the room order is listed as Recv, Cut, Pack, Chill (Fig. 4b). To arrange a specific order, the user can go to TOOLS, then OPTIONS, then CUSTOM LISTS on the Excel Standard Toolbar and then sort the list into a desired order. Also, the user may need to click on the specific PivotTable Field button and choose ADVANCED and AUTOSORT OPTIONS.

New PivotTables. Numerous useful PivotTables can be created from a spreadsheet, but a new PivotTable cannot be created from another PivotTable. The original data set or spreadsheet must be used to create new PivotTables.

CONCLUSIONS

PivotTables are a valuable tool for summarizing and evaluating environmental sampling plans and data from sample analyses. The capacity for rapid evaluation of data from a large number of sample test results can help processors determine if they must employ a corrective action in response to a trend in their environmental sampling data over time.

Other computer software tools are available to perform the comparisons and reports described in this example. For example, some processors use the software that may be packaged with an ATP bioluminometer to record, chart and evaluate test data. However, many professionals are familiar with or are currently using Microsoft Excel for various spreadsheet applications. The PivotTable feature of this software could be used for other applications in food quality assurance and product development, such as microbiological data evaluation from shelf life studies and various physical and chemical tests of products and ingredients.

ACKNOWLEDGMENTS

Dr. Hengjian Wang, Tram-Anh Tu and Ron Sorrell assisted in the development of examples and pivot table formats.

Presented as poster session, "Spreadsheet tool for recording and evaluating environmental sampling data" at the Annual Meeting of the International Association for Food Protection, Atlanta, GA; Aug. 9, 2000. Partial funding was provided through the Cooperative State Re-

search, Education, and Extension Service of the U.S. Department of Agriculture, Project Number 99-4153-0674.

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NOTIFICATION OF PROPOSED AMENDMENTS

TO THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION BYLAWS

Membership vote to take place at IAFP 2002 Business Meeting

July 2, 2002
4:00 p.m.

Manchester Grand Hyatt San Diego
San Diego, California

The following two proposals to amend the International Association for Food Protection Bylaws will be voted on at the Association's Business Meeting. A majority affirmative vote of the members present is required for acceptance.

Proposal 1: To change Bylaws Section VI, B, 1.2.I to read as follows:

IAFP Awards:

The Awards Committee is responsible for selecting recipients of IAFP awards, from nominations received by the Executive Director, unless otherwise designated by the Bylaws. Selection guidelines are established and approved by the Executive Board. The following awards are under the purview of the Awards Committee:

Sanitarian
Educator
Harold Barnum Industry
Maurice Weber Laboratorian
International Leadership Award
Harry Haverland Citation

Each of the above individual award selection committees consists of three members. The Awards Committee Chairperson (Immediate Past Affiliate Council Chairperson) will recommend members for 3-year appointments with staggered terms to be confirmed by the Executive Board. In their third year of sevice, a member is designated to serve as chairperson of the individual award selection committee.

Rationale: This change reflects the new award named "International Leadership Award."

Proposal 2: To change Bylaws Section VI, C, 1.3 to read as follows:

~~Current PDGs include, Applied Laboratory Methods, Dairy Quality and Safety, Food Safety Network, Food Sanitation, Fruit and Vegetable Safety and Quality, Meat and Poultry Safety and Quality, Microbial Risk Analysis, Retail Food Safety and Quality, Seafood Safety and Quality, Student, Viral and Parasitic Foodborne Disease.~~

Rationale: This change (deletion of Section VI, C, 1.3) will allow for the addition of new PDGs without having to amend the Bylaws.

Changes shown in red.

Jeffrey M. Farber
Elected IAFP Secretary

The International Association for Food Protection welcomes Dr. Jeffrey M. Farber to the Executive Board as Secretary. Dr. Farber will take office at the conclusion of the Awards Banquet at IAFP 2002, the Association's 89th Annual Meeting in San Diego, California. By accepting this position, he made a five-year commitment to the Association and will begin his term as President in the summer of 2005.

Dr. Farber is currently Director of the Bureau of Microbial Hazards, for the Food Directorate of Health Canada, where he is responsible for the management of research and policy development in the area of microbiological food safety. Prior to assuming the Director's position, Dr. Farber was a Research Scientist in the Bureau of Microbial Hazards for 17 years after completing an NSERC post-doctoral fellowship at Health Canada in 1983. He became Acting Chief of the Microbiology Research Division in 1998, and Associate Director in 2000.

During his 19-year career, Dr. Farber has published over 100 papers in refereed journals, six book chapters, edited two books, has been, and continues to be an invited lecturer on food microbiology and food safety, internationally. His main areas of expertise are *Listeria monocytogenes*, modified atmosphere packaging, fresh-cut produce, *Enterobacter sakazakii*, and molecular typing of foodborne pathogens. He currently also holds International Life Sciences Institute (ILSI) and Biotechnology grants for work on the virulence, molecular typing and biochip detection of *L. monocytogenes* in foods. In 1999, Dr. Farber was awarded the Seafood Technology Division, Divisional Lecturer award and also received two Food Directorate Team Awards in 2001.

Since joining the International Association for Food Protection (IAFP) in 1986, Dr. Farber served on the Program Committee for close to six years, the last year of which he was the Chairperson. Dr. Farber has also given many invited talks, as well as organized numerous symposia at the IAFP Annual Meetings, and has been involved with a number of the Professional Development Groups (PDGs). He has also been a member of the Nominating Committee, Chairperson of the Developing Scientist Award Committee, and actually started the very successful Fruit and Vegetable Safety and Quality PDG, of which he is still a member.

Dr. Farber is currently a member and Treasurer of the International Commission on Microbiological Specifications for Foods (ICMSF). In terms of editorial work, Dr. Farber is currently the Editor of the *International Journal of Food Microbiology* and on the Editorial Board of the *Journal of Food Protection* and the *Italian Journal of Food Science*, as well as being on the *Journal of Food Protection* Management Committee. He has served on Expert Committees for the WHO, FAO and IFT, as well as Scientific and Technical Panels for recent IFT Task Force efforts.

Locally, Dr. Farber has been an Adjunct Professor of Microbiology at the University of Ottawa since 1992, and currently supervises two graduate students.

Dr. Farber obtained his B.Sc. and M.Sc.(A) degrees in Applied Microbiology and Immunology from McGill University in Montreal and his Ph.D. from Food Microbiology, McGill University in Ste. Anne de Bellevue, Quebec.

Congratulations!

New Members

ARGENTINA

Silviz Nelina Gonzalez
Salud Publica - Univ. of Tucuman
San Miguel De Tucuman,
Tucuman

CANADA

William T. Bodenhamer
Toxin Alert Inc.
Mississauga, Ontario

Lianne A. Dizon
The Steritech Group Corp.
Milton, Ontario

Kim Hopkins
Silliker Canada Co.
Markham, Ontario

Maria Milic
FDSC Inc.
Richmond Hill, Ontario

Frances M. Nattress
Agriculture & Agri-Food Canada
Lacombe, Alberta

Iain Wright
Kitchener, Ontario

IRELAND

Elaine M. Gleeson
University of Limerick
Clonmel, Tipperary

MEXICO

Carmen Oropezo Rodriguez
Universidad De Guadalajara
Zapopan, Jalisco

SOUTH AFRICA

Sean Lombard
Kemklean (Pty) Ltd.
Johannesburg

SOUTH KOREA

Woo Kyung Jung
Seoul National University
Suwon, Kyonggi-Do

Jun Man Kim
Seoul National University
Suwon, Kyonggi-Do

Nam Hoon Kwon
Seoul National University
Suwon, Kyonggi-Do

Kyoung Min Noh
Seoul National University
Suwon, Kyonggi-Do

UNITED STATES

Alabama

Dennis Bogart
Randolph Associates
Alabaster

Armed Forces

Abida S. Shoyeb
US Army
FPO, AP

California

Surinder S. Kang
Ruiz Food Products Inc.
Dinuba

Karen Richter
Sun Ten Laboratories
Irvine

Luis R. Sanchez
Melissa's
Vernon

Bill Schneider
Melissa's
Los Angeles

District of Columbia

Stephanie A. Smith
Institute of Food Technologists
Washington

Florida

Anne S. Cooper
Allied Domecq QSR
Ft. Lauderdale

Oscar A. Jeter
Safeline, Inc.
Tampa

Georgia

Deborah A. Loveys
US Food and Drug Administration
Decatur

Vernon Mullins
Georgia Dept. of Agriculture
Thomson

Illinois

Nicole D. Maks
National Center for Food Safety
& Technology, Bolingbrook

Daniel P. Meyer
American Dairy Products Institute
Chicago

Joe M. Stout
Kraft Foods
Northfield

Indiana

Ann M. Guentert
Purdue University
West Lafayette

Kansas

Mark A. Seyfert
Kansas State University
Manhattan

Maryland

Candace Burnette
University of Maryland Eastern Shore, Princess Anne

Massachusetts

Dave Beebe
Ken's Foods Inc.
Marlborough

Michigan

David Kedzierski
Leprino Foods
Allendale

Minnesota

Michael G. Williams
3M Microbiology Products
St. Paul

Missouri

Lisa Bezzole
bioMérieux, Inc.
Hazelwood

Nebraska

Gaye Johnson
USDA-FSIS-FO-TSC
Omaha

Kari D. Shoaf
University of Nebraska
Lincoln

New Jersey

Ibrahim Naderi
Cranford

New York

Richard W. Svenson
NYS Dept. of Health
Troy

North Carolina

Fred Breidt
USDA/ARS
Raleigh

Charles T. Trout
Mother Murphy's Laboratories
Greensboro

Ohio

Bill W. Hayes
The Kroger Co.
Cincinnati

Kenneth S. Ray
John Morrell & Co.
Cincinnati

Oregon

Sarah K. Menely
Oregon Dept. of Agriculture
Portland

Tennessee

Nancy R. DeTrana
University of Tennessee
Knoxville

Gary P. Jansen
Stroh Brewing Co.
Franklin

Brandy L. Knox
University of Tennessee
Knoxville

Kimberly D. Stanley
University of Tennessee
Knoxville

Texas

Cathy Barnett
City of Houston
Houston

Virginia

Richard G. Morley
AMF Bowling Worldwide
Mechanicsville

Wisconsin

Karl I. Linck
Sargento Foods Inc.
Elkhart Lake

UpDates

Alfa Laval Names New Inside Sales Representatives

Alfa Laval Inc. announces the appointment of Aaron Galdonik as pump inside sales representative at the Pleasant Prairie, WI facility.

Aaron has been with Alfa Laval for over six years in various roles. Most recently, Aaron held the title of warehouse lead. In that position, he assisted the warehouse manager with the day-to-day operations of the department. During that time, Aaron has gained extensive knowledge of the company's product line.

In his new role, Aaron will be responsible for assisting distributors and customers with selecting size and style of pumps that best fits their needs and following up with aftermarket activities.

Carrie Kram has been appointed to the position of inside sales representative at the Pleasant Prairie, WI facility.

In this position, Carrie will be the primary contact for the company's original equipment manufacturers and will assist with ordering, expediting, and tracking Alfa Laval products.

Prior to joining Alfa Laval, Carrie held the position of office administrator with Schwarz Worldwide Fastpak.

Dennis W. Edwards Promoted in Rich Products Corporate Quality and Food Safety Department

Rich Products has announced the promotion of Dennis W. Edwards to food safety manager of corporate quality and food safety department.

Edwards' responsibilities include directing the corporate food safety program by defining standards, procedures and controls. He will stay informed of relevant legislation, food safety issues, and scientific and technical developments and employ state-of-the-art applications for continuous improvement of the corporate-wide food safety program.

Prior to his promotion, Dennis held the position of food safety specialist of corporate quality and food safety department.

Dennis is a 1994 graduate of the State University of New York College at Buffalo, where he received his BS in industrial engineering technology. Dennis is a Member of the International Association for Food Protection, the National Environmental Health Association, and the National Food Processors Food Allergen Committee and Special Situations Committee.

Joergen Olsson Appointed New Vice President of Global Sales for Thermo Electron's Weighing & Inspection Business Unit

Joergen Olsson has been appointed to the newly developed position of vice president of global sales for Thermo Electron's weighing & inspection business unit. He is responsible for global sales and the strategic direction of the unit's marketing activities. The weighing & inspection group is comprised of Thermo Ramsey, Thermo Goring Kerr, Thermo Allen Coding, Thermo Detection and Thermo Moisture Systems.

Prior to joining the Thermo team, Olsson spent 17 years in a variety of American and international assignments with Mettler-Toledo. He was most recently the national dales manager for Hi-Speed Checkweigher, a subsidiary of Mettler-Toledo. Olsson has solid industry experience. He has a bachelor's degree in natural science.

Sally Donovan Joins Silliker Inc. as Technical Sales Manager

Silliker Inc. announces the appointment of Sally Donovan as technical sales manager. A graduate of California State University with nine years of food industry experience, Donovan will oversee sales activities in the northwest region of the United States.

Chr. Hansen Appoints Albert Giannantonio as New Account Manager

Chr. Hansen, Inc., North American announces that Albert Giannantonio has recently moved into the position of account manager for Savory Ingredients. He previously was account manager for Specialty Sweeteners for the company.

Mr. Giannantonio's main territory covers Pennsylvania, western New York and Ohio, where he is primarily responsible for selling savory flavors and seasonings. In this role, he will develop and strengthen working partnerships with major food industry accounts by offering a full line of savory ingredients and technical assistance.

Mr. Giannantonio's has extensive experience in seasonings and flavors to major food producers. Prior to joining Chr. Hansen, he was an account manager with Bush Boake Allen, Inc. where he specialized in essential oils and specialty ingredients.

The Australia New Zealand Food Authority (ANZFA) Releases Research on Food Handling Practices

ANZFA has released a research report on food handling practices in Australian food businesses. The results of the National Food Handling Benchmark Report showed that businesses have started to use the better practices proposed in the new national food safety standards.

When releasing the report, ANZFA's managing director, Ian Lindenmayer, said that he was pleased that the majority of the food businesses surveyed, such as food manufacturers, food retailers, child care centers, schools, hospitals, cafés and restaurants knew about and are implementing safe food handling practices.

Most significantly, food businesses with a food safety program in place scored better on food safety than those without. A food safety program sets out in writing how a business will ensure that the food they sell is safe. With the exception of Victoria, these programs are voluntary at this stage, yet they make a considerable amount of business sense. Large businesses and those handling high risk foods, such as processed meats, poultry, seafood, egg and dairy dishes and prepared salads, were more likely than other businesses to have better knowledge of safe food handling practices and to be using them.

However, it is disappointing that a small but significant proportion of businesses are not aware of the basics of food safety, such as the need to keep high risk food at the right temperature, to protect food from contamination, to clean and sanitize food preparation equipment properly, and to follow personal hygiene and

illness management procedures. "For example, over 20% of food businesses did not know the correct temperatures for storing chilled food or for holding hot food safely and a considerable number of food businesses used touch (43%) and/or sight (57%) to check food temperatures. It is also a matter of concern that many food businesses are not following proper personal hygiene practices to ensure the safety of their food, with 17% not having sufficient hand washing facilities, 7% with no soap or hand cleanser and 14% with no warm running water," Mr. Lindenmayer said. To reduce the risks of producing food that is unsafe, the States and Territories are introducing three new national Food Safety Standards, developed by ANZFA, that require businesses to have safe food handling practices, premises and equipment and this helps ensure food produced in a business is safe for consumers. It is anticipated that these standards will improve food safety practices in food businesses.

This research was a benchmark study conducted prior to the implementation of the food safety standards. Results of future surveys will provide evidence of whether any improvement has occurred. ANZFA commissioned Campbell Research & Consulting to do this research as part of a new initiative to check the effectiveness of new food standards. ANZFA appreciates the assistance of local government officers with the survey. In a 1999 ANZFA report it was estimated that foodborne illnesses cost Australia $2.6 billion each year and that Australians have a one in five chance of contracting food poisoning in any twelve month period. Australia is currently enhancing its surveillance of foodborne illnesses. This will provide better data on changes in the incidence of foodborne illness in Australia and the most likely causes. "I am delighted that a large number of businesses are conscientious about food safety but am concerned that a significant number don't have the required basic knowledge and are placing their customers at risk," Mr. Lindenmayer said

A copy of the summary and full report is available on the ANZFA Web site www.anzfa.gov.au/mediareleases publications/publications/nationalfoodhandling1315.cfm.

European Commission — Food and Veterinary Office Report on a Review of Control for VTEC in Europe

The Food and Veterinary Office of the European Commission Health and Consumer Protection Directorate has published its report on a series of missions undertaken to assess controls of Vero cytotoxigenic *Escherichia coli* (VTEC) in the food production sector. In the first half of 2001 six countries were visited (Belgium, Denmark, France, Germany, Portugal, and Sweden), and the objectives of the missions were to provide a review of the current situation regarding VTEC at a European level, and identify best practices in the member states visited.

Although the focus was mainly on animal health and food

safety practices, the missions also looked at surveillance of infection among humans, and the coordination between these areas.

The general conclusions of the report are that although there are some systems in place for monitoring VTEC throughout the food chain, more could be done to coordinate VTEC surveillance. Routine diagnostic methods for identification of all VTEC strains (including O157) in humans, animals, and food should be developed, validated, and implemented. Guidelines should be created on the action required to detect, prevent, control, and investigate VTEC outbreaks in animal and human populations. International networks created under the Network Decision, and the national networks supporting them, should be further developed to enhance their effectiveness, and the development of effective working links between human health and veterinary services should be given a high priority.

Work on resolving some of these issues is already under way. To enhance the effectiveness of Enternet (the international surveillance network for *Salmonella* and VTEC infections), it was agreed at the recent annual workshop that surveillance reports on human cases of VTEC infection would be prepared, and public domain versions would be made available. This will improve the availability of information on human cases of VTEC. A European action for cooperation in the field of scientific and technical research (COST) has been created to address the issue of a coordinated approach to European surveillance. COST Action 920, entitled "Foodborne zoonoses: a coordinated food chain approach" (www. cost 920.com/), involves one working group looking specifically at the harmonization of diagnostic and typing methods. Standardization of typing methods, and the subsequent dissemination of the results through Enternet, will lead to greater knowledge of VTEC and its impact on public health in Europe.

America's Emerging Microbial Food Safety Issues

Despite significant success at improving the safety of the nation's food supply, current science on which safety is based does not sufficiently protect us from emerging issues inherent to a complex food supply. The evolving characteristics of food, technology, pathogens and consumers make it unlikely the marketplace will be entirely free of dangerous organisms at all times for all consumers. This is among the conclusions presented in the new expert report published by the not-for-profit scientific society Institute of Food Technologists. The report, Emerging Microbiological Food Safety Issues: Implications for Control in the 21st Century was released at IFT's International Food Safety and Quality Conference and Expo in Atlanta.

The report, which draws upon experts specializing in foodborne pathogens and microbial evolution, foodborne illness, food production and processing, testing methods and regulatory measures, reveals that diligent adherence to current methods that create and monitor the food supply cannot eliminate the risk of foodborne illness. It also offers recommendations for providing the greatest possible reduction in food safety risks.

Among its seven sections, the report addresses: procedures from farm to table to significantly reduce illness due to mishandling, processes to recognize and respond to outbreaks and to reduce their scope, poor habits that make consumers more susceptible to foodborne illness, education and training recommendations necessary for reducing pathogenic influence at every step-from production to consumption-and recommendations to enhance monitoring, data generation, and risk assessment.

The report also specifies the current state and future potential of rapidly evolving illness-causing pathogens and other key issues. To gain the greatest measure of food safety, the report stresses the necessity of implementing flexible food safety measures in order to utilize as quickly as possible the latest scientific information as it evolves. It further urges manufacturers, regulatory and public health agencies and allied organizations to develop partnerships to improve risk assessment and food safety management.

Better Ways to Sanitize Fruit and Vegetables

Agricultural Research Service scientists in Wyndmoor, PA, are studying commercial-type washing and sanitizing equipment that could do a better job of reducing bacterial populations on fruit and vegetable surfaces. The washing and sanitizing equipment is located within a containment chamber inside a unique Biosafety Level 2 (BSL-2) pilot plant at the ARS Eastern Regional Research Center (ERRC) in Wyndmoor. The plant will be used to improve conventional produce-cleaning methods and to develop new approaches for removing or inactivating human pathogens

associated with fresh produce, according to food technologist Gerald M. Sapers and microbiologist Bassam A. Annous. They work at ERRC's food safety intervention technologies research unit.

The washing equipment and a small-scale prototype of the containment chamber were designed, built and validated by a collaborating team of scientists and engineers from Pennsylvania State University and ERRC. Early tests with the new system were very successful.

Chlorine and other produce sanitizers used by packinghouses to reduce microbial levels are not able to penetrate the crevices in produce skin. Sapers and his team are developing and evaluating new, commercial-type processes for decontaminating fresh and minimally-processed fruits and vegetables. Effective technology can then be transferred to produce packing and processing industries.

New washing and sanitizing treatments are developed in the laboratory before being tested in the pilot plant. For example, experimental hydrogen peroxide and hot water treatments have been applied to apples in a dip tank at different temperatures. Temperatures exceeding 60 degrees Celsius (140 degrees Fahrenheit) could not be used without causing discoloration.

Other experimental methods being studied include steam treatments, applying sanitizing solutions under vacuum, treating inoculated apples and other produce with antimicrobial vapors and using an abrasive paste to grind pathogens off produce.

A more detailed story on this research is available in the March issue of Agricultural Research magazine, available on the World Wide Web at htm; www.ars.usda.gov/is/AR/archive/mar02/fruit0302.htm. ARS is the US Department of Agriculture's chief scientific research agency.

Food Safety Facts on Bottled Water

Bottled water is water which has been packaged in sealed containers for human consumption. It includes water represented as "spring" water or "mineral" water and water from various other sources that may have been treated to make it fit for human consumption.

What are the different types of bottled water? According to current regulations, bottled water may be represented as "spring" or "mineral" water only if it originates from an underground source which is not part of a community water supply. The water must be naturally for human consumption at its point of origin and may not be subjected to any treatment that would modify the original chemical composition of the water. The only treatments permitted include carbonation, the addition of ozone as a disinfecting agent or fluoridation to prevent dental cavities.

Generally, mineral water contains a larger amount of dissolved mineral salts than spring water. Bottled water that is not labeled as "spring" or "mineral" may be from any source and can be treated to make it fit for human consumption or to modify its original composition. The label of these waters must show how they have been treated. The following product names must appear on the label: "distilled water" – when the treatment includes distillation (i.e., vaporization and condensation); "demineralized water" – when the treatment, by means other than distillation, results in the mineral content being reduced to less than 10 parts per million; and "carbonated water" – when the water contains added carbon dioxide, making it effervescent.

Bottled waters that do not fit into one of the categories, and do not qualify to be represented as spring or mineral water, may be named by any other appropriate term which is accurate and not misleading. Could tap water be used to manufacture bottled water? Yes, except for water represented as spring or mineral water. Some bottled waters such as "distilled" or "demineralized" water may be tap water that has undergone a treatment process to lower the mineral content and/or remove chemicals such as chlorine.

What information is required to appear on the label of bottled water? Like any prepackaged food, bottled water must carry the following basic labeling information: common name, list of ingredients if it consists of more than one ingredient, net quantity, and name and address of the company responsible.

Additional labeling requirements specific to bottled water include the following for all bottled waters: fluoride ion content; For "spring" and "mineral" water: dissolved mineral salt content, statement indicating whether ozone or fluoride has been added, and statement relating the geographic location of the underground source of the water.

For bottled waters, other than "spring" or "mineral" water: description of any treatment the water has undergone. Could bottled water have bacteria in it? Bottled water is not a sterile product. However, it is required to be free of disease-causing organisms. Like most foods, bottled water may contain naturally occurring bacteria which typically have little or no health significance.

