VOL. 27, NO. 11
ISSN: 1541-9576
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FOOD PROTECTION TRENDS

SCIENCE AND NEWS FROM THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

NOVEMBER 2007

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FOOD PROTECTION TRENDS
SCIENCE AND NEWS FROM THE INTERNATIONAL ASSOCIATION FOR FOOD PROTECTION

Food Protection Trends (ISSN-1541-9576) 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.

News Releases, Updates, Coming Events and Cover Photos: Correspondence for these materials should be sent to Donna A. Bahun, Production Editor, International Association for Food Protection.

"Instructions for Authors" may be obtained from our Web site at www.foodprotection.org or from Donna A. Bahun, Production Editor, International Association for Food Protection.

Orders for Reprints: All orders should be sent to *Food Protection Trends*, International Association for Food Protection. Note: Single copies of reprints are not available from this address; address single copy reprint requests to principal author.

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Business Matters: Correspondence regarding business matters should be addressed to Lisa K. Hovey, Managing Editor, International Association for Food Protection.

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Subscription Rates: ***Food Protection Trends*** is available by subscription for $248.00 US, $263.00 Canada/Mexico, and $278.00 International. Single issues are available for $26.00 US and $35.00 all other countries. All rates include shipping and handling. No cancellations accepted. For more information contact Julie A. Cattanach, Membership Services, International Association for Food Protection.

Claims: Notice of failure to receive copies must be reported within 30 days domestic, 90 days outside US.

Postmaster: Send address changes to ***Food Protection Trends,*** 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2864, USA.

Food Protection Trends is printed on paper that meets the requirements of ANSI/NISO 239.48-1992.

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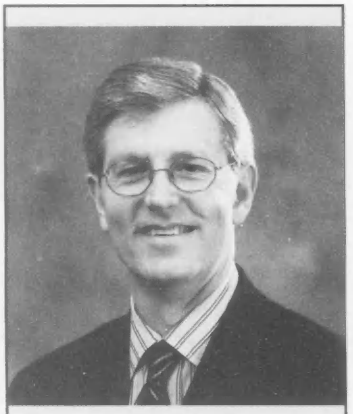
"LONE STAR PERSPECTIVE"
FROM YOUR PRESIDENT

Are you ready for the "holiday season?" Well, you might as well be, because the 2007 holiday season is officially upon us. I know it is probably just my age showing, but it seems like the winter holidays just finished, and now they are back again. Actually, I can remember hearing "old" people say stuff like that when I was a kid and thinking something must be seriously wrong with them. Maybe it is just the fact that we have so many things to think about and be responsible for that the holidays never cross our minds until they show up at our doorstep to remind us that there is still preparation to be done. In my case, "preparation" usually means I need to go shopping for gifts, since I have procrastinated so much that I am in a panic to find anything appropriate. I always resolve to shop for gifts throughout the year and purchase the "perfect gift" as I just happen to find it. That way, all my gifts have sincere and meaningful significance and have obviously been purchased with thoughtful consideration of the recipient's needs and personality. *Right…*

In the United States, the "holiday season" kicks off in November with Thanksgiving Day and then continues on through New Year's Day on January 1. Since we are an international association, I know there are all kinds of holidays involving our members that occur throughout the year. Traditional, annual holidays are important for our well-being, because they remind us of an event, support a tradition, give us an opportunity to refocus our activities and life—or simply provide an excuse to gather with friends and family.



By GARY ACUFF
PRESIDENT

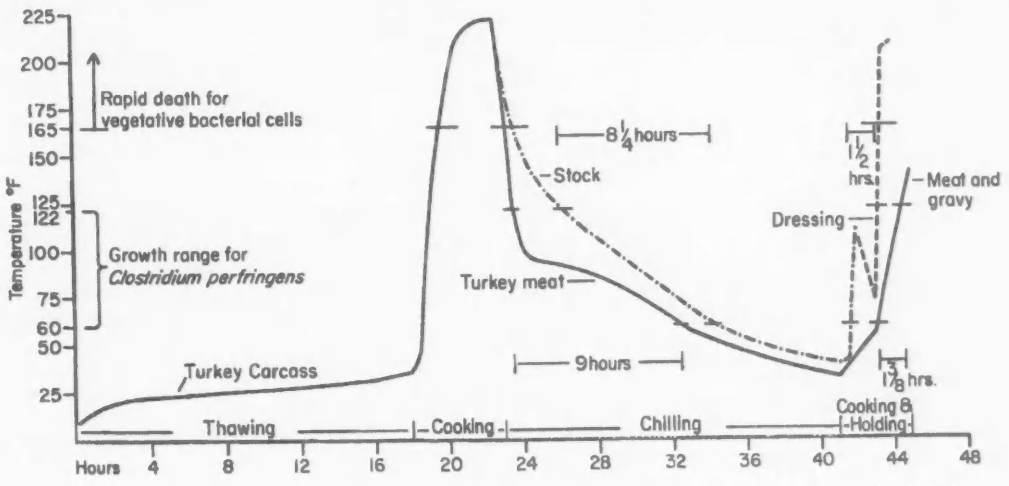
"What better way for us to advance food safety worldwide than to help protect our friends and family?"

So why is this important to IAFP? That's easy. Whether you are in the US or anywhere else around the globe, holidays usually involve people gathering, unusual or traditional customs, activities, and food. Nearly always food. Lots of food. And often the food is provided from several points of preparation, maybe distant points of preparation, to be transported to some central location for a gathering of friends or family to celebrate the holiday. And that's where we step in. What better way for us to advance food safety worldwide than to help protect our friends and family?

In my career as a food microbiologist, there are several journal articles that I would consider landmark articles. Not necessarily because they were extremely innovative or provided some remarkable new discovery, but because they spoke to some need I had at the time or they opened my eyes to some new facet of the field. One of my favorite articles is a manuscript published in 1971 by Frank Bryan, Thomas McKinley and Byron Mixon in the *Journal of Milk and Food Technology* (the former name of the *Journal of Food Protection*), volume 34, page 576 and following. This article is on my all time favorite list because it was well-written, easy to follow, extremely practical, and it was one of the papers I read back in the 1970s that convinced me I really wanted to work in this field.

Bryan et al. were conducting an investigation of a foodborne outbreak of *Clostridium perfringens* that was associated with turkey and dressing and occurred at a Georgia elementary school, and since turkey and dressing are often served at meals in the US during the holiday season, I always remember the study at this time of year. In this manuscript, the authors reported that they were unable from epidemiological data to confirm the source of the illness or the preparation circumstances that allowed the illness to occur. So they did what any self-respecting scientist would do—they reconstructed the event

FIGURE 10. Illustration of possible time-temperature relationships during turkey preparation in a school lunch kitchen.

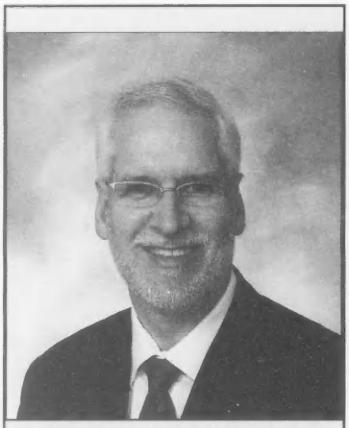


and observed for possible mistakes. Actually, they waited until the school kitchen again prepared turkey and dressing and monitored the process, but "reconstructed the event" sounds so much more official and scientific. The authors collected samples for various pathogens, monitored temperatures at numerous locations in preparation to include food products during thawing, room temperature, cooking temperatures, cooling temperatures... Well, you understand; they measured the temperature of nearly everything. There were nine different figures published in the manuscript illustrating temperature changes during preparation, cooking, holding, and serving of the turkey and dressing, but Figure 10 always caught my attention (shown above). Figure 10 summarizes everything. It shows how time-temperature relationships during preparation may have allowed *C. perfringens* to grow in different parts of the meal during preparation, prior to and after assembly and during storage. The figure also illustrates how vegetative cells would have been destroyed during heating and reheating, and how spores could have survived and produced vegetative cells again during temperature abuse. This figure was a landmark point at the beginning of my studies in food microbiology because it opened my eyes to the complication of food preparation processes. It made me realize how microbial ecology interrelates with the process, and it showed me how temperature control is not as simple as putting something in an insulated cooler.

Few of our friends and family members realize how complicated food production, processing and preparation actually is, and it would likely be unreasonable to expect them to understand how we might view a situation within a holiday gathering that had obvious food safety flaws. They probably do know that we are often cautious about what we eat and, on occasion, they may hear us make a comment about proper preparation or storage temperature. I know I have gotten the raised eyebrow and maybe even a snide remark about being a little paranoid from a family member more than once after a comment. That is usually followed by a statement of assurance in the *status quo*: "We have been doing this for as long as I can remember and nobody has ever gotten sick." *Right...*

So are you ready for the holidays? I am. I have new batteries for my thermocouple and I am ready to check the temperature on anything that squawked, snorted, or mooed in a former life. Guess I better start doing a little shopping for gifts, though. If you have any good ideas for friend and family gifts, please send me an E-mail! Oh, and in case you were wondering, the meat and gravy turned out to be the likely culprit in the Bryan et al. study.

"COMMENTARY"
FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP, CAE
EXECUTIVE DIRECTOR

"We are always interested in thoughts and ideas that can help build the international network of food safety professionals"

I know that over the past months I have written about IAFP and the ways in which we are developing internationally as an Association. For this month, I want to again update you on what IAFP has accomplished over the recent past.

In September, IAFP participated as a partner and supporter of the first "China International Food Safety & Quality" conference, or CIFSQ conference that was held in Beijing, China. You may have seen summary reports (linked from IAFP's Home page) about this conference, but let me tell you first hand that it was a very exciting event for your Association! There were more than 1,000 people in attendance from more than 17 countries; with over 40 companies exhibiting their products and services. It was gratifying to see many international companies, who regularly support IAFP, were able to step forward to support this conference. IAFP's summary report, including pictures, begins on page 916 of this issue.

You may recall that IAFP assisted the conference organizers by providing input on program topics and through speaker suggestions. As a result of our direct invitations, there were 10 internationally recognized food safety professionals on the program. In addition, there were another 10 IAFP Members who learned of the CIFSQ conference and volunteered their time and expertise to participate as presenters. In addition, there were a fair number of people from North America who made the trip to China just to attend this first-of-its-kind conference. We commend all who participated, whether as an attendee, speaker or sponsor! It was a well received program and one which garnered the attention of China's food safety government officials.

I would be remiss if I did not mention that Frank Yiannas, now our Past President, worked tirelessly in support of this conference. Frank provided guidance on topics, speakers and extended many personal invitations to encourage participation. Frank was also honored as a plenary session speaker in addition to bringing an IAFP welcome to all attendees. I am certain that recognition of IAFP skyrocketed in the Asian region as a result of our avid support of this conference. We were also surprised at the number of people who visited with both Frank and me at the conference who thought this conference was an "IAFP organized" gathering of food safety professionals. Because of the success of the conference, this is good! Be watching for information about a second conference (a follow up to this first China conference) to be held in September of 2008.

As I have said before, this is such an exciting time for IAFP Members! In addition to the involvement in China, by the time you read this column, our Third European Food Safety Symposium will have concluded. Since I am writing before the event began, we cannot provide you with a summary or pictures, but we will do so in the December issue of *Food Protection Trends*. We received excellent support from a number of companies who agreed to sponsor and exhibit at the symposium. It would be appropriate to recognize our lead sponsors at the Gold Level; they are bioMérieux Industry, Bio-Rad Laboratories and DuPont Qualicon. We appreciate the support provided by these industry leading companies and also from the IAFP Foundation. The financial contribution made by each of our sponsors allows IAFP to conduct the symposium in a financially responsible manner for the Association.

At the beginning of October, President Gary Acuff and I traveled to São Paulo, Brazil to visit possible meeting sites and to meet with potential sponsors and exhibitors

in planning for a Latin American Symposium on Food Safety to be held in June or July of 2008. Soon, we will announce the program content and identify those agreeing to sponsor and exhibit. It was a short trip (as to time we had in São Paulo!), but one that will pay dividends for IAFP in the long-term. In so many of our world's cultures, it means much more to meet someone face-to-face in order to show your sincerity. We must recognize this as IAFP grows internationally.

With the assistance of Maria Teresa Destro and Mariza Landgraf, we met at the University of São Paulo with more than 12 interested sponsors. This meeting was arranged in less than two weeks time and there were other companies who were unable to attend, but were still interested. As I was writing this column on the plane returning from São Paulo, I learned upon my arrival back in Des Moines that we already have one sponsor for the Latin American Symposium in the amount of $5,000! I believe this shows the power of demonstrating IAFP's commitment to holding symposia outside of North America and it also shows the wonderful financial assistance provided by our supporting companies.

If you are interested in future involvement with IAFP's international efforts, please contact me at the IAFP office. We are always interested in thoughts and ideas that can help build the international network of food safety professionals. It is an exciting time to be an IAFP Member!

ARTICLES

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6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2864

International Association for Food Protection

Recommendations for Handling Fresh-cut Leafy Green Salads by Consumers and Retail Foodservice Operators

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SUMMARY

A panel of scientists with expertise in microbial safety of fresh produce was convened to review recent research and re-evaluate guidelines for foodservice and restaurant operators, regulatory agencies with oversight over food facilities, and consumers for handling prewashed bagged salads. The guidelines developed by the panel, together with materials reviewed by the panel to develop the guidelines, are presented. The background materials reviewed include published research and recent recommendations made by other authoritative sources. The panel concluded that leafy green salad in sealed bags labeled "washed" or "ready-to-eat" that are produced in a facility inspected by a regulatory authority and operated under cGMPs, does not need additional washing at the time of use unless specifically directed on the label. The panel also advised that additional washing of ready-to-eat green salads is not likely to enhance safety. The risk of cross contamination from food handlers and food contact surfaces used during washing may outweigh any safety benefit that further washing may confer.

A peer-reviewed article

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INTRODUCTION

Fresh-cut (minimally processed) fruit and vegetable sales have grown to approximately $15 billion per year in the North American foodservice and retail market and account for nearly 15% of all produce sales. The largest portion of US fresh-cut produce sales at retail are fresh-cut salads, with sales of $2.7 billion per annum *(24)*. While the incidence of foodborne illness associated with fresh-cut salads is very low relative to the quantity consumed, the increased use of these products has been accompanied by an increase in reported outbreaks associated with their consumption. Since 1995, FDA records indicate that 22 US outbreaks of foodborne illness caused by *Escherichia coli* O157:H7 have been associated with consumption of fresh or fresh-cut lettuce and two with pre-washed spinach *(9)*. In 2006, a large *E. coli* O157:H7 outbreak associated with pre-washed spinach affected over 200 people in more than 20 states *(10)*. This outbreak was followed by two restaurant-associated outbreaks linked to consumption of pre-washed lettuce. An outbreak of *E. coli* O157:H7 in 2005, in Minnesota, was epidemiologically associated with pre-washed bagged salad products containing romaine lettuce *(7)*. Similar outbreaks in 2003 were associated with bagged pre-washed spinach and romaine-iceberg mix *(5, 6)*. An increase in the incidence of hepatitis A in Los Angeles County between August and December 2005 led to an epidemiological study of one cluster of illnesses that implicated two food products, one of which was a leafy green salad *(18)*. Following these outbreaks, the question of possible recommendations for consumers was posed by local regulatory authorities. Specifically, it was proposed that consumers and foodservice operators be advised to re-wash bagged, pre-washed salad greens prior to use. To answer these questions, a panel of food safety experts with particular expertise in produce safety was convened to review recently published research and current recommendations on use of packaged leafy green salads. The panel then met to produce guidelines for foodservice operators and for consumers.

