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Food Protection Trends

Science and News from the International Association for Food Protection

Impact of Oregano and Rosemary Oleoresins on Native Microflora and *E. coli* O157:H7 Growth on Sliced and Grated Carrots

Food Safety Training Needs Assessment for Independent Ethnic Restaurants

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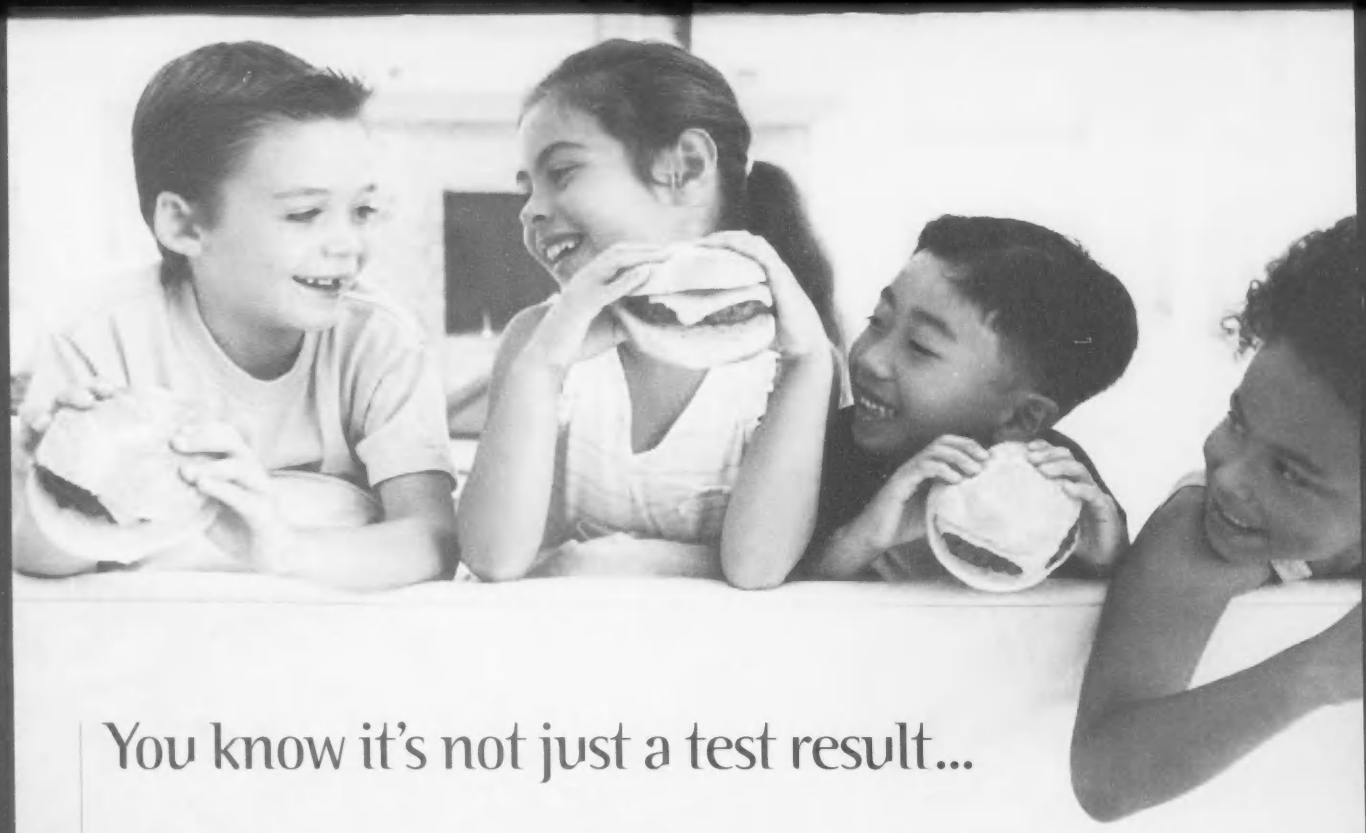

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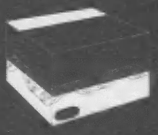

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VOLUME 30, NO. 7

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

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NACMCF Executive Secretariat,* 2007. Analytical utility of *Campylobacter* methodologies. U.S. Department of Agriculture, Food Safety and Inspection Service, Washington, D.C. Journal Food Protect. 70:241-250.
Stern, N.J., B. Wolton, and K. Kwiatek. 1992. A differential-selective medium and dry ice-generated atmosphere for recovery of *Campylobacter jejuni*. J. Food Protect. 55:514-517.