Is bottled water safer than tap water? Manufacturers and importers of bottled water are required to ensure that their products continually meet the Canadian health and safety standards. Quality standards for bottled and municipal waters are similar. Both bottled and municipal waters that meet or exceed their required health and safety standards, are considered to be safe. At the present time, no waterborne disease outbreaks have been associated with drinking bottled water in Canada.

Health Canada recommends that populations particularly susceptible to illness or disease should consider either boiling their water prior to use or using only sterile water. This recommendation applies to infants, pregnant women, the frail elderly and those whose immune system has been weakened by disease, surgery or therapy.

What should I consider before purchasing bottled water? Examine the bottles closely before purchasing and buy only bottles where the seal is unbroken. Make sure the water is clear and free of debris. The consumer should avoid refilling old bottles unless they have been properly cleaned and sanitized.

How should bottled water be stored? Water should always be stored in well-sealed containers. Large quantities of bottled water may be stored in a cool, dark storage area such as a basement or warehouse. As with other foods, if bottled water is being stockpiled in long-term storage, care should be taken to rotate the inventory so that no product in storage will exceed its shelf life. Most bottled water manufacturers indicate that their product has a two-year shelf-life.

How is bottled water regulated? Bottled water is considered to be a food product and is regulated under the Food and Drugs Act and Regulations. These regulations include requirements for microbiological quality, composition and labeling. Like any prepackaged consumer product, bottled water is also subject to the requirements of the Consumer Packaging and Labeling Act and Regulations. Health Canada establishes health and safety standards for the bottled water sold in Canada through the Food and Drugs Act. The Canadian Food Inspection Agency (CFIA) enforces these standards. The CFIA also sets and enforces requirements under both of the above-mentioned Acts to protect consumers against fraud in relation to the composition, packaging, labeling and advertising of bottled water. As part of its enforcement role, CFIA can inspect products, labels, and establishments involved in the sale, manufacture and distribution of bottled water. In addition, some provincial and municipal ministries and agencies may regulate and inspect bottled water.

Agricultural Research Service Scientists Devise New Test for *E. coli* O157 in Water

Agricultural Research Service (ARS) scientists have developed a rapid, easy-to-use test to detect and count *E. coli* O157:H7 bacteria in natural and constructed bodies of water. ARS microbiologists Dan Shelton and Jeff Karns in the Animal Waste Pathogen Laboratory, Beltsville, MD developed the test, which uses magnetic beads to detect the pathogen.

The magnetic beads are coated with anti-*E. coli* monoclonal antibodies that bind to the bacteria, making it possible to count the bacteria. Current testing methods are designed only to detect the bacteria, but not to measure how many are present. The number of *E. coli* bacteria present is crucial information since the levels that cause infection can vary from person to person, depending on the person's health status. Also, the new method makes it possible to detect *E. coli* in water samples in a day or less, compared with traditional testing that can take up to four days to complete.

Usually spread in contaminated food, *E. coli* is sometimes waterborne. In 1998, an *E. coli* outbreak occurred at an Atlanta, GA, water park, causing the hospitalization of several children. *E. coli* can cause diarrhea, hemorrhagic colitis and hemolytic uremic syndrome (HUS). HUS can result in destruction of red blood cells, damage to the lining of blood vessel walls and, in severe cases, kidney failure. Investigations are under way to assure no other bacteria cross-react with the magnetic beads. However, if this test proves to be accurate and selective, it should allow for detection of *E. coli* in a variety of liquid samples, such as swimming pools and other recreational water.

Results of the II Meeting of the Pan American Food Safety Commission

The second meeting of the Pan American Commission of Food Safety (COPAIA) concluded a convention here to help define regional policies and programs designed to improve food safety in the Americas. All sectors involved, both public as Ministries of Health and Agriculture, and private, as representatives of producers and consumers of the entire continent, participated of this event.

The II Meeting of the COPAIA approved the lines of action, the objectives, and the reference terms that will guide the work of the commission. It was concluded that the final purpose of the commission would be helping

to improve food safety throughout the food and agriculture chain. Within the principal lines of action for the COPAIA the following ones were approved: the promotion of the intersectorial coordination, the development of politics for the modernization of the sanitary food inspection, the development of strategic partnerships and the promotion of the participation of the countries of the Region in the works of Codex Alimentarius.

During the meeting, Dr. Claudio R. Almeida, director of the Pan American Institute for Food Protection and Zoonoses (INPPAZ) pointed out the importance of having a forum of high political level oriented to the development of regional food safety politics, destined to achieve equity in the food safety for domestic consumption and for international trade. INPPAZ, a specialized center of the Pan American Health Organization (PAHO), presented its plan of action in COPAIA and the members recommended that PAHO supported the center in its implementation.

Actually, food safety represents one of the most critical problems in health, only in these last five years 5,500 outbreaks happened in the Americas, the COPAIA is a collective and hemispheric effort of PAHO's Member States for understanding this situation and search for possible solutions, remarked Dr. Almeida. Thirty-two representatives from international agencies of technical and financial cooperation participated of the meeting as observers. It was elected as president of the meeting Dr. Fernando Gracia García, Minister of Health of Panama, as president. Jorge Escoto Marroquín, minister of agriculture of Guatemala, was elected first vice-president; Dr. Frank Rivas Von Eichwald, director of the Venezuela Industrial Meat Producers Association 2nd vice-president, and Dr. Marcelo Azalim, associate director of Brazil's National Sanitary Surveillance Agency, rapporteur. The COPAIA convenes all the interested parts in food safety, from the health and agriculture sectors up to the associations of producers and consumers.

Based on this multi-sectorial approach and finding support in the concept "from the farm to the table," it intends to achieve a greater coordination throughout the whole food chain.

Industry Products

GrayWolf Sensing Solutions

DirectSense IAQ PPC from GrayWolf Sensing Solutions

GrayWolf Sensing Solutions introduces a powerful new tool for indoor environmental measurements. The DirectSense IAQ PPC is a Pocket PC computer-based system that not only makes possible accurate measurement of key indoor air quality parameters (IAQ), but also allows for extensive information from measurement locations to be input into the mobile computer, facilitating efficient, very detailed reporting.

Carbon dioxide, carbon monoxide, relative humidity, temperature, airspeed and much more may be displayed and data logged. Instantaneously record data during a walkthrough, or on timed intervals over hours/days/weeks/months. Each individual location file, which measurement data is recorded to may also have text notes, audio notes, Microsoft Word templates, graphic notes. calibration information (and even, optionally, CAD-CAM drawings, GPS data, digital photos and more) stored concurrently. This significantly improves data collection and documentation, which is crucial for IAQ and other environmental applications.

Desktop PC software is supplied for professional analysis and reporting of data collected in the field with the Pocket PC system. A probe pouch with shoulder strap enables hands-free measurement during walk-throughs, and an optional hard shell security case hides and protects the Pocket PC system when left for unattended monitoring.

GrayWolf Sensing Solutions, Trumbull, CT

Reader Service No. 226

Subminiature Flush Diaphragm Pressure Sensor for High Temperature Applications from Sensotec, Inc.

The Sensotec subminiature Model S(H) pressure transducer is now available to operate at temperatures up to 400°F. The 0.375" diameter flush sensing diaphragm makes this unit ideal for many applications including industrial process control, pharmaceutical manufacturing, and laboratory material compatibility testing for both fluids and gases.

The model S(H) delivers +/-1% FS accuracy: The excellent thermal characteristics and highly stable output provide reliable data over these extreme operating temperatures. This rugged transducer features a unitized all welded 17-4 PH Stainless Steel flush diaphragm, heavy sidewall construction and standard 7/16-20 UNF threaded housing, The standard excitation is 5 VDC, and output sensitivity is 2m V/V for most ranges. Amplified outputs of 0-5 VDC, 0-10VDC or 4-20 mA are available with Universal and DIN-Rail Mount In-Line Amplifiers.

The Model S(H) is available in pressure ranges from 0-150 to 0-10,000 psig, (gage pressure) or psia (absolute pressure). High frequency response and overload capacity up to 150% F.S. makes this transducer one of our most versatile models. Other high temperature products from Sensotec include miniature load cells.

Sensotec, Inc., Columbus, OH

Reader Service No. 227

PBI-Dansensor America Inc. Package Test Equipment Assures Consistency and Quality in Branded Case-Ready Products

PBI-Dansensor provides a selection of Modified Atmosphere Packaging (MAP) devices that enables meat processors and packagers to introduce a new point of parity in meeting consumers' demand for maintaining shelf-life, brand quality and consistency in taste, texture, color, visual presentation and freshness during extended retail and logistic operations.

PBI-Dansensor addresses Modified Atmosphere Packaging (MAP) issues with random Spot/Headspace testing and on-line gas analyzers that monitor the package environment.

Spot testing or head space testing is performed on a sample of packages pulled from production during a repetitive time schedule. A built-in, pump-operated syringe extracts a gas sample from the package and records the measurement in an operator-friendly display hold function. Data can also be recorded by specific measurement, packaging machine, and time to assure uniformity, generate test documentation, and facilitate package traceability.

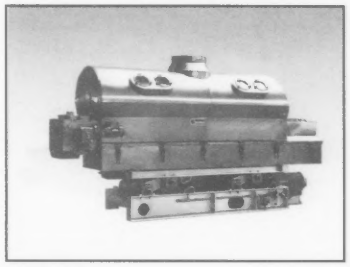
On-line gas analysis assures zero defect accuracy for total package testing of the entire line. 100% of the packages are measured at the point of sealing in a continuous, non-destructive high-speed sampling process. An automatic program set-up checking feature presents the operator with different alarm levels for each product as an automatic safety that is useful to prevent errors during product change-overs. Complete data logging is also available for electronic storage during the entire packaging process.

PBI-Dansensor, Glen Rock, NJ

Reader Service No. 228

Ventilex USA's Unique Design of Ventilex Fluid Bed Cooler is Ideal for Conditioning in the Food and Dairy Industries

Fluid bed coolers from Ventilex USA, with a revolutionary yet simple transport design and unique drive system, are ideal for conditioning a wide variety of dairy and food products after processing or dehumidifying,



Ventilex USA

including cheese and lactose, cereals, chocolate, bread crumbs and soya.

The Ventilex design is unique because the entire cooler is part of the movement or conveyance of the dairy or food product. The amplitude of the movement remains constant while the frequency can be varied over a wide range according to the required transport speed, which enables accurate adjustment of the product cooling times.

The heart of the Ventilex transport system is the revolutionary but logical drive mechanism, in which the cooler is supported on air bellows which are accurately adjusted according to the product requirements. The entire cooler is attached to the upper steel C beams and the entire product bed is raised and moved forward within the fluid bed cooler simultaneously.

Sub-fluidized conditioning provides almost ideal plug flow and many products can be conditioned by a combination of fluidized and sub-fluidized techniques. Normal bed thickness of 6" to 10" can be achieved. Combining fluidized and sub-fluidized techniques allows the conditioning of a wide variety of dairy and food products, and residence times of up to two hours are possible with a minimal spread.

All Ventilex fluid bed coolers are constructed with stainless steel in the process areas. Optional equipment available includes a Clean in Place (CIP) system and a Sanitary Design Standard that exceeds strict USDA guidelines for hygiene and sanitation.

Ventilex USA, Mason, OH

Reader Service No. 229

New Metal Detector/In-Line Checkweigher Systems

Eriez has expanded its line of E-Z Tec® Metal Detectors to include detector/in-motion checkweigher systems. These new systems provide a reliable and accurate method for production line quality control in the food and pharmaceutical industries, meeting the most demanding quality control requirements.

Fast and efficient, these systems combine Eriez' proven metal detection technology with the accuracy and flexibility of Thompson Scale Company's checkweighers.

Eriez' checkweigher models TSC 350, Sonic 350, 4693 and 4693i cover capacities from .002 lbs. to 200 lbs. (1g to 90.7 kg) with speeds from 40 to 350 units per minute. Conveyors are available in either stainless steel, painted mild steel or, for harsh environments, can be painted with a corrosion-resistant epoxy. Optional statistical programs and serial feedback loops are available.

These metal detector/checkweigher systems are available in configurations to suit a wide variety of production industries from small parts manufacturers to packaged food processors. Eriez engineering consultants can design a system to suit virtually any product application.

Eriez Magnetics, Erie, PA

Reader Service No. 230

Heinkel Validates Clean-In-Place Systems on HF-Inverting Filter Centrifuges for Customers Processing Toxic Products

Heinkel Filtering Systems has conducted tests to validate its clean-in-place (CIP) systems on their HF-Inverting Filter Centrifuge for customers who process hazardous materials. The tests determine the proper cleaning nozzle placement and the overall effectiveness of its CIP cycle.

Using a fluorescing solution of riboflavin sprayed onto all areas of the unit that come into contact with product and allowed to dry, the wash fluid was dispensed through the spray nozzles and feed pipe. After washing, the machine was examined using an ultra violet light.

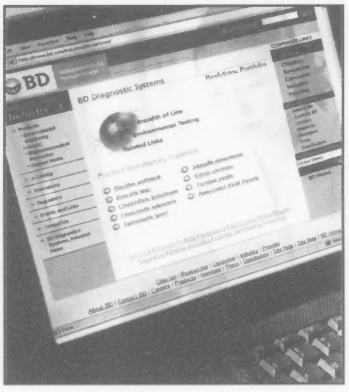
The examination concluded that all areas of the machine were wetted and cleaned by feeding wash liquid through the spray nozzles and feed pipe while opening and closing the bowl. Heinkel is working closely with its customers to validate their CIP systems and other needs.

Heinkel Filtering Systems, Swedesboro, NJ

Reader Service No. 231

BD Biodefense Web Site — A Resource for Products and Information on Sampling, Testing and Identification of Bioterrorist Agents

BD Diagnostic Systems announces the immediate launch on the Internet of the BD Biodefense Web site. BD has created this Web site in response to the increased need to test, sample and identify potential bioterrorist agents, as well as the need to increase production of antibiotics and vaccines to treat and prevent possible disease. Located at http://bd.com/biodefense, the BD Biodefense Web site is a user-friendly resource for clinical, public health and industrial laboratories.



BD Diagnastic Systems

The BD Biodefense Web site features products for sampling, testing and presumptive identification of *Bacillus anthracis*, (the organism that causes anthrax). Additional information from the Centers for Disease Control and Prevention (CDC) is part of the Web site, pictured as flow charts for culturing and staining *Bacillus anthracis*, based on cutaneous, gastrointestinal or inhalation specimens.

Products for seven other potential agents of bioterrorism are also included: *Brucella* spp., *Clostridium botulinum*, *Francisella tularensis*, *Salmonella typhi, Shigella dysenteriae*, *Vibrio cholerae* and *Yersinia pestis*. In some cases CDC information and testing protocols are included for these organisms as well.

The BD Biodefense Web site also contains a section for viral agent collection and transport, and identification. Viral agent testing is an important consideration when differentiating bacteria from viral disease during flu season.

In the areas of antibiotic and vaccine production, the BD Biodefense Web site can link users to information about a full range of products required for the manufacturing of pharmaceuticals, including peptones and hydrolysates. Web site information is also available on the whole array of BD Prepared Sterility Testing Media, as well as the complete offering of prepared media, reagents and identifications systems.

BD Diagnostic Systems, Sparks, MD

Reader Service No. 232

Sigma-Aldrich's Hybridoma Medium Powdered Formulation Maximizes Antibody Production

Sigma-Aldrich has introduced a powdered form of the animal- and serum-free Hybridoma medium (product number H8784). Like the existing liquid medium formulation (product number H4409), the powdered medium eliminates adventitious agents in the manufacturing of biopharmaceuticals saving customers time and money while also satisfying regulatory guidelines.

This medium demonstrated excellent cell growth and antibody production in a wide variety of hybridoma cell lines tested during development. A comparison was done of IgG concentrations produced by HFN 7.1 cells grown in Sigma-Aldrich's hybridoma medium powder and liquid formulations. IgG production supported by the powdered formulation matched production supported by the liquid formulation. Past results of IgG production supported by Sigma-Aldrich's hybridoma liquid medium formulation H4409 exceeded IgG production from competitor media by 150%.

Sigma-Aldrich Corporation, St. Louis, MO

Reader Service No. 233

Labconco Corp. Protector® Work Stations Meet the Needs of Pathologists and Histotechnologists

Labconco Corporation presents the Protector® Work Stations designed specifically for pathologists and histotechnologists. Like a traditional fume hood, the Protector Work Station has a front air foil and rear baffle that direct inflow air across the work area and away from the operator. Chemical vapors are contained within the enclosure.

Protector Work Stations are available in several styles that offer a variety of ducting options. Models are available for connection either to a remote blower, where the ducting connection may be made either from the back, top or side of the enclosure, or with a built-in blower. If ducting to the outside is not feasible, models with a built-in blower are available which use specially treated charcoal filters. These filter packs keep low level concentrations of toluene, xylene, formalin, and formaldehyde below the OSHA-recommended time-weighted averages and restore clean air to breathe.

Features include a stainless steel interior grille, angled tempered safety glass sash (which swings open for loading and cleaning), an aerodynamic air foil, fluorescent lighting and an epoxy-coated steel and laminate-covered hardboard exterior.

Labconco Corporation, Kansas City, MO

Reader Service No. 234

Smart CheK™ Pocket-Sized Waterproof pH, ORP and BNC Meters Now Available from Thermo Orion

Thermo Orion introduces the Smart CheK pocket-sized meter.

The new Smart CheK meter is economical, durable and can fit in the palm of your hand. Smart CheK is fast, accurate, and easy to use. The meter is completely waterproof (IP67) and will float if dropped into water, making it suitable for any portable pH or ORP measurement requirements.

The sensor modules on Smart CheK are replaceable so that the meters can be reused. Additional features of the Smart CheK pH meter include: Auto Buffer Recognition, 10 point data log, hold feature (locks the measurement value on the display), auto-shut off to minimize battery consumption, and low battery indication.

Product specifics for the Smart CheK meter include the following:

- Economical and long-lasting pocket-sized meters;
- Three models including pH, ORP and BNC;
- Waterproof to IP67 and floats in water;
- Replaceable sensor modules;
- Automatic recognition of 4, 7, and 10 buffers; and
- Fast, accurate, and reliable measurements

Thermo Orion, Beverly, MA

Reader Service No. 235

QMI Introduces Improved Line Sampling Procedures

Proper sampling along with proper laboratory procedures can identify or monitor potential sources of contamination. Monitoring these sources requires sampling procedures that are aseptic. Validation studies have proven that the QMI aseptic sampling system will not contaminate the samples or the product. To further improve sampling accuracy, QMI is now introducing the composite sample bag. This is a sterile bag with tubing and a needle attached that allows a sample to be taken over time, improving testing efficiency.

Quality Management Inc., Oakdale, MN

Reader Service No. 236

Ivan Parkin Lecture

will be presented by

Mitchell L. Cohen, M.D.

Director
Division of Bacterial and Mycotic Diseases
National Center for Infectious Diseases
Centers for Disease Control and Prevention
Atlanta, Georgia

Food Safety in the Time of Anthrax

Sunday, June 30, 2002

Opening Session — 7:00 p.m.

Dr. Mitchell L. Cohen received his undergraduate and medical degrees from Duke University. His postgraduate training was in internal medicine at the University of Texas Southwestern Medical School, and his Infectious Disease Fellowship was completed at the University of Washington in Seattle. Since 1976, he has held positions in the Enteric Diseases Branch; Hospital Infections Program; and Office of the Director in the Division of Bacterial and Mycotic Diseases. His research interests include the epidemiology of antimicrobial resistance, foodborne diseases, and the application of molecular biology techniques to answer epidemiologic questions. He has been editor and reviewer for a number of scientific journals. He is a Fellow in the American College of Physicians and the Infectious Diseases Society of America. Dr. Cohen has been a member of several advisory committees including the Recombinant DNA Advisory Committee, National Institutes of Health, and the National Advisory Committee on Microbiological Criteria for Foods.

June 30–July 3, 2002
San Diego, CA

Preliminary Program

SUNDAY EVENING – JUNE 30, 2002

7:00 p.m. – 8:00 p.m.

Opening Session – Regency Ballroom

Presentation of the International Association for Food Protection Fellows Awards

Ivan Parkin Lecture – **Food Safety in the Time of Anthrax**, Mitchell L. Cohen, M.D., Director, Division of Bacterial and Mycotic Diseases, National Center for Infectious Diseases, CDC, Atlanta, GA

Cheese and Wine Reception will follow in the Exhibit Hall

MONDAY MORNING – JULY 1, 2002

8:30 a.m. – 12:00 p.m.

S01 Antibiotic Resistance in Humans and Feed Animals – Manchester Ballroom A-B

Sponsored by ILSI N.A.