The issue

Does washing of ready-to-eat fresh-cut produce immediately before consumption at retail, restaurant or by consumers significantly enhance, reduce or have no effect on the risk of foodborne illness?

Survival and growth of human pathogens on leafy vegetables and internalization of cells

Studies on survival and growth of pathogens on lettuce and parsley have shown that *Shigella sonnei* and *E. coli* O157:H7 will decrease in numbers when the produce is stored at 4–5°C/39–41°F but increase at 12°C/54 °F (*E. coli* O157:H7) and 21°C/70 °F (both pathogens)*(1, 28)*. Seo and Frank *(20)* inoculated lettuce by immersion in a suspension of *E. coli* O157:H7 overnight at 7°C/45°F, after which it was rinsed with sterile distilled water and then treated with a 20 ppm chlorine solution. In a separate experiment, lettuce leaves were first immersed in a suspension of *Pseudomonas fluorescens* for 48 h at 16°C/61°F to allow biofilm formation. The leaves were then rinsed with sterile water and transferred to a suspension of *E. coli* O157:H7 for 24 h at 7°C/45°F. Examination of inoculated lettuce leaf surfaces by confocal scanning laser microscopy showed that *Pseudomonas* (predominant psychrotrophic spoilage organism) adhered to and grew mainly on the intact leaf surface, whereas *E. coli* O157:H7 was entrapped 20 to 100 µm below the surface in stomata and cut edges. Many live *E. coli* O157:H7 cells were found in stomata and on cut edges following the chlorine treatment. This indicates the probability that subsequent washing probably will not be effective in removing the cells. Takeuchi et al. *(23)* allowed attachment of cells of *E. coli* O157:H7, *Listeria monocytogenes*, *Salmonella* Typhimurium, and *P. fluorescens* to lettuce leaves for 18 h at 4°C/39°F. The cut edges were physically separated from the remainder of the leaf section, and populations were enumerated on appropriate selective media. In addition, the inoculated lettuce sections were examined by confocal scanning laser microscopy. Results confirmed the preferential attachment of *E. coli* O157:H7 to cut surfaces, and showed that *L. monocytogenes* has an even greater preference for cut surfaces, whereas *S.* Typhimurium attached equally to both sites. *L. monocytogenes* also has been shown to grow on lettuce.

Effect of wash procedures on subsequent growth or survival during storage

Delaquis et al. *(11)* inoculated cut iceberg lettuce with *E. coli* O157:H7 and *L. monocytogenes* before and after washing for 3 min in cold (4°C/39°F) and warm (47°C/117°F) water containing 100 ppm total chlorine, then stored the product at 1 and 10°C/50°F under aerobic conditions. Populations of *E. coli* O157:H7 declined over 14 days storage at 1°C/34°F under both washing conditions as well as at 10°C/50°F when washed in cold chlorine solution (current industry practice). Populations increased when stored at 10°C/50°F after a warm chlorine solution wash. However, this is not the procedure currently used in commercial operations. Similar results were obtained with *L. monocytogenes*, which showed about a 1 log CFU/g increase in the inoculated control when stored at 10°C/50°F but a 2 log CFU/g increase when the lettuce was washed with warm chlorine solution. Li et al. *(16)* also studied the survival and growth of *E. coli* O157:H7 on lettuce treated with 20 ppm chlorine at either 20 or 50°C/68 or 122°F then stored at 5°C/41°F for 18 days or at 15°C/59°F for 7 days. Populations declined throughout storage at 5°C/41°F but increased by 2.3 to 3.2 log CFU/g within 2 days at 15°C/59°F, and then continued to increase at a slower rate through the 7 days of storage at that temperature.

Home or foodservice washing procedures

Vijayakumar and Wolf-Hall *(26)* evaluated "household sanitizers" for their effectiveness in reducing levels of inoculated *E. coli* and naturally present aerobic mesophilic bacteria on iceberg lettuce. Treatments tested were diluted solutions of apple cider vinegar, 5% (0.3% acetic acid); household bleach, 4% (180 ppm available chlorine); lemon juice, 13% (0.6% citric acid); and white vinegar, diluted 35:65 with water (1.9% acetic acid). The white vinegar solution, used at 21°C/70°F for 10 min without agitation, or 5 min with agitation, produced a 5.4 log CFU/g reduction in *E. coli*, compared to a 0.9 log CFU/g reduction achieved with distilled water at the same temperature. However, sensory evaluation of the lettuce treated with white vinegar showed that it was significantly less acceptable than samples treated with the other sanitizers. Lemon juice (at 4°C/39°F) and cider vinegar (at 21°C/68°F) gave reductions of 2.1 and 2.7 log CFU/g, respectively, compared

to 0.9 log CFU/g for distilled water. The bleach solution gave a reduction of 1.6 log CFU/g when used at 4°C/39°F with agitation for 10 min.

Kilonzo-Nthenge, Chen, and Godwin *(13)* evaluated home washing methods for reducing surface contamination of lettuce with *L. monocytogenes*. Washing with running tap water for 15 s achieved a 1.4 log CFU/g reduction, compared to the following treatments: 2 min soak in tap water followed by 15 s rinse (1.8 log CFU/g reduction); 2 min soak in vinegar (5%) followed by 15 s rinse in water (1.9 log CFU/g reduction); 2 min soak in Veggie Wash (2.0 oz/gal of water) followed by 15 s rinse in water (1.7 log CFU/g reduction).

Several researchers have shown that washing lettuce with chlorine solutions (20 to 200 mg/l) reduces the microbial load (either naturally occurring microflora or inoculated pathogen) more than washing with water. However, the difference is relatively small, and neither treatment eliminates pathogens or spoilage bacteria. For example, Lang, Harris and Beuchat *(15)* obtained average reductions of *E. coli* O157:H7 on lettuce of 0.6 log CFU/ml with water and 1.4 log CFU/ml with chlorine (200 ppm) when the lettuce was submerged with agitation for 5 min. An inoculated sample that contained 5.1 log CFU before treatment contained 4.6 log CFU after washing with water and 3.7 log CFU after treatment with chlorine. Weissinger, Chantarapanont, and Beuchat *(27)* inoculated *Salmonella* Baildon onto shredded lettuce at low (0.6 log CFU/g) and high (3.6 log CFU/g) level and treated the inoculated lettuce with cold (4°C/39°F) sodium hypochlorite (NaClO) solution (120 and 200 ppm) immediately after inoculation for 40 s. The test organism was recovered from all samples by enrichment, and populations on the lettuce treated with the high inoculum level was found to be reduced by 1.1 log CFU/g with 120 ppm free chlorine and 1.1 log CFU/g with 200 ppm free chlorine. Washing with cold deionized water (control) reduced the population by 0.3 log CFU/g. Kondo, Murata, and Isshiki *(14)* inoculated iceberg lettuce with *Staphylococcus aureus*, *E. coli* O157:H7, and *S.* Typhimurium DT104 by immersing leaves in cell suspensions for 5 min or 1 h. In addition, some leaves inoculated for 1 h were wrapped in plastic film and stored at 4°C/39°F for 2 days. Inoculated leaves were washed five times with 0.85% NaCl. Washing was most effective (2.9% residual cells for *E. coli* O157:H7) on leaves inoculated for 5 min and least effective (13.6% residual cells for *E. coli* O157:H7) when 2 days storage occurred before washing. Inoculated leaves were immersed in treatment solutions for 10 min at room temperature or for 1 min at 50°C/122°F, and then cooled in 0.85% NaCl solution at 4°C/39 °F for 30 s, followed by three washes in 0.85% NaCl solution. Treatment solutions included fumaric acid (5 mM and 50 mM), NaClO (200 ppm, pH 6.0), and distilled water. For leaves inoculated and held for 1 h and stored for 2 days, treatment with NaClO reduced populations of *E. coli* O157:H7 to 6.4% of the pretreatment cell population, compared with 17.8% residual cells when treatment was with distilled water. Treatment with 50 mM fumaric acid at room temperature was not significantly more effective than 200 ppm NaClO, leaving 4.0% residual cells.

Singh et al. *(21)* used aqueous chlorine dioxide (10 mg/L for 10 min), ozonated water (10 mg/L for 10 min), and thyme oil (0.1% for 5 min) to wash shredded romaine lettuce inoculated with *E. coli* O157:H7. When sprinkle-inoculated lettuce samples were held for 24 h at 5°C/41°F before washing, log reductions achieved by washing were 1.6, 1.5, and 1.9 log CFU/ml (respectively), compared to a log reduction of 0.9 log CFU/ml by sterile deionized water wash. A multistage washing treatment improved efficacy somewhat. Using treatment times of 5 min for de-ionized water, aqueous chlorine dioxide, ozonated water, and 2 min for thyme oil, log reductions after the first wash were 0.5, 1.2, 1.1 and 1.5 log CFU/ml, respectively. After the second wash, total log reductions were 0.6, 1.7, 1.6, and 2.2 log CFU/ml, respectively. A third wash did not result in significant improvement. The authors speculate that this may be because the remaining microorganisms have penetrated the cut surfaces and stomata and are not accessible to the sanitizers.

Smith et al. *(22)* evaluated the effect of a commercial peroxyacetic acid produce wash on the natural microflora in a food service setting and found that when the initial contamination was greater than 100 CFU/g, use of the commercial wash resulted in about a 1 log CFU/g greater reduction than water alone. Sapers *(19)* reviewed washing treatments for home or foodservice use and found that use of alternatives to chlorine for produce washes may avoid disadvantages of chlorine such as formation of toxic reaction products, but differences in antimicrobial efficacy are small. He also observed that "safe and uniform application may be problematic without the controls available for large-scale applications."

Escudero et al. *(12)* evaluated the effects of chlorine and chlorine combined with surface active agents and organic acids on *Yersinia enterocolitica* on fresh lettuce. The combination of 100 ppm chlorine and 0.5% lactic acid (pH 2.28, 22°C/72°F, 1 min treatment) produced a reduction of more than 6 log CFU/g of the target organism. The authors did not address potential hazards to workers of using this solution in a foodservice setting.

Studies on washing produce and general food handling by consumers and foodservice establishments

Li-Cohen and Bruhn in 2002 *(17)* studied consumer handling of fresh produce from the time of purchase to the plate via a national mail survey of 624 respondents. Six percent of respondents replied that they never or seldom wash fresh produce before consumption. Approximately 53% of all respondents did not wash their hands before handling fresh produce; 56% report that they always wash the sink before handling fresh produce; and of those that wash the sink, 11% use water only. Ninety-seven percent of all respondents reported that they always washed food preparation surfaces after contact with raw meat products. However, washing was inefficient, since 5% of respondents only dry wipe, and 24% of respondents wash these potentially contaminated food preparation surfaces with water only. This survey also found that many respondents did not separate produce from raw meat, poultry or fish in their refrigerators. This data indicates that the possibility of re-contaminating a previously washed product in the consumer's kitchen is fairly high.

In 2003, the US Food and Drug Administration (FDA) collected data

TABLE 1. Percent of facilities out of compliance with assessment criteria based on 1997 Food Code

Type of facility	Contaminated equipment/protection from contamination[1]	Surfaces/utensils cleaned and sanitized	Poor personal hygiene[2]	Proper hand-washing
Fast food restaurant	21.9	50.9	31.2	53.8
Full serve restaurant	37.3	56.6	41.7	72.7
Retail stores/produce	20.5	44.4	22.3	33.3

[1]Contaminated equipment/protection from contamination is a multi-factor category that includes surfaces/utensils cleaned and sanitized.

[2]Poor personal hygiene is a multi-factor category that includes proper hand washing.

Source: USHHS-FDA *(25)*.

via site-visits to over 900 establishments representing nine distinct facility types including restaurants, institutional food-service operations and retail food stores *(25)*. Direct observations of produce handling practices were supplemented with information gained from discussions with management and food workers and were used to document the establishments' compliance status based on provisions in the 1997 Model FDA Food Code. Failure to control product holding temperatures, poor personal hygiene, use of contaminated equipment/failure to protect food handling equipment from contamination and risk of potential chemical contamination were the risk factors found to be most often out of compliance with the 1997 FDA Model Food Code. The percentages of "out of compliance" observations for each of these risk factors were found to be: improper holding/time temperature (49.3%), poor personal hygiene (22.3%), contaminated equipment (20.5%) and chemical contamination (13.5%). Specifically, for the improper holding/time and temperature risk factor, it was found that maintaining cold holding temperatures at or below 5°C/41°F) for produce items that are classified as potentially hazardous foods (PHF) did not occur in 70.2% of the observed situations. Holding PHFs at or below 5°C/41°F) is critical to preventing the potential growth of human pathogens, which may rapidly proliferate on inadequately refrigerated PHFs. Date marking of refrigerated ready-to-eat, PHFs is also an important component of any food safety system, and it is designed to promote proper food rotation and limit the growth of *L. monocytogenes* during cold storage. However, appropriate date marking of ready-to eat, PHF produce items made on-site did not occur in 34.0% of the observations.

The personal hygiene risk factors associated with produce that are most in need of attention at retail and foodservice operations include adequate, available and accessible handwashing facilities. These personal hygiene risk factors were found by the survey to be not in compliance with the 1997 FDA Model Food Code 33.3%, 26.2%, and 20.6% of the time, respectively. Hands are a very common vehicle for the transfer of human pathogens to food products, and food handlers' hands may become contaminated when they engage in activities such as handling raw meat products, using the restroom, coughing or handling soiled tableware.

Food safety procedures for cleaning and sanitizing food contact surfaces and utensils for handling produce were found to be not in compliance with the 1997 FDA Model Food Code in 44.4% of the observations in this study. Proper cleaning and sanitization of food contact surfaces is essential to preventing cross contamination. Results for selected types of facilities and selected assessment criteria are shown in Table 1.

Many fresh-cut fruit and vegetable products are "ready-to-eat" food products that require no further preparation. These products are no different from any other ready-to-eat food product. The fresh-cut produce industry was established to provide convenient ready-to-eat foods to food service establishments and the consumer in a form that reduced the risk of food product contamination by placing preparation of fresh-cut produce in a controlled food manufacturing environment.

Current recommendations regarding re-washing of fresh-cut produce

Advice to consumers contained in current publications such as the "Fight BAC" materials from the Partnership for Food Safety Education *(2)*, the 2005 report of the Produce for Better Health Foundation *(8)*, California Department of Health Services document *(3, 4)* and the 2005 Dietary Guidelines Advisory Committee Report may be summarized as follows.

1. Consumers should first read the label to determine if the product is ready-to-eat. Packaged salad mixes labeled "ready-to-eat,"

"washed," or "triple-washed" need not be washed again by the user if they are kept refrigerated and used by the "use-by" date.

2. If desired, pre-washed packaged salads may be rewashed without harming product quality. Since improper handling in the home or restaurant during preparation is a leading cause of foodborne illness, it is important to protect the product from cross contamination from raw foods, contaminated equipment, or inadequately washed hands.
3. Antibacterial agents may be used on raw produce if they are approved for food contact and used according to directions. However, these products do not completely remove bacterial pathogens or disease-causing viruses.