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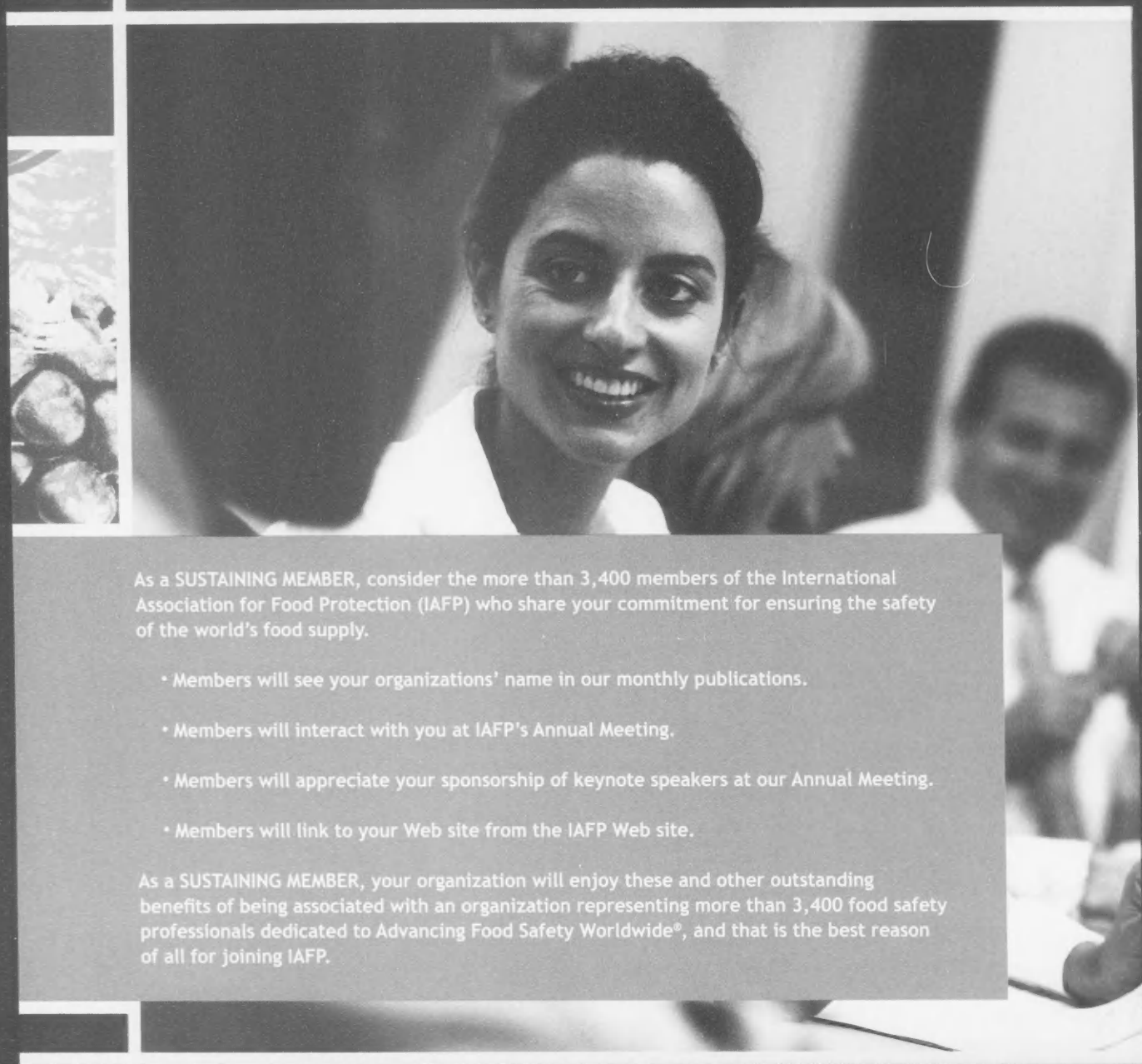

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"VICKIE'S VIEW"
FROM YOUR PRESIDENT

By VICKIE LEWANDOWSKI
PRESIDENT

"If we provide the forum, they will come!"

Greetings to all! We are wrapping up the Memorial Day holiday here in the U.S., the three-day weekend that officially kicks off summer. I am fortunate enough to work for a company that gives an extra day off to make it a four-day weekend. And boy, have I taken advantage of the time! There are all sorts of festivities to help with the annual summer kick-off: baseball games (professional and kids), new blockbuster movie releases, unbelievable sales at retail shops, reduced entry fees at amusement parks, and the opening of the local pool, just to name a few. Throw in a few backyard barbeques with friends and family and there goes the weekend! While I was enjoying these activities during this holiday weekend, I observed that if there is a forum for people to gather, eat, drink and be merry, they will come.