Organizer: Catherine Nnoka

Convenors: Stan Bailey and Marguerite Neill

8:30 • Historical Perspective on the Problem of Antibiotic Resistance–To be determined

9:00 • Resistance in *Salmonella* Newport–AMITA GUPTA, CDC, Atlanta, GA, USA

9:30 • Multiple Drug Resistance – Trends and Implications–PAULA J. FEDORKA-CRAY, USDA-ARS-RRC, Athens, GA, USA

10:00 • Break

10:30 • Antibiotic Resistance Trends in Europe–E. JOHN THRELFALL, Centeral Public Health Laboratory, London, UK

11:00 • Perspectives in Addressing the Safety of Cephalosporin Use in Animal Medicine–SUSAN F. KOTARSKI, Pharmacia Animal Health, Kalamazoo, MI, USA

11:30 • Consequence of Removal of Sub-therapeutic Antibiotics from European Farms–HANNE-DORTHE EMBORG, Danish Veterinary Institute, Copenhagen, Denmark

S02 Viruses in Foods – Regency Ballroom A-B

Organizer: Sagar M. Goyal

Convenors: Sagar M. Goyal and Craig W. Hedberg

8:30 • The Epidemiology of Norwalk-like Viral Gastroenteritis–CRAIG W. HEDBERG, University of Minnesota, Minneapolis, MN, USA

9:00 • Investigating Outbreaks of Foodborne Viral Gastroenteritis–PAUL ALLWOOD, Minnesota Dept. of Health, St. Paul, MN, USA

9:30 • CaliciNet: A Tool to Improve Surveillance for Norwalk-like Viruses–STEVE MONROE, CDC, Atlanta, GA, USA

Program subject to change

(Monday a.m., *continued*)

10:00 • Break

10:30 • Environmental Persistence and Transfer of Norwalk-like Viruses—LEE-ANN JAYKUS, North Carolina State University, Raleigh, NC, USA

11:00 • Viral Indicators and Methods of Detection—SAGAR M. GOYAL, University of Minnesota, St. Paul, MN, USA

11:30 • Control Strategies—DEAN O. CLIVER, University of California-Davis, Davis, CA, USA

S03 Development in Intervention Technologies to Enhance Produce Safety – Regency Ballroom C

Sponsored by Air Liquide and IAFP Foundation Fund

Organizers/Convenors: Bassam A. Annous and James T. C. Yuan

8:30 • The Role of Ozone in a Microbial Intervention Strategy for Food Processing—BRIAN C. HAMPSON, California Polytechnic State University, San Luis Obispo, CA, USA

9:00 • Pulsed Electric Field as an Antimicrobial Treatment of Fruits and Vegetables—HOWARD Q. ZHANG, Ohio State University, Columbus, OH, USA

9:30 • Low-dose Irradiation of Fruits and Vegetables as an Antimicrobial Treatment—BRENDAN A. NIEMIRA, USDA-ARS-ERRC, Wyndmoor, PA, USA

10:00 • Break

10:30 • The Role of High Pressure Processing Technology in Microbial Intervention Strategy—DALLAS G. HOOVER, University of Delaware, Newark, DE, USA

11:00 • Effectiveness of Antimicrobial Food Packaging Materials—KAY COOKSEY, Clemson University, Clemson, SC, USA

11:30 • Novel Development in Intervention Strategies to Enhance Produce Safety at ERRC—BASSAM A. ANNOUS, USDA-ARS-ERRC, Wyndmoor, PA, USA

S04 Safety of Latin-Style High Moisture Fresh Cheese – Cunningham Room

Organizers/Convenors: Steven C. Murphy and John E. Rushing

8:30 • Small Cheese Manufacturing Operations in Central America—JOHN RUSHING, North Carolina State University, Raleigh, NC, USA

9:00 • Anatomy of an Outbreak—SUE GRAYSON, State of North Carolina, Environmental Health Services, Raleigh, NC, USA

9:30 • Tracking Sources of Environmental Contamination (*Listeria monocytogenes*) in Latin-Style Cheese—KATHRYN J. BOOR, Cornell University, Ithaca, NY, USA

10:00 • Break

10:30 • Application of HACCP in a Latin-Style Cheese Plant—EVA RODRIGUEZ, Tropical Cheese Industries, Perth Amboy, NJ, USA

11:00 • Safety and Regulatory Issues with Domestic and Imported Latin-Style Cheese—JACK GUZEWICH, FDA, College Park, MD, USA

11:30 • Panel Discussion

T01 Meat and Poultry Microbiology – Regency Ballroom D-E

8:30 T1 • Review of the USDA Escherichia coli Draft Risk Assessment – Findings of a National Academy of Sciences Study—DAVID A. BUTLER and Ricardo A. Molins, National Academy of Sciences, Washington, D.C., USA

8:45 T2 • Microbiological Risk Assessment on Raw Beef Carcasses in Ontario Abattoirs—PAT JOHNSON, Joseph Odumeru, Abdullahi Mahdi, and Tom Baker, Ontario Ministry of Agriculture, Guelph, Ontario, Canada

9:00 T3 • Incidence of *Clostridium perfringens* in Commercially Produced Cured Raw-Meat-Product Mixtures and Behavior in These Products during Cooking, Chilling, and Refrigerated Storage—PETER J. TAORMINA, Gene W. Bartholomew, and Warren J. Dorsa, John Morrell and Co., Cincinnati, OH, USA

9:15 T4 • Microbiological Analysis of Ground Beef Treated with Hydrodynamic Pressure Processing—ANISHA WILLIAMS-CAMPBELL and Morse Solomon, USDA-ARS, Beltsville, MD, USA

9:30 T5 • High Efficiency Microbial Collection off Beef Carcasses with Wet-Vacuum Procedures—Bruce J. Bradley, FILOMENA S. SADDLER, and Joseph K. Hillers, Rocky Mountain Resource Labs, Inc., Jerome, ID, USA

9:45 • Break

10:15 T6 • Microbiological Profile of Air Chilled Chickens from Farm to Table—W. FLUCKEY, M. Brashears, S. McKee, and E. Pendleton, Texas Tech University, Lubbock, TX, USA

10:30 T7 • Association of *Campylobacter* spp. Levels in Poultry Production to Levels Found on Processed Product—NORMAN J. STERN and Michael C. Robach, USDA-ARS-RRC, Athens, GA, USA

10:45 T8 • *Salmonella* on Free-range Chickens—J. S. BAILEY and D. E. Cosby, USDA-ARS, Athens, GA, USA

11:00 T9 • Comparison of *Salmonella* Prevalence Rates on Chicken Carcasses Before and After Processing—J. S. BAILEY and N. J. Stern, USDA-ARS, Athens, GA, USA

11:15 T10 • Comparison of Shelf Life and Microbial Profile of Immersion-chilled and Air-chilled Broilers—NGAH-WAN (JENNIFER) PHOON, S. R. McKee, and M. Brashears, University of Nebraska-Lincoln, Lincoln, NE, USA

11:30 T11 • Inhibition of *Campylobacter jejuni* by Bacteria Isolated from Broiler Deboning Operations—TAM L. MAI and Donald E. Conner, Auburn University, Auburn, AL, USA

11:45 T12 • *Zygosaccharomyces bailii* and Other Yeasts Associated with Refrigerated Storage of Commercially Processed Broiler Carcasses—ARTHUR HINTON, JR., J. A. Cason, and Kimberly D. Ingram, USDA-RRC, Athens, GA, USA

P01 Microbiological Methods and Antimicrobials – Exhibit Hall, Manchester Ballroom

10:00 a.m.–1:00 p.m.
(Authors present 10:30 a.m.–12:30 p.m.)

P1 • Monitoring the Effectiveness of Cleaning in Food Processing Plants—GINNY MOORE and Chris Griffith, University of Wales Institute-Cardiff, Cardiff, Wales, UK

P2 • Comparison of Methods to Improve Sensitivity in a Multiplex PCR Reaction for Detection of *Escherichia coli* O157:H7 in Fresh Produce—MICHAEL A. GRANT, FDA, Bothell, WA, USA

P3 • Evaluation of Compass *Listeria monocytogenes*, a New Chromogenic Medium for Highly Specific Isolation of *L. monocytogenes*—CHRISTOPHE QUIRING, David Miller, and Pierre-Yves Marquet, Biokar Diagnostics-Solabia, Pantin cedex, France

P4 • The Effect of pH and Agitation on the Growth of *Listeria monocytogenes* in Brain Heart Infusion (BHI) Broth Containing Combined Potassium Lactate and Sodium Diacetate Stored at 4°C and 10°C—RUTH A. BARRATT, Ki. S. Yoon, and Richard C. Whiting, University of Maryland Eastern Shore, Princess Anne, MD, USA

P5 • A Comparison of the Microbact System with the Conventional ISO Method and the API Gallery for Identification of *Listeria* Isolates—Marie-Laure Sorin, Sandrine Rougier and PATRICE ARBAULT, Diffchamb SA, Lyon, France

P6 • A Rapid Antibody Specific Method for the Detection of a Food Pathogens from Environmental Surfaces Using the RBD2100—KRISTI R. HARKINS, Kelley Harrigan, Lillian M.Erdahl, and Jan M. Tippett, Advanced Analytical Technologies, Inc., Ames, IA, USA

P7 • Detection of Salmonellae from Poultry by Real-Time PCR—AYSEGUL EYIGOR, Kamil Tayfun Carli, and Can Bora Unal, Uludag University, Gorukle Kampusu, Bursa, Turkey

P8 • Inactivation of Refrigerator Biofilm Bacteria for Application in the Food Service Environment—BARRY MICHAELS, Troy Ayers, Marlene Celis and Vidhya Gangar, Georgia-Pacific Corporation, Palatka, FL, USA

P9 • Prediction of Raw Produce Surface Area from Weight Measurement—JOSEPH EIFERT, Gabriel Sanglay and Dah-Jye Lee, Virginia Tech., Blacksburg, VA, USA

P10 • A Practical Solution to the Problems Associated with Rapid Pathogen Detection—ADRIAN PARTON and Roy Betts, Matrix Microscience Ltd., Newmarket, Cambridge, UK

P11 • Detection of Pathogenic *Yersinia enterocolitica* in Drinking Water and Vegetables by a Mutiplex PCR—T. S. LEE, B. K. Park, and D. H. Oh, Kangwon National University, Chunchon, Kangwon, Korea

P12 • Viability and Morphology Assessment of *Bacillus cereus* Following Exposure to Sanitizers—M. E. Peta, D. Lindsay, V. S. Brözel, and A. VON HOLY, University of the Witwatersrand, Johannesburg, South Africa

P13 • *Bacillus cereus* Cell Size Decreases When Exposed to Alkaline Ph—D. Lindsay, M. C. Oosthuizen, V. S. Brözel, and A. VON HOLY, University of the Witwatersrand, Johannesburg, South Africa

P14 • Improving the Sensitivity of Detecting Bacterial Foodborne Pathogens in Fresh Produce by PCR—CHING-HSING LIAO and Lisa M. Shollenberger, USDA-ARS-ERRC, Wyndmoor, PA, USA

P15 • Comparison of Two Methods for the Detection of *Salmonella* Enteritidis in Shell Eggs—I. E. VALENTÍN-BON, K. H. Seo, R. E. Brackett, T. S. Hammack, and W. Andrews, FDA-CFSAN, Washington, D.C., USA

P16 • Comparison of Four Selective Agar Media for *Campylobacter* Detection from Poultry Samples—Marius Van Eck, Esther Broekmaat, and FLORENCE GORSE, bioMerieux, Marcy l'Etoile, France

P17 • Evaluation of a New Alternative Method for *Campylobacter* Detection in Food Samples—Marius Van Eck, Esther Broekmaat, and FLORENCE GORSE, bioMerieux, Marcy l'Etoile, France

P18 • Development of Fluorescence Polarization Immunoassay (FPIA) for the Rapid and Quantitative Determination of Herbicide, 2,4-dichlorophenoxyacetic Acid—JI-HUN KIM, Jung-Hyun Park, Yoon-Jung Kim, Sung-Jo Kang, and Duck-Hwa Chung, Gyeongsang National University, Gyeongnam, Korea

P19 • Automated Measurements of AntiListerial Activities of Lactate and Diacetate in Ready-to-eat Meat—EVELYNE MBANDI and Leora A. Shelef, Wayne State University, Detroit, MI, USA

P20 • A Comparison of Vidas *Listeria monocytogenes* II with the EN ISO 11290-1 Method for the Detection of *Listeria monocytogenes* in Food Samples—Stéphanie Souchon, Carole Ragot, Christine Cullafroz, and JEAN-MICHEL PRADEL, bioMerieux, Marcy l'Etoile, France

(Monday a.m., *continued*)

P21 • Characterization of *Staphylococcus aureus* Isolated from Stock Farms in Korea Using the Polymerase Chain Reaction and Random Amplification Polymorphic DNA Analysis—KWANG-SOO HA, Seon-Ja Park, Ann F. Draughon, and Duck-Hwa Chung, Gyeongsang National University, Gyeongnam, Korea

P22 • Rapid Detection of *Campylobacter jejuni* on Chicken Carcasses by Use of PCR-based Fluorescent Method—HONG WANG, Yanbin Li, and Michael F. Slavik, University of Arkansas, Fayetteville, AR, USA

P23 • Detection of Verocytotoxigenic *Escherichia coli* by Use of a PCR/DNA Probe Membrane-based Colorimetric Detection Assay—JUSTINE FITZMAURICE, Geraldine Duffy, Maura Glennon, Terry Smith, Cyril Carroll, Majella Maher, National University of Ireland, Galway, Ireland

P24 • Evaluation of MIST Alert™ in Paralytic Shellfish Poison Testing of Clams and Molluscs—B.H. HIMELBLOOM, University of Alaska-Fairbanks, Kodiak, AK, USA

P25 • Efficacy of a Unique Quaternary/Peroxide Foaming Sanitizer against Spoilage and Pathogenic Foodborne Microorganisms—J. M. BIEKER, H. Thippareddi, R. K. Phebus, C. L. Kastner, and A. L. Reicks, Kansas State University, Manhattan, KS, USA

P26 • Rapid Detection of Microorganisms in Aseptic Products Using an ATP Bioluminescent System—TOSHINORI IGARASHI and Seiji Murakami, Kikkoman Corporation Research and Development Div., Noda, Chiba Pref., Japan

P27 • Rapid Detection of Coliforms Using a Sensitive Bioluminescence Assay—HIROKI TATSUMI and Satoshi Fukuda, Kikkoman Corporation Research and Development Div., Noda, Chiba Pref., Japan

P28 • Evaluation of a Rapid Detection Method for *Listeria* Species in Meat Products Following the USDA/FSIS Enrichment Protocol—CHARLES CARVER and Jean Michel Pradel, rtech laboratories, St. Paul, MN, USA

P29 • The Effectiveness of Sanitizers to *Escherichia coli* O157:H7 Biofilms with Micrococcus Species—D. K. JEONG and J. S. Lee, Kosin University, Busan, Republic of Korea

P30 • Independent Laboratory Evaluation of a New Rapid Method for the Detection of *Listeria monocytogenes* in Various Meats—CHARLES CARVER and Jean Michel Pradel, rtech laboratories, St. Paul, MN, USA

P31 • Independent Laboratory Evaluation of a New Rapid Method for the Detection of *Listeria monocytogenes* in Vegetables and Seafood—CHARLES CARVER and Jean Michel Pradel, rtech laboratories, St. Paul, MN, USA

P32 • Protein Profile Changes in *Listeria monocytogenes* after Sub-lethal High Pressure Processing—NICOLE MAKS, Sadhana Ravishankar, Claudia Rodriguez, and Peter J. Slade, Illinois Institute of Technology, Summit-Argo, IL, USA

P33 • 3M™ Petrifilm™ Staph Express Count Plate for the Rapid Enumeration of *Staphylococus aureus* in Foods—BARBARA HORTER and Muriel Moreau, 3M Microbiology Products, St. Paul, MN, USA

P34 • Analysis of mRNA as a Marker for Viability of *Campylobacter* spp. by RT-PCR—KIDON SUNG, Kelli L. Hiett, and Norman J. Stern, University of Georgia, Athens, GA, USA

P35 • Microwave vs. Dry Ash Digestion as Used as a Precursor in the Mineral Analysis by Inductively Coupled Plasma Emission Spectroscopy of Infant Formula—Wai Yip, EUGENE P. WOLKOW, Michael Iorsh, and Mohammed R. Islam, FDA, Jamaica, NY, USA

P36 • Detection of Naturally Occurring *Campylobacter* in Poultry Rinses by Capicitance Monitoring—ERIC LINE, USDA-ARS-RRC, Athens, GA, USA

P37 • Determination of *Listeria* Attachment Using a Polystyrene Culture Tube Method—NURDAN A. KOCAOGLU-VURMA and Hua Wang, The Ohio State University, Columbus, OH, USA

P38 • *Campylobacter jejuni* Transformation Frequency Declines during Log Phase in Liquid Culture—DAVID WILSON, Julia Bell, Linda Mansfield, and John Linz, Michigan State University, East Lansing, MI, USA

P39 • Membrane Filtration as Part of Sample Treatment for Improved Pathogen Detection—TONG-JEN FU and Olif M. VanPelt, FDA, Summit-Argo, IL, USA

P40 • Influence of Extended Acid Stressing in Fresh Beef Decontamination Fluids on Sanitizer Inactivation of Acid-adapted *Escherichia coli* O157:H7 Biofilms—J. D. STOPFORTH, P. A. Kendall, G. C. Smith, and J. N. Sofos, Colorado State University, Ft. Collins, CO, USA

P41 • Vanilla and Cinnamon Extracts as Antimycotic Agents in Fruit-based Agar Systems—VICTORIA PEREZ-PETRONE, Ivonne Audiffred, Fidel T. Vergara-Balderas, Enrique Palou, and Aurelio López-Malo, Universidad de las Américas-Puebla, Puebla, Mexico

P42 • Antibacterial Activity of Thymol, Eugenol, Vanillin, Carvacrol, Citral, Potassium Sorbate and Sodium Benzoate against *Staphylococcus aureus* in Culture Medium—Anglica Santiesteban-Lopez, Stella M. Alzamora, Enrique Palou, and AURELIO LOPEZ-MALO, Universidad de las Américas-Puebla, Puebla, Mexico

P43 • Marginal Safety of Irradiation Dosage for Reduction and Post-irradiation Survival of *Listeria monocytogenes* in Ready-to-eat (RTE) Meats—SALLY C. C. FOONG, Glenda L. Gonzalez, and James S. Dickson, Iowa State University, Ames, IA, USA

P44 • Effect of Modified Alkaline Cooking on Aflatoxin Content in Contaminated Corn—M. E. ARREOLA, T. M Cabanillas, G. G. Uribe, and S. D PEÑA BETANCOURT, U.A.M., Mexico, D.F., Mexico

P45 • Bacteriocinogenic *Lactobacillus sake* 1 Inhibits *Listeria monocytogenes* in a Model Meat Gravy System—E. C. P. DE MARTINIS and V. F. Alves, Faculdade de Ciências Farmacêuticas de Ribeirão Preto - USP, Ribeirão Preto, São Pãulo, Brazil

P46 • Effects of Gamma Irradiation on the Storage Quality of Dry Groats of Coix—FONG-IN CHOU, Hsiao-Ping Chung, and Hsiao-Wei Wen, National Tsing Hua University, Nuclear Science and Tech. Development Center, HsinChu, Taiwan, The Republic of China

P47 • Antagonistic Activity of Natural Herb Product against *Salmonella* and *Escherichia coli* O157:H7—SO HYUN KIM, Nam Hoon Kwon, Ji Yeon Kim, Ji Youn Lim, WonKi Bae, Jun Man Kim, Kyoung Min Noh, Jin Hur, Woo Kyung Jung, Sook Shin, Jong Eun Lee, Jung Chan Ra, and Yong Ho Park, Seoul National University, Kwon-Sun Gu, Suwon, Gyunggi, Korea

P48 • Growth/No Growth Interface of Selected *Aspergilli* as a Function of pH, Incubation Temperature and Vanillin Concentration—Aurelio López-Malo and ENRIQUE PALOU, Universidad de las Américas-Puebla, Puebla, Mexico

P49 • Thymol Inhibitory Concentrations of *Aspergillus parasiticus* Growth Determined by Probabilistic Modeling—AURELIO LÓPEZ-MALO and Enrique Palou, Universidad de las Américas-Puebla, Puebla, Mexico

P50 • Antimicrobial Resistance and Plasmid Analysis of *Campylobacter jejuni* Isolated from Clinical Samples—XIAO WANG, Carl Gilbert, Donald Cave, Michael F. Slavik, Univerisity of Arkansas, Fayetteville, AR, USA

P51 • Combined Effect of Lactic Acid and Nisin Solution in Reducing the Levels of Microbiological Contamination in Red Meat Carcasses—YASMINA BARBOZA DE MARTINEZ, Kenna Ferrer, and Enrique J. Marquez, Universidad del Zulia, Maracaibo, Zulia, Venezuela

MONDAY AFTERNOON — JULY 1, 2002

1:30 p.m. — 5:00 p.m.

S05 • Enhancing Agricultural Security — Manchester Ballroom A-B

Organizer: Ann Draughon

Convenors: Ann Draughon and Ewen Todd

1:30 • Harnessing the Intellectual and Physcial Resources Needed to Combat Agricultural Security—ED MATHER, Michigan State University, East Lansing, MI, USA

2:00 • Animal Disease and the Threat of Agricultural Security—PHIL ELZER, Louisiana State University, Baton Rouge, LA, USA

2:30 • Plant Disease and the Threat of Agricultural Security—JASON PATE, Monterey Institute of International Studies, Monterey, CA, USA

3:00 • Break

3:30 • State Departments of Agriculture — A State of Readiness—JOHN SANFORD, Tennessee Dept. of Agriculture, Nashville, TN, USA

4:00 • Rapid and Real-Time Methodology for Identifying Agents of Destruction—C. NEAL STEWART, JR., University of North Carolina, Greensboro, NC, USA

4:30 • Laboratory Security Issues - Regulations and Challenges—ROGER BREEZE, USDA, Washington, D.C., USA

S06 Minimizing the Risk of *Salmonella* Enteritidis in Shell Eggs — Regency Ballroom A-B

Sponsored by Auburn University Poultry Products Safety and Quality Program, IAFP Foundation Fund, and United Egg Producers

Organizers/Convenors: Robert E. Brackett and Donald E. Conner

1:30 • Overview of *Salmonella* Enteritidis Risks Associated with Shell Eggs—ROBERT E. BRACKETT, FDA-CFSAN, College Park, MD, USA

1:45 • Risk Factors for *Salmonella* Enteritidis Infection of Laying Hens—RICHARD K. GAST, USDA, Southeast Poultry Research Laboratory, Athens, GA, USA

2:15 • Environmental Testing for *Salmonella* Enteritidis in Layer Houses—MARK WALDERHAUG, FDA-CFSAN, Washington, D.C., USA

2:30 • Reduction of *Salmonella* Enteritidis in Shell Eggs in the United Kingdom—ROBERT R. H. DAVIES, Veterinary Laboratories Agency, Surrey, UK

3:00 • Break

3:30 • Emerging Technologies for Rapid Cooling of Shell Eggs—PATRICIA A. CURTIS, Auburn University, Auburn University, AL, USA

4:00 • Pasteurization of Shell Eggs—BRIAN SHELDON, North Carolina State University, Raleigh, NC, USA

4:30 • HACCP for Shell Egg Packing and Processing—SHELLY McKEE, University of Nebraska, Lincoln, NE, USA

S07 Microbiological Food Safety at Retail — Regency Ballroom C

Sponsored by IAFP Foundation Fund

Organizer: Vickie Lewandowski

Convenors: Albert Espinoza and Vickie Lewandowski

1:30 • Foodborne Outbreaks Associated at Retail—SHELLY HUDDLE, CDC, Atlanta, GA, USA

(Monday p.m., *continued*)

2:00 • Redefining Potentially Hazardous Foods—FRANK BUSTA, University of Minnesota, St. Paul, MN, USA

2:30 • Suppliers to Retail Operations – Control Measures—TIM FREIER, Cargill, Wayzata, MN, USA

3:00 • Break

3:30 • Microbial Control Strategies at Retail—STEVE GROVER, National Restaurant Association, Washington, D.C., USA

4:00 • Viruses at Retail – Incidence and Control—SUSAN SUMNER, Virginia Tech, Blacksburg, VA, USA

4:30 • Management of Food Safety Risks at Retail—DAVID THENO, Jack-in-the-Box, Inc., San Diego, CA, USA

S08 **Extended Shelf Life Meat Products – Issues and Interventions** – Cunningham Room

Sponsored by FOSS

Organizer: Carl S. Custer

Convenors: J. Stan Bailey and Carl S. Custer

1:30 • An Overview of the Microbiology of Extended Shelf Life Products—BRUCE TOMPKIN, ConAgra Foods, Inc., Downers Grove, IL, USA

2:00 • Low-Temperature-Growing Clostridia—DOROTA M. BRODA, AgResearch Limited, Hamilton, New Zealand

2:40 • Unusual Spoilage in Vacuum Packed Cooked Meats—RICHARD A. HOLLEY, University of Manitoba, Winnipeg, Manitoba, Canada

3:10 • Break

3:40 • Update on Prevalence and Persistence of *Listeria monocytogenes* in Ready-to-eat Meat—JOHN LUCHANSKY, USDA-ARS-ERRC, Wyndmoor, PA, USA

4:10 • Intervention Strategies—ROBIN KALINOWSKI, ConAgra Foods, Inc., Downers Grove, IL, USA

4:40 • Additives as Interventions in Processed Meats—JOHN SOFOS, Colorado State University, Ft. Collins, CO, USA

T02 **Microbiological Methods** – Regency Ballroom D-E

1:30 T13 • A Non-selective/Differential Medium for Recovery of Stressed *Salmonella* from Cultured Dairy Products—YASHODHAR BURGULA and Sita Tatini, University of Minnesota, St. Paul, MN, USA

1:45 T14 • Comparison of Automated BAX for Screening System for *Listeria monocytogenes* and *Salmonella* with Culture Methods—EILEEN M. COLE, W. Mark Barbour, and George Tice, DuPont Qualicon, Wilmington, DE, USA

2:00 T15 • Direct Microscopic Observation and Visualization of Viability Detection of *Campylobacter jejuni* on Chicken Skin—WALAIRUT CHANTARAPANONT, Mark Berrang, and Joseph F. Frank, University of Georgia, Athens, GA, USA

2:15 T16 • Withdrawn

2:30 T17 • Development of a Selection Method for Detection of Shiga Toxin-producing *Escherichia coli* Based on Glutamate-dependent Acid Resistance—GEUNWOO PARK and Francisco Diez-Gonzalez, University of Minnesota, St. Paul, MN, USA

2:45 • Break

3:15 T18 • Spinal Cord Tissue Detection in Comminuted Beef: Comparison of Two Immunological Methods—MAHA HAJMEER, Dean O. Cliver, and Roger Provost, University of California-Davis, Davis, CA, USA

3:30 T19 • Comparison of Recovery of Airborne Microorganisms in a Dairy Cattle Facility Using Selective Agar and Thin Agar Layer (TAL) Resuscitation Media—BETH ANN CROZIER-DODSON and Daniel Y. C. Fung, Kansas State University, Manhattan, KS, USA

3:45 T20 • A Simple and Inexpensive Method to Concentrate Bacteria from Produce for Detection Using Cultural or Molecular Techniques—LYNETTE KLEMAN and Lee-Ann Jaykus, North Carolina State University, Raleigh, NC, USA

4:00 T21 • Studies to Select an Appropriate Non Pathogenic Surrogate *Escherichia coli* Strain for Use in Place of *Escherichia coli* O157:H7 in a Pilot Plant Environment—B. A. ANNOUS, D. C. R. Riordan, and G. M. Sapers, USDA-ARS-ERRC, Wyndmoor, PA, USA

4:15 T22 • Pediococcus Species NRRL B02354 as a Thermal Surrogate in Place of Salmonellae and *Listeria monocytogenes*—JEFFREY KORNACKI and Joshua Gurtler, University of Georgia, Griffin, GA, USA

4:30 T23 • Development of a Spatially Valid Sampling Technique for the Enumeration of *Salmonella* in the Swine Abattoir Holding Pen—Annette O'Connor, JARED K. GAILEY, and H. Scott Hurd, Iowa State University, Ames, IA, USA

4:45 T24 • Development and Testing of a Method for the Detection of Moulds Using the MicroFoss System—N. Beales, R. P. BETTS, S. McDougal, and R. Firstenberg-Eden, Campden and Chorleywood Food Research Association, Gloucestershire, UK

P02 **General Food Microbiology** – Exhibit Hall, Manchester Ballroom

3:00 p.m.–6:00 p.m.
(Authors present 3:30 p.m.–5:30 p.m.)