After reviewing all of the above information, the panel drafted the following recommendations for (a) retail and food service operators and (b) consumers.

Recommendations to retail and food service operators regarding rewashing ready-to-eat lettuce/leafy green salads

1. Carefully read labels to determine whether a product is a raw agricultural commodity (e.g. hearts of Romaine) that should be washed before consumption or a ready-to-eat (RTE) food product (e.g. pre-washed lettuce/leafy green salad). If the product is not labeled "washed", "triple washed" or "ready-to-eat", the product needs to be washed before consumption.
2. If a RTE lettuce/leafy green salad is received in sealed bags labeled "washed", "triple washed" or "ready-to-eat" from a facility inspected by a regulatory authority and operated under cGMPs, it does not need additional washing at the time of use unless specifically directed on the label.
3. Additional washing of RTE lettuce/leafy green salads is not likely to enhance safety.
   - Current research suggests that if harmful microorganisms are present after commercial washing treatments, they are likely to resist removal or inactivation by further washing.
   - If appropriate practices are not followed, there is a risk of cross contamination from food handlers and food-contact surfaces such as sinks, colanders and pans used during washing. This may outweigh any safety benefit that further washing may confer in bagged, pre-washed, RTE salads.
4. If the end-user chooses to wash the RTE lettuce/leafy green salads before use:
   - Wash hands thoroughly with soap and warm water before handling RTE lettuce/leafy green salads. Rewash hands as necessary.
   - Clean and sanitize the sink, colander, and any equipment or utensils that will contact the product.
   - Use cold running water to wash RTE lettuce/leafy green salads to reduce the potential for cross contamination.
   - If product is soaked, reduce the potential for cross contamination by using a registered (US EPA, US FDA, state and local jurisdictions) and appropriately labeled antimicrobial products as per manufacturer's directions. Antimicrobial concentrations should be monitored to ensure appropriate concentrations are maintained during soaking or washing. Household bleach is generally not acceptable for this application.
5. Additional Considerations
   - Wash hands thoroughly for 20 s with soap and warm water before handling RTE lettuce/leafy green salads. Rewash hands as necessary.
   - Use a barrier such as clean, intact gloves and/or an appropriate clean and sanitized utensil (changed with sufficient frequency to prevent cross contamination) to handle or dispense fresh-cut lettuce/leafy green salads. This does not alleviate the need for proper hand-washing, so hands should be washed for 20 s before gloves are used.
   - RTE lettuce/leaf green salads should be shipped, stored and displayed under refrigeration.
   - RTE lettuce/leafy green salad shipping containers may become contaminated during transport and storage. Therefore:
     - ➢ Inspect product cartons or bags upon receipt and reject any product that shows evidence of mishandling or tampering (e.g., dirty, wet, open or crushed boxes or bags, etc.).
     - ➢ Ensure that storage practices do not subject the product to potential cross contamination (e.g., do not store raw meats above RTE lettuce/leafy green salad cartons or bags).
   - Discard the product if it appears spoiled or has exceeded its labeled use-by date.

Recommendations to consumers regarding washing ready-to-eat lettuce/leafy green salads

1. Carefully read labels to determine whether a product is one that should be washed before consumption (e.g. hearts of Romaine) or is a ready-to-eat (RTE) food product (e.g. pre-washed lettuce/leafy green salad). If the product is not labeled "washed", "triple washed" or "ready-to-eat", the product needs to be washed before consumption.
2. If a RTE lettuce/leafy green salad is received in either a sealed bag or rigid plastic containers labeled "washed", "triple washed" or "ready-to-eat" it does not need additional washing before you eat it unless specifically directed on the label.
3. Additional washing treatments are not likely to enhance the safety of RTE lettuce/leafy green salads.

- Harmful bacteria are rarely found on RTE lettuce/leafy green salads.
- In the unlikely event that harmful bacteria are present on a RTE lettuce/leafy greens salad after commercial washing, they are likely to resist removal or inactivation by further washing.
- If the following instructions for washing are not followed, there is a risk of cross contamination from hands sinks, colanders, pans and utensils that may be used during washing. This may outweigh any safety benefit that further washing may provide to prewashed, ready-to-eat salads.

4. If you choose to wash the RTE lettuce/leafy green salads before use, you should:
   - Wash your hands thoroughly with soap and warm water for at least 20 s before handling RTE lettuce/leafy green salads. Rewash hands as necessary.
   - Clean with hot soapy water, the sink, colander, salad spinner and any utensils that will contact the lettuce/leafy greens salad.
   - Use cold running water to wash RTE lettuce/leafy green salads to reduce the potential for cross contamination.
   - Dry RTE lettuce/leafy green salad with a clean salad spinner or paper towel not previously used for another purpose.
   - Never use detergent or bleach to wash fresh vegetables. These products are not intended for consumption.
5. Follow FightBAC!™ procedures to protect RTE lettuce/leafy green salads from contamination.

Check

- Check to be sure that RTE lettuce/leafy green salads you buy are not bruised or damaged.
- Check that RTE lettuce/leafy green salads are refrigerated at the store before buying. Do not buy RTE lettuce/leafy green salads that are not refrigerated.

Clean

- Wash hands with warm water and soap for at least 20 s before handling RTE lettuce/leafy green salads.
- Use hot water and soap to clean all surfaces and utensils, including counter tops and salad spinners, that will touch RTE lettuce/leafy green salads.
- Use a clean utensil to serve RTE lettuce/leafy green salads.

Separate

- When shopping, be sure fresh produce is separated from household chemicals and raw foods such as meat, poultry and seafood in your cart and in bags at checkout.
- Keep RTE lettuce/leafy green salads separate and protect from contact with raw meat, poultry or seafood or their juices in your refrigerator. Do not allow raw meat, poultry or seafood juices to drip onto RTE lettuce/leafy green salads.

Chill

- Store RTE lettuce/leafy green salads in the refrigerator.

Throw Away

- Throw away RTE lettuce/leafy green salad if it has touched raw meat, poultry or seafood.
- Discard the product if it appears spoiled or has exceeded its labeled use-by date.

More information regarding safe produce handling may be found on the FightBAC!™ Web site at: http://portal.fightbac.org/pfse/toolsyoucanuse/phec/.

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Sampling Cartons of Beef Trim for Microbiological Analysis: Comparison of Portions Versus Surface Slices

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SUMMARY

In this article the sensitivity of a new sampling method for beef trim, which involves the collection of surface slices, is compared with the sensitivity of the established method of collecting small pieces of trim. Fifty cartons of beef trim were sampled, using 'portion' samples and surface slices. Each sample consisted of five 65-g sub-samples, all of which were analyzed for generic *E. coli*, used as surrogate for *E. coli* O157 to obtain more positives. Each sample was classified as positive if at least one of the five sub-samples was positive. For both sample types, approximate surface area to mass ratio calculations were performed and compared. For portion samples, 48 (96%) were positive, while 45 (90%) of surface slice samples were positive (*P* value = 0.37). The number of positive sub-samples, obtained using the portion and surface slice methods were not significantly different (*P* value = 0.47). Surface slices have greater surface area to mass ratio only when slices are less than about 3 mm in thickness, which is difficult to achieve by use of a knife and hook/tongs for sampling.

INTRODUCTION

Meat processors and regulatory authorities use sampling schemes to determine the safety or suitability of products for use. Of importance in the international beef trade are methods specified in the USA Pathogen Reduction Final Rule *(2)*, one of which is concerned with detection of *E. coli* O157:H7, a pathogen that has been declared an adulterant of ground beef and of trimmings intended for grinding and is required to be 'not detected' in the sample mass specified.

Currently, the United States Department of Agriculture's Food Safety and Inspection Service (FSIS) specify accreting 65 g samples from pieces of trimmings, five of which are amalgamated into a 325 g sample for microbiological testing for *E. coli* O157:H7. In 2005, however, the FSIS implemented a nationwide raw ground beef component microbiological baseline data collection program that specified collection of surface slices, rather than portions of meat trimmings *(3)*.

The emphasis on obtaining carcass surface tissue is clearly designed to increase the likelihood of detecting *E. coli* O157:H7 from beef trimmings, a major component in ground beef manufacture. A significant proportion of beef trimmings used in the United States is imported; according to the USDA Economic Research Service, in 2004 some 1.6 million tons of

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TABLE 1. Number of cartons from which *E. coli* was recovered*

	Portions (5 × 65 g)	Surface Slices (5 × 65 g)
Number positive (out of 50 cartons)	48 (96%)	45 (90%)

* The carton was deemed positive if *E. coli* was recovered from at least 1 of 5 sub-samples.

beef and veal trim was imported, much of it to be mixed with domestic trim *(4)*.

Clearly, a change in sampling protocol designed to increase the probability of detecting *E. coli* O157:H7 might be of great commercial importance to countries that export beef trimmings to the United States. Accordingly, testing was undertaken to assess the effect of sampling surface slices, rather than pieces, of beef trim. Because of the very low prevalence of *E. coli* O157:H7, generic *E. coli* was recovered from beef trim as a surrogate.

MATERIALS AND METHODS

Sampling

On each of ten sampling occasions between February and May 2006, five cartons (27.2 kg each) of chilled beef trim were selected at random in the boning (fabrication) room. As required, utensils were cleaned by immersion for around 5 seconds in a hot water "sterilizer" (minimum temperature 82°C).

From each carton, a sample of approximately 650 g of beef trim portions and a sample of approximately 650 g of beef trim surface slices were collected and placed into sterile bags. Trim was sampled by use of a knife and tongs to closely mimic the procedure illustrated in training material supplied to FSIS inspectors. Surface slices were cut as thin as possible, between 0.5 and 1 cm thick. Bags were sealed and placed in an insulated box with ice bricks on top. "Bubble-wrap" was placed between the ice bricks and the samples to prevent freezing of the samples.

Samples were transported to the laboratory, and testing commenced within 4 h and 2 h of collecting the first and last samples, respectively.

At the laboratory, each 650 g sample was minced by use of a sterile hand mincer and then mixed manually for 1 min.

From the minced portion samples, five 65 g sub-samples were prepared for presence/absence testing (referred to as a 'Portion' sample) together with three 11 g samples for MPN estimation. Similarly, from the minced surface slice samples, five 65 g sub-samples of minced meat ('Surface Slice' sample) plus three 11 g samples of minced meat were prepared for presence/absence testing and MPN estimation, respectively. All sub-samples were placed into separate sterile plastic bags.

For the purpose of surface area to mass ratio estimation, further 45 portion samples and 44 slice samples were collected, separate from those collected for microbiological analysis.

Microbiological analysis

EC Broth (Oxoid CM0853) was added to each sample; 11 g samples were diluted 1:10 and 65 g samples were diluted 1:5. All samples were then homogenized in a stomacher (IUL Instruments, Barcelona, Spain) for 1 min.

The 65 g bags were incubated at 44°C for 24 h. The incubated cultures were streaked onto Eosin Methylene Blue Agar (Oxoid CM0069) and incubated at 37°C for 24 h. Typical colonies were inoculated into Tryptone water and incubated at 44°C for 24 h. Kovac's reagent was added to the incubated Tryptone water and the presence of *E. coli* was confirmed by the development of a red color. For each portion and surface slice sample, the number out of the 5 sub-samples from which *E. coli* was recovered was recorded.

From each of the three 11 g bags containing 110 ml of EC Broth, aliquots of 10 ml and 1.0 ml were removed. The 10 ml aliquot was placed into a sterile container. The 1.0 ml aliquot was placed into 9 ml of EC Broth. The three aliquots, representing 10 g, 1 g and 0.1 g of minced meat, were incubated at 44°C for 24 h. The incubated cultures were streaked onto Eosin Methylene Blue Agar (Oxoid CM0069) and incubated at 37°C for 24 h, after which typical colonies were processed as described above. The most probable number of *E. coli* was then estimated by use probability tables *(1)*.

Surface area to mass ratio

The weight of the 45 portion samples ranged between 8.7 and 44.2 g, with a mean of 28.7 g, while the 44 surface slice samples ranged between 6.2 and 57.5 g, with a mean of 28.9. The surface area of each portion of beef trim was estimated by measuring its "average" width, length and height and by assuming that the sample was in the form of a box. For surface slice samples, the three average dimensions of the samples were also measured, but only the surface exposed in the boning room was used for the surface area calculation (i.e., width × length of the sample).

Because thickness of the slice clearly affects the weight of the slice sample, for a given surface area, thick slices will be heavier than thin slices. Consequently, the surface area to mass ratio needs to take this into account. This can be done by standardizing the slice to a given thickness. Accordingly, standard thicknesses of 1.0 cm, 0.5 cm, 0.3 cm and 0.2 cm were used and compared. In addition, the surface area to mass ratio ignoring slice width, i.e., as sampled, was calculated. It is acknowledged that this was an approximation and hence that the actual surface area of each meat sample may have been smaller or larger. However, it was considered that this approximation, adequate for surface slices, may not have been as reliable for portions. In addition, the current estimation did not take into account the composition of the meat sample, that is, the proportions of muscle and fat which affects weight of each sample and hence the surface area to mass ratio.

Statistical analysis

McNemar's test *(7)* was used to assess differences in proportions between the portion and surface slice sampling methods as the samples taken from each carton were related. This test can deal only with matched pairs, requiring that each pair of sampling methods be assessed separately.

TABLE 2. Number of cartons testing positive for each combination of positive sub-samples (out of five) for portion and surface slice methods

Positive Surface Slice Sub-samples*	Positive Portion 2 Sub-samples*					
	0	1	2	3	4	5
0	**1**	1	0	1	2	0
1	0	**2**	1	1	0	2
2	1	0	**2**	4	0	0
3	0	0	0	**1**	2	0
4	0	0	2	1	**1**	4
5	0	2	0	0	5	**14**

TABLE 3. Mean $\log_{10}$ MPN g^{-1} of *E. coli* from portions and surface slices of beef trim (n = 50)

Sampling Method	Mean	SD
Portions	-1.49	0.88
Slices	-1.65	0.79

TABLE 4. Surface area to mass ratios for portion and surface slice samples and for surface slices standardized to a given thickness

	Surface area to mass ratio	
	Average	Standard Deviation
Portions	2.43	0.45
Surface Slices		
As sampled	1.21	0.28
0.2 cm thick	4.32	1.22
0.3 cm thick	2.88	0.81
0.5 cm thick	1.73	0.49
1.0 cm thick	0.86	0.24

McNemar's test was also used to assess whether there were differences between the number of positive sub-samples (out of 5) for the portion and surface slice methods.

The two sampling methods were tested for differences in mean $\log_{10}$ *E. coli* MPN/g concentrations by use of a censored regression approach that takes into account non-detects *(5, 6)*. The analysis allowed for the pairing of the two sampling methods (both were used for each carton) similar to a paired two-sample *t*-test.

Differences in mean surface to mass ratios between portion and surface slice samples were assessed by use of Welch's *t*-test, which allows for difference in variances between the two samples.

All analyses were performed using the statistical software R *(8)*.