In fact, every event that I attended this weekend was busy, in spite of the economy. It seems that everybody welcomes a forum that helps them meet the basic needs of food, drink and human interaction. It sort of reminds me of the line from the Kevin Costner baseball movie, *Field of Dreams*: "If you build it, he (they) will come." I found myself relating that observation to IAFP and our mission statement: "To provide food safety professionals worldwide with a *forum* to exchange information on protecting the food supply" (italics mine). Throughout the year, IAFP and its affiliates provide a number of forums for the exchange of information at the local, state, national and international levels. I have been honored to be invited to many of the affiliate meetings in the U.S. and abroad, as well as have had the privilege to represent IAFP at many of its international meetings. Regardless of where the meeting is held, I have observed that if there is a forum for exchanging information on food protection, people will attend.

As I mentioned last year in my September column, IAFP had a successful 2009 Annual Meeting in terms of attendance and participation. Simply put, we did not experience the decrease in attendance that many other meetings are experiencing in these tough economic times. People need a forum that brings them together to talk about and learn about the recent developments in food protection, especially since the science and policy continue to change so quickly.

By the time you read this month's *Food Protection Trends*, the Sixth European Symposium on Food Safety will be finished and the final arrangements and preparation for the 2010 IAFP Annual Meeting will be close to completion. However, as I write this column, preparations for both meetings are in full swing. We try to predict and plan for the success of all IAFP meetings by looking at past meeting registration and meeting sponsorship, and at press time, I am happy to report that the numbers for these 2010 meetings are strong. For example, two weeks prior to last year's Fifth European meeting, registration stood at 169; this year, that number is 209 for the Sixth European meeting to be held in Dublin. Many would-be registrants have voiced concern about the recurring Icelandic volcanic eruptions and their potential impact on travel, holding off on registering for the symposium. Even so, we are hoping for a total registration of 250 to 265 attendees compared to 215 last year. However, sponsorship sales for the meeting have reached the budgeted amount, which is very positive in light of the depressed European economy.

Similarly, registration numbers for the 2010 IAFP Annual Meeting in Anaheim, CA, August 1–4, are well ahead of last year at the same time prior: 508 registrants for the 2010 meeting compared with 393 in 2009, up from 406 registrants in 2008 counted at 10 weeks prior to the meeting start date. We expect these numbers to rise, especially since a fair number of attendees typically

register onsite. In addition, IAFP also relies heavily on exhibitors to add another level of interest and dimension to the Annual Meeting, as well as revenue. The numbers here also are strong: As of this writing, exhibit booth sales stand at 130 this year compared with 104 in 2009.

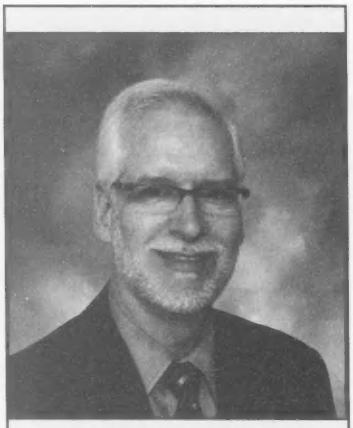
We are experiencing success not only in meeting attendance and exhibitor booth sales, but also in increased sponsorship via the Sustaining Membership Program and with the growing number of affiliates around the world. Remember, you can be a sponsor of the IAFP Foundation simply by donating an item to the Silent Auction (contact Donna at dgronstal@foodprotection.org), or by bidding on an item during the auction at the Annual Meeting.

It is so exciting to see our numbers continue to increase. We know that some of our "competitor" organizations have not been as successful, with some experiencing up to a 25% decrease in meeting attendance. It might make one stop and wonder why IAFP has experienced little to no decline in meeting attendance or sponsorship. But when you stop to think about it, it's really not that hard to understand: IAFP offers everything all food safety stakeholders—from crop to consumption—need to see and hear, and gives everyone the opportunity to contribute to global food safety solutions. It's been said that IAFP is a "one-stop-shop" for food safety. You don't have to weed through a ton of program information just to find one small session on food safety. You don't have to walk for miles through an exhibit hall to find the company that you need to talk to about the latest test methods, technologies or professional services. It's likely that people can attend only one meeting a year right now (I know that's what is happening in my company) and they are choosing the one that gives them the most value for their money—be it A DOLLAR, A EURO, A DIRHAM, A PESO, or any other currency. As I stated earlier, food safety stakeholders need a forum for the exchange of information and they are choosing IAFP over all of the others. If we provide the forum, they will come!

Help guarantee continued success of the IAFP Annual Meeting by attending and actively participating in sessions, by visiting with exhibitors to learn about the latest technologies, and by exploiting all networking opportunities. IAFP meetings are still relatively small enough that there is the time and opportunity to do all the networking you need to do. Please register online today, join us in Anaheim in August and be a part of the most successful food protection meeting in the world!

As always, please feel free to contact me directly with your comments and feedback at vlewandowski@kraft.com.

"COMMENTARY" FROM THE EXECUTIVE DIRECTOR



By **DAVID W. THARP, CAE**
EXECUTIVE DIRECTOR

"We hope you will join us in Anaheim