P52 • Colonization Property of *Lactobacillus reuteri* and Its Antagonistic Activity in Mice Infected with *Salmonella enterica* serovar Typhimurium DT104—SO HYUN KIM, Nam Hoon Kwon, Ji Yeon Kim, Ji Youn Lim, Jong Hwan Park, Jun Man Kim, WonKi Bae, Kyoung Min Noh, Jin Hur, Woo Kyung Jung, Sook Shin, Byung Woo Yoo, and Yong Ho Park, Seoul National University, Suwon, Gyunggi, Korea

P53 • Quantitative Contamination and Transfer from Foods of *Escherichia coli* by Houseflies—ANTONIO J. DE JESUS, Richard C. Whiting, Alan Olsen, and John Bryce, FDA-CFSAN, College Park, MD, USA

P54 • Survival and Growth of *Listeria monocytogenes* in Stored (4°, 15° or 25°C) Infant Cereal Hydrated with Water, Milk or Apple Juice—A. Abushelaibi, J. Samelis, P. A. Kendall and J. N. SOFOS, Colorado State University, Ft. Collins, CO, USA

P55 • Growth Potential of *Listeria monocytogenes* in Commercially Prepared Ready-to-eat Deli Salads Stored at Refrigeration Temperatures—BRIAN S. EBLEN, Richard C. Whiting and Arthur J. Miller, FDA-CFSAN, College Park, MD, USA

P56 • Evaluation of Coliforms in Bottled Water at Xalapa City, Veracruz, Mexico—PAOLA SABINA CONTRERAS ROMO, Laboratorio de Alta Tecnología de Xalapa, S.C., Xalapa, Veracruz, Mexico

P57 • Assessment of Risks Associated with Consumer Food Handling Practices Using Real-Time Microbiological Analysis—E. C. REDMOND, C. J. Griffith, J. Slader, and T. J. Humphrey, University of Wales Institute-Cardiff, Cardiff, Wales, UK

P58 • Plant Metabolites Inhibit Growth and Enterotoxin Production of *Vibrio cholerae*—NORMA HEREDIA, Santos Garcia, and Ginebra Alarcon, Universidad Autonoma de Nuevo Leon, San Nicolas, N.L., Mexico

P59 • Adaptation of *Vibrio cholerae* to Acidic and Bile Juice after Sublethal Shock—GENOVEVA ALVAREZ, Norma Heredia, and Santos García, Universidad Autónoma de Nuevo León, San Nicolás, N.L., Mexico

P60 • *Haematoxylon brasiletto* Extracts Inhibit Growth, Verotoxin Production and Adhesion of *Escherichia coli* O157:H7—SANTOS GARCIA, Marco Escobar and Norma Heredia, Universidad Autónoma de Nuevo León, San Nicolás, N.L., Mexico

P61 • Synergistic Effect of Eugenol, Vanillin and Potassium Sorbate Combinations to Inhibit Growth of *Aspergillus flavus*—M. Teresa Jimenez-Munguia, Enrique Palou and AURELIO LÓPEZ-MALO, Universidad de las Américas-Puebla, Puebla, Mexico

P62 • The Role of Exopolysaccharide in Protecting *Escherichia coli* O157:H7 from Acidic Conditions in Set and Stirred Yogurt—SHIAO MEI LEE and Jinru Chen, University of Georgia, Griffin, GA, USA

P63 • *Debaryomyces hansenii* Growth/No Growth Interface as Affected by Solute and Acid Type Used to Adjust a_w and pH—ENRIQUE PALOU and Aurelio López-Malo, Universidad de las Américas-Puebla, Puebla, Mexico

P64 • Death of Pathogenic Bacteria in Yellow Fat Spreads, Margarine, and Toppings as Affected by Temperature—Sarah L. Holliday and LARRY R. BEUCHAT, University of Georgia, Griffin, GA, USA

P65 • Advantages and Limitations of a Multiple Hurdle System to Control Food Pathogens and Food Spoilage Organisms—CLAUDIA KOERTING and Carey Walker, University of Connecticut, Storrs, CT, USA

P66 • Microbial Quality of Groundwater in a Shallow Aquifer Following Hog Manure Application to an Overlying Field—J. Rogasky, G. BLANK, R. Holley, and B. Betcher, University of Manitoba, Winnipeg, Manitoba, Canada

P67 • Combined Effects of Carbon Dioxide and Temperature in High Pressure Processing of Fluid Food Systems—V. M. (Bala) Balasubramaniam, Sue Keller, Joe Dunn, OMAR MARTIN, and Armand Paradis, Illinois Institute of Technology, Summit-Argo, IL, USA

P68 • A Composite Model for Prediction of Bacterial Destruction in Antimicrobial Treatment of Vegetables—HONG YANG, Betty L. Swem, Hong Wang and Yanbin Li, University of Arkansas, Fayetteville, AR, USA

P69 • HAV Resistance in Mussels Subjected to Different Kinds of Domestic Cooking—CROCI LUCIANA, Dario De Medici, Simona Di Pasquale, Elisabetta Suffredini, and Laura Toti, Istituto Superiore di Sanità - Laboratorio Alimenti, Rome, Italy

P70 • GIS and *Listeria* Isolates Recovered from Dairy Cows, Calves, and Farm Environments—K. D. LAMAR, M. Evans, V. Ling, S. P. Oliver, D. A. Golden, and F. A. Draughon, University of Tennessee-Knoxville, Knoxville, TN, USA

P71 • An Australian Survey of the Incidence of *Listeria* in Ready-to-eat Co-mingled Food Samples—JILL GEBLER and Sharon Savory, Murray Goulburn Co-op Co. Ltd., Yarram, Victoria, Australia

P72 • Withdrawn

P73 • Acid Tolerance of Susceptible and Multi-antimicrobial Resistant *Salmonella* Cultures Prepared under Acid Stressing Conditions—R. T. BACON, J. N. Sofos, P. A. Kendall, K. E. Belk, and G. C. Smith, Colorado State University, Ft. Collins, CO, USA

P74 • Thermal Inactivation of Susceptible and Multi-antimicrobial Resistant *Salmonella* Grown in the Absence or Presence of Glucose—R. T. BACON, J. N. Sofos, P. A. Kendall, J. R. Ransom, K. E. Belk, and G. C. Smith, Colorado State University, Ft. Collins, CO, USA

P75 • Genotypic Diversity of *Listeria* Isolates from Dairy Cows, Calves, and the Farm Environment—MATTHEW R. EVANS, F. A. Draughon, S. P. Oliver, and V. Ling, The University of Tennessee-Knoxville, Knoxville, TN, USA

(Monday p.m., *continued*)

P76 • Simultaneous Detection of Hepatitis A Virus and Human Rotavirus Using Colorimetric Biplex Nucleic Acid Sequence-based Amplification (NASBA)–Enzyme-Linked Immunosorbent Assay–JULIE JEAN, Burton Blais, André Darveau, and Ismail Fliss, Univeriste Laval, Quebec, Canada

P77 • Antimicrobial Activity and Mechanisms of Action of Essential Oils and Components–VALERIE W. LING, Katie Davenport, P. Michael Davidson, and F. Ann Draughon, University of Tennessee, Knoxville, TN, USA

P78 • Distribution of Environmental and Disease Associated *Listeria monocytogenes* Biofilm Phenotypes within rep-PCR Genotype Patterns–JAMES FOLSOM, Gregory Siragusa, and Joseph Frank, University of Georgia, Athens, GA, USA

P79 • Withdrawn

P80 • Bias and Accuracy Values from Ten Years of Predictive Food Microbiology Literature–SIOBAIN DUFFY and Donald W. Schaffner, Yale University, New Haven, CT, USA

P81 • Statistical Distributions Describing Microbial Quality of Surfaces and Foods in a Foodservice Operation–REBECCA MONTVILLE and Don Schaffner, Rutgers University, New Brunswick, NJ, USA

P82 • Modified RT-PCR to Eliminate False Positive RT-PCR with Inactivated Viruses–SUPHACHAI NUANUALSUWAN, Sakchai Himathongkham, Hans Riemann, MingQi Deng, and Dean Cliver, University of California-Davis, Davis, CA, USA

P83 • Effect of *Lactobacillus rhamnosus* and a Fermented Milk on the Growth of *Aspergillus* and *Penicillium* Species–JITKA STILES, Valerie Carter, and Lloyd B. Bullerman, University of Nebraska-Lincoln, Lincoln, NE, USA

P84 • Formation of Volatile Compounds by Wild Strains of *Lactococcus lactis* Isolated from Raw Ewes' Milk Cheese–Pilar Morales, Estrella Fernandez-Garcia, Pilar Gaya, Margarita Medina, and MANUEL NUÑEZ, Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, Madrid, Spain

P85 • Factors Affecting Inhibition of *Listeria monocytogenes* in Milk by Nisin–MEENA BHATTI and Leora A. Shelef, Wayne State University, Detroit, MI, USA

P86 • The Effect of Bacteriocin-producing *Lactococcus lactis* subsp. *lactis* INIA 415 as Adjunct Culture on Proteolysis and Flavor of a Semi-Hard Cheese–Sonia Garde, Javier Tomillo, Pilar Gaya, Margarita Medina, and MANUEL NUÑEZ, Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, Madrid, Spain

P87 • Validation of SL-Beta-lactam Test Performance in Goats' Milk–ROBERT S. SALTER, Mary Bulthaus, Frank Fillman, Bob Bonifacio, Phil Kijac, Charm Sciences, Inc., Lawrence, MA, USA

P88 • Virulence Attributes of *Escherichia coli* O157:H7 Isolated from Dairies in East Tennessee–PAUL D. EBNER, Shelton E. Murinda, Barbara E. Gillespie, Stephen P. Oliver and Alan G. Mathew, University of Tennessee, Knoxville, TN, USA

P89 • Incidence of *Brucella* spp., *Listeria* spp. and *Escherichia coli* O157:H7 in Raw Milk from Jalisco State, Mexico–E. CABRERA-DÍAZ, G. Partida-Gutiérrez, R. C. Olivares-Cruz, and M. R. Torres-Vitela, University of Guadalajara, Guadalajara, Jalisco, Mexico

P90 • The Use of Ionizable Zinc to Increase the Efficacy of a Chlorhexidine Disinfectant Used in Mastitis Control–Geoffrey Westfall, CLAUDIA KOERTING, and Lynn Hinckley, University of Connecticut, Storrs, CT, USA

P91 • A Rapid Screening Method to Test for Alkaline Phosphatase Activity in Cheese–KEN J. YOSHITOMI, FDA, Bothell, WA, USA

TUESDAY MORNING – JULY 2, 2002

8:30 a.m. – 12:00 p.m.

S09 **Cooperating to Improve Foodborne Outbreak Investigations** – Manchester Ballroom A-B

Sponsored by IAFP Foundation Fund

Organizer: Kali Kniel

Convenors: Kali Kniel and Marcos Sanchez

8:30 • Foodborne Outbreaks: Roles and Responsibilities–JACK GUZEWICH, FDA, College Park, MD, USA

9:00 • Overview of Surveillance and Epidemiological Investigations–ROB V. TAUXE, CDC, Atlanta, GA, USA

9:30 • Two Recent Examples of an Epidemiological Investigations of Foodborne Outbreaks–To be determined

10:10 • Break

10:40 • Overview of Environmental Investigations–JEFF FARRAR, California Dept. of Health Services, Sacramento, CA, USA

11:10 • Recent Examples of Environmental Investigations of Foodborne Outbreaks–MARY PALUMBO, California Dept. of Health Services, Sacramento, CA, USA

11:30 • The Food Safety System: Past Accomplishments and Future Efforts to Improve Foodborne Outbreak Investigations–MINDY BRASHEARS, Texas Tech University, Lubbock, TX, USA

S10 **Integrated Approaches for the Study and Control of Foodborne Pathogens in Meat and Poultry** – Regency Ballroom A-B

Sponsored by IAFP Foundation Fund and Walt Disney World Co.

Organizer: Ruff Lowman

Convenors: Roger L. Cook and Ruff Lowman

8:30 • Iceland *Campylobacter* Project: Sources and Risk Factors for *Campylobacter* in Poultry and Impact on Human Disease in a Closed System — Microbiology and Molecular Typing–NORMAN STERN, USDA-ARS, Athens, GA, USA

8:45 • Iceland *Campylobacter* Project: Sources and Risk Factors for *Campylobacter* in Poultry and Impact on Human Disease in a Closed System – Epidemiological and Spatial Analysis–PASCAL MICHEL, Health Canada, St-Hyacinthe, Quebec, Canada

9:00 • Iceland *Campylobacter* Project: Sources and Risk Factors for *Campylobacter* in Poultry and Impact on Human Disease in a Closed System – Systems Modelling–GREG PAOLI, Decisionalysis Risk Consultants, Inc., Ottawa, Ontario, Canada

9:15 • Integrated Approach to Zoonotic Disease Research in New Zealand–ROGER L. COOK, Ministry of Agriculture and Forestry, Wellington, New Zealand

10:00 • Break

10:30 • Research into the Role of Feed and Water Hygiene in Pre-harvest Food Safety–DALE HANCOCK, Washington State University, Pullman, WA, USA

11:15 • *Salmonella* Control in Swine, Food Safety Perspectives and Impact on the Swine Industry in Denmark–VIBEKE MØGELMOSE, Danish Bacon and Meat Council, Copenhagen, Denmark

S11 ***Listeria* Research Update** – Regency Ballroom C

Sponsored by ILSI N.A.

Organizer: Catherine Nnoka

Convenors: Karen D. Huether and Bala Swaminathan

8:30 • Use of Sequence Typing for Characterization of Virulence Factors and for the Development of a Novel Molecular Typing Scheme for *Listeria monocytogenes*–JEFFREY M. FARBER, Health Canada, Ottawa, Ontario, Canada

9:00 • Identification of Potentially Unique Genetic Markers and Virulence Attributes of Epidemic-associated Strains of *Listeria monocytogenes*–SOPHIA KATHARIOU, North Carolina State University, Raleigh, NC, USA

9:30 • Molecular and Phenotypic Characterization of *Listeria monocytogenes* Isolates from Humans and Foods to Define Human Pathogenic Strains–MARTIN WIEDMANN, Cornell University, Ithaca, NY, USA

10:00 • Break

10:30 • Rapid Nucleic Acid-based Detection and Enumeration of *Listeria monocytogenes* by Flow Cytometry–BYRON BREHM-STECHER, University of Wisconsin-Madison, Madison, WI, USA

11:00 • Summary of the Key Points of the Presentations–BALA SWAMINATHAN, CDC, Atlanta, GA, USA

11:30 • Panel Discussion

S12 **Current Issues in Seafood Safety** – Cunningham Room

Sponsored by IAFP Foundation Fund

Organizers: Linda S. Andrews, Angelo DePaola, and Douglas L. Marshall

Convenors: Linda S. Andrews and Douglas L. Marshall

8:30 • Epidemiology of Seafood Diseases–LEE-ANN JAYKUS, North Carolina State University, Raleigh, NC, USA

9:00 • Risk Characterization of *Vibrio parahaemolyticus* in Raw Oysters–MARIANNE MILIOTIS, FDA-CFSAN-DVA-VMB, Washington, D.C., USA

9:30 • Processing Strategies to Reduce *Vibrios* in Raw Oysters–LINDA S. ANDREWS, Mississippi State University, Biloxi, MS, USA

10:00 • Break

10:30 • Control of *Listeria monocytogenes* in Ready-to-eat Seafood–LISBETH TRUELSTRUP HANSEN, Canadian Institute of Fisheries Technology, Halifax, NS, Canada

11:00 • Chemical Contaminants in Fish–RITA SCHOENY, US Environmental Protection Agency, Washington, D.C., USA

11:30 • Analytical Perspective on the Prevention of Neurotoxic Shellfish Poisoning–ROBERT W. DICKEY, FDA, Gulf Coast Seafood Laboratory, Dauphin Island, AL, USA

T03 **GMOs and Produce** – Regency Ballroom D-E

8:30 T25 • The Impact of Biotechnology on the Foodservice Industry–STEVEN F. GROVER, National Restaurant Association, Washington, D.C., USA

8:45 T26 • What Can We Learn about Biotechnology from the Retail Food Industry Experiences? –SUSAN HARLANDER, BIOrational Consultants, Inc., New Brighton, MN, USA

9:00 T27 • A Farm to Fork Case Study in Risk Communication - The Model Farm Project, Year 2–KATIJA A. BLAINE, Douglas A. Powell, and Jeffrey Wilson, University of Guelph, Guelph, ON, Canada

9:15 T28 • Needs Assessment for a Proposed Biotechnology Education Initiative for Ontario High School Biology Students–LIZ GOMES and Douglas Powell, University of Guelph, Guelph, ON, Canada

(Tuesday a.m., *continued*)

9:30 T29 • Public Attitudes toward Genetically Modified Foods—CHRISTINE BRUHN, University of California-Davis, Davis, CA, USA

9:45 • Break

10:15 T30 • Response to an Outbreak of Salmonellosis Associated with California Almonds—S. ISAACS, J. Aramini, B. Ciebin, J. Farrar, R. Ahmed, D. Middleton, E. Chan, S. Pichette, K. Campbell, P. Mead, L. Lior, M. Pearce, C. Clark, F. Rogers, F. Jamieson, I. Brophy, A. Ellis, Health Canada, Guelph, Ontario, Canada

10:30 T31 • Overcoming Barriers When Implementing an On-farm Food Safety Program: A Case Study of the Ontario Greenhouse Vegetable Growers—AMBER LUEDTKE, Benjamin Chapman, Douglas Powell, and all of the Food Safety Network, University of Guelph, Guelph, Ontario, Canada

10:45 T32 • Evaluation of the Use of Lactic Acid Bacteria to Control Pathogens on Alfalfa Sprouts—MARSHA R. HARRIS, Mindy M. Brashears, and Durward A. Smith, University of Nebraska-Lincoln, Lincoln, NE, USA

11:00 T33 • A Survey of Sprout Growers in California JENNIFER THOMAS, Mary Palumbo, Dean Cliver, Jeff Farrar, and Thomas Farver, California Dept. of Health Services, Sacramento, CA, USA

11:15 T34 • Proteolytic Activity of Fungi Isolated from Decayed and Damaged Tomatoes—WENDY N. WADE and Larry R. Beuchat, University of Georgia, Griffin, GA, USA

11:30 T35 • The Use of Oxidation to Control *Cryptosporidium* Infectivity—K. KNIEL, S. S. Sumner, D. S. Lindsay, C. R. Hackney, M. D. Pierson, A. Zajac, and D. A. Golden, Virginia Tech., Blacksburg, VA, USA

11:45 T36 • Proximity to Dairy Operations Influences the Presence of a Fecal Indicator on Peaches, Plums, and Nectarines—Shantana Goerge, Lorena Fernandez, and TREVOR SUSLOW, University of California-Davis, Davis, CA, USA

P03 Produce, Meat, and Seafood Microbiology

— Exhibit Hall, Manchester Ballroom

10:00 a.m.—1:00 p.m.
(Authors present 10:30 a.m.—12:30 p.m.)