RESULTS

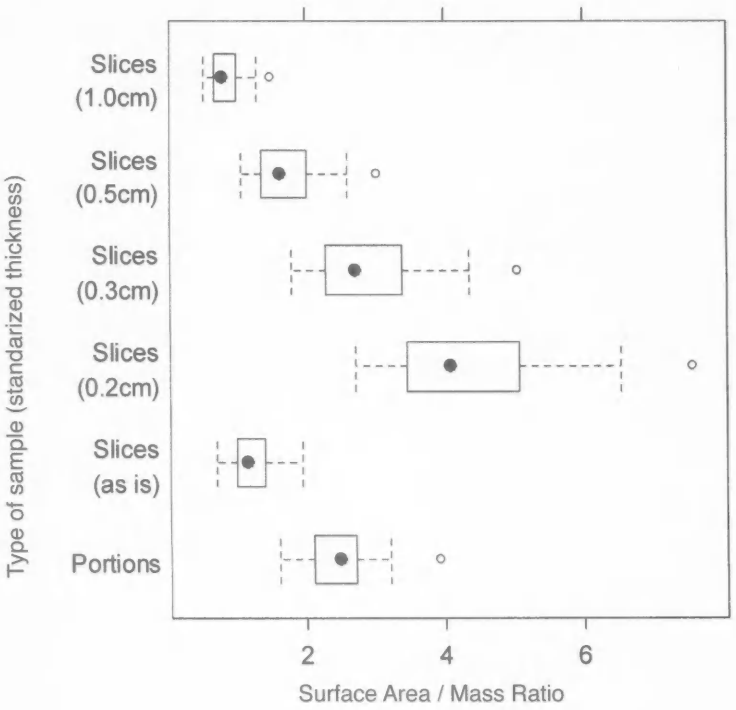
Prevalence of *E. coli*

The number of cartons from which 65 g samples of portions and surface slices yielded *E. coli* (Table 1) were not statistically significant ($P = 0.37$). In addition, no significant difference ($P = 0.47$) was found between the number of positive sub-samples of portions and surface slices (Table 2), indicating that both methods are equivalent at detecting *E. coli*; if surface slices were more sensitive, then it would be expected that for any given carton more surface slice sub-samples than portion sub-samples are positive.

Concentration of *E. coli*

Mean $\log_{10}$ MPN/g of *E. coli* recovered from portions and surface slices of beef trim (Table 3) were not statistically significant ($P = 0.21$).

FIGURE 1. Box plots of surface area to mass ratios for portion and surface slice samples, and surface slices standardized to a given thickness



Surface area to mass ratio

The average surface area to mass ratio for portions, surface slices (as sampled) and surface slices standardized to a given thickness are shown in Table 4 and depicted graphically in the box plots in Fig. 1.

On average, portions had a significantly higher surface area to mass ratio than slices "as sampled" and than "thicker" slices (1.0 cm and 0.5 cm thick). However, "thinner" slices (0.3 cm and 0.2 cm thick) had higher surface area:mass than the average portion. Consequently, it appears reasonable to conclude that surface slices with a thickness of less than 0.3 cm are likely to yield a significantly higher average surface area to mass ratio than portions.

DISCUSSION

Taking surface slices instead of portion samples does not appear to increase the isolation of *E. coli*, at least not at the concentrations present in this work and at a surface slice thickness of 0.5–1.0 cm.

Because the aim of taking surface slices is to maximize the surface area of the sample, it might be expected that the likelihood of detection and a higher concentrations (per unit mass) would be obtained with an increase in surface area to mass ratio. In addition, lower concentrations should be detectable when a larger surface area is sampled because the limit of detection has been decreased. However, the data collected in the present study, indicate that sampling surface slices instead of portions did not have a significant impact on the probability of detection or the estimated concentration. One possible explanation is that in order for surface slices to have a higher surface area to mass ratio, they have to be very thin (< 0.3 cm). From the viewpoint of sampling beef trim in the boning (fabrication) facility, it is difficult to obtain slices thinner than 0.5 – 1 cm with use of implements such as tongs and a knife without considerable effort and skill. Current sampling, which is based on excising small portions, can be achieved more easily than surface slicing and provides samples of larger surface area to mass ratio. In addition, small portions can always be collected, or cut from larger pieces of trim, to provide the increased surface area and therefore the sensitivity that can be achieved by sampling very thin slices.

ACKNOWLEDGMENTS

We thank the staff of T&R Pastoral (Lagoon Road, Murray Bridge, South Australia 5253) for their cooperation during sample collection and Viv Mattei and Gayle Smith for their assistance with sample preparation and microbiological testing. Two anonymous reviewers are also thanked for their comments.

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Food Protection Trends, Vol. 27, No. 11, Pages 903–908

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Developing Benchmarks for Handwashing in Retail Foodservice Operations: A Pilot Study in Delicatessens

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SUMMARY

The purpose of this study was to develop a process for establishing benchmarks for handwashing in retail foodservice establishments. One type of restaurant, the delicatessen (deli), was used for the pilot study. A handwashing observation form to be used in determining actual and desired handwashing frequencies and methods used by employees was developed and pilot tested.

Two in-depth field observations were conducted in each of five delis. Employees (n = 18) were observed during production and service. Each operation had one handwashing sink located in the sandwich assembly and service area, and each met the Food Code requirements of providing soap and a supply of disposable towels. Hot water was available in three of the five operations.

Results indicated that during production and service, employees in delis did not wash their hands properly or at appropriate times. Most employees used only one or two steps of the 3-step handwashing process described in the 2005 Food Code. Handwashing in compliance with the Food Code was observed for two situations during the service phase: "before employees engaged in food preparation" and "before returning to the preparation area." Proposed benchmarks specify that employees should wash their hands a minimum of 6 times per hour during production and 11 times per hour during service.

INTRODUCTION

Foodborne outbreaks are likely to occur in foodservice operations *(3, 17, 28)* and research has identified poor personal hygiene as a contributing factor *(4, 11, 16)*. Inadequate handwashing by foodservice workers is an important contributing factor *(1)*, because infected food workers can transmit foodborne pathogens by touching food or food contact surfaces with contaminated hands. The Food and Drug Administration (FDA) *(10)* has stated that transmission of viruses, bacteria, and parasites from raw food or from ill workers to food by way of improperly washed hands continues to be a major factor in the spread of foodborne illness.

Proper handwashing is one of the most effective ways to prevent cross contamination and minimize transfer of microorganisms to ready-to-eat foods in foodservice *(6)*. Common sense indicates that hands should be washed at least when visibly soiled, but it is important to consider that pathogens cannot be seen, which makes it important for foodservice personnel to wash their hands on a regular basis, using proper methods as described in the Food Code *(12)*.

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Handwashing should be done before and/or after the following activities: cleaning equipment and utensils; handling unwrapped, single-service, and single-use articles; changing between working with raw food and working with ready-to-eat food; touching bare human body parts other than clean hands and clean, exposed portions of arms; and using the toilet room *(12)*.

Chen, Jackson, Chea, and Schaffner *(6)* investigated bacterial transfer rates between hands and other common surfaces involved in food preparation areas in foodservice operations. Results indicated that contamination of hands and various surfaces in the food preparation area presented cross-contamination problems. Effective handwashing is one of the most important measures to reduce cross contamination of food by employees. Keeping handwashing sinks in good operating conditions with available hot water, soap, and a recommended drying method can help prevent cross contamination by ensuring that employees have all the supplies and equipment needed to wash their hands *(11, 29)*.

Green et al. *(14)* found that restaurant workers commonly reported engaging in risky food handling practices; 25% of the 16,435 interviewed participants said they did not always wash their hands, and about a third said they did not always change gloves, between touching raw meat or poultry and touching ready-to-eat foods. The researchers concluded that failure to wash hands at appropriate times or improper handwashing procedures increased the risk of cross contamination.

FDA Regional and Retail Food Specialists used direct observations and discussions with managers and food workers in various sectors of foodservice to document establishments' compliance status for 42 data items, including proper and adequate handwashing *(11)*. Foodborne illness risk factors with the highest rates of noncompliance to standards in deli-type operations were: improper holding/time and temperature (64.4%), poor personal hygiene (23.5%), contaminated equipment/protection from contamination (23.4%), and other/chemicals (21.9%). For the category of poor personal hygiene, the procedure with the highest percent of noncompliance was proper and adequate handwashing (56.7%). Clearly, handwashing practices of employees in retail foodservice need to be improved. FDA *(11)* concluded that "proper handwashing as described in the Food Code continues to serve as a vital and necessary public health practice in retail foodservices" (p. 2).

Developing benchmarks for handwashing in foodservice operations is one strategy that might improve handwashing practices and food safety. Benchmarking is a process that establishes industry best practices or standards to serve as a reference point for comparison with actual performance. A benchmark is a measured best-in-class achievement, recognized as the standard of excellence for a business process *(21)*. Managers of foodservice operations could use benchmarks to train employees about proper personal hygiene and monitor employee handwashing practices, and employees could use benchmarks as a reference point.

Results of one survey of foodservice directors in universities/colleges, correctional facilities, health care facilities, and schools, showed that the majority of respondents thought that the benchmarking process had some or great importance to their jobs. Respondents also indicated a need to increase knowledge and skills in different areas of the benchmarking process *(18)*. Benchmarking has traditionally been used for objective outcome data, but little has been done to examine benchmarking of processes. Some research initiatives have focused on field studies to examine actual handwashing practices of foodservice employees *(1, 13, 15)*. Relatively little research on benchmarking in foodservice operations has been done, and no benchmarks for handwashing have been proposed.

This study developed and pilot tested a handwashing observation form to determine actual and desired handwashing frequencies and methods used by employees in deli-type retail foodservice establishments in Iowa. These observations were used to develop preliminary benchmarks for handwashing in deli-type foodservice operations.

METHODS

This study used structured in-depth observations at five delicatessen foodservice operaions *(19)*. A handwashing observation form was developed for use in data collection. The research protocol and data collection tools were reviewed and approved by the Human Subject Research Committee at Iowa State University.

Instrument development

A 3-part handwashing observation form (HOF) was developed to record handwashing behavior of employees in deli foodservice operations. Part I listed all conditions when hands should be washed and recommended methods for handwashing, based on FDA guidelines *(10)* and the 2005 Food Code *(12)*. Purposes for which handwashing should occur were listed by category: personal hygiene, food preparation, cleaning, and other tasks (changing tasks with hands, handling money). The number of times handwashing should have occurred and the number of times it did occur were marked on the form. Steps in the handwashing procedure (soap used, all parts of hand lathered, friction on fingertips or use of nail brush, friction on wrists, 10–15 seconds lathering or friction, drying with disposable towel or heated air, and faucet turned off with towel) were listed, and observations were recorded.

Part II included questions related to demographic characteristics of employees, including gender, approximate age, length of time employed at the facility, length of time worked in foodservice, average hours worked per week, and type of training received. Part III was used to record information about handwashing facilities, including observations about location of hand sinks, availability of nailbrush and soap, type of hand drying options, and availability of hot water.

A structured interview form was used to gather information about ownership of the facility, personal hygiene training provided, organizational policies related to handwashing, number of years the manager had worked in foodservice and at this location, and any food safety certification or training of the manager.

A pilot test of the instrument was conducted based on recommendations by Dillman *(9)*. The instrument was first reviewed by three food safety experts to ensure that all important observations would be made. The revised instrument was used by the researcher during a 3-hour observation. The form was again revised for ease and accuracy of data collection.

Sample

Ten deli foodservice operations in central Iowa were contacted, and five agreed to participate. After an initial visit, two 3-hour observation visits to each of

TABLE 1. Characteristics of observed hourly employees in five deli-type foodservice operations (N = 15)

Characteristic	N
Gender	
Male	6
Female	9
Employment category	
Part time	13
Full time	2
Years working in foodservice	
Less than one	1
One to two	7
Three to four	3
Five or more	4
Years with current employers	
Less than one	7
One to two	4
Three to four	2
Five or more	2

the five participating facilities were scheduled during a 2-month period of time (November–December). Observation visits were conducted on weekdays.

Deli-type foodservice operations were selected, because a high number of foodborne illness outbreaks are attributed to restaurants *(10, 26, 28)*. These types of quick-service restaurants experience problems related to food handlers (e.g., high turnover, paucity of training, and inadequate English skills); also, vulnerable populations eat in restaurants *(26)*. The operations were selected based on location (central Iowa) and ownership (both independently owned and part of a chain).

Deli-type foodservice operations selected for this study served unprocessed fresh produce (such as lettuce or tomatoes) and ready-to-eat processed meats. Most of these food items did not receive heat treatment before service and required some handling by employees. All delis were open for noon and evening meals.

Data collection

Observation of employee handwashing frequency and methods were conducted in each of the five operations, by use of the HOF, during two 3-hour periods of time. One observation period focused on production and the other on meal service. In each of the 10 observation periods, one to three employees were observed in each facility.

During the first visit to each operation, an interview with the manager was conducted while that individual was working. Informal conversational interviews with each observed employee were conducted the first time each employee was observed.

A total of 18 different employees (15 hourly employees and 3 managers) were observed performing different activities during production and service phases. Ten employees were observed during the five production visits, and 12 were observed during the five service visits. Possible contamination of data due to the subjective judgment of the observer was minimized by using a structured observation form for data collection as well as by using only one observer.

Data analysis

Frequencies were calculated for employee and operational characteristics, and for information gathered from interviews with managers. Based on observations of frequencies of when hands should have been washed, handwashing benchmarks are proposed for deli-type retail foodservice operations for both production and service phases. Benchmarks were estimated using the following formula:

$$\text{Handwashing benchmark per employee per hour} = \frac{\text{Total number of times employees should have washed their hands during hours observed}}{\text{Total number of observed employee hours}}$$

RESULTS AND DISCUSSION

Employees and operational characteristics

Most employees worked part time, and the mean number of hours worked weekly per employee was 16.5. Nearly one-half of the employees reported one to two years of work experience in foodservice operations, and about half (n = 7) had worked less than one year for their current employer (Table 1). The length of time employees had worked for foodservice operations could have an impact on personal hygiene practices. Previous research has shown that length of time employees had worked for an employer negatively affected good personal hygiene practices (such as handwashing) *(8)*.

TABLE 2. Observed handwashing practices in deli-type foodservice operations (N = 5)

Category	Frequency of Actual Handwashing[a]		
	Number of times should have washed hands[a]	Attempts to wash hands	Method in compliance with Food Code[b]
Production			
Personal hygiene	43	3	0
Food preparation	80	18	0
Cleaning	23	4	0
Other tasks	49	3	0
Service			
Personal hygiene	31	3	0
Food preparation	108	40	2
Cleaning	48	6	0
Other tasks	204	22	0

[a]A total of 33 employee hours was observed for production and 36 employee hours were observed for service.

[b]Employees' handwashing procedure was in compliance with standard handwashing procedure defined by Food Code *(12)*.

Training received by employees was reported to be related to organizational procedures. Employees did not mention food safety as part of their training. All managers in these operations were male, and half of those interviewed (n = 2) had five or more years of work experience in the foodservice industry. Those two had been working with the current organization for five years or more.

Ownership of operations varied. Two of the operations were independently owned, and the others were part of a corporate-owned or franchised chain. With franchised chain or corporate-owned operations, a centralized authority established operational policies. The estimated mean number of sandwiches sold per operation per day was 228 ± 108. Most operations (n = 4) had written organizational policies about personal hygiene and handwashing in place, but only one had written policies about required food safety certification.

Observed deli foodservice operations offered a variety of menu items, including sandwiches with different types of breads, meats, cheeses, vegetable toppings, salads, desserts, soups, beverages, and chips. One operation purchased chips in bulk, while the others offered individual packages. Meat and cheese were sliced on-site in two operations, and the other operations purchased those products pre-sliced. Vegetable toppings offered at operations included lettuce, tomatoes, green peppers, onions, black olives, pickles, and banana peppers; some items required some processing. A choice of dressings used on sandwiches or salads was offered in all operations. Typically, sandwiches were served cold.