P92 • Effect of Superoxidized Water and Hypochlorite Solutions on the Survival of *Escherichia coli* on Capsicum Fruit—HUGH MARTIN and Jean Taylor, Royal Agricultural College, Stroud Road, Cirencester, Gloucestershire, UK

P93 • Survival of *Escherichia coli* O157:H7 and *Salmonella* Muenchen on Apples as Affected by Application of Commercial Fruit Waxes—STEPHEN J. KENNEY and Larry R. Beuchat, University of Georgia, Athens, GA, USA

P94 • Preharvest Assessment of *Salmonella* spp. Contamination of Outer Rind of Cantaloupes in California—TREVOR SUSLOW, Marcella Zuñiga, Lorena Fernandez, and Bradley Butterfield, University of California-Davis, Davis, CA, USA

P95 • Inactivation of *Salmonella* during Drying of Roma Tomatoes Treated with Organic Acids—Y. YOON, P. A. Kendall and J. N. Sofos, Colorado State University, Ft. Collins, CO, USA

P96 • Assessment of the Viral Quality of Reclaimed Wastewater for Food Crop Irrigation—DIMA KAYED, Pablo Gortares, Martin M. Karpiscak, Robert P. Freitas, Ralph Meer, and Charles P. Gerba, University of Arizona, Tucson, AZ, USA

P97 • Reduction of *Escherichia coli* O157:H7 on Alfalfa Seeds Following Exposure to Trans-2-Nonenal—M. AUCHTER and M. C. Newman, University of Kentucky, Lexington, KY, USA

P98 • Comparision of Subsurface and Furrow Irrigation in the Viral Contamination of Iceberg Lettuce—SCOTT STINE, Inhong Song, Faezah Manshadi, Jose Pimentel, Christopher Y. Choi, and Charles P. Gerba, University of Arizona, Tucson, AZ, USA

P99 • *Salmonella* Enteritidis Infections Associated with Mung Bean Sprouts, California, 2000—J. C. MOHLE-BOETANI, J. Farrar, P. Bradley, M. Miller, K. Cummings, and S. B. Werner, California Dept. of Health Services, Berkeley, CA, USA

P100 • Inactivation of GFP-Transformed *Escherichia coli* O157:H7 by Sanitizers on Lettuce and Strawberries as Determined by Confocal Scanning Laser Microscopy—STEPHANIE L. RODGERS, Joanne H. Whallon, and Elliot T. Ryser, Michigan State University, East Lansing, MI, USA

P101 • An Outbreak of *Salmonella* Serotype Kottbus Infections Associated with Raw Alfalfa Sprouts—K. L. Winthrop, M. S. PALUMBO, J. A. Farrar, J. Mohle-Boetani, S. Abbott, G. Inami, and S. B. Werner, California Dept. of Health Services, Sacramento, CA, USA

P102 • Survival and Growth of *Salmonella* spp. on Fresh-cut Cantaloupe Cubes and Rind Following Electron Beam Irradiation—AUBREY MENDONCA, Maria Romero, Ainura Orozalieva, and Floyd Woods, Iowa State University, Ames, IA, USA

P103 • Inactivation of *Salmonella* during Drying and Storage of Gala Apples Treated with Acid or Sodium Metabisulfite Solutions—Patricia Di Persio, P. A. Kendall, M. Calicioglu, and J. N. SOFOS, Colorado State University, Ft. Collins, CO, USA

P104 • Attraction of a Free-living Nematode, *Caenorhabditis elegans*, to *Escherichia coli* O157:H7 and *Salmonella*, and Its Potential as a Vector for Preharvest Contamination of Fruits and Vegetables—KRISHAUN N. CALDWELL, Gary L. Anderson, Phillip L. Williams, and Larry R. Beuchat, University of Georgia, Griffin, GA, USA

P105 • Cross-contamination of Lettuce by *Escherichia coli* O157:H7 via Contaminated Ground Beef—MARIAN R. WACHTEL, James L. Mc Evoy, Yaguang Luo, Anisha Williams-Campbell, and Morse B. Solomon, USDA-ARS-BARC-W, Beltsville, MD, USA

P106 • The Microbiological Examination of Prepared Ready-to-eat Salad Vegetables from Retail and Catering Premises in the United Kingdom—CHRISTINE L. LITTLE, Satnam K. Sagoo, and Robert T. Mitchell, Public Health Laboratory Service, London, UK

P107 • Passage of *Escherichia coli* O157:H7 from Contaminated Water to Lettuce is Dependent on Irrigation Methodology—ETHAN B. SOLOMON and Karl R. Matthews, Rutgers University, New Brunswick, NJ, USA

P108 • Effect of Acid Adaption on Inactivation of *Escherichia coli* O157:H7 during Drying of Apple Slices—Suman Priya Lakkakula, PATRICIA A. KENDALL, John Samelis, and John N. Sofos, Colorado State University, Ft. Collins, CO, USA

P109 • Inhibition of Sprout Pathogenic Fungi Growth Using Allyl Isothiocyanate Vapor—KANAKO FURUYA, Shigeo Miyao, and Kenji Isshiki, Daikin Environmental Laboratory, Limited, Tsukuba, Ibaraki, Japan

P110 • Reduction of *Escherichia coli* K12 on Alfalfa Seeds by Supercritical Carbon Dioxide Treatment—Angela M. Mazzoni, ALI DEMIRCI, Gregory R. Ziegler, and Ratna R. Sharma, Pennsylvania State University, University Park, PA, USA

P111 • Efficacy of Chlorine and Calcinated Calcium Treatment of Alfalfa Seeds and Sprouts to Eliminate *Salmonella*—MEGHA GANDHI and Karl R. Matthews, Rutgers, The State University of New Jersey, Cook College, New Brunswick, NJ, USA

P112 • Inactivation of *Escherichia coli* O157:H7 on Alfalfa Seeds and Sprouts by Ozonation—Ratna R. Sharma, ALI DEMIRCI, Larry R. Beuchat, and William F. Fett, Pennsylvania State University, University Park, PA, USA

P113 • VUV-C Destruction of *Salmonella* spp. and *Escherichia coli* O157:H7 on the Surface of Agar and Fresh Produce—B. R. YAUN, S. S. Sumner, J. D. Eifert, and J. E. Marcy, Virginia Tech., Blacksburg, VA, USA

P114 • Influence of Calcium Lactate on the Fate of Pathogenic and Spoilage Microorganisms in Orange Juice—JINRU CHEN, Joy G. Adams, and Jui-Yueh Yeh, CFS, University of Georgia, Griffin, GA, USA

P115 • Evidence of *Salmonella* Internalization into Fresh Mangoes during Simulated Post Harvesting Procedures—Ana L. Penteado, BRIAN S. EBLEN, and Arthur J. Miller, CFSAN-FDA, College Park, MD, USA

P116 • Screening of Potential Bacterial Pathogen Surrogates for Antibiotic Resistance—ARUNA PERI, Claudia Rodriguez, Nicole Maks, Jodie Ulaszek, Susanne Keller, Sadhana Ravishankar and Peter Slade, The National Center for Food Safety and Technology, Summit-Argo, IL, USA

P117 • Incidence and Growth of *Salmonella* and *Listeria* in Melon—ANA LUCIA PENTEADO and Mauro Farber Freitas Leitao, State University of Campinas, Campinas, São Pãulo, Brazil

P118 • Evaluation of Factors that Influence the Recovery of *Listeria monocytogenes* from Lettuce Treated with Sanitizers—Andrea B. Burnett, Montserrat H. Iturriaga, Eduardo F. Escartin, Charles A. Pettigrew, and LARRY R. BEUCHAT, University of Georgia, Griffin, GA, USA

P119 • A Receptor Assay for the Detection of Sulfamonomethoxine and Sulfadimethoxine Residue in Live Pigs—S. H. LEE, S. J. Park, H. Lee, H. J. Lee, C. C. Chae, Y. Jin, J. H. Choi and M. H. Lee, College of Agriculture and Life Sciences, Seoul National University, Suwon, Kyonggi-do, South Korea

P120 • National Animal Health Monitoring System Swine 2000: A Surveillance Study of *Escherichia coli* O157 in Swine—INGRID FEDER, Jeffrey T. Gray, Rachel Pearce, Eric Bush, Pina Fratamico, F. Morgan Wallace, Anna Porto, Paula Fedorka-Cray, Richard Perrine, Robert Dudley, and John B. Luchansky, USDA-ARS-ERRC, Wyndmoor, PA, USA

P121 • Evaluation of Enrichment Methods for Recovery of *Yersinia enterocolitica* O:3 and O:8 from Swine Feeds—JOO-SUNG KIM, Alan Mathew, and F. Ann Draughon, The University of Tennessee Food Safety Center of Excellence, Knoxville, TN, USA

P122 • Genomic Fingerprinting of *Salmonella* Recovered from Swine Carcass and Fecal Samples at a Slaughterhouse—LAURA WONDERLING, Rachel Pearce, F. Morgan Wallace, Jeffrey E. Call, Mark Tamplin, Robert Dudley, Ingrid Feder, Samuel Palumbo, Alan Oser, Lisa Yoder, and John B. Luchansky, USDA-ARS-ERRC, Wyndmoor, PA, USA

P123 • Evaluation of Methods for Recovery of *Salmonella* from Swine Feces—PHILIPUS PANGLOLI, F. Ann Draughon, Alan Mathew, and Omaima Ahmed, The University of Tennessee, Food Safety Center of Excellence, Knoxville, TN, USA

P124 • Examination of Class I Integrons in *Escherichia coli* Isolated from Pigs on US Swine Farms that Use or Exclude Antibiotics—PAUL D. EBNER and Alan G. Mathew, University of Tennessee, Knoxville, TN, USA

P125 • Prevalence of *Trichinella* sp. in Farmed Wild Boars in Alberta—JOHN T. Y. WU, Ken H. Dies, Evay Y. W. Chow, Evelyn E. Bowlby, and Lester S. Y. Wong, Alberta Agriculture Food and Rural Development, Edmonton, Alberta, Canada

(Tuesday a.m., *continued*)

P126 • Screening for Cephalosporins Plasma Residues in Live Pigs by Receptor Assay—S. J. Park, S. H. LEE, H. Lee, H. J. Lee, C. C. Chae, Y. Jin, J. H. Choi and M. H. Lee, Seoul National University, Suwon, Kyonggi-do, South Korea

P127 • Enzyme-linked Immunosorbent Assay for the Detection of Sulfamonomethoxine and Sulfadimethoxine Residue in Live Pigs—S. H. LEE, S. J. Park, H. Lee, H. J. Lee, C. C. Chae, Y. Jin, J. H. Choi and M. H. Lee, Seoul National University, Suwon, Kyonggi-do, South Korea

P128 • A Comparison and Development of Isolation Protocols for Recovery of *Escherichia coli* O157:H7 from Swine Feces—PHILIPUS PANGLOLI, F. Ann Draughon, David Golden, Alan Mathew, and Omaima Ahmed, The University of Tennessee, Knoxville, TN, USA

P129 • Influence of pH on Retail Shelflife of Pork—B. L. KNOX, R. L. J. M. van Laack, P. M. Davidson, E. Spencer, and R. E. Klont, University of Tennessee, Knoxville, TN, USA

P130 • The Impact of Starvation on the Resistance of *Salmonella* Typhimurium to Irradiation in 0.85% Saline and in Ground Pork—AUBREY MENDONCA, Maria Romero, and Makuba Lihono, Iowa State University, Ames, IA, USA

P131 • Detection and Enumeration of *Listeria monocytogenes* in Battered and Breaded Seafood—FLETCHER ARRITT, Joseph Eifert, and Michael Jahncke, Virginia Tech., Blacksburg, VA, USA

P132 • The Fate of *Escherichia coli* O157:H7 on Channel Catfish Fillets with and without Skin Packaged under Modified Atmosphere—RICO SUHALIM and Yao-wen Huang, The University of Georgia, Athens, GA, USA

P133 • Microbial Validation of Sous Vide-like Cooking Process for Lamb in Curry Sauce—L. S. VANDERWAL, H. Thippareddi, C. L. Kastner, R. J. Danler, P. Udomvarapont, D. H. Kropf, R. K. Phebus, and E. A. Boyle, Kansas State University, Manhattan, KS, USA

P134 • Human BSE Exposure Risk and Direct Detection of Abnormal Prion Protein in Meat Products—E. LÜCKER, M. Hardt, and M. H. Groschup, University of Leipzig, Leipzig, Germany

P135 • The Role of the SigB Gene in Stress Survival of *Listeria monocytogenes* Strains of Meat and Clinical Origin—SANDRA M. MOORHEAD and Gary A. Dykes, AgResearch, Hamilton, New Zealand

P136 • Genotypic Variability and Antibiotic Resistance Profiles of *Escherichia coli* O157:H7 Isolates from Downer and Healthy Dairy Cattle—CAITRIONA M. BYRNE, Irfan Erol, Jeffrey E. Call, Dennis Buege, Charles W. Kaspar, Clayton Hiemke, Paula Fedorka-Cray, Jovita Hermosillo, Takiyah Ball, Andrew K. Benson, Morgan Wallace, Marcus Handy, and John B. Luchansky, USDA-ARS-ERRC, Wyndmoor, PA, USA

P137 • Dried Distiller's Grains with Solubles in Finishing Cattle Diets: A Preharvest Strategy against Acid Resistant *Escherichia coli* and Coliforms—MICHELLE GORDON, R. K. Phebus, J. S. Drouillard, H. Thippareddi, D. L. Lambert, K. Kerr, N. Pike, J. J. Sindt, and J. J. Higgins, Kansas State University, Manhattan, KS, USA

P138 • Characterization of *Escherichia coli* O157 Isolated from Slaughterhouses and Retail Stores in Korea—JI YEON KIM, Won ki Bae, So Hyun Kim, Nam Hoon Kwon, Ji Youn Lim, Jun Man Kim, Kyoung Min Noh, Woo Kyoung Jung, and Yong Ho Park, Seoul National University, Suwon, Gyunggi, Korea

P139 • Preparation of Ground Beef Samples for Detecting *Escherichia coli* O157:H7 by PCR—SHENGHUI CUI and Jiang Hong Meng, University of Maryland, College Park, MD, USA

P140 • Vancomycin Resistant Enterococci Possessing vanA Gene Isolated from Beef Imported to Malaysia—NIMITA FIFADARA, Gulam Rusul, Son Radu, Zaiton Hassan, and Larry R. Beuchat, University Putra Malaysia, Serdang, Selangor, D.C., Malaysia

P141 • Identification of Spoilage Microorganisms in Ground Beef Treated with Diacetyl and Hydrodynamic Pressure Processing, Alone or in Combination—CHERYL MUDD, Anisha Williams-Campbell, and Morse Solomon, USDA-ARS, Beltsville, MD, USA

TUESDAY AFTERNOON — JULY 2, 2002

1:30 p.m. – 3:30 p.m.

S13 Controlling *Clostridium perfringens* Hazards during Cooling – Regency Ballroom A-B

Organizers: Vijay K. Juneja and Don Schaffner

Convenors: Vijay K. Juneja and Sadhana Ravishankar

1:30 • Characteristics of *Clostridium perfringens* in Food Safety—JOHN S. NOVAK, USDA-ARS-ERRC, Wyndmoor, PA, USA

1:50 • Safe Cooking of Meats and Retail Foods: An Industry Perspective—O. PETER SNYDER, Hospitality Institute of Technology and Management, St. Paul, MN, USA

2:15 • Stabilization Performance Standards: An Industry Response—H. THIPPAREDDI, Kansas State University, Manhattan, KS, USA

2:40 • Predictive Models for *Clostridium perfringens* Applicable to Cooling—VIJAY K. JUNEJA, USDA-ARS-ERRC, Wyndmoor, PA, USA

3:05 • Risk Assessment of *Clostridium perfringens* during Cooling of Cooked Meats—AAMIR FAZIL, Health Canada, Guelph, Ontario, Canada

S14 **Innovations in Retail Food Safety Management Systems and Technology** – Regency Ballroom C

Organizer: Susan Sumner

Convenors: Al Fain and Mary Anne Hogue

1:30 • Essentials of Retail HACCP—FRED REIMERS, HEB Quality Assurance, San Antonio, TX, USA

1:50 • Building on Prerequisite Programs—AL FAIN, Darden Restaurant Inc., Orlando, FL, USA

2:20 • Influence of Regulations on Innovations—RICHARD BARNES, FDA, Rockville, MD, USA

2:40 • Retail Food Safety Training—CAMERON R. HACKNEY, West Virginia University, Morgantown, WV, USA

3:00 • Food Safety Tools and Management Systems—CHRISTOPHER BOYLES, Steritech Group Inc., Charlotte, NC, USA

S15 **Alternatives in Dairy Waste Management: Create New Products or Generate Power!** – Cunningham Room

Organizers/Convenors: Marc Bates and Stephanie Olmsted

1:30 • Technical Solutions for Liquid/Solids Separation—MARK FOSSHAGEE, World Water Works, Edgewater, NJ, USA

2:00 • Product Recovery - Keeping Dairy from Going Down the Drain—MARK D. JOHNSON, Gannett Fleming, Malden, MA, USA and CLAY DETLEFSEN, International Dairy Foods Association, Washington, D.C., USA

2:30 • Methane to Money – California's Dairy Power Production Program—MICHAEL MARSH, Western United Dairymen, Modesto, CA, USA

3:00 • Integrating Life Cycle Analyses into Dairy Systems to Close Nutrient-Waste-Pathogen Cycles—F. MICHAEL BYERS, USDA, Beltsville, MD, USA

T04 **Public Health and Outbreaks** – Regency Ballroom D-E

1:30 T37 • Environmental Health Specialists Network (EHS-Net) - Understanding the Causes of Foodborne Illness and Improving the Practice of Environmental Health—ROBIN LEE, Craig Hedberg, Daniela Niutta, Carol Selman, and the EHS-Net Working Group, CDC-NCEH, Atlanta, GA, USA

1:45 T38 • Staphylococcal Food Poisoning: Phenotypic and Genotypic Characterization of Isolates from Food and Human Samples—Viviane Colombari, Mariana D. B. Mayer, Zaira M. Laicini, Elza M. Mamizuka, Bernadette D. G. M. Franco, MARIA T. DESTRO, and Mariza Landgraf, University of São Pãulo - Brazil, São Pãulo, Brazil

2:00 T39 • Epidemiological Typing of *Campylobacter* Clinical and Food Isolates Using Pulsed-Field Gel Electrophoresis (PFGE) – DIANE MEDEIROS, Jeff Farber, and Syed Sattar, Bureau of Microbial Hazards, Food Directorate, Health Products and Food Branch, Ottawa, Ontario, Canada

2:15 T40 • Dose Response Modelling of *Escherichia coli* O157 Incorporating Data from Foodborne and Environmental Outbreaks—N. J. C. STRACHAN and I. D. Ogden, University of Aberdeen, Aberdeen, UK

2:30 T41 • An Analysis of US Cross-connection Incidents in the Food Industry: 1901-2000—PAULA MARIE TANNER and P. J. E. Quintana, Jack-in-the-Box Corporate Headquarters, San Diego, CA, USA

2:45 T42 • Implications of Flies, Pathogens and Public Health Risks—JERRY BUTLER, James Maruniak, and Frank Meek, University of Florida, Gainesville, FL, USA

Lecture Topics – Manchester Ballroom A-B

Organizer/Convenor: Anna Lammerding

- 1:30 p.m.–2:30 p.m.
  ICMSF Lecture on Microbiological Sampling Plans—SUSANNE DAHMS, Institute of Biometrics and Data Processing, Berlin, Germany
- 2:30 p.m.–3:30 p.m.
  Risk Assessment of Microbiological Hazards in Foods: An International Approach—SARAH CAHILL, Food and Agriculture Organization, Rome, Italy; PETER KARIM BEN EMBAREK, World Health Organization, Geneva, Switzerland

Business Meeting (4:00 p.m.–5:00 p.m.) – Manchester Ballroom A-B

S16 **Chronic Wasting Disease and Other Transmissible Spongiform Encephalopathies** – Manchester Ballroom A-B

Sponsored by ILSI N.A. in partnership with the International Food Information Council

Organizer: Catherine Nnoka

Convenors: Robert E. Brackett, John G. Cerveny, and Martin Wiedmann

8:30 • Overview of TSEs—DEAN O. CLIVER, University of California, Davis, CA, USA

9:00 • CWD Detection Methods—KATHERINE O'ROURKE, Washington State University, Pullman, WA, USA

9:30 • In Vitro and in Vivo Models for the Biology, Pathogenesis, and Transmission of CWD—SUZETTE A. PRIOLA, Rocky Mountain Laboratories, Hamilton, MT, USA

10:00 • Break

10:30 • Epidemiology of CWD in Wildlife—ELIZABETH S. WILLIAMS, University of Wyoming, Laramie, WY, USA

(Wednesday a.m., *continued*)

11:00 • Scrapies and TSEs in Small Ruminants–To be determined

11:30 • Panel Discussion

S17 **Applications of DNA Chip Technology in the Food Safety Area** – Regency Ballroom A-B

Sponsored by IAFP Foundation Fund

Organizers/Convenors: Jeff Farber and Gisele LaPointe

8:30 • Overview of DNA Chip Tehcnology–NEIL WINEGARDEN, Ontario Cancer Institute, University Health Network, Toronto, Ontario, Canada

9:00 • Potential Application of DNA Chip Technology for the Molecular Typing of Microorganisms–BALA SWAMINATHAN, CDC, Atlanta, GA, USA

9:30 • An Industry Perspective on the Potential Application of DNA Chips to Food Safety–GIANFRANCO DE FEO, Affymetrix, Inc., Santa Clara, CA, USA

10:00 • Break

10:30 • Applications of DNA Chip Technology for the Study of the Virulence of Enteric Foodborne Pathogens–ANDREW BENSON, University of Nebraska, Lincoln, NE, USA

11:00 • Direct Applications of DNA Chips in Food Safety: *Campylobacter* spp.–JOHN NASH, National Research Council of Canada, Ottawa, Ontario, Canada

11:30 • Direct Applications of DNA Chips in Food Safety: *Listeria monocytogenes*–JEFF FARBER and FRANCO PAGOTTO, Health Canada, Ottawa, Ontario, Canada

S18 **Sanitary Design of Plants and Equipment** – Regency Ballroom C

Sponsored by IAFP Foundation Fund

Organizer: Vickie Lewandowski

Convenors: Tim Freier and Vickie Lewandowski

8:30 • Overview of Sanitary Design of Food Processing Facilities and Equipment–DONALD GRAHAM, Chesterfield, MO, USA

9:00 • The Relationship of Sanitary Design to Product Quality–JOE STOUT, Kraft, Northfield, IL, USA

9:30 • NSF Standard 14159 Hygenic Requirements for the Design of Meat and Poultry Processing Equipment–JOHN ARMBRUSTER, NSF, Ann Arbor, MI, USA

10:00 • Break

10:30 • Recent Improvements to the Sanitary Design of Conveyors–TIM FREIER, Cargill, Wayzata, MN, USA

11:00 • Sanitary Design of Air Handling Systems–BRUCE PAULSON, Evapco, Owatonna, MN, USA

11:30 • European Perspective on Hygenic Plant and Equipment Design–JEFFREY BANKS, Qualicon, Wilmington, DE, USA

S19 **Risk Assessment of Food Workers Hygiene Practices and Intervention Strategies** – Cunningham Room

Sponsored by IAFP Foundation Fund

Organizer: Ewen Todd

Convenors: Jack Guzewich and Ewen Todd

8:30 • Hazard Identification in Ill and Asymptomatic Food Workers–BARRY MICHAELS, Georgia-Pacific Corporation, Palatka, FL, USA

9:00 • Exposure Assessment Based on an Investigation of Food Handling Transmission Routes–CHRIS GRIFFITH, University of Wales Institute, Cardiff, Wales, UK

9:30 • Transfer Rates of Viruses to Foods and Surfaces and Their Reduction through Proper Handwashing and Drying–SABAH BIDAWID, Health Canada, Ottawa, Ontario, Canada

10:00 • Break

10:30 • Modeling of Transfer of Pathogens in Handwashing–DON SCHAFFNER, Rutgers University, New Brunswick, NJ, USA

11:00 • Dose Response Modeling for Use in Food Worker Hygiene Risk Assessment–LEE-ANN JAYKUS, North Carolina State University, Raleigh, NC, USA

11:30 • Handwashing: What Works and What Doesn't – A Psychologist's Approach–DEBORAH CLAYTON, University of Wales Institute, Cardiff, Wales, UK

T05 **General Food Microbiology** – Regency Ballroom D-E

8:30 T43 • Food Safety and Security: Operational Risk Management Systems Approach–LARRY BARRETT, US Air Force and California Dept. of Health Services, Sacramento, CA, USA

8:45 T44 • The Food Safety Network: A Model for Scientific Risk Management and Public Engagement–BENJAMIN CHAPMAN and Douglas Powell, University of Guelph, Guelph, Ontario, Canada

9:00 T45 • Comparison of the Linear and Nonlinear Models of Thermal Inactivation of Milk-borne Microorganisms–C. R. LOSS and J. H. Hotchkiss, Cornell University, Ithaca, NY, USA

9:15 T46 • A Quantitative Microbial Risk Assessment Model for Processed Postchill Broilers–IRA ZAKARIADZE and Yanbin Li, University of Arkansas, Fayetteville, AR, USA

9:30 T47 • Food Safety and Control Standards in Food Manufacturing Premises in Wales–GORDON HAYBURN and Chris Griffith, University of Wales Institute-Cardiff, Cardiff, Wales, UK

9:45 T48 • The Perceived and Actual Cost of Quality Failures in the Welsh Food Manufacturing Sector and Links with Food Safety Management—DAVID LLOYD and Chris Griffith, University of Wales Institute-Cardiff, Cardiff, Wales, UK

10:00 • Break

10:30 T49 • Microbiological Levels in Warewash Machines Used in Foodservice Establishments—EVA STÅHL WERNERSSON, Håkan Håkanson, and Inger Lindvall, Granuldisk AB, Malmö, Sweden

10:45 T50 • Hygienic Practices Evaluation at Homes in Xalapa City, Veracruz, Mexico—PAOLA SABINA CONTRERAS ROMO, Laboratorio de Alta Tecnología de Xalapa, Xalapa, Veracruz, Mexico

11:00 T51 • Bacterial Populations Associated with Water in Vending Machines—JAYNE DRAKE, Adrian Peters, Louise Fielding, and Mike Saltmarsh, University of Wales Institute-Cardiff, Cardiff, Wales, UK

11:15 T52 • Food Safety Education Using a Cross-Disciplinary Approach and Web-based Teaching Materials—M. A. DAVIS, D. E. Conner, and W. F. Gale, Auburn University, Auburn, AL, USA

11:30 T53 • External Review of an Evidence-based Web site Containing Messages Related to Food and Water Safety for Consumers—BONNIE LACROIX and Douglas Powell, University of Guelph, Guelph, Ontario, Canada

11:45 T54 • Inactivation of Foodborne Viruses by High Pressure Processing—ALVIN LEE, Michelle Bull, Cindy Stewart, Lisa Szabo, Jason Wan, John Coventry, and Martin Cole, Food Science Australia, Werribee, Victoria, Australia

P04 Produce and Meat Microbiology – Manchester Ballroom

9:00 a.m.–12:00 p.m.
(Authors present 9:30 a.m.–11:30 a.m.)

P142 • Improving the Safety of Harvest Practices for Strawberries for Processing—MARY PALUMBO, Nancy Nagle, Cindy Jewell, Michael Gutierrez, and Jeff Farrar, California Dept. of Health Services, Sacramento, CA, USA

P143 • Efficacy of an FDA Approved Peroxyacid-based Sanitizer to Inactivate *Escherichia coli* O157:H7 in Artificially Contaminated Alfalfa Seeds—PASCALE M. PIERRE, Elliot T. Ryser, and Jerry N. Cash, Michigan State University, East Lansing, MI, USA

P144 • Combination Treatments of Ozone, Chemical Preservatives, and Refrigerated Storage for Inactivation of *Escherichia coli* O157:H7 and *Salmonella* in Apple Cider—Charity A. Lakins, DAVID A. GOLDEN, and Susan S. Sumner, University of Tennessee, Knoxville, TN, USA

P145 • Irradiation Temperature Influences Product Quality Factors of Frozen Vegetables and Radiation Sensitivity of Inoculated *Listeria monocytogenes*—Brendan A. Niemira, Xuetong Fan, and CHRISTOPHER H. SOMMERS, USDA-ARS-ERRC, Wyndmoor, PA, USA

P146 • Withdrawn

P147 • Efficacy of Detergents to Enumerate Pathogenic Microorganisms from the Surface of Fresh Strawberries—RENEE M. RAIDEN, Susan S. Sumner, Merle D. Pierson, and Joseph D. Eifert, Virginia Tech, Blacksburg, VA, USA

P148 • Non-thermal Pathogen Reduction for *Escherichia coli* O157:H7 on Apple Surfaces Using Chlorine Dioxide Gas—J. DU, Y. Han, and R. H. Linton, Purdue University, W. Lafayette, IN, USA

P149 • Evaluation of Good Agricultural Practices and Good Manufacturing Practices in Export Growers and Packaging Houses of Fresh Fruits and Vegetables in Costa Rica—CARMELA VELÁZQUEZ and Fernando Aguilar, University of Costa Rica, San José, Costa Rica

P150 • Internalization of *Escherichia coli* in Apples—B. K. SEEMAN, S. S. Sumner, M. Pierson, R. Worobo, D. Kang, Virginia Tech., Blacksburg, VA, USA

P151 • Reduction of *Salmonella* spp. in Aqueous Treatments Used to Pack Fresh-Market Oranges—JENNIFER E. SNART, Mickey Parish, and Linda J. Harris, University of California-Davis, Davis, CA, USA

P152 • Inactivation of *Escherichia coli* O157:H7 and *Salmonella* in Apple Cider and Orange Juice by Combination Treatments of Ozone, Chemical Preservatives, and Refrigerated Storage—ROBERT C. WILLIAMS, David A. Golden, and Susan S. Sumner, Virginia Tech., Blacksburg, VA, USA

P153 • The Effect of Gamma Irradiation on *Escherichia coli* O157:H7 and *Salmonella* Inoculated on Strawberries—A. KILONZO, J. Kim, T. S. Huang, M. Carter, S. J. Weese, and C. I. Wei, Auburn University, Auburn, AL, USA

P154 • Differential Killing Activity of Cetylpyridinium Chloride (CPC), with or without Neutralizing Buffer Quench, against Firmly Adhered *Salmonella* Gaminara on Lettuce Stored at 4°C—MOEZNIMANWATY OSMAN, M. E. Janes, R. Story, R. Nannapaneni, and M. G. Johnson, University of Arkansas, Fayetteville, AR, USA

P155 • The Risk of Salmonellosis Associated with the Consumption of Raw Alfalfa Sprouts: An Exposure Assessment—LYNETTE KLEMAN and Lee-Ann Jaykus, North Carolina State University, Raleigh, NC, USA

P156 • Ultrasonic Treatment of a Rinse Solution to Enhance Enumeration of *Salmonella* spp. from Produce Surfaces—GABRIEL SANGLAY, Joseph Eifert, Merle Pierson, and Susan Sumner, Virginia Tech, Blacksburg, VA, USA

(Wednesday a.m., *continued*)

P157 • Microbial Profile of Conventionally and Organically Grown Spring Mix—Christie A. Phillips and MARK A. HARRISON, University of Georgia, Athens, GA, USA

P158 • The Analysis of Pathogens in Chicken Manure Fertilizer—TRISTIN CRENSHAW, Christopher Choi, and Charles Gerba, University of Arizona, Tucson, AZ, USA

P159 • Comparison of Dipping, Spotting, and Spraying Methods to Inoculate *Listeria monocytogenes* on Green Pepper Surfaces—Y. HAN and R. H. Linton, Purdue University, W. Lafayette, IN, USA

P160 • Physical Means of Inactivating *Salmonella*, *Escherichia coli* O157:H7, and *Listeria monocytogenes* on Alfalfa Seeds—Chih-Ying Lu, Stuart O. Nelson, Larry R. Beuchat, and MARK A. HARRISON, University of Georgia, Athens, GA, USA

P161 • Fate of *Salmonella* in Homemade Unpasteurized Fruit and Vegetable Juices—Claudia M. Cornwell and MARK A. HARRISON, University of Georgia, Athens, GA, USA

P162 • Microbial Ecology of Cassava and Gari—M. C. E. KHAMBULA, E. van Zyl, S. de Kock, H. Abrahamse, C. Rey, and A. von Holy, Technikon Witwatersrand, Doornfontein, South Africa

P163 • Reduction of Microbes Attached to Fresh-cut Lettuce Using Electrochemically Activated Water Spray—BETTY L. SWEM, Hong Yang, Yulai Cheng, and Yanbin Li, University of Arkansas-Fayetteville, Fayetteville, AR, USA

P164 • Survival of *Shigella flexneri* on Strawberries Stored at -20, 4, and 24°C—STEPHAN FLESSA and Linda J. Harris, University of California-Davis, Davis, CA, USA

P165 • Growth of *Salmonella* Enteritidis PT 30 on Almond Hulls and Shells—LINDA J. HARRIS, Solymar Ontiveros, and Aaron Uesugi, University of California-Davis, Davis, CA, USA

P166 • Contamination of Vegetable Crops Irrigated with Dairy Wastewater—FAEZAH MANSHADI, Pablo Gortares, Martin M. Karpiscak, Robert J. Freitas and Charles P. Gerba, University of Arizona, Tucson, AZ, USA

P167 • Survival of Acid-adapted or Nonadapted *Escherichia coli* O157:H7 in Apple Wounds following Chemical Treatments and Storage of Samples—J. Ikeda, J.D. STOPFORTH, P. A. Kendall, and J.N. Sofos, Colorado State University, Ft. Collins, CO, USA

P168 • Efficacy of Calcinated Calcium in Killing *Escherichia coli* O157:H7, *Salmonella* and *Listeria monocytogenes* on the Surface of Tomatoes—M. L. BARI, Y. Inatsu, S. Kawasaki, E. Nazuka, and K. Isshiki, National Food Research Institute, Tsukuba, Japan

P169 • Survival of *Listeria monocytogenes* in a Simulated Recirculating Brine Chiller System—J. K. GAILEY, J. S. Dickson, and W. Dorsa, Iowa State University, Ames, IA, USA

P170 • Investigation for Potential Sites of Microbial Contamination of Sliced Ready-to-eat Meat Products—L. PEDROSO, A. Louçã and J. Sofos, Instituto Superior de Ciências da Saúde - Sul, Caparica, Portugal

P171 • Ability of *Listeria monocytogenes* to Withstand Re-heating of Frankfurters—Anna C. S. Porto, Manuela Osoria, Peggy Williamson, Caitriona Byrne, Lisa Yoder, JEFFREY E. CALL, and John B. Luchansky, USDA-ARS-ERRC, Wyndmoor, PA, USA

P172 • Use of PFGE to Determine the Persistence of a Five-strain Mixture of *Listeria monocytogenes* during Chilled Storage of Vacuum-sealed Packages of Frankfurters—Anna Porto, LAURA WONDERLING, Jeffrey Call, and John B. Luchansky, USDA-ARS-ERRC, Wyndmoor, PA, USA

P173 • Evaluation of *Listeria monocytogenes* Survival in Inoculated Frankfurters Following Consumer Accessible Cooking Instructions—M. T. ORTEGA-VALENZUELA, R. K. Phebus, and H. Thippareddi, Kansas State University, Manhattan, KS, USA

P174 • Edible Zein Film Coatings Containing Nisin and EDTA to Control *Listeria monocytogenes* Inoculated onto the Surfaces of Turkey Franks—M. E. JANES, B. Lungu, and M. G. Johnson, University of Arkansas, Fayetteville, AR, USA

P175 • Inactivation of *Listeria monocytogenes* on Ready-to-eat Hot Dogs Treated with Volatilized Acetic Acid—Nancy Jensen, Andrew Inglis, and PETER W. BODNARUK, Food Science Australia, North Ryde, NSW, Australia

P176 • Effects of Pediocin and Post-packaging Thermal Pasteurization on *Listeria monocytogenes* on Frankfurters—CHIH-MING CHEN, Joseph G. Sebranek, James S. Dickson, and Aubrey F. Mendonca, Iowa State University, Ames, IA, USA

P177 • Effects of Pediocin and Post-packaging Irradiation on *Listeria monocytogenes* on Frankfurters—CHIH-MING CHEN, Joseph G. Sebranek, James S. Dickson, and Aubrey F. Mendonca, Iowa State University, Ames, IA, USA

P178 • Hydrostatic Pressurization at 50°C in the Presence of Bacteriocin Completely Eliminated Contaminated *Listeria monocytogenes* in Processed Meat Products—SOMNATH BANDYOPADHYAY, Alex Wolf, Norsak Kalchayanand, and Bibek Ray, University of Wyoming, Laramie, WY, USA

P179 • Effect of Packaging Materials on Inactivation of Pathogenic Microorganisms on Meat during Irradiation—Kathiravan Krishnamurthy, ALI DEMIRCI, Virendra M. Puri, and Catherine N. Cutter, Pennsylvania State University, University Park, PA, USA

P180 • Effect of Acid Adaptation on Destruction of *Salmonella* during Drying (60°C) and Storage (25°C) of Beef Jerky Treated with Marinades—Mehmet Calicioglu, JOHN N. SOFOS, John N. Samelis, and Patricia A. Kendall, Colorado State University, Ft. Collins, CO, USA

P181 • Influence of Marinades on Survival during Storage at 25°C of Acid-adapted and Nonadapted *Listeria monocytogenes* or *Salmonella* Inoculated Post-drying on Beef Jerky—Mehmet Calicioglu, JOHN N. SOFOS, and Patricia A. Kendall, Colorado State University, Ft. Collins, CO, USA

P182 • Distribution of *Escherichia coli* O157:H7 in Ground Meat Resulting from a Laboratory-scale Grinder—ROLANDO A. FLORES, Tod Stewart, and Mark Tamplin, USDA-ERRC-ARS, Wyndmoor, PA, USA

P183 • Origin of Ground Beef Contamination and Genetic Diversity of *Escherichia coli* in Beef Production Processes—MUEEN ASLAM, Frances Nattress, Gordon Greer, Colin Gill, and Lynn McMullen, Agriculture and Agri-Food Canada, Lacombe, Alberta, Canada

P184 • The Growth of *Escherichia coli* O157:H7 in Retail and Irradiated Ground Beef at 10°C—MARK L. TAMPLIN, USDA-ARS-ERRC, Wyndmoor, PA, USA

P185 • Influence of Composition and Packaging of Beef Patties on Gamma Radiation Inactivation of *Escherichia coli* O157:H7—Dory Worcman-Barninka, Bernadette D. G. M. Franco, Maria Teresa Destro, and MARIZA LANDGRAF, University of São Pãulo-Brazil, São Pãulo, Brazil

P186 • PCR Characterization of Enterohemorrhagic *Escherichia coli* from Fecal, Hide and Ground Beef Samples—ADAM B. OLSON, Frances Nattress, Gordon Greer, Mueen Aslam, and Lynn M. McMullen, University of Alberta, Edmonton, Alberta, Canada

P187 • The Effect of a Mixture of Lactic Acid and Nisin on the Shelf Life of Retail and Vacuum Packaged Fresh Meat—ENRIQUE MARQUEZ SALAS, Kenna Ferrer, Yasmina Barboza de Martinez, and Jorge Ruíz Ramires, Universidad del Zulia, Maracaibo, Zulia, Venezuela

WEDNESDAY AFTERNOON — JULY 3, 2002

1:30 p.m. — 5:00 p.m.

S20 Customized Approaches to Microbiological Risk Assessment — Manchester Ballroom A-B

Organizer: Leon Gorris

Convenors: Leon Gorris and Tom Ross

1:30 • Approaches to and Outcomes of Formal Microbiological Risk Assessments—JORGEN SCHLUNDT, World Health Organization, Geneva, Switzerland

2:00 • Ranking of Microbiological Risks—RICHARD WHITING, FDA-CFSAN, College Park, MD, USA

2:30 • Microbiological Risk Profiling—SERVE NOTERMANS, TNO Nutrition and Food Research Institute, 3700 AJ Zeist, The Netherlands

3:00 • Break

3:30 • A Simple Decision Support Tool for MRA—TOM ROSS, University of Tasmania, Hobart, Tasmania, Australia

4:00 • Tiered Approaches to MRA Covering Part of the Supply Chain—LEON GORRIS, Unilever, SEAC — Risk Analysis Group, Sharnbrook, UK

4:30 • Process Risk Assessment—AAMIR M. FAZIL, Health Canada, Guelph, Ontario, Canada

S21 Control of *Escherichia coli* O157:H7 in Cattle — Regency Ballroom A-B

Sponsored by IAFP Foundation Fund and Warren Analytical Laboratories

Organizer: Francisco Diez-Gonzalez

Convenors: Mindy Brashears and Francisco Diez-Gonzalez

1:30 • Effect of Dietary Changes and Forage Feeding—FRANCISCO DIEZ-GONZALEZ, University of Minnesota, St. Paul, MN, USA

2:00 • Control of *E. coli* O157 in Livestock Drinking Water—JEFFREY T. LEJEUNE, Ohio State University, Wooster, OH, USA

2:30 • Use of Chlorate Salt Preparations as Feed Additives for Preharvest Control of Enterohemorrhagic *E. coli* and *Salmonella*—ROBIN ANDERSON, Southern Plains Agricultural Research Center, College Station, TX, USA

3:00 • Break

3:30 • Competitive Exclusion of *E. coli* in Beef Cattle—MINDY BRASHEARS, Texas Tech University, Lubbock, TX, USA

4:00 • Vaccination as a Tool to Reduce Colonization of Cattle by *E. coli* O157—ANDREW A. POTTER, Veterinary Infectious Disease Organization, Saskatoon, Saskatchewan, Canada

4:30 • Use of Dietary Supplements to Manage Generic and Toxigenic *E. coli* in Tropical Beef Production Systems—DENIS O. KRAUSE, CSIRO Livestock Industries, Indooroopilly, Australia

S22 Current Practices in Produce Safety — Regency Ballroom C

Organizer: Donna Garren

Convenors: Philip G. Blagoyevich and Donna Garren

1:30 • Good Agricultural and Manufacturing Practices in the Fresh Produce Industry: An Overview—BOB GRAVANI, Cornell University, Ithaca, NY, USA

(Wednesday p.m., *continued*)

2:00 • Industry Perspective on the Development, Implementation, and Verification of GAPs and GMPs—MAHIPAL KUNDURU, Dole Fresh Vegetables, Inc., Salinas, CA, USA

2:30 • Impact of Growing and Post-harvest Practices on Produce Food Safety: An Overview—TREVOR SUSLOW, University of California-Davis, Davis, CA, USA

3:00 • Break

3:30 • Safe Growing and Handling Practices to Reduce Chemical Hazards—JOE FURUIKE, Driscoll Strawberry Associates, Inc., Watsonville, CA, USA

4:00 • Safe Growing and Handling Practices to Reduce Microbial and Physcial Hazards—FRANCES PABRUA, Fresh Advantage, Salinas, CA, USA

4:30 • Panel Discussion

S23 Food Safety Education Update – Cunningham Room

Organizers/Convenors: Robert B. Gravani and O. Peter Snyder Jr.

1:30 • Effective Consumer Food Safety Education—CHRISTINE BRUHN, University of California-Davis, Davis, CA, USA

2:00 • Food Safety Education for Chefs—O. PETER SNYDER, JR., Hospitality Instutite of Technology and Management, St. Paul, MN, USA

2:30 • Communicating Food Safety and Security in a Manufacturing Environment: A Case History—PETE FRIEDMAN, ACH Food Companies, Cordova, TN, USA

3:00 • Break

3:30 • Educating Retail Food Handlers—ROBERT B. GRAVANI, Cornell University, Ithaca, NY, USA

4:00 • Elementary School and Preschool Education Efforts—JUDY HARRISON, University of Georgia, Athens, GA, USA

4:30 • Reinforcing Safe Food Handling Practices of Junior and Senior High Schoolers—LAURA FOX, FDA, Arlington, VA, USA

T06 Antimicrobials – Regency Ballroom D-E

1:30 T55 • Extension of Produce Shelf Life following Acidified Sodium Chlorite Treatment during Processing—G. KERE KEMP, C. Cayce Warf, Chris Hawk, and Scott Musgrave, Alcide Corporation, Redmond, WA, USA

1:45 T56 • Application of Natural Antimicrobial Systems to RTE Food for Control of *Clostridium botulinum*—XINTIAN MING, Jeff Lambeseder, Jan Payne, and Bill King, Rhodia Foods, Madison, WI, USA

2:00 T57 • Assessment of the Antibacterial Properties of Ozone on Aerosolized *Micrococcus luteus* Using a Bioaerosol Test Chamber—R. A. BAILEY, A. Young, L. Fielding, and C. Griffith, University of Wales Institute-Cardiff, Cardiff, Wales, UK

2:15 T58 • Evaluation of a Foaming High Retention Peracetic Acid System—CRYSTAL A. NESBITT, Kenneth E. Kellar, Joseph C. Richards, and Mark A. Weiss, FMC Corporation, Princeton, NJ, USA

2:30 T59 • Decontamination in the Food Industry Using Ozone—L. M. FIELDING, L. Creed, R. A. Bailey, C. G. Griffith and A. C. Peters, University of Wales Institute-Cardiff, Cardiff, Wales, UK

2:45 T60 • Efficacy of an Acidified Sodium Chlorite In-home Antimicrobial Spray on Produce—G. KERE KEMP and Keith Schneider, Alcide Corporation, Redmond, WA, USA

3:00 • Break

3:30 T61 • Comparison of Intervention Technologies for Reducing *Escherichia coli* O157:H7 on Beef Cuts and Trimmings—J. R. RANSOM, K. E. Belk, J. N. Sofos, J. A. Scanga, and G. C. Smith, Colorado State University, Ft. Collins, CO, USA

3:45 T62 • Effects of Dried Plum Purees on Suppression of Growth of Foodborne Pathogens in Uncooked Pork Sausage—LESLIE K. THOMPSON and Daniel Y. C. Fung, Kansas State University, Manhattan, KS, USA

4:00 T63 • Sources of *Listeria monocytogenes* Contamination in a Salmon Smokehouse and Comparison of Two Sanitizing Procedures—BIRTE FONNESBECH VOGEL, Dorthe Bagge, Kelna Gardshodn, and Lone Gram, Danish Institute for Fisheries Research, Lyngby, Denmark

4:15 T64 • The Evaluation and Control of Biofilm of Signficance to the Food Industry—ADRIAN PETERS, Karen Elvers, and Chris Griffith, University of Wales Institute-Cardiff, Cardiff, Wales, UK

4:30 T65 • Comparison of Multiple Antimicrobial Resistance among *Salmonella* Isolates of Animal Origin—P. J. FEDORKA-CRAY, M. L. Headrick, B. Salamone, N. Anandaraman, B. Rose, J. T. Gray, and D. A. Dargatz, USDA-ARS, Athens, GA, USA

4:45 T66 • Characterization of Multiple Fluoroquinolone Resistance among Avian *Escherichia coli* Isolates from North Georgia—JUAN F. DE VILLENA, David D. White, Shaohua Zhao, John J. Maurer, and Jianghong Meng, University of Maryland-College Park, College Park, MD, USA

P05 Poultry, Meat and General Food Microbiology – Manchester Ballroom

2:00 p.m.–5:00 p.m.
(Authors present 2:30 p.m.–4:30 p.m.)

P188 • Outbreak Alert—CAROLINE SMITH DEWAAL, Center for Science in the Public Interest, Washington, D.C., USA

P189 • Investigation of *Clostridium botulinum* (Botulism) Outbreak in Texas, 2001—STEVEN D. BENGTSON, USDA-FSIS, Boulder, CO, USA

P190 • Microbiology of Flour Milling—AILSA D. HOCKING, Lana K. Berghofer, and Di Miskelly, Food Science Australia, North Ryde, NSW, Australia

P191 • Commodity-specific Food Safety Training Program Partnerships—INGEBORG SMALL, Michelle Smith, Sandra Bahn, and Jeff Farrar, California Dept. of Health Services, Sacramento, CA, USA

P192 • Commercial Food Handlers' Knowledge, Attitudes and Implementation of Food Hygiene Practices—D. A. CLAYTON and C. J. Griffith, University of Wales Institute-Cardiff, Cardiff, Wales, UK

P193 • Operational Risk Management—Food Safety and Security Training—INGEBORG SMALL, Jennifer Thomas, Sandra Bahn, and Jeff Farrar, California Dept. of Health Services, Sacramento, CA, USA

P194 • A Meta-Analysis of International Consumer Food Safety Studies—E. C. REDMOND and C. J. Griffith, University of Wales Institute-Cardiff, Cardiff, Wales, UK

P195 • Efficacy of Alcohol Gel Instant Hand Sanitizer When Used in Conjunction with Normal Handwashing—BARRY MICHAELS, Maria Arenas, Ann Schultz, and Vidhya Gangar, Georgia-Pacific Corporation, Palatka, FL, USA

P196 • Characterization of the Acid Tolerance Response in *Salmonella* Species Induced by Acid Shock and Moderate pH—Malika Meemongkolkiat, David Benson, and CLAUDIA KOERTING, University of Connecticut, Storrs, CT, USA

P197 • Determining the Feasibility of Developing a Food Safety Virtual Reference Service on the World Wide Web—DANIEL HENROID, JR. and James Huss, Iowa State University, Ames, IA, USA

P198 • Migration and Growth of *Salmonella* Enteritidis in Chicken Eggs as Influenced by Storage Time and Temperature and by Breakdown of Yolk Membrane—NUTAN MYTLE and Jinru Chen, CFS, University of Georgia, Griffin, GA, USA

P199 • Thermal Inactivation of *Salmonella* Senftenberg and *Listeria innocua* in Battered and Breaded Meat Product during Frying and Convection Cooking—RONG Y. MURPHY and E. R. Johnson, University of Arkansas, Fayetteville, AK, USA

P200 • Thermal Inactivation of *Salmonella* Senftenberg and *Listeria innocua* in Undercooked Meat Product during Impingement Cooking—RONG Y. MURPHY and E. R. Johnson, University of Arkansas, Fayetteville, AK, USA

P201 • Comparison of the Pulsed Field Gel Electrophoresis (PFGE) Patterns for *Salmonella* Enteritidis Isolates from Human Origin in Taiwan and Those from Poultry Origin in USA—HAU-YANG TSEN and Jer-Sheng Lin, National Chung-Hsing University, Taichung, Taiwan, R.O.C.