All operations had an accessible handwashing sink, located in the sandwich assembly and service area. Having only one sink was appropriate for this type of operation, because all delis were small. Gloves were worn in most (n = 4) of the operations.

All operations met the Food Code *(12)* requirement to provide soap and disposable towels. Less than half of the operations had a trash can at each handwashing sink. Of the five operations, three had both hot and cold running water as required in the Food Code *(12)*.

Handwashing frequencies and methods

Results indicated that during production and service phases, employees in deli foodservice operations were not washing their hands at appropriate times (Table 2). Except for handwashing related to two activities in the food preparation category (before engaging in food preparation and before returning to the preparation area), the percent of handwashing frequency for each specific task was very low (less than 50%) during production and service phases. However, during both phases of observation, the category of tasks with the highest percent of handwashing frequency was food preparation (18 of 80 observations and 40 of 108 observations).

Benchmarks are proposed based on observations of number of times employees should have washed their hands for both production and service phases. Based on 33 employee work hours observed during food production and 36 employee work hours observed during service at five deli operations, the following general benchmarks are proposed:

- ✓ Benchmark during food production per employee hour.....6
- ✓ Benchmark during service per employee hour.....11

These benchmarks represent the minimum handwashing standard, based on typical deli menu offerings and characteristics of observed deli-type foodservice operations. Managers of deli foodservice operations could consider this standard when developing training programs for employees or determining position task

responsibilities. Employees could use this information as a reference on how often they should wash their hands per hour.

The proposed benchmark is higher for service than for food production because during service, employees performed a greater variety of tasks and consequently needed more frequent handwashing. Additionally, it is during service that tasks such as handling money or replenishing supplies are done. It is also important to consider that in deli operations, most of the preparation of sandwiches occurs during the service phase.

Handwashing methods used by employees varied. Most employees tended to use only one or two steps of the 3-step handwashing process described in the Food Code *(12)*. Compliance with Food Code handwashing methods was observed for only two tasks and by a small number of employees during the service phase: "before employees engaged in food preparation" (n = 1) and "before returning to the preparation area" (n = 1) (Table 2). During both phases, when employees did make an effort to wash their hands, disposable towels were used most of the time.

Even though most employees did not completely follow the handwashing methods defined by Food Code *(12)*, efforts to use at least some of the required steps were observed. Employees rinsing their hands only, washing with soap but lathering less than 10 seconds, or failing to use a recommended drying method were examples of steps that were not performed correctly by employees. Past research has noted the variations in effectiveness of different handwashing methods *(2, 6, 7, 23, 24, 25, 28)*.

Findings from the current study suggest that a high potential risk of cross contamination exists during production and service phases at deli operations because employees were not observed washing their hands as required by Food Code *(12)*, and recommended methods were not followed. Contamination of hands and various surfaces in the food preparation area also presented cross-contamination risks, as noted in past research *(5, 6, 20, 22, 26, 27)*.

With observation used as the primary method of data collection, results showed operational practices inconsistent with regulations. In past research, studies that used interviews or surveys, foodservice workers reported not always washing their hands and not always using the appropriate methods *(1, 14)*. The present study found lower compliance with recommended handwashing practices than results reported by Allwood et al. and Green et al. *(1, 14)*.

Some limitations should be considered when reviewing findings from this study, which was limited to one type of retail foodservice operation in one Midwestern state. Findings may not be generalizable to all foodservice establishments in the United States or even to deli foodservice operations, as organizational characteristics and employee practices may vary.

In-depth field observations were used to collect data. There might have been observer effects on handwashing behavior, as individuals were conscious of being observed and were aware of the purpose of the study. The fact that more than one employee was observed at a time might have caused some inconsistency in data collection. However, because operations were very small and only one handwashing sink was present in each establishment, it is assumed that missed observations were few.

The HOF was a fairly complete and useful data collection tool, but some changes were determined to be necessary for future use. Tasks in the different categories needed to be changed or added. For example, a task to be added in the category of personal hygiene is "after touching clothes," as employees were frequently observed touching their clothes or aprons while working. The column of *should wash* hands should be wider than the column of *did wash* hands to allow for more notations. It is also suggested the HOF include observations of posted signs with a "must wash hands" message near handwashing sinks and information about the availability of trash cans. A protocol explaining number of employees that should be observed, period of time of observations, and tools needed by the researcher for each observation should be developed for future use. The application of the HOF in larger operations or in operations in which employees have multiple duties would require tracking of handwashing frequencies and methods for each employee during a set period of time. Additional research with the HOF in deli-type foodservice operations operating with greater volume, and in other sectors of the industry, is recommended to test proposed benchmarks.

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Request for Preproposals for Research Support

The International Life Sciences Institute (ILSI) North America Technical Committee on Food Microbiology is accepting preproposals for financial support for research in these areas: 1) detection and mitigation strategies for viral causes of foodborne illness; 2) control of sporeforming bacterial pathogens and spoilage organisms; 3) rapid separation and concentration of pathogens from food matrices; and 4) technology and processes to control *Salmonella* in low-moisture foods. **The deadline for submission of preproposals is January 25, 2008.** Copies of the Request for Preproposals can be obtained from the ILSI North America website under "Hot Topics" (www.ilsina.org). FOR MORE INFORMATION, CONTACT: Marie Latulippe, ILSI North America, One Thomas Circle, NW, 9th floor, Washington, DC, 20005, USA, Tel: 202-659-0074, E-mail: mlatulippe@ilsi.org

ILSI North America

95th Annual Meeting

IAFP 2008

Columbus, Ohio • August 3–6

Call for Abstracts

IAFP 2008

General Information

1. Complete the Abstract Submission Form Online.
2. All presenters must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
3. There is no limit on the number of abstracts individuals may submit. However, one of the authors must deliver the presentation.
4. Accepted abstracts will be published in the Program and Abstract Book. Editorial changes may be made to accepted abstracts at the discretion of the Program Committee.
5. Membership in the Association is not required for presenting a paper at IAFP 2008.

Presentation Format

1. Technical – Oral presentations will be scheduled with a maximum of 15 minutes, including a two to four-minute discussion. LCD projectors will be available and computers will be supplied by the convenors.
2. Poster – Freestanding boards will be provided for presenting posters. Poster presentation surface area is 48" high by 96" wide (121.9 cm × 243.8 cm). Handouts may be used, but audio-visual equipment will not be available. The presenter is responsible for bringing pins and velcro. All posters should include the title and author information.

Note: The Program Committee reserves the right to make the final determination on which format will be used for each presentation.

Instructions for Preparing Abstracts

1. All abstracts must be written in English. If the author is non-English speaking, consider having the abstract reviewed by an English-speaking person before submitting.
2. All abstracts must be approved and signed off by all authors before submission.
3. Title – The title should be short but descriptive. The title should be in title case.
4. Authors – List all authors using the following style: first name followed by the surname.
5. Presenter Name and Title – List the full name and title of the person who will present the paper.
6. Presenter Address – List the name of the department, institution and full postal address (including zip/postal code and country).
7. Phone Number – List the phone number, including area, country, and city codes of the presenter.
8. Fax Number – List the fax number, including area, country, and city codes of the presenter.
9. E-mail – List the E-mail address for the presenter.
10. Format preferred – Check the box to indicate oral or poster format. The Program Committee reserves the right to make the final determination of presentation format.
11. Category – The categories are used by the Program Committee to organize the posters and technical sessions. Please check 2–3 boxes which best describe the categories for which the abstract is suitable.
12. Developing Scientist Awards Competition – Check the box to indicate if the presenter is a student wishing to be considered in this competition. The student will make the initial submission, and IAFP will E-mail the abstract to the major professor, who will complete the submission process. For more information, see "Call for Entrants in the Developing Scientist Awards Competitions."
13. Abstract – Key the abstract into the web-based system. In addition, a double-spaced copy of the abstract, typed in 12-point font in MS Word, should be E-mailed to abstracts@foodprotection.org at the time of submission. Use no more than 300 words. Abstracts are most often rejected because of a failure to follow the instructions below.

In addition to following these instructions, authors should carefully review the sections on selection criteria and rejection reasons as well as the sample abstract before submitting the abstract. Original research abstracts MUST be in the following format:

Introduction: State the reason for pursuing this work (2–3 sentences)

Purpose: State the purpose or objectives of the study (1–2 sentences)

Methods: State the methodology used in the study (2–3 sentences). The methods should be specific enough that researchers in the same or similar field would understand the basic experimental design or approach.

Results: Describe the results obtained in the study (2–3 sentences). NOTE: Specific results, with statistical analysis (if appropriate), MUST be provided. A statement of "results pending" or "to be discussed" is not acceptable and will be grounds for abstract rejection. Results should be summarized; do NOT use tables or figures.

Significance: State the significance of the findings to food safety and/or public health (1–2 sentences) NOTE: Do not include reference citations in the Abstract. Please see sample abstracts for further guidance on abstract structure.

Education abstracts MUST present an improvement or innovation on a proven method in order to educate others (about a food protection related topic). There should be a way to measure the outcomes and substantiate the improvements and/or outcomes. If measured, the sample size should be sufficiently large to represent the intended population.

Abstract Submission

Abstracts submitted for IAFP 2008 will be evaluated for acceptance by the Program Committee. Please be sure to follow the instructions above carefully; failure to do so may result in rejection. Information in the abstract data must not have been previously published in a copyrighted journal.

Abstracts must be received no later than January 29, 2008. Completed abstract and information must be submitted online. Use the online submission form at www.foodprotection.org. In addition, a double-spaced copy of the abstract, typed in 12-point font in MS Word, should be E-mailed to abstracts@foodprotection.org at the time of submission. You will receive an E-mail confirming receipt of your submission.

Selection Criteria

1. Abstracts must be structured as described above.
2. Abstracts must report the results of original research pertinent to the subject matter. Papers should report the results of new, applied studies dealing with: (i) causes (e.g., microorganisms, chemicals, natural toxicants) and control of all forms of foodborne illness; (ii) causes (e.g., microorganisms, chemicals, insects, rodents) and control of food contamination and/or spoilage; (iii) food safety from farm-to-fork (including all sectors of the chain including production, processing, distribution, retail, and consumer phases); (iv) novel approaches for the tracking of foodborne pathogens or the study of pathogenesis and/or microbial ecology; (v) public health significance of foodborne disease, including outbreak investigation; (vi) non-microbiology food safety issues (food toxiology, allergens, chemical contaminants); (vii) advances in sanitation, quality control/assurance, and food safety systems; (viii) advances in laboratory methods; and (ix) food safety risk assessment. Papers may also report subject matter of an educational nature.
3. Research must be based on accepted scientific practices.
4. Research should not have been previously presented nor intended for presentation at another scientific meeting. Papers should not appear in print prior to the Annual Meeting.

Rejection Reasons

1. Abstract was not prepared according to the "Instructions for Preparing Abstracts." This includes abstracts that are too lengthy.
2. Abstract reports inappropriate or unacceptable subject matter.
3. Abstract is not based on accepted scientific or educational practices and/or the quality of the research or scientific/educational approach is inadequate.
4. Potential for the approach to be practically used to enhance food safety is not justified.
5. Work reported appears to be incomplete and/or data and statistical validity are not presented. Percentages alone are not acceptable unless sample sizes (both numbers of samples and sample weight or volume) are reported. Detection limits should be specified when stating that populations are below these limits. Indicating that data will only appear in the presentation without including them in the abstract is NOT acceptable.
6. Abstract was poorly written or prepared. This includes spelling and grammatical errors or improper English language usage.
7. Results have been presented or published previously.
8. Abstract was received after the deadline for submission.
9. Abstract contains information that is in violation of the International Association for Food Protection Policy on Commercialism.
10. Abstract subject is similar to other(s) submitted by same author. (The committee reserves the right to combine such abstracts.)
11. Abstracts that report research that is confirmatory of previous studies and/or lacks originality will be given low priority for acceptance.

Projected Deadlines/Notification

Abstract Submission Deadline: January 29, 2008

Submission Confirmations: Within 48 hours of submission

Acceptance/Rejection Notification: March 21, 2008.

Contact Information

Questions regarding abstract submission can be directed to Tamara P. Ford, 515.276.3344 or 800.369.6337; E-mail: tford@foodprotection.org

Program Chairperson

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Call for Entrants in the Developing Scientist Awards Competitions

Supported by the International Association for Food Protection Foundation

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

Purpose

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

Presentation Format

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

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

General Information

1. Competition entrants cannot have graduated more than a year prior to the deadline for submitting abstracts.
2. Accredited universities or colleges must deal with environmental, food or dairy sanitation, protection or safety research.
3. The work must represent original research completed and presented by the entrant.
4. Entrants may enter only one paper in either the oral or poster competition.
5. All entrants must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
6. Acceptance of your abstract for presentation is independent of acceptance as a competition finalist. Competition entrants who are chosen as finalists will be notified of their status by the chairperson by April 30, 2008.
7. Entrants who are full-time students, with accepted abstracts will receive a complimentary, one-year Student Membership with *JFP* Online.
8. In addition to adhering to the instruction in the "Call for Abstracts," competition entrants must check the box to indicate if the paper is to be presented by a student in this competition. A copy of the abstract will be E-mailed to the major professor for final approval.
9. You must also specify full-time student or part-time student.

Judging Criteria

A panel of judges will evaluate abstracts and presentations. Selection of up to ten finalists for each competition will be based on evaluations of the abstracts and the scientific quality of the work. All entrants will be advised of the results by April 30, 2008. Only competition finalists will be judged at the Annual Meeting and will be eligible for the awards.

Judging criteria will be based on the following:

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

Finalists

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

Awards

First Place – $600 and an engraved plaque
Second Place – $400 and a framed certificate
Third Place – $200 and a framed certificate

Award winners will receive a complimentary, one-year Membership including *Food Protection Trends*, *Journal of Food Protection*, and *JFP* Online.

Policy on Commercialism

for Annual Meeting Presentations

1. INTRODUCTION

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

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

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

2. TECHNICAL CONTENT OF SUBMISSIONS AND PRESENTATIONS

2.1 Original Work

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

2.2 Substantiating Data

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

2.3 Trade Names

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

2.4 "Industry Practice" Statements

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

2.5 Ranking

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

2.6 Proprietary Information (See also 2.2.)

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

2.7 Capabilities

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

3. GRAPHICS

3.1 Purpose

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

3.2 Source

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

3.3 Company Identification

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

3.4 Copies

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

4. INTERPRETATION AND ENFORCEMENT

4.1 Distribution

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

4.2 Assessment Process

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

4.3 Author Awareness

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

4.4 Monitoring

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

4.5 Enforcement

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

4.6 Penalties

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

China International Food Safety & Quality Conference + Expo 2007

The China International Food Safety & Quality Conference (CIFSQ) + Expo was held in Beijing, China on September 12 and 13, 2007 with more than 1,000 attendees. IAFP was proud to be a part of this inaugural conference and assisted the conference organizers by providing program content and suggesting experts to participate in the program. In addition, many of IAFP's industry supporters extended their financial and physical support to this all important conference.

CIFSQ was in the planning for more than two years during which IAFP's support of the idea never wavered. As it turned out, the conference dates coincided with many food safety issues that took place from July 2007, forward. This added an extreme interest in the food safety topic from government officials and industry representatives. The conference even attracted the interest of Li Changjiang, the Minister of China's General Administration for Quality Supervision, Inspection and Quarantine. Minister Li served as the Conference Honorary Chairman and provided opening comments (1).

Frank Yiannas, Past President of IAFP, met with Minister Li and other dignitaries (2) to discuss food safety issues during a VIP session. Frank was instrumental in providing program guidance for the CIFSQ and also provided opening comments (3) welcoming attendees on behalf of IAFP.

More than 76 presentations over the two-day conference focused on microbial food safety, food testing, food safety management, risk and crisis communication and advancements in food safety for food production and processing among other topics. A good portion of the program content was provided by IAFP Members including those pictured here: Robert Brackett (4), Dane Bernard (5), Tom Chestnut (6), Leon Gorris (7), and Cindy Jiang (8). Other speakers are also shown.

Of note was that four IAFP Past Presidents were participating in the conference (9). Left to right, Frank Yiannas, Gale Prince, Paul Hall, and Bob Brackett joined David Tharp, IAFP's Executive Director for a picture. The World Health Organization and the Food and Agriculture Organization were also represented by Jorgen Schlundt (10) and B. K. Nandi (11), respectively.

There were forty exhibitors and sponsors for this first-of-its-kind event. Plans are already underway for a second CIFSQ to be held in September of 2008. IAFP will again be an avid supporter and will continue our work of "Advancing Food Safety Worldwide®."

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NEW MEMBERS

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Brisbane, Queensland

Matt Turner
3M Microbiology
Frenchs Forest, New South Wales

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Ministry of Health & Long Term Care
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Guelph, Ontario

Nina Cameron
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Kevin Freeborn
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Food Research Institute
Madison

Jamie H. Isonhood
Schreiber Foods, Inc.
Appleton

Robert A. Sahaghian
UW-Madison
Madison

UPDATES

Food Product Safety Pioneer, Gale Prince Appointed Trustee of Menu Foods Income Fund

The Board of Trustees of Menu Foods Income Fund is pleased to announce the appointment of Mr. Gale Prince to its Board of Trustees as well as his appointment to the Board of Directors of Menu Foods GenPar Limited, the administrator of the Fund. In addition, Mr. Prince will serve as Chair of the Board of Directors' Food Safety and Quality Assurance Committee.

"Gale Prince is a highly regarded food safety expert in Canada and the United States with over 40 years experience in the retail food safety field," said C. Ian Ross, Chairman of the Board. "With his lengthy record of service in industry, government and regulatory organizations, Gale is in a unique position to make a significant contribution to the Menu Foods team."

Mr. Prince is known for his leadership in advancing food safety throughout all segments of the food industry. He was the driving force behind the development of the retail food industry's "FightBAC!" program on food safety training, and conducted the industry's first food store manager certification program. He is the past president of the International Association for Food Protection (IAFP) and is currently chair of the IAFP Foundation.

Most recently, Mr. Prince played a senior role at The Kroger Co., overseeing product safety for all food products offered nationwide through Kroger's retail stores and manufactured at that company's 42 plants.

For more than 25 years, Mr. Prince served on the food protection and safety committees of both the Food Marketing Institute, International Dairy Foods Association, and the American Bakers Association. He has also worked to ensure product safety for a myriad of other food organizations, boards and committees including, the United Fresh Fruit and Vegetable Association, the Ohio Retail Food Safety Council, the Conference for Food Protection, and the Association of Food and Drug Officials Endowment Foundation. Mr. Prince has served on the US Department of Justice Drug Enforcement Agency's Suspicious Orders Task Force.

"We are very fortunate to have Gale Prince join us," says Dr. Rick Shields, Menu's executive vice president, technical service. "I know he shares our commitment to providing the highest quality products to our contract manufacture and private-label customers. His reputation certainly precedes him. We look forward to his contributions to our efforts to produce safe and nutritious pet food."

Welcoming Eric Hentges, Ph.D., as ILSI North America Executive Director

Eric Hentges, Ph.D., officially joined ILSI North America as its executive director on September 4. Mr. Hentges brings over 25 years of experience in nutrition education, research, priority planning, and administration to ILSI North America. Until recently, he was executive director of the US Department of Agriculture's (USDA) Center for Nutrition Policy and Promotion, which is well known for its involvement in the development of the Dietary Guidelines for Americans and the Food Guidance System.

Mr. Hentges combination of scientific and administrative expertise will serve ILSI North America particularly well at this point in time. He will provide strong leadership, helping members and staff identify and act on new opportunities while also ensuring our core activities have impact. Given his recent work at USDA, Mr. Hentges is particularly able to help us understand how our science can play a larger role in improving the public's health and well-being. Staff is to be thanked for dedication and professionalism in spite of the unavoidable, unsettled atmosphere that comes with major changes.

NEWS

CIFSQ 2007 Post-Conference Report

More than 1,022 individuals overall, representing 17 countries recently took part in the inaugural China International Food Safety and Quality Conference + Expo 2007 (CIFSQ), which was held September 12 – 13 in Beijing, People's Republic of China. The event was a timely forum for discussing the growing food-safety challenges in the midst of globalization. This maiden conference also proved to be a premier gathering for government regulators, scientists, executives and other stakeholders interested in learning more about food-safety issues from an international perspective.

CIFSQ convened with an opening ceremony on the morning of September 12th. The ceremony provided attendees the opportunity to hear food safety leaders from around the world. Li Changjiang, CIFSQ Honorary Chairman and Minister of China's General Administration for Quality Supervision, Inspection and Quarantine, officially commenced the event. During his address, Minister Li stressed that China is a responsible partner in ensuring the safety of the global food supply.

Following the Minister were welcome remarks from Wang Da-Ning, Director General, Import and Export Food Safety Bureau, AQSIQ; Jørgen Schlundt, Director, Department of Food Safety, World Health Organization; Daniel Piccuta, Deputy Chief of Mission, US Embassy, Beijing; Biplab Nandi, Senior Food and Nutrition Officer, Food and Agriculture Organization of the United Nation; and Frank Yiannas, President, International Association for Food Protection; Director, Food Safety & Health, Walt Disney World Corp. Each of their speeches emphasized the need for a coordinated approach to sharing and accessing information, and the necessity for collaboration in achieving food safety.

The 2-day conference featured a total of 76 sessions, including breakout presentations, plenary panel discussion, workshops, keynotes, and vendor seminars. Organized by tracks, the educational program focused on Microbial Food Safety, Food Testing, Food Safety Management, Risk/Crisis Communications, Novel Food Safety Programs, Harmonization of Food Safety and Quality System Standards, and Advancements in Food Safety for Food Production and Processing. Two workshops provided audiences with insight on navigating the US Food Market and the HACCP Implementation.

Forty distinct market-leading companies were on hand at this year's exhibition. Attendees were invited to see up close a wide range of innovative technologies, products and services including a USA pavilion. In addition, attendees could choose to take part in a variety of technical seminars hosted by vendors.

Dr. Daniel Y.C. Fung Awarded the Inaugural Outstanding Educator in Food Safety Award

Dr. Daniel Y. C. Fung, Professor of Food Science and Animal Sciences and Industry, Kansas State University, received the Inaugural Outstanding Educator in Food Safety Award sponsored by Food Safety Magazine and ConAgra Foods. The award honors Fung's contribution to educating more than 18,000 undergraduate and graduate students, distance-learning students and professionals in classroom teaching, symposia, seminars, workshops, and meetings on Microbial Food Safety around the world. Dr. Fung held the XXVII International Workshop on Rapid Methods and Automation in Microbiology at Kansas State University, June 15–22, 2007. This popular workshop has attracted about 4,000 participants from 60 countries to Manhattan, KS to be trained in the latest technologies in detecting microbes and controlling them for food safety and security. During the May 2007 KSU graduation ceremony, Dr. Fung celebrated the graduation of his 100th graduate student (34 Ph.D. and 66 M.S.) as the major professor. Dr. Fung has published more than 800 research papers, books, proceeding articles, and abstracts since beginning his career in 1969 at Penn State. He came to Kansas State University in 1978.

UK: *E. coli* O157 Report Published

The Report of the Outbreak Control Team into the outbreak of *E. coli* O157 in South Wales in the autumn of 2005 has been published.

The report was completed in June 2006 but publication was delayed pending legal proceedings involving the local meat supplier at the center of the outbreak. Legal proceedings ended on Friday, September 7 in Cardiff.

In September 2005, the largest *E. coli* O157 outbreak ever seen in

Wales occurred. There were 157 cases meeting the case definition of which 118 were microbiologically confirmed. 109 of these confirmed cases were of phage type 21/28 and of a strain unique to this outbreak. Primary cases were mostly among schoolchildren attending 44 schools in Bridgend, Caerphilly, Merthyr Tydfil and Rhondda Cynon Taf, although there were also three cases in the Vale of Glamorgan.

Thirty-one cases were hospitalized, 11 of which were transferred to tertiary hospitals, and one child died.

An Outbreak Control Team (OCT) was convened and a number of investigations were carried out to identify the cause of the outbreak. From the results (which are detailed in this report), the OCT concluded that cooked sliced meats supplied to the school meals service were the source for the transmission of *E. coli* O157 to primary cases in the four main Local Authority areas affected.

Control measures were successful in rapidly terminating the presentation of primary cases connected with schools outbreak, but secondary household cases continued to present in October. Fifty percent of all cases excreted the organism for between 5 and 32 days. Some cases continued to excrete *E. coli* O157 for prolonged periods, the longest being 80 days. The outbreak was declared over on December 20 2005.

During November 2005, 16 cases of *E. coli* O157 infection occurred associated with Abercynon Infants School in Rhondda Cynon Taf. After exhaustive investigation, these were declared a separate outbreak not connected with the main outbreak. However, as the investigative and geographical context was the same in both outbreaks, the Abercynon outbreak report is nested within this document.

The full report is available to download from the following link: http://www2.nphs.wales.nhs.uk:8080/PressReleasesDocs.nfs.

USDA Web Portal Offers Big Food Safety Benefits for Small Food Processors

The US Department of Agriculture (USDA) has unveiled a new Internet resource to help smaller companies answer food safety questions and help food processors make science-based food production decisions. The Internet portal, available at http://www.ars.usda.gov/naa/errc/mfsru/portal, is one of the most comprehensive decision support tools available.

"Scientists, food safety risk managers, researchers and government decision-makers can use this access to predictive modeling tools and food microbiology information," said Edward B. Knipling, administrator of USDA's Agricultural Research Service (ARS). "The portal is geared towards small and very small processors, but the information it contains will benefit companies of all sizes."

"This partnership builds on our extensive efforts to provide more resources and better tools to the small and very small plants so they can enhance the safety of their products," said Al Almanza, administrator of USDA's Food Safety and Inspection Service (FSIS).

The Predictive Microbiology Information Portal (PMIP) was developed by ARS scientists at Wyndmoor, PA, working with colleagues at FSIS, Rutgers University, and Decisionalysis Risk Consultants, Inc., in Canada. FSIS will also provide a link to the portal to facilitate access by the meat and poultry industry, especially small and very small plants.

PMIP focuses on processors with 500 or fewer employees. ARS microbiologist Vijay K. Juneja and his ARS and FSIS colleagues met with many industry members to tailor the Web portal to their diverse needs in providing safe and wholesome products to consumers.

Currently, PMIP offers information on research, regulations and resources related to *Listeria monocytogenes* in ready-to-eat foods, the prototype identified for the project by FSIS. In the coming months, it will be expanded to include other pathogen and food combinations. A searchable database allows users to find information that can also be used by food processors to develop plans for Hazard Analysis Critical Control Point, to ensure the safety of food processes.

The Web portal also includes a tutorial section with instructions on using and interpreting predictive models and links users directly to the ARS Pathogen Modeling Program and ComBase. The Pathogen Modeling Program is a multi-lingual modeling tool that is used by food processing companies around the world. ComBase is an international relational database of predictive microbiology information that contains more than 30,000 datasets describing the growth, survival and inactivation of bacteria under diverse environments relevant to food processing operations.

Grocery Manufacturers' Association Unveils Action Plan for Strengthening Imported Food Safety

Cal Dooley, president and CEO of the Grocery Manufacturers Association (GMA) has unveiled Commitment to Consumers: The Four Pillars of Food Safety, a unique proposal designed to protect consumers by strengthening,

modernizing and improving the system governing the safety of food and food ingredients imported into the United States.

"Ensuring the United States has the safest food supply in the world is priority number one for the food and beverage industry," said Mr. Dooley. "Because we cannot simply inspect our way to a safer food supply, industry can apply its vast knowledge and practical experience along the entire supply chain to prevent problems before they arise. And, under our proposal, a fortified FDA will be right there with us, side by side, to make sure we do it right."

Prevention and a stronger public-private food safety partnership are the foundation of GMA's Four Pillars proposal. If adopted, all importers of record would be required to adopt a foreign supplier quality assurance program and verify that imported ingredients and products meet US Food and Drug Administration (FDA) food safety and quality requirements. The program would be based on FDA guidance and industry best practices, and would be monitored and enforced by the FDA.

The second pillar of the proposal would allow FDA to focus even greater resources on products and countries deemed of higher risk through a program that would allow food companies/importers to qualify their products as lower risk by sharing test results, data and supply chain information with the FDA in a confidential manner. Qualifying products and ingredients would receive expedited treatment at the borders, allowing the FDA to train its resources on products that carry greater risk of contamination.

The third leg of the proposal focuses on building capacity within foreign governments to facilitate food safety standards that are more closely aligned with those of the FDA.

Finally, recognizing that FDA must be armed with the appropriate resources to administer this program and adequately fulfill its food safety mission, the fourth pillar seeks to expand the capacity of FDA, by providing the Agency with the resources it needs to get the job done.

Echoing a major theme from last week's White House Interagency Working Group on Import Safety report, the Four Pillars program proposal is intended to improve the safety of food imports through an integrated, "life-cycle" approach centering on prevention.

"The 'Four Pillars' proposal is an innovative and comprehensive approach that offers effective and practical solutions to the latest challenges to our food safety net. It builds upon a long and successful history of partnership and cooperation between the public and private sectors that has provided our country with what is still one of the safest food supplies in the world. I look forward to working with Congress, the Bush Administration and appropriate agencies to adopt this prevention-first strategy," concluded Mr. Dooley.

A copy of Commitment to Consumers: The Four Pillars of Food Safety can be found here http://www.ers.usda.gov/Briefing/ConsumerFoodSafety/overview.htm.

Each year federal and state food-safety authorities and private enterprises spend billions of dollars on food-safety related activities. Yet 76 million US consumers still contract foodborne illnesses, resulting in 325,000 hospitalizations, 5,000 deaths, and an unknown number of chronic complications each year.

Are some foodborne illnesses inevitable, or can they be prevented through government regulation? If food safety could be observed, this would not be a troubling question. Consumers could choose the level of food safety they were willing to pay for, thereby creating powerful economic incentives for food suppliers to make all possible cost-effective investments in plants, equipment, and labor training that promote food safety.

If a food supplier produced foods that were not as safe as consumers wanted, consumers would simply turn to other suppliers, buying safer food elsewhere. The supplier of insufficiently safe foods would have to offer safer foods or face financial ruin. Consumers could also choose their own level of food safety: consumers who are willing to scrupulously clean their kitchens and thoroughly heat their foods might not feel the need to buy the same level of safety as those who are less adept at defensive actions. Under these conditions, there would be no reason to involve the public sector in food safety.

But food safety is usually not discernable as foods move from farms to manufacturers to distributors to consumers. Food contaminated with disease-causing pathogens may look, smell, and taste exactly like a safe product. Many pathogens cause illnesses and disease only after a period of days or weeks, so being able to definitively link illnesses and disease with particular foods is a rare event. If consumers cannot identify unsafe foods, they have no way of choosing safer foods. Consequently, suppliers are not rewarded for producing safer foods and are not penalized for ignoring safety. Consumers' food purchases create few financial incentives for suppliers to provide food safety.

ERS food-safety research examines how markets, consumers, and regulators interact to provide safe food, and analyzes the economic efficiency of these interactions. The aim of ERS research is to inform public sector food-safety policies, by addressing:

Do consumers' food choices create sufficient incentives or are

consumers' demands for safety unmet even though suppliers are physically and financially able to meet those demands?

Can food safety be marketed and, if so, how do sellers (all along the food supply chain) gain buyers' trust that foods meet advertised safety margins? Is trust bought with third-party certification or made with contracts?

What would greater food safety cost at different points in the food supply chain?

Can public-sector intervention solve problems of unmet safety demands and, if so, at what cost?

Do regulatory actions increase economic incentives for food-safety innovation and adoption of better practices throughout the supply chain? Regulatory options include hazard analysis critical control point (HACCP) requirements and enforcement applied to food manufacturers, school lunch contracts, pathogen testing from farm to retail, and consumer safe-food handling labels.

New Zealand: FSA Announces Additions to *Campylobacter* Strategy

The New Zealand Food Safety Authority's updated *Campylobacter* in Poultry Risk Management Strategy identifies some stringent additions that it anticipates will lead to significant reductions in this country's high levels of human campylobacteriosis.

Together with the poultry industry, NZFSA will introduce an interim performance target that aims to see human cases of foodborne campylobacteriosis fall by 50 percent over the next five years.

This approach seeks to encourage the greatest reductions in bacteria numbers as early as possible in the processing food chain. The interim performance target that the poultry industry has agreed to meet represents a 90 percent reduction in current contamination levels and will be mandated from 1 April 2008. This time lag will allow industry sufficient time to put the necessary changes to production systems in place, and introduce new food safety technologies.

With the support of the poultry industry, NZFSA will take strong action against premises that do not meet the target. Ultimately, sanctions could escalate to closing down poor-performing premises.

"Like the rest of New Zealand, NZFSA is very concerned about this country's high levels of *Campylobacter*, but mandatory freezing of poultry across all of industry is not a practical or effective option, or one that New Zealand consumers appear keen to adopt," says Dr. Andrew McKenzie, NZFSA's acting chief executive. "NZFSA has decided to take a science-based approach to implementing controls."

"Precipitous decisions could add high costs with no benefits to consumers, and this is unacceptable." Dr. McKenzie says he is hopeful that mandating a performance target will considerably reduce human cases of campylobacteriosis while leaving the intervention decisions to industry.

This, together with a range of other measures being introduced as a consequence of NZFSA's *Campylobacter* Strategy, should significantly reduce foodborne *Campylobacter* infections in New Zealand. However, the rate of reduction is open to conjecture and re-evaluation of the performance target will take place as soon as enough human illness data becomes available.

"Additional interventions further along the processing, packaging and retail continuum are being progressed and there already is much work being done by the retail sector that will minimize cross contamination."

"This is a complex problem and New Zealand is just one of dozens of countries grappling with it." While poultry is recognized as the primary pathway for over half the country's reported rates of foodborne campylobacteriosis, NZFSA is also looking at the environment, food in shops, and domestic animals in efforts to reduce the country's unacceptably high infection rates.

NZFSA continues to stress the need for ongoing consumer vigilance in the home. "While everything possible is presently being done to improve this country's high rates of campylobacteriosis, New Zealanders need to heed our simple Clean, Cook, Cover, Chill and '20 seconds wash+20 seconds dry = clean hands' messages, which will help ensure they have the best chance of avoiding campylobacteriosis, as well as most other foodborne illnesses."

Campylobacter in Poultry Risk Management Strategy is available online at: www.nzfsa.govt.nz/consumers/food-safety-topics/foodborne-illnesses/campylobacter/.

Government Officials Applaud Expansion of Education Campaign

United States Department of Agriculture (USDA) Secretary Mike Johanns and United States Food and Drug Administration Commissioner Andrew von Eschenbach joined other high-ranking government officials on Capitol Hill to recognize the Partnership for Food Safety Education's (PFSE) expansion of the Be Food Safe campaign. Originally launched by the USDA last fall, the campaign

actively engages food-safety educators and retailers across the country to promote safe food-handling messages among consumers.

The event sets the stage for an aggressive food safety education effort to help reduce incidence of foodborne illness. While the overall rate of foodborne illness is declining, research shows that one in four Americans suffer from foodborne illness each year.

Officials praised the Be Food Safe retail campaign, which will empower retailers to deliver core food safety messages ("Clean, Cook, Separate, Chill") through a bold new graphics platform. "Be Food Safe is a perfect example of an effective public-private initiative that can make a real difference in the health of American consumers," said USDA Secretary Johanns. "As the Partnership continues to engage the nation's retailers, this new campaign will give Americans compelling visual reminders of the importance of proper food handling to reducing risk of illness."

Results from the Food Marketing Institute (FMI) US Grocery Shopper Trends, 2007 report reveal that consumer confidence in food safety provided by the industry has declined. In research conducted in March 2007 by PFSE consumers indicated that they believed it was "very important" to educate the public on safe-food handling, with most believing that food companies and the government should provide this information. Be Food Safe retailers represent 5,200 stores in 46 states reaching an estimated 81 million consumers with consistent reminders about how to safely handle food to reduce their risk. These food retailers will bring Be Food Safe messages to their customers through in-store signage, brochures, flyers, packaging and circular ads, among other materials.

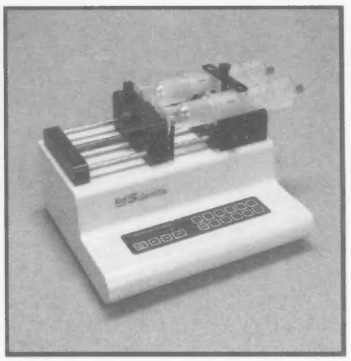
"The Partnership recognizes that everyone in the food system has an important part to play in ensuring the safety of our food supply," said Partnership for Food Safety Education Chairman Bryan Silbermann. "Our 10-year cooperative efforts with government, industry, consumer, public health and scientific organizations have led to improved levels of consumer awareness about basic safe food handling practices, and adding the reach of retailers and their suppliers to the PFSE's message communication will significantly increase consumer awareness of this important information."

Food Marketing Institute President Tim Hammonds added, "Food retailers across the country are eager to help communicate critical food-safety messages to their customers in the store environment. The Be Food Safe campaign is an important tool for grocers in their efforts to achieve the highest standards of safety and quality."

The event marks the 10th Anniversary of the Partnership for Food Safety Education, a collaboration between the US Department of Agri-culture, US Food and Drug Administration, US Centers for Disease Control and Prevention, industry and professional associations and consumer non-profit organizations. It included a salute to the role that state and community organizations play in creating and disseminating unique programs based on the four core safe handling messages.

www.foodprotection.org

INDUSTRY PRODUCTS



KD Scientific

New Economical Syringe Pump with Smooth Flow from KD Scientific

KD Scientific has introduced the KDS 210 Syringe Pump which offers smooth flow with more advanced features than any other infusion/withdrawal pump in its price range.

There are five operating modes available consisting of infusion, withdrawal, infusion then withdrawal and withdrawal then infusion.

The KDS 210 has independent rate and volume settings for infusion and withdrawal plus independent rate and volume settings for both infusion and withdrawal.

The KDS 210 holds two syringes, 10 µl to 140 ml each. The units have built-in RS232C interface for computer "daisy chaining" up to 100 pumps.

KD Scientific designs, manufactures and sells a range of quality fluidics equipment used by research laboratory markets worldwide.

KD Scientific
508.429.6809
Holliston, MA
www.kdscientific.com

New Web Data Logger from TandD Corporation

TandD Corporation has introduced the new WDR-3 Web Data Logger.

The WDR-3 is a network compatible Data Logger that records output voltage and on/off (point of contact) signals from various types of sensors and measuring devices. Compatible with both analog and digital signal inputs, the WDR-3, with its network connection, allows the user to download measurements and data.

The WDR-3 has a built-in network connection function which allows the user to connect to any type of network, including the Internet for monitoring of real-time measurements, giving the user a low-cost method to monitor measurement signals in real time over great distances.

This Data Logger is ideal for instrumentation such as flow meters, wattmeters or analyzers and the collecting of recorded data of analyzers for environmental and weather data such as acid rain, pH, rainfall, snow accumulation, solar radiation, wind speed / direction etc.

The WDR-3 allows data to be viewed, configured and downloaded from a standard browser with access by LAN or Internet. An optional 802.11b adapter card is also available to allow wireless acess. In addition, over-limit warnings can be obtained by E-mail at inquiries@tandd.com.

TandD Corporation
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Saratoga Springs, NY
www.tandd.com

Nilfisk CFM SL Vac Series: An Affordable Maintenance Solution

Food manufacturers today are under a great amount of pressure to keep a clean plant while also cutting costs. This can be a difficult task; however, Nilfisk-Advance America is helping the food and beverage industry meet those challenges with their SL Vac series, an affordable yet durable three-phase industrial line of vacuums.

Designed to meet the twin concerns of cost and performance, the SL Vacs feature solid construction and strong performance at an affordable price, making them a cost-effective solution for many companies. Lightweight and highly maneuverable, the SL Vacs are ideal for picking up powders, liquids, dust and debris.

In addition, the SL Vacs are available with HEPA filtration, to capture 99.97% of particles, down to and including 0.3 microns. A unique release lever that lowers the wheeled collection container also makes disposal of collected debris a breeze. Like all Nilfisk CFM vacuums, the SL series is compatible with the company's comprehensive line of hose and accessories, including those for overhead, to suit a wide range of cleaning applications.

Nilfisk-Advance America
610.647.6420
Malvern, PA
www.pa.nilfisk-advance.com

Be sure to mention, "I read about it in *Food Protection Trends*"!

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Pipette MD is the ultimate, full service, total care service organization devoted to maintaining all makes, models and volumes of Pipettors.

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Flavex Technologies Introduces First Food Technology That Reduces Purge for Increased Yields, Depresses Microbial Load and Inhibits the Growth of *Listeria*

A new technology that simultaneously reduces juice purge in meat, poultry and seafood by 3 to 4 percent, depresses microbial load and inhibits the growth of *Listeria monocytogenes* has been introduced by Flavex Technologies, a division of The Arnhem Group, of Cranford, NJ. The patent-pending development is believed to be the first food technology to combine these critical capabilities.

Two university challenge studies, conducted at Ohio State University, identified the remarkable capability of Flavex BioProtection Coatings™—which are based on Flavex's well-known protein products—to block the growth of *Listeria monocytogenes* and to reduce purge and prevent color deterioration in meats, poultry and seafood.

"More than a billion dollars is wasted each year, because of unattractive discoloration in meat that occurs before unacceptable microbial counts are reached," Michael Bonner, president of The Arnhem Group, explained. "One of the studies showed that the beef industry alone would save $762 million dollars if retail loss due to product unacceptability could be reduced by only 3.6 percent.

"Flavex BioProtection Coatings can dramatically increase shelf life for packaged meat, poultry and seafood products," Mr. Bonner added. "The technology is so simple that it can be applied in a local supermarket as well as in a major food processing plant."

Flavex BioProtection Coatings use a gel matrix to reduce moisture exudates by 3 to 4 percent of gross weight in carcass meat, roast, ground beef, beef tenderloins, pork loin, salmon filets and chicken breast in comparison to control samples, the university study found. Purge reduction also resulted when the coating was applied to pork bellies, fresh pork livers, sausages and smoked poultry pieces.

The coating matrix extends shelf life by providing a barrier to water and oxygen, thereby reducing purge, microbial loads, color deterioration and rancidity.

A reduction in color deterioration was noted when the coating was applied to fresh beef loins, ham and bacon pieces, fresh pork chops, sausages, turkey steaks and cod fish filet patties. In addition to protecting the food from bacterial growth and reducing juice purge, the gel matrix has the added benefit of protecting many core ingredients from heat, moisture and acidity during food processing.

By reducing purge BioProtection Coatings limit microbial growth and increase product safety. The reduction in purge also maintains better flavor, texture, color and weight in meat, poultry and fish.

The control of *Listeria monocytogenes*—one of the most dangerous foodborne pathogens—is a major problem for the food industry. The Centers for Disease Control and Prevention note that virtually everyone who contracts listeriosis,

the disease brought about by *Listeria monocytogenes*, is hospitalized. Of the 2,500 people infected in the United States each year, 500 die—a death rate of 20 percent.

Listeria monocytogenes can grow in temperatures down to 3° Centigrade, making refrigeration ineffective in controlling the bacterium. Vacuum packaging and modified atmosphere packaging have proven similarly ineffective in controlling *Listeria monocytogenes*.

A listeriosis outbreak is devastating for the individuals who become ill and for the food processor that made the food, if the illness can be traced to its facility. Food recalls and plant shut-downs costing millions of dollars can result.

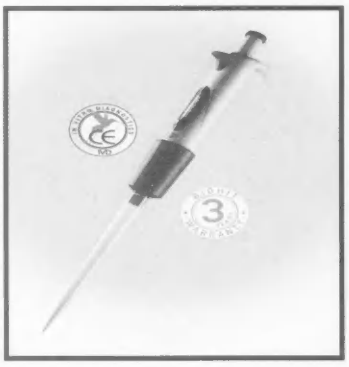
The patent-pending technology encapsulates flavor oils, oleoresins and spices in a colloid gel. The gel matrix may be used in gel form and injected or mixed into meat products, and it may be used directly in the food system or further processed before it is added to the food system.

Encapsulation assists in maintaining a separation between the food processing ingredient and air, thereby reducing the opportunity for oxidation, degradation or other chemical reactions. The Flavex BioProtection Coatings protect the food ingredients even if high processing temperatures are used to convert the matrix into a liquid.

Flavex BioProtection Coatings inhibit the growth of *Listeria monocytogenes* by themselves, and enhance the effectiveness of antimicrobial agents, which can be added before, during or following the application of the coating.

There is virtually no impact on the perceived smell or taste of protected foods. They provide clean labeling, as the coatings need not be declared on the front ingredients panel. Diapers, which are conventionally placed beneath packaged meat, poultry and fish, can be eliminated. This will make the packages more appealing to consumers.

Flavex Technologies
800.851.1052
Cranford, NJ
www.arnhemgroup.com



Biohit, Inc.

Biohit's New 10-ml Pipettor

Biohit, Inc., has expanded its mLINE family of pipettors with the addition of the new 1-10 ml volume range.

This new Macro Volume Pipettor, along with the new 10-ml tip provides a convenient way to handle large volumes of liquid accurately and safely.

The 10-ml Pipettor is an ideal working tool in water, food and environmental labs, as well as in Biotech and Chemical Industries.

The Pipettor features excellent chemical resistance and is compatible with most liquids including chloroform. Biohit Safe Cone filters installed into the tip cone can minimize the risk of contamination.

The mLINE 1-10 ml Pipettor is fully autoclavable and is adjustable in 20 µl increments. It operates with a light touch for both pipetting and tip ejection.

Biohit, Inc.
800.922.0784
Neptune NJ
www.biohit.com

FKI Logistex Latest Robotic Palletizing Solution

FKI Logistex® has introduced its palletizing technologies, the company's new, high-speed robotic palletizing solution, which uses jointed-arm robots capable of palletizing at rates of more than 100 cases per minute.

The patent-pending FKI Logistex robotic solution will be demonstrated in an integrated conveyor loop at the exhibit. Motoman EPL-80 robotic arms with FKI Logistex-manufactured end-of-arm tooling concurrently palletize and depalletize customer product to a single load location. The loop also features FKI Logistex Accuzone® 24-volt powered roller conveyor, which offers zero-pressure, zero-contact product accumulation.

The FKI Logistex robotic solution enables customers to achieve higher palletizing rates with a reduced footprint and increased layout configurations compared to common palletizing systems. The robots offer gentle handling to minimize product damage, and four-way orientation of cases gives customers full control of package label positioning. End-users can easily display the same graphics on all four sides of the pallet, or orient barcodes to streamline scanning operations.

FKI Logistex North America
314.995.2363
St. Louis, MO
www.fkilogistex.com

Eriez® Deep Reach Separator Features Improved Design

Eriez® announces an improved design for its line of Deep Reach Magnetic Separators. These state-of-the-art separators utilize two powerful magnet circuits surrounding a chute to penetrate product flow such as cocoa, powdered cheese, sugar, starch, flour, gypsum and other sticky products to remove ferrous contamination.

According to Eriez, the Deep Reach has succeeded where other separators fail to maintain production rates in handling leafy, powdery, moist, sticky or lumpy materials while improving product purity and protecting equipment and personnel.

The Deep Reach features a low profile design for tight places and three unique magnetic circuits to penetrate product flow for optimum separation efficiency. The Xtreme™ Rare Earth magnet circuit is now available to remove fine or weakly magnetic contaminants, while Eriez traditional ceramic magnet circuits can be selected to remove larger tramp metal. The Deep Reach Magnets may be hinged for easy tramp metal collection or include an easy-to-clean drawer option that provides easy removal of collected tramp metal.

All stainless steel construction is available for food or corrosive environments.

Eriez
888.300.ERIEZ
Erie, PA
www.eriez.com

Jeio Tech, Inc.

New Lab Companion Water Baths from Jeio Tech

The new Lab Companion line of water baths offers temperatures to 100°C, accuracy of ±0.1°C and PID microprocessor controls with full-digital displays.

Additional features include programmable time setting with delayed start and stop, three memory settings for temperature, patented "agitating system" for better temperature uniformity, drain valve and more.

The Lab Companion line offers many models with capacities from 3.5 liters up to 20 liters and includes dual bath models with individual temperature controller for each chamber.

The bath chambers are constructed of stainless steel to allow the use of water or silicone fluids. Safety features include over-temperature limiters and alarm indicators.

Various accessories include transparent gable covers, flat SUS covers, open-ring covers, test tube racks, spring wire racks and half-shelf adjusters.

Jeio Tech, Inc
847.298.6613
Des Plaines, IL
www.jeiotech.com

Dickson's TH800 Critical Storage

We all know that we have to monitor the temperature in refrigerators and freezers storing vaccines and food to ensure their potency and safety from contamination. But what about the contents in storerooms? Supply closets and storerooms often hold materials and products that are sensitive to extremes in temperature and humidity. Dickson has a full line of instruments that are ideal for these critical storage applications.

Dickson's new TH800 chart recorder fits well into these small storage areas and because it is battery operated, electricity and cords are not an issue. The TH800 provides the data and documentation. The signed chart from this recorder provides the SPD operator with a compliance record.

The TH800 features:

- 4 AA battery operation
- Compact and rugged enclosure
- User selectable temperature ranges +32 to +120°F (0 to 50°C)
- Recording times: 7 day or 24 h
- Recorded and displayed dew point
- Flip up pen arm for easy chart and pen changes
- Greater accuracy at a low price

Dickson's TH800 works great for what the VA needed to solve their critical monitoring need. They also could have used any one of our other products because Dickson's line of temperature and temperature/humidity data loggers and chart recorders have a variety of features that can fit into any application of critical storage that you might have.

Dickson Data
800.323.2448
Addison, IL
www.DicksonData.com

Be sure to mention, "I read about it in *Food Protection Trends*"!

COMING EVENTS

DECEMBER

- **3, Safety and Management Systems,** Manhattan, KS. For more information, call AIB at 800.633.5137 or go to www.aibonline.org.
- **3–5, HTST Workshop, Randolph Associates, Inc.,** Mufreesboro, TN. For more information, call 205.595.6455; E-mail: Henry.Randolph@raiconsult.com.
- **3–5, Pflug's Microbiology & Engineering of Sterilization Processes Course,** Scanticon Conference Center, King of Prussia, PA. For more information, call Ann Nicholas at 434.263.4950 or go to www.drpflug.com.
- **4, British Columbia Food Protection Association Annual Meeting,** River Rock Conference Center, Richmond, British Columbia. For more information, contact Terry Peters at 604.666.1080; E-mail: terry_peters@telus.net.
- **5, Food Labeling Workshop, FDA-regulated Foods: Complying with Regulatory Labeling,** Washington, D.C. For more information, go to www.fpa-food.org.
- **10–11, SQF Training Course – Implementing SQF 2000 Systems,** Fayetteville, AK. For more information, call 202.452.8444 or go to http://fmi.org/events.

JANUARY

- **17–18, GMA Sustainability Summit,** The Ritz-Carlton, Washington, D.C. For more information, call 202.295.3950 or go to lcookson@gmabrands.com.
- **18–24, ILSI 2008 Annual Meeting,** Wyndham Rio Mar Beach Resort and Spa, Rio Mar, Puerto Rico. For more information, call 202.659.0074 or go to www.ilsi.org.
- **21–24, National Mastitis Council 46th Annual Meeting,** Marriott Riverwalk Hotel, San Antonio, TX. For more information, go to www.nmconline.org.
- **23–25, International Poultry Expo,** Georgia World Congress Center, Atlanta, GA. For more information, call 770.493.9401 or go to www.ipe08.org.

FEBRUARY

- **13–15, International Food Safety Conference,** Hotel Okura, Amsterdam, The Netherlands. For more information, call 33.1.44.69.84.84 or go to www.ciesfoodsafety.com.
- **23–27, AFFI Frozen Food Convention,** Sheraton San Diego Hotel & Marina, San Diego, CA. For more information, call 703.821.0770 or go to www.affi.com.

MARCH

- **12–15, FPSA 2008 Conference,** Hyatt Regency Coconut Point, Bonita Springs, FL. For more information, call 703.761.2600 or go to www.fpsa.org.

APRIL

- **9, SfAM 2008 Spring Meeting,** Aston University, Birmingham, UK. For more information, call 44.0.1234.326661 or go to www.sfam.org.uk.
- **27–30, 2008 ADPI/ABI Annual Conference,** Marriott Downtown, Chicago, IL. For more information, call 630.530.8700 or go to www.adpi.org.

MAY

- **4–7, The FMI Show plus MARKETECHNICS®,** Mandalay Bay Convention Center, Las Vegas, NV. For more information, call FMI at 202.452.8444 or go to www.fmi.org.
- **17–20, NRA Show 2008,** McCormick Place, Chicago, IL. For more information, call 312.853.2525 or go to www.restaurant.org.
- **18–20, 2008 APHL Annual Meeting,** St. Louis, MO. For more information, call APHL at 240.485.2745 or go to www.aphl.org.

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Statement of Ownership, Management, and Circulation
(All Periodicals Publications Except Requester Publications)

1. Publication Title	2. Publication Number	3. Filing Date
Food Protection Trends	1 5 4 1 - 9 5 7 6	9/26/07
4. Issue Frequency	5. Number of Issues Published Annually	6. Annual Subscription Price
Monthly	12	$248 ~ Sub, $110 Aff. $55 ~ Student

7. Complete Mailing Address of Known Office of Publication (Not printer) (Street, city, county, state, and ZIP+4®)
International Association for Food Protection, 6200 Aurora Ave., Ste. 200W, Des Moines, Polk, IA 50322-2864
Contact Person: Julie Cattanach
Telephone (Include area code): 515.276.3344

8. Complete Mailing Address of Headquarters or General Business Office of Publisher (Not printer)
International Association for Food Protection
6200 Aurora Ave., Ste. 200W, Des Moines, IA 50322-2864

9. Full Names and Complete Mailing Addresses of Publisher, Editor, and Managing Editor (Do not leave blank)
Publisher (Name and complete mailing address)
International Association for Food Protection
6200 Aurora Ave., Ste. 200W, Des Moines, IA 50322-2864

Editor (Name and complete mailing address)
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Managing Editor (Name and complete mailing address)
Ms. Lisa K. Hovey, International Association for Food Protection, 6200 Aurora Ave., 200W, Des Moines, IA 50322-2864

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13. Publication Title	14. Issue Date for Circulation Data Below
Food Protection Trends	August 2007

15. Extent and Nature of Circulation			Average No. Copies Each Issue During Preceding 12 Months	No. Copies of Single Issue Published Nearest to Filing Date
a. Total Number of Copies (Net press run)			2,919	2,400
b. Paid Circulation (By Mail and Outside the Mail)	(1)	Mailed Outside-County Paid Subscriptions Stated on PS Form 3541 (Include paid distribution above nominal rate, advertiser's proof copies, and exchange copies)	1,853	1,312
	(2)	Mailed In-County Paid Subscriptions Stated on PS Form 3541 (Include paid distribution above nominal rate, advertiser's proof copies, and exchange copies)	0	0
	(3)	Paid Distribution Outside the Mails Including Sales Through Dealers and Carriers, Street Vendors, Counter Sales, and Other Paid Distribution Outside USPS®	640	440
	(4)	Paid Distribution by Other Classes of Mail Through the USPS (e.g. First-Class Mail®)	0	0
c. Total Paid Distribution (Sum of 15b (1), (2), (3), and (4))			2,493	1,752
d. Free or Nominal Rate Distribution (By Mail and Outside the Mail)	(1)	Free or Nominal Rate Outside-County Copies included on PS Form 3541	0	0
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	(4)	Free or Nominal Rate Distribution Outside the Mail (Carriers or other means)	192	292
e. Total Free or Nominal Rate Distribution (Sum of 15d (1), (2), (3) and (4))			256	422
f. Total Distribution (Sum of 15c and 15e)			2,749	2,174
g. Copies not Distributed (See Instructions to Publishers #4 (page #3))			170	226
h. Total (Sum of 15f and g)			2,919	2,400
i. Percent Paid (15c divided by 15f times 100)			90.68	80.58

16. Publication of Statement of Ownership
☑ If the publication is a general publication, publication of this statement is required. Will be printed in the November '07 issue of this publication. ☐ Publication not required.

17. Signature and Title of Editor, Publisher, Business Manager, or Owner
David W Tharp — Executive Director — Date: 9/26/07

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Journal of Food Protection®

ISSN: 0362-028X
Official Publication

International Association for Food Protection®

Reg. U.S. Pat. Off.

Vol. 70 | October 2007 | No. 10

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❑ Student Membership with *JFP*	Add	$ 75.00	$ 95.00	$125.00
❑ Student Membership with *JFP* Online	Add	$ 18.00	$ 18.00	$ 18.00
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IAFP 2008

August 3–6, 2008

Hyatt Regency Columbus
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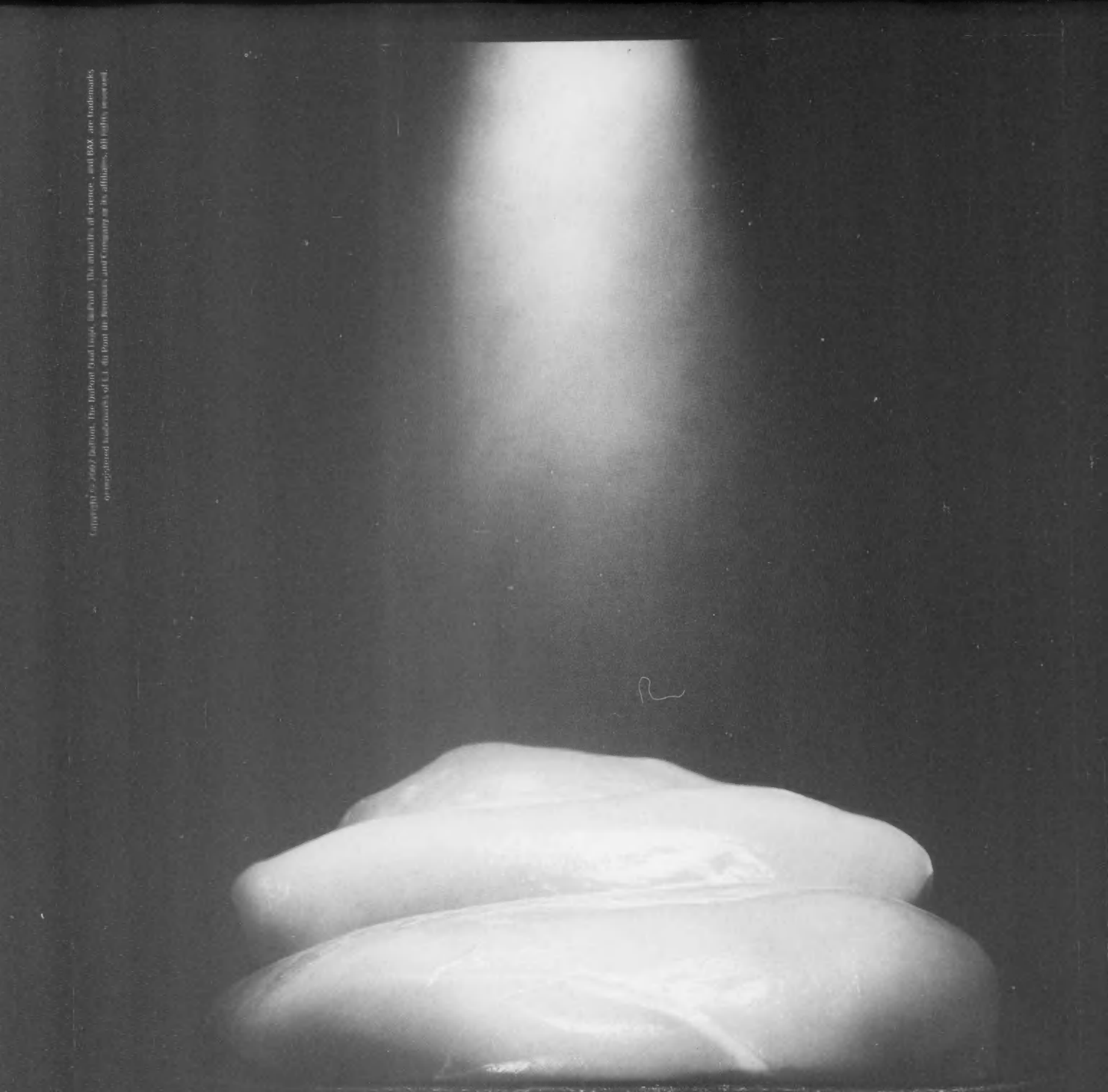

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