P202 • Survival of *Campylobacter jejuni* on Sterile Chicken Breast Burgers Stored at Refrigeration and Ambient Temperatures—KISUN YOON, Candace N. Burnette, and Thomas P. Oscar, University of Maryland Eastern Shore, Princess Anne, MD, USA

P203 • Reduction of *Salmonella* Typhimurium in Experimentally Challenged Broilers by Nitrate Adaptation and Chlorate Supplementation in Drinking Water—YONG SOO JUNG, Robin C. Anderson, James A. Byrd, Randle W. Moore, Todd R. Callaway, Thomas S. Edrington, and David J. Nisbet, USDA-ARS, College Station, TX, USA

P204 • Water as a Possible Vehicle of Infection for *Campylobacter* in Broilers—I. D. OGDEN, M. MacRae, M. Johnston, and D. Newell, University of Aberdeen, Foresterhill, Aberdeen, UK

P205 • Microbiological Assessment of Raw and Ready-to-eat Meat and Poultry Products Collected from the Retail Marketplace in Edmonton, Alberta, Canada—LYNN M. MCMULLEN, Michael E. Stiles, Valerie Bohaychuk, Gary Gensler, Robin King, Ole Sorensen, John Wu, and Ken Manninen, University of Alberta, Edmonton, Alberta, Canada

P206 • Antibiotic Resistant *Salmonella* spp., *Listeria monocytogenes*, *Staphylococcus aureus*, and *Campylobacter jejuni* Isolated from Poultry Processing in Korea—WONKI BAE, Nam-Hoon Kwon, Ji-Yeun Lim, Jun-Man Kim, Kyoung-Min Roh, Jin Hur, Ji-Yeon Kim, So-Hyun Kim, and Yong-Ho Park, Seoul National University, Suwon, Gyounggyi, Korea

P207 • *Campylobacter* and *Salmonella* Levels in US Poultry – Some Conclusions from Baseline Data Collected 1994-95 and 1999-2000—DENISE R. EBLEN and L. Victor Cook, USDA-FSIS-OPHS, Washington, D.C., USA

P208 • Reduction of *Campylobacter jejuni* on Poultry by Low-temperature Treatment—TONG ZHAO, Gabriel O. I. Ezeike, Michael P. Doyle, Yen-Con Hung, Rhonda S. Howell, and Jim Ayres, University of Georgia, Center for Food Safety, Griffin, GA, USA

P209 • *Campylobacter* MPN Enumeration in Chicken Carcasses—G. PEZZOTTI, A. Serafin, A. Buratin, and C. Bacelle, Istituto Zooprofilattico Sperimentale delle Venezie, Legnaro, Padova, Italy

P210 • Growth and Survival of *Salmonella* Typhimurium and *Campylobacter jejuni* on Sterile Ground Chicken Patties under Aerobic Conditions at Various Temperatures—CANDACE N. BURNETTE and Ki S. Yoon, University of Maryland Eastern Shore, Princess Anne, MD, USA

P211 • Variation in Genetic Clonality among Multi-drug Resistant *Salmonella enterica* Isolated from a Turkey Production Facility—RAJESH NAYAK, Rong-Fu Wang, and Carl E. Cerniglia, FDA, Jefferson, AR. USA

P212 • Molecular Typing of Guillian-Barré Syndrome Initiating Antibiotic-resistant *Campylobacter* Strains Isolated from Turkey Litter—R. Nayak, M. S. NAWAZ, R. F. Wang, S. A. Khan, and A. A. Khan, FDA, Jefferson, AR, USA

(Wednesday p.m., *continued*)

P213 • Quantitative Monitoring of Ciprofloxacin-Resistant and -Sensitive *Campylobacter* Populations on Pre- and Post-chilled Raw Broiler Carcasses from Poultry Processing—R. Nannapaneni, R. Story, K. Wiggins, and M. G. JOHNSON, University of Arkansas, Fayetteville, AR, USA

P214 • Antibiotic Resistance in Guatemalan Cattle—ERIC RUNDLETT, Eric Davis, and Ann Draughon, University of Tennessee Food Safety Center of Excellence, Knoxville, TN, USA

P215 • Treatment of Wastewater in a Laboratory-scale Fluidized Bed Bioreactor—D. Lindsay, U. Meeta, S. Moodley, V. Gray, and A. VON HOLY, University of the Witwatersrand, Johannesburg, South Africa

P216 • A Predictive Model to Determine the Effects of Temperature, Sodium Pyrophosphate, and Sodium Chloride on Thermal Inactivation of Starved *Listeria monocytogenes* in Pork Slurry—MAKUBA LIHONO, Aubrey Mendonca, and James Dickson, Iowa State University, Ames, IA, USA

P217 • Influence of Fingernail Length and Type on Removing *Escherichia coli* from the Nail Regions Using Different Hand Washing Interventions—C.-M. LIN, F.-M. Wu, M. P. Doyle, B. S. Michaels, and K. Williams, University of Georgia, CFSQE, Griffin, GA, USA

P218 • Biocontrol of Zearalenone, an Estrogenic Mycotoxin: Interaction with Food Grade *Lactobacilli*—HANI EL-NEZAMI, Nektaria Polychronaki, Seppo Salminen, and Hannu Mykkanen, University of Kuopio, Kuopio, Finland

P219 • The Influence of Food Microtopography on the Distribution of Bacteria in Two Food Spoilage Associations—GARY A. DYKES and Alexander von Holy, Saskatchewan Food Product Innovation Program, Dept. of Applied Microbiology and Food Science, University of Saskatchewan, Saskatoon, Saskatchewan, Canada

P220 • Ultraviolet Inactivation of Caliciviruses: First Study—SUPHACHAI NUANUALSUWAN, Sakchai Himathongkham, Hans Riemann, MingQi Deng, and Dean Cliver, University of California-Davis, Davis, CA, USA

P221 • Increased Thermotolerance of *Clostridium perfringens* Spores following Sublethal Heat Shock—VIJAY K. JUNEJA and John S. Novak, USDA-ARS-ERRC, Wyndmoor, PA, USA

P222 • Screening of Lactic Acid Bacteria Strains as Potential Probiotics—CHENG-CHIH TSAI, Li-Fang Huang, Chia-Chan Lin, Wen-Hsin Lin, and Hau-Yan Tsen, National Chung Hsing University, Taichung, Taiwan, ROC

P223 • Growth Kinetics of Parent and Green Fluorescent Protein-producing Strains of *Salmonella*—T. P. OSCAR, USDA-ARS, University of Maryland Eastern Shore, Princess Anne, MD, USA

P224 • High Hydrostatic Pressure Inactivation of Calicivirus (SMSV-17) in Oysters—K. R. CALCI, W. Burkhardt III, and A. W. Smith, FDA, Dauphin Island, AL, USA

P225 • Comparison of Sample Preparation Methods for Recovering *Salmonella* Enteritidis in Eggs—K. H. SEO, R. E. Brackett, I. E. Valentin-Von, and P. S. Holt, FDA/CFSAN, Washington, D.C., USA

Congratulations

In February 2002, the International Association for Food Protection participated at the United Fresh Fruit and Vegetable Association Meeting in Orlando, FL. While exhibiting, we offered a drawing for a one-year Membership with our Association. We are pleased to announce the following winner of the drawing:

IAFP Membership

Karen Prange
Canadian Food Inspection Agency
Nepean, Ontario, Canada

WELCOME

Southern California Association for Food Protection

A New IAFP Affiliate

For additional information,
contact Margaret Burton
at 858.571.2441;
E-mail: margaret.burton@jackinthebox.com

89th Annual Meeting

June 30–July 3, 2002

Event Information

EVENING EVENTS

Cheese and Wine Reception

Sunday, June 30, 2002 • 8:00 p.m. – 10:00 p.m.

Attendees and guests are invited to this traditional reception in the exhibit hall.

Exhibit Hall Reception

Monday, July 1, 2002 • 5:00 p.m. – 6:30 p.m.

Network with fellow food safety professionals during this informal reception while seeing the latest developments in the industry.

Monday Night Social at the San Diego Zoo

Monday, July 1, 2002 • 6:00 p.m. – 10:00 p.m.

Polar Bear Plunge, Tiger River, Gorilla Tropics and Ituri Forest – sound interesting? The World-Famous San Diego Zoo has been the gem of the city of San Diego for more than 80 years. Join us for the Monday Night Social and see first hand some of the world's rarest wildlife. Dinner will be provided in a reserved area for IAFP 2002 attendees. The Zoo will remain open to you and the public until 10:00 p.m. Explore the Zoo on a three-mile guided double-deck bus tour or go on your own adventure. Price includes admission to the Zoo, dinner, and transportation. Get your ticket today!

San Diego Dinner Cruise

Tuesday, July 2, 2002 • 6:00 p.m. – 10:30 p.m.

The celebration begins the moment you board the Hornblower Yacht. Watch the sun go down, sip champagne and enjoy a three-course dinner prepared fresh on board by talented chefs. Then dance to music or watch the San Diego sights drift by from the outdoor decks. Tickets are limited so get yours today.

Awards Banquet

Wednesday, July 3, 2002 • 7:00 p.m. – 9:30 p.m.

A special occasion to formally recognize the accomplishments of deserving food safety professionals. An elegant reception and dinner are followed by the awards ceremony. Business attire requested.

IAFP FUNCTIONS

New Member Reception

Saturday, June 29, 2002 • 4:30 p.m. – 5:30 p.m.

If you recently joined the Association or if this is your first time attending an IAFP Annual Meeting, welcome! Attend this informal reception to learn how to get the most out of attending the Meeting and meet some of today's leaders.

Affiliate Reception

Saturday, June 29, 2002 • 5:30 p.m. – 7:00 p.m.

Affiliate officers and delegates plan to arrive in time to participate in this educational reception. Watch your mail for additional details.

Committee Meetings

Sunday, June 30, 2002 • 7:00 a.m. – 5:00 p.m.

Committees and professional Development Groups (PDGs) plan, develop and institute many of the Association's projects, including workshops, publications, and educational sessions. Share your expertise by volunteering to serve on any number of committees or PDGs.

Student Luncheon

Sunday, June 30, 2002 • 12:00 p.m. – 1:30 p.m.

The mission of the Student PDG is to provide students of food safety with a platform to enrich their experience as Members of IAFP. Sign up for the luncheon to help start building your professional network.

IAFP Job Fair

Sunday, June 30, 2002 thru Wednesday July 3, 2002

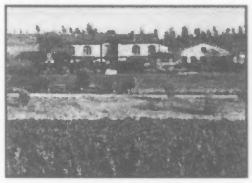
Employers, take advantage of recruiting the top food scientists in the world! Post your job announcements and interview candidates. Watch for additional information at www.foodprotection.org.

DAYTIME TOURS

(Lunch included on all daytime tours)

Wine Country Tour

Saturday, June 29, 2002 • 10:00 a.m. – 3:00 p.m.



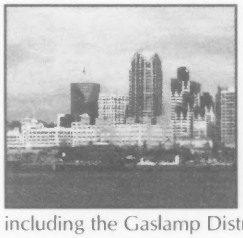
The Temecula Valley Wine Country tour takes you on a visit to the Callaway and Thornton (formerly Culbertson's) Wineries. Guests will enjoy a private in-depth tour and a lecture-tasting of white wine at Callaway.

Afterwards, we will cross the road to Thornton for a short tour on the art of making fine champagnes. Thornton still employs the French method of hand turning the bottles during the fermenting process.

A box lunch will be served. You will be sure to enjoy this Southern California wine tasting experience!

Scenic San Diego by Land and Sea

Sunday, June 30, 2002 • 10:00 a.m. – 3:00 p.m.



Visit San Diego, the city that glistens by the sea!

The highlights of "America's Finest City" will be presented on this narrated guided tour. You will see areas such as: Old Town, Balboa Park, and San Diego's Downtown areas including the Gaslamp District and Horton Plaza. We will then tour and enjoy lunch in one of California's most charming coastal resort towns, Coronado Island.

After seeing the city by land, you will board a yacht to cruise the calm waters of the San Diego Bay. Guides will narrate points of interest such as the Coronado Bay Bridge, the Navy shipyards and aircraft carriers, Shelter Island, Harbor Island and North Island. You will enjoy this relaxing day of learning about the city that glistens by the sea!

La Jolla: The Jewel of San Diego

Monday, July 1, 2002 • 10:00 a.m. – 3:00 p.m.

La Jolla, with the tantalizing charm of a Mediterranean Isle, unique shops and breathtaking views of the Pacific, is a refreshing change of pace sure to delight even the most discriminating visitor! You will see the La Jolla Bay and Cove area. The famed La Jolla Underwater Park, maintained as an ecological reserve, is a favorite spot for scuba divers and snorkelers.

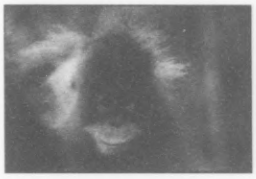
Tour guests will delight in a special 45-minute historical walking tour of La Jolla. This tour will bring the history of La Jolla to life with a personal docent who is a resident expert.

Shopping is always an extraordinary experience in La Jolla. Among the many boutiques, import shops, galleries and specialty food shops, you are sure to find unique and exclusive gifts.

A delicious lunch at George's at the Cove, one of the many fine restaurants in La Jolla, will be a special treat for all.

Behind the Scenes at the Wild Animal Park

Tuesday, July 2, 2002 • 9:00 a.m. – 2:00 p.m.



The San Diego Wild Animal Park began more than 20 years ago as a breeding facility for the San Diego Zoo's large animals. Dr. Charles Schroeder had the vision to open the 2,100-acre wildlife sanctuary for visitors to view animals roaming freely in settings similar to their native homelands. Known worldwide for its conservation efforts, the Wild Animal Park boasts over 3,000 animals from over 250 species and over 3,000 different exotic plant species.

You will enjoy a "Beastly Business" tour at the Wild Animal Park. This tour offers participants a private guided program focusing on the mammal, bird, and plant collection at the Wild Animal Park. Guests will enjoy a private monorail tour to view the extensive Asian and African field enclosures where rhinos, antelopes, giraffes, monkeys, elephants, and flamingo can be spotted from the train.

The entire program is conducted by a personal guide who can share the latest updates on animal births, new exhibit plans, and ways to help conserve endangered animals and their habitat.

As part of the "Behind the Scenes Tour," you will also experience a privately guided walking tour and an up close encounter with an exotic animal and its trainer in a special VIP Program. A lunch voucher is included so you can grab a bite to eat while enjoying your day at the Wild Animal Park.

HOSPITALITY ROOMS

Spouse/Companion Room

Register your spouse/companion and they will have access to the hospitality room where a continental breakfast and afternoon snacks are provided Sunday through Wednesday.

Retired Member Room

At the request of IAFP Retired Members, a room has been set aside for their use. A cribbage board, cards, and other games will be available. You are invited to bring your favorite game to challenge your fellow retired colleagues.

IMPORTANT! Please read this information before completing your registration form.

MEETING INFORMATION

Register to attend the world's leading food safety conference. Registration includes:

- Technical Sessions
- Symposia
- Poster Presentations
- Ivan Parkin Lecture
- Exhibit Hall Admittance
- Cheese and Wine Reception
- Exhibit Hall Reception
- Program and Abstract Book

4 EASY WAYS TO REGISTER

Complete the Attendee Registration Form and submit it to the International Association for Food Protection by:

Online: www.foodprotection.org

Fax: 515.276.8655

Mail: 6200 Aurora Avenue, Suite 200W,
Des Moines, IA 50322-2864, USA

Phone: 800.369.6337; 515.276.3344

The early registration deadline is May 30, 2002.
After this date, late registration fees are in effect.

REFUND/CANCELLATION POLICY

Registration fees, less a $50 administration fee and any applicable bank charges, will be refunded for written cancellations received by June 7, 2002. No refunds will be made after June 7, 2002; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after July 8, 2002. Event and tour tickets purchased are nonrefundable.

International Association for Food Protection®

EXHIBIT HOURS

Sunday, June 30, 2002	8:00 p.m. – 10:00 p.m.
Monday, July 1, 2002	9:30 a.m. – 1:30 p.m. 3:00 p.m. – 6:30 p.m.
Tuesday, July 2, 2002	9:30 a.m. – 1:30 p.m.

DAYTIME TOURS

Saturday, June 29, 2002	
Wine Country Tour	10:00 a.m. – 3:00 p.m.
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Scenic San Diego by Land and Sea	10:00 a.m. – 3:00 p.m.
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La Jolla: The Jewel of San Diego	10:00 a.m. – 3:00 p.m.
Tuesday, July 2, 2002	
Behind the Scenes at the Wild Animal Park	9:00 a.m. – 2:00 p.m.

EVENING EVENTS

Sunday, June 30, 2002	
Opening Session	7:00 p.m. – 8:00 p.m.
Cheese and Wine Reception	8:00 p.m. – 10:00 p.m.
Monday, July 1, 2002	
Exhibit Hall Reception	5:00 p.m. – 6:30 p.m.
Monday Night Social at the San Diego Zoo	6:00 p.m. – 10:00 p.m.
Tuesday, July 2, 2002	
Dinner Cruise	6:00 p.m. – 10:30 p.m.
Wednesday, July 3, 2002	
Awards Banquet Reception	6:00 p.m. – 7:00 p.m.
Awards Banquet	7:00 p.m. – 9:30 p.m.

HOTEL INFORMATION

For reservations, contact the hotel directly and identify yourself as an International Association for Food Protection Annual Meeting attendee to receive a special rate of $143 per night, single or double. Make your reservations as soon as possible; this special rate is available only until May 30, 2002.

Manchester Grand Hyatt San Diego
(Formerly Hyatt Regency San Diego)
One Market Place
San Diego, California 92101
Phone: 800.233.1234
619.232.1234

International Association for
Food Protection®
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2864, USA
Phone: 800.369.6337 • 515.276.3344
Fax: 515.276.8655
E-mail: info@foodprotection.org
Web site: www.foodprotection.org

Name (Print or type your name as you wish it to appear on name badge) _____ Member Number: _____

Employer _____ Title _____

Mailing Address (Please specify: ❒ Home ❒ Work) _____

City _____ State/Province _____ Country _____ Postal/Zip Code _____

Telephone _____ Fax _____ E-mail _____

❒ First time attending meeting Member since: _____

❒ Regarding the ADA, please attach a brief description of special requirements you may have.

❒ IAFP occasionally provides Attendees' addresses (excluding phone and E-mail) to vendors and exhibitors supplying products and services for the food safety industry. If you prefer NOT to be included in these lists, please check the box.

Registration (Awards Banquet included)	$ 295 ($345 late)	$ 445 ($495 late)	_____
Association Student Member (Awards Banquet included)	$ 50 ($ 60 late)	Not Available	_____
Retired Association Member (Awards Banquet included)	$ 50 ($ 60 late)	Not Available	_____
One Day Registration:* ❒ Mon. ❒ Tues. ❒ Wed.	$ 165 ($190 late)	$ 225 ($250 late)	_____
Spouse/Companion* (Name): _____	$ 45 ($ 45 late)	$ 45 ($ 45 late)	_____
Children 15 & Over* (Names): _____	$ 25 ($ 25 late)	$ 25 ($ 25 late)	_____
Children 14 & Under* (Names): _____	FREE	FREE	_____
*Awards Banquet not included			
		# OF TICKETS	
Student Luncheon (Sunday, 6/30)	$ 5 ($ 10 late)	_____	_____
Monday Night Social at the San Diego Zoo (Monday, 7/1)	$ 39 ($ 44 late)	_____	_____
Children 14 and under	$ 34 ($ 39 late)	_____	_____
Dinner Cruise (Tuesday, 7/2)	$ 70 ($ 75 late)	_____	_____
Awards Banquet (Wednesday, 7/3)	$ 45 ($ 50 late)	_____	_____
(Lunch included in all daytime tours)			
Wine Country Tour (Saturday, 6/29)	$ 63 ($ 68 late)	_____	_____
Scenic San Diego by Land and Sea (Sunday, 6/30)	$ 68 ($ 73 late)	_____	_____
La Jolla: The Jewel of San Diego (Monday, 7/1)	$ 71 ($ 76 late)	_____	_____
Behind the Scenes at the Wild Animal Park (Tuesday, 7/2)	$ 76 ($ 81 late)	_____	_____

❒ Check Enclosed ❒ VISA ❒ MasterCard ❒ Discover

TOTAL AMOUNT ENCLOSED $ _____ US FUNDS on US BANK

Expiration Date _____

Name on Card _____

Signature _____

(Attach a completed Membership application)
(See page 396 of this issue for a Membership application)

EXHIBITORS DO NOT USE THIS FORM

Workshops of IAFP 2002

Workshop I

Critical Steps in Laboratory Methods for the Detection of *Listeria monocytogenes*

This workshop is intended as an ongoing update of the science in the isolation of *Listeria monocytogenes*. Participants are exposed to the most current information on the advantages and disadvantages of currently employed technologies used in recovery of this pathogen. The evolution of each tool, its associated challenges and how these issues are overcome, pending changes in the various technologies and the quality aspects of each technology are discussed. This two-day workshop includes lectures and laboratory demonstrations at San Diego State University of various technologies from a vendor of each application as well as interaction from the presenter covering that specific methodology.

Workshop Topics

- Why Study *L. monocytogenes*
- Critical Steps in the Detection of *L. monocytogenes* Using:
  - Cultural Methods (USDA/FDA)
  - Immunological Methods
  - Nucleic Acid Methods
  - RAPD Ribotyping
  - Pulsed Field Electrophoresis
- Development and Validation of Methodologies for the Detection of *L. monocytogenes*
- USDA/FSIS Analysis of *L. monocytogenes*

Instructors

James R. Agin, Ohio Department of Agriculture, Reynoldsburg, OH
Bill Cray, Ph.D., USDA/FSIS Laboratory, Athens, GA
Judy Fraser-Heaps, General Mills, Apple Valley, MN
Anthony D. Hitchins, Ph.D., FDA/CFSAN, College Park, MD
Timothy C. Jackson, Ph.D., Nestlé USA, Dublin, OH
Franco Pagotto, Ph.D., Health Canada, Ottawa, Ontario, Canada
W. Payton Pruett, Jr., Ph.D., ConAgra Refrigerated Prepared Foods, Downers Grove, IL

Organizer

Robert W. Brooks, Woodson-Tenent Laboratories, Gainesville, GA

Who Should Attend?

This workshop is intended for the professional or laboratorian already working in the science of isolating *L. monocytogenes*. As the workshop is intended to hone the skills of laboratory personnel in recovery of this pathogen, it is assumed that the participants have a working knowledge of basic laboratory operations.

Hours for Workshop

Friday, June 28, 2002	Saturday, June 29, 2002
Registration — 7:30 a.m. Continental Breakfast	**Registration —** 7:30 a.m. Continental Breakfast
Workshop — 8:00 a.m. - 5:00 p.m. (Lunch provided)	**Workshop —** 8:00 a.m. - 4:00 p.m. (Lunch provided)

Workshop II

Current Practices in Produce Safety: GAPs and GMPs

In Partnership with United Fresh Fruit and Vegetable Association

The objective of this one and one-half day workshop is to discuss the impact of growing practices on the food safety of produce. Industry and university experts will present and share current knowledge regarding the application of "Good Agricultural Practices" for pre- and post-harvest produce.

The first day of the workshop will involve a one-half day field trip to local produce growing and packing operations to observe first-hand the practical applications of the materials presented.

On the second day of this session, participants will learn about relevant laws, microbial agents responsible for foodborne illness outbreaks linked to produce, chemical and physical hazards, and the most significant means of minimizing their associated risks.

Workshop Topics

- Good Agricultural and Manufacturing Practices in the Fresh Produce Industry
- Produce Industry Perspective on the Development, Implementation, and Verification of GAPs and GMPs
- Produce Specific Food Law
- Retail Buyer Perspective on the Development, Implementation, and Verification of GAPs and GMPs
- Produce Microbiology 101
- Impact of Growing and Post-harvest Practices on Produce Food Safety
- Safe Growing and Handling Practices to Reduce Chemical Hazards
- Safe Growing and Handling Practices to Reduce Microbial and Physical Hazards

Instructors

Robert E. Brackett, Ph.D., CFSAN/FDA, College Park, MD
Joe Furuike, Driscoll Strawberry Associates, Inc., Watsonville, CA
Robert B. Gravani, Ph.D., Cornell University, Ithaca, NY
Mark Harrison, Ph.D., University of Georgia, Athens, GA
Mahipal R. Kunduru, Ph.D., Dole Fresh Vegetables, Inc., Salinas, CA
Frances F. Pabrua, Fresh Express Inc., Salinas, CA
Gale Prince, The Kroger Co., Cincinnati, OH
Trevor V. Suslow, Ph.D., University of California-Davis, Davis, CA

Organizers

Philip G. Blagoyevich, The HACCP Institute, San Ramon, CA
Donna M. Garren, Ph.D., United Fresh Fruit and Vegetable Association, Alexandria, VA

Who Should Attend?

This workshop is intended for growers, shippers, and processors of fresh fruits and vegetables. Food safety and quality assurance professionals interested in produce food safety would also benefit from this workshop.

Hours for Workshop

Friday, June 28, 2002	Saturday, June 29, 2002
Registration —	**Registration —**
12:00 p.m. - 12:30 p.m.	7:30 a.m. Continental Breakfast
Tours —	**Workshop —**
12:30 p.m. - 5:00 p.m.	8:00 a.m. - 5:00 p.m. (Lunch provided)

Workshop III

Control of Pathogens in the Dairy Processing Environment

This workshop is intended to help dairy processing facilities design and implement an effective pathogen monitoring program for their products and their plant environment. With greater emphasis on HACCP in the dairies and mandatory HACCP for 100% juice processors, environmental monitoring can be invaluable as a pre-requisite program and product testing can be used to verify that HACCP is effective. This workshop will discuss the when, where, how and why of sampling both products and environment. A brief review of current technologies will help participants evaluate and choose appropriate tools to be used in their monitoring program. Participants will learn how data from a monitoring program provides the foundation for setting up pathogen control measures. Emphasis will be placed on determining effective corrective actions and follow-up testing for positive test results. Participants will have opportunities for interaction with the presenter to discuss points of interest.

Workshop Topics

- Overview of Pathogens of Concern to the Dairy Processor
- Sampling Plan for Environmental and Finished Products
- Methods of Sampling
- Overview of Methodology
- Corrective Actions/Follow-up and Auditing/ Verification
- Role of Training and Employee Awareness

Instructors

Kathryn J. Boor, Ph.D., Cornell University, Ithaca, NY
Larry Cohen, Kraft Foods, Inc., Glenview, IL
Beth Ann Crozier-Dodson, Kansas State University, Manhattan, KS
Roger Hooi, Dean Foods Technical Center, Rockford, IL
Margaret A. Poole, Ph.D., Hood Dairies, Chelsea, MA
L. Michele Smoot, Ph.D., Silliker Laboratories Group, Inc., Carson, CA

Organizers

Paul A. Hall, Kraft Foods, Inc., Glenview, IL
Kay N. Sadler, New-Tech Consulting, Inc., Milford, OH
Gaylord B. Smith, Mohawk Associates, Schenectady, NY

(Workshop information continued on next page)

Who Should Attend?

This workshop is intended for dairy processors, quality assurance and food safety individuals.

Hours for Workshop

Saturday, June 29, 2002

Registration — 7:30 a.m.

Continental Breakfast

Workshop — 8:00 a.m. - 5:00 p.m.
(Lunch provided)

Workshop IV

Media Training for the Scientific Community

In Partnership with
International Food Information Council

The scientific community today is conducting cutting-edge, valuable research with the potential to enhance the safety of the world's food supply. There is also an open platform for food safety issues to be discussed and a golden opportunity to provide balance on controversial issues such as foodborne illness, BSE, food biotechnology and other new and emerging technologies. The media have proven to be key for scientists and food safety experts to get their message heard.

While the most common source of health and food safety information is the media, the most trusted sources include scientists as well as doctors. It is our goal to assist workshop attendees in developing practical media techniques, which are necessary for developing messages useful during media interviews. Message development and delivery are critical in providing the audience with the information you want heard.

Workshop Topics

- Effective communication strategies to communicate key messages to the audience
- Ways to identify your audience needs and provide them with information they need to know
- How to transform a negative interview into a positive one with strategic message development
- Intensive on-camera interview training

Instructors

Shelly Sims, Susan Peterson Productions, Washington, D.C.
Nan Tolbert, Susan Peterson Productions, Washington, D.C.

Organizers

Tony Flood, International Food Information Council, Washington, D.C.

Dave Schmidt, International Food Information Council, Washington, D.C.

Who Should Attend?

This workshop is intended for key professionals, experts in their field, who are responsible for communicating with the public via the media. *Due to the extensive, hands-on activities in this workshop,* ***attendance is limited to 10 participants.***

Hours for Workshop

Saturday, June 29, 2002

Registration — 7:30 a.m.

Continental Breakfast

Workshop — 8:00 a.m. - 4:30 p.m.
(Lunch provided)

Manchester Hyatt Regency Hotel
San Diego, California

A complete committee meeting schedule will appear in the June issue of *DFES* or visit our Web site at www.foodprotection.org.

♦ Registration Form ♦

- ❑ Critical Steps in Laboratory Methods for the Detection of *Listeria monocytogenes*
- ❑ Current Practices in Produce Safety: GAPs and GMPs
- ❑ Control of Pathogens in the Dairy Processing Environment
- ❑ Media Training for the Scientific Community

First Name (will appear on badge) _____ Last Name _____

Company _____ Job Title _____

Address _____ City _____

State/Province _____ Country _____ Postal Code/Zip + 4 _____

Area Code & Telephone _____ Fax _____

E-mail _____ Member # _____

❑ Check Enclosed ❑ VISA ❑ MasterCard ❑

Name on Card _____ Total Amount Enclosed _____

Signature _____ Expiration date _____

For further information, please contact the Association office at 800.369.6337; 515.276.3344; Fax: 515.276.8655; E-mail: jcattanach@foodprotection.org

Critical Steps in Laboratory Methods for the Detection of *Listeria monocytogenes*			Current Practices in Produce Safety: GAPs and GMPs			Control of Pathogens in the Dairy Processing Environment			Media Training for the Scientific Community		
IAFP Member	$525.00	$600.00	IAFP Member	$325.00	$400.00	IAFP Member	$300.00	$375.00	IAFP Member	$650.00	$725.00
NonMember	$625.00	$700.00	NonMember	$425.00	$500.00	NonMember	$400.00	$475.00	NonMember	$750.00	$825.00

GROUP DISCOUNT:
Register 3 or more people from your company for one workshop and receive a 15% discount. Registrations must be received as a group. Discount does not apply to Workshop IV.

Refund/Cancellation Policy

Registration fees, less a $50 administrative charge, will be refunded for written cancellations received by June 14, 2002. No refunds will be made after that date; however, the registration may be transferred to a colleague with written notification. Refunds will be processed after July 8, 2002. The workshop may be cancelled if sufficient enrollment is not received by June 7, 2002.

To register, complete the Workshop Registration Form and submit to the International Association for Food Protection by:

Fax: 515.276.8655

Mail: 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2864, USA

Phone: 800.369.6337; 515.276.3344

CONTRIBUTE TO THE FIFTH ANNUAL FOUNDATION FUND SILENT AUCTION TODAY!

The Foundation of the International Association for Food Protection will hold its Annual Silent Auction during IAFP 2002, the Association's 89th Annual Meeting in San Diego, California, June 30–July 3, 2002. The Foundation Fund supports the:

- ★ Ivan Parkin Lecture
- ★ Travel support for exceptional speakers at the Annual Meeting
- ★ Audiovisual Library
- ★ Developing Scientist Competition
- ★ Shipment of volumes of surplus *JFP* and *DFES* journals to developing countries through FAO in Rome

Support the Foundation by donating an item today. A sample of items donated last year included:

- ★ Charleston Sweetgrass Basket
- ★ Food Safety Videos & Publications
- ★ Jeff Gordon Jacket
- ★ Phantom of the Marsh Print
- ★ Waterford Crystal Frame
- ★ White House 2001 Ornament
- ★ Wine
- ★ Wisconsin Master Cheesemaker Cheese Selection

Complete the form and send it in today.

Description of auction items _____

Estimated Value _____

Name of Donor _____

Company (if relevant) _____

Mailing Address _____

(Please specify: ❒ Home ❒ Work)

City _____ State or Province _____

Postal Code/Zip + 4 _____ Country _____

Telephone # _____ Fax # _____

E-mail _____

Return to:

Donna Gronstal
International Association for Food Protection
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2864, USA
Fax: 515.276.8655
E-mail: dgronstal@foodprotection.org

International Association for Food Protection®

Sponsorships

We invite you to participate as a sponsor for IAFP 2002. Sponsorship participation provides an excellent opportunity to position your company or organization as a supporter of the Association.

Several exciting opportunities will be available in 2002. Please review the event listing to select the one that will best position your organization. Reservations will be taken in order received for any open sponsorship events. A waiting list for events with a right of first option will be established.

SPONSORSHIP EVENT LIST

Amount	Event
$16,000	Monday Evening Social
$14,000	Opening Reception (Sunday)
$14,000	Exhibit Hall Reception (Monday)
$10,000	President's Reception (Tuesday)
$7,500	Badge Holders w/Lanyards
$3,250	Exhibit Hall Pastries and Coffee (Monday Morning)
$2,750	Exhibit Hall Coffee Break (Monday Afternoon)
$3,250	Exhibit Hall Pastries and Coffee (Tuesday Morning)
$2,750	Coffee Break (Tuesday Afternoon)
$2,750	Coffee Break (Wednesday Morning)
$2,250	Coffee Break (Wednesday Afternoon)
$3,500	Spouse/Companion Hospitality Room
$3,500	Student PDG Luncheon (Sunday)
$3,000	IAFP New Member Orientation (Saturday)
$3,000	Affiliate Reception (Saturday)
$2,000	Exhibitor Move-in Refreshments (Sunday)
$1,800	Awards Banquet Flowers (Wednesday)
$1,750	Committee Day Refreshments (Sunday)
$1,000	Speaker Travel Support
$600	Golfers' Continental Breakfast (Sunday)
$Various	Golf Tournament Prizes (Sunday)

Partial sponsorship for the above events is available.
Contact Dave Larson for details.

SPONSORSHIP PARTICIPANT

Name _____

Company _____

Address _____

City _____ State or Province _____

Country _____ Postal Code/Zip + 4 _____

Phone _____ Fax _____

E-mail _____

Desired Event to Sponsor _____

Amount Paid _____

Payment: ❑ Check ❑ VISA ❑ Mastercard ❑ American Express

Account Number _____

Expiration Date _____

Cardholder Signature _____

Contact:

Dave Larson
Phone: 515.440.2810
Fax: 515.440.2809
E-mail: larson6@earthlink.net

Payment Must be Enclosed for Order to be Processed
★ US Funds on US Bank ★

Coming Events

JUNE

·**4-5, Clean-In Place (CIP) Short Course**, Michigan State University, East Lansing, MI. For further information, call 517.355.7713 ext. 177; E-mail: partridg@msu.edu.

·**4-5, HACCP Seminar,** St. Louis, MO. For more information, call ASI Food Safety Consultants, Jeanette Huge at 800.477.0778, ext. 302.

·**4-6, Food Microbiology Short Course, Detection and Control of Foodborne Pathogens,** Penn State Berks, Reading, PA. For more information, call the Pennsylvania State University, Office of Conferences and Short Courses, at 814.865.8301; E-mail: shortcourse@ psu.edu.

·**4-6, Penn State Food Microbiology Short Course: Detection and Control of Foodborne Pathogens**, Penn State Berks Campus, Reading, PA. For further information, contact Dr. Cathy Cutter at 814. 865.8862; E-mail: cnc3@psu.edu.

·**5, Minimizing Allergen Risk in a Food Processing Plant One-Day Training Session**, Crowne Plaza Hotel, Madison, WI. For further information, call Neil Vassau at 608.833.6181; E-mail: nevassau@aol.com.

·**6-7, Advanced HACCP Seminar,** St. Louis, MO. For more information, call ASI Food Safety Consultants, Jeanette Huge at 800.477.0778, ext. 302.

·**15-19, IFT Annual Meeting**, Anaheim Convention Center, Anaheim, CA. For further information, call James N. Klapthor, 312.782. 8424 ext. 231; E-mail: jnklapthor@ ift.org.

·**28-29, IAFP Workshops,** San Diego, CA.

Workshop I – "Critical Steps in Laboratory Methods for the Detection of *Listeria monocytogenes*"

Workshop II – "Current Practices in Produce Safety: GAPs and GMPs"

·**29, IAFP Workshops,** San Diego, CA.

Workshop III – "Control of Pathogens in the Dairy Processing Environment"

Workshop IV– "Media Training for the Scientific Community"

See page 380 of this issue for additional workshop information.

·**30-July 3, IAFP 2002, the Association's 89th Annual Meeting,** San Diego, CA. Registration materials available in this issue of *DFES* on page 379 or visit our Web site at **www. foodprotection. org** for the most up-to-date Annual Meeting information.

·**30-July 3, NEHA, 66th Annual Educational Conference,** Minneapolis Hilton Hotel, Minneapolis, MN. For additional information, call 303.756.9090.

JULY

·**12-19, 22nd International Workshop/Symposium on Rapid Methods and Automation in Microbiology,** Manhattan, KS. For further information, contact Daniel Y. C. Fung at 785.532.5654; E-mail: dfung@oznet.ksu.edu.

·**18-19, Lead Auditor Seminar,** St. Louis, MO. For more information, call ASl Food Safety Consultants, Jeanette Huge at 800. 477.0778, ext. 302.

·**28-31, 39th Annual Florida Pesticide Residue Workshop and 5th Annual Florida Foodborne Pathogen Analysis Conference,** Trade Winds Island Grand Resort, St. Pete Beach, FL. For further information, contact W. George Fong at gandwfong@cs.com.

AUGUST

·**12-16, Introduction to Food Science,** Rutgers College, New Brunswick, NJ. For further information, contact Keith Wilson at 732. 932.9271; E-mail: kwilson@aesop. rutgers.edu.

·**17-22, 21st International Congress of Refrigeration,** Washington, D.C. For further information, contact Nadine George at 301. 984.9450 ext. 11; E-mail: nadineg@ conferencemanagers.com.

SEPTEMBER

·**9-10, HACCP I: Documenting Your HACCP Prerequisite Program,** Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, call Marlene Inglis at 519.821.1246; E-mail: gftc@ gftc.ca.

·**10-11, Upper Midwest Dairy Industry Association Annual Meeting,** Holiday Inn, St. Cloud, MN. For more information, contact Paul Nierman at 763.785. 0484.

·**17-19, New York Association for Food Protection Annual Meeting,** Holiday Inn, Syracuse/ Liverpool, NY. For more information, contact Janene Lucia at 607. 255.2892.

·**18-19, Wisconsin Association of Milk and Food Sanitarians, Inc. Joint Conference,** Ramada Inn, Eau Claire, WI. For more information, contact Randy Daggs at 608.837.2087.

·**18-20, "Thinking Globally — Working Locally: A Conference for Food Safety Education,"** Radisson Hotel Orlando, Orlando, FL. For more information, call 202.314.3459; E-mail: fsis.outreach @usda.gov.

·**18-21, AWT Convention and Exposition,** Disney's Coronado Springs Resort, Orlando, FL. For further information, contact Carrie Harley at 800.858.6683; E-mail: charley@awt.org.

·**23-25, Indiana Environmental Health Association Fall Educational Conference,** University Inn, West Lafayette. For more information, contact Helene Uhlman at 219.853.6358.

·**24-26, Wyoming Environmental Health Association Annual Educational Conference,** Camplex Center, Gillette. For more information, contact Sherry Maston at 307.322.9671.

·**24-27, Tecno Fidta 2002,** 6th International Food Technology, Additives and Ingredients Exhibition and Conference, Buenos Aires, Argentina. For further information, contact Julie Bernier at 207.842.5583.

·**25-27, Washington Association for Food Protection Annual Meeting,** Campbells' Resort, Chelan, WA. For more information, contact Bill Brewer at 206.363.5411.

·**25-29, The 27th World Veterinary Congress, WORLDVET Tunisia 2002,** Tunis, Tunisia. For further information, contact www.worldvetunisia2002.com.

OCTOBER

·**13-16, UW-River Falls Food Microbiology Symposium,** University of Wisconsin-River Falls, River Falls, WI. For additional information, contact Doreen Cegielski at 715.425.3704; E-mail: foodmicro@uwrf.edu.

·**16, Good Manufacturing Practices and Food Safety,** Cook College, Rutgers, New Brunswick, NJ. For additional information, contact Keith Wilson at 732.932.9271; E-mail: kwilson@aesop.rutgers.edu.

·**23-24, Associated Illinois Milk, Food, and Environmental Sanitarians Annual Meeting,** Stony Creek Inn & Conference Center, East Peoria, IL. For more information, contact Larry Terando at 217.278.5900.

·**29, Statistical Process Control in the Food Industry,** Part I of 2, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, call Marlene Inglis at 519.821.1246; E-mail: gftc@gftc.ca.

·**31, North Dakota Environmental Health Association Annual Meeting,** Holiday Inn Riverside, Minot, ND. For more information, contact Debra Larson at 701.328.6150.

NOVEMBER

·**20-21, Alabama Association for Food Protection Annual Meeting,** Holiday Inn-Homewood, Birmingham, AL. For more information, contact G. M. Gallaspy at 334.206.5375.

·**20-22, HACCP II: Development of Your HACCP Plan,** Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, call Marlene Inglis at 519.821.1246; E-mail: gftc@gftc.ca.

Career Services Section

FACULTY POSITION IN FOOD SAFETY

Assistant/Associate Professor of Food Safety at the University of California, Davis. PhD required with research training in microbial food safety, especially of foods of animal origin. DVM or equivalent preferred. Demonstrated aptitude/experience or documented potential in teaching. Documented research record or potential to develop an independent research program in food safety. Demonstrated record or potential in acquisition of extramural funding. Familiarity with food production and processing systems for foods of animal origin. Knowledge of use of applied epidemiological methods (e.g., risk analysis) in research. Must possess excellent interpersonal and communication skills and a demonstrated ability to work with others in a collegial team atmosphere. Teaching responsibilities include participation in lectures and labs in the DVM professional curriculum, the graduate professional curricula (MPVM, MPEH) and the graduate academic (MS and PhD) programs of the campus. Research responsibilities include development of a creative, independent and productive research program in food safety. To receive fullest consideration, applications must be received by June 28, 2002. Position open until filled. Qualified applicants should submit a letter of intent outlining special interest in the position, overall related qualifications and experience and career goals, curriculum vitae, and names, mailing and e-mail addresses of three professional references to Robert BonDurant, Chair (attn Linda Bentley), Department of Population Health and Reproduction, School of Veterinary Medicine, University of California, Davis, CA 95616.

The University of California is an equal opportunity/affirmative action employer.

Career Services Section

Department of Agriculture (USDA)

Agricultural Research Service (ARS)

ARS RESEARCH SCIENTISTS

The Agricultural Research Service, Beltsville, MD, is seeking applications for two permanent RESEARCH SCIENTIST positions in the Food Technology and Safety Laboratory. Microbiologist, Announcement #ARS-X2E-2163, and Research Food Technologist/Microbiologist, Announcement #ARS-X2E-2165. Grades GS-12/13. The mission of the laboratory is to conduct basic and applied research on beef, pork, lamb, poultry, and other animal products to enhance their quality and safety, and to develop technology for evaluating, maintaining, and improving the safety and quality of meat and meat products. U.S. CITIZENSHIP REQUIRED. Applications must be submitted by the closing date of announcement, May 6, 2002. For information on procedures, copy of full vacancy announcement, and/or forms call 301-504-1369, or view full announcements on Internet under http:www. afm.ars.usda.gov/divisions/hrd/index.html.

ARS is an equal opportunity provider and employer.

OREGON DEPARTMENT OF HUMAN SERVICES

Environmental Health Specialist 3

(Food Consultation and Training Officer)
Salary $3,115 to $4,346/monthly

The Oregon DHS, Office of Environmental Services and Consultation is currently recruiting for an Environmental Health Specialist - 3 to serve as Food Program Consultation and Training Officer. This is a permanent full-time position located in Portland.

This position works directly with the Food Program Coordinator and will act as a liaison with local health departments, participate in conducting office and field audits of the food protection program in county health departments, standardization of field inspectors and providing rule and policy interpretations, technical consultation to industry, health departments and the public.

To review the job qualifications and application requirements, see the DHS website at http://personnel.hr.state.or.us, **call 503-945-5742, or contact your local Oregon Employment Department office. Look or ask for job announcement LEHS2117. The deadline for applications is June 7, 2002.**

EEO

CAREER SERVICES SECTION

List your open positions in *Dairy, Food and Environmental Sanitation*. Special rates for this section provide a cost-effective means for you to reach the leading professionals in the industry. Call today for rate information.

Ads appearing in *DFES* will be posted on the Association Web site at www.foodprotection.org at no additional cost.

Send your job ads to Donna Bahun at dbahun@foodprotection.org or to the Association office: 6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2864; Phone: 800.369.6337; 515.276.3344; Fax: 515.276.8655.

IAFP Members

Did you know that you are eligible to place an advertisement if you are unemployed and looking for a new position? As a Member benefit, you may assist your search by running an advertisement touting your qualifications.

Journal of Food Protection®

ISSN: 032-028X
Official Publication

International Association for Food Protection®

Reg. U.S. Pat. Off.

Vol. 65 | May 2002 | No. 5

Letters to the Editor

Articles

Research Notes

Review

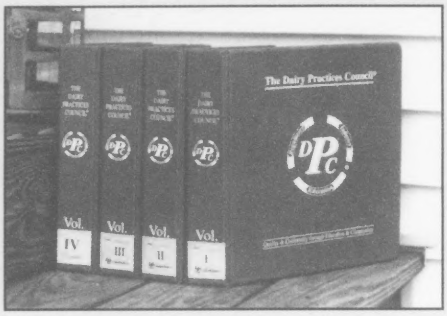
* Asterisk indicates author for correspondence.

In Memory of...

Dr. Charles Lattuada
Hartwell, GA

IAFP would like to extend our deepest sympathy to the family and friends of Dr. Charles Lattuada. IAFP will always have sincere gratitude for his contribution to the association and the profession.

ADVERTISING INDEX



IAFP Offers "Guidelines for the Dairy Industry" from The Dairy Practices Council®

This newly expanded Four-volume set consists of 66 guidelines.

1 Planning Dairy Freestall Barns
2 Effective Installation, Cleaning, and Sanitizing of Milking Systems
3 Selected Personnel in Milk Sanitation
4 Installation, Cleaning, & Sanitizing of Large Parlor Milking Systems
5 Directory of Dairy Farm Building & Milking System Resource People
6 Natural Ventilation for Dairy Tie Stall Barns
7 Sampling Fluid Milk
8 Good Manufacturing Practices for Dairy Processing Plants
9 Fundamentals of Cleaning & Sanitizing Farm Milk Handling Equipment
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For the past 32 years, DPC's primary mission has been the development and distribution of educational guidelines directed to proper and improved sanitation practices in the production, processing, and distribution of high quality milk and milk products.

The DPC Guidelines are written by professionals who comprise six permanent task forces. Prior to distribution, every guideline is submitted for approval to the state regulatory agencies in each member state. Should any official have an exception to a section of a proposed guideline, that exception is noted in the final document.

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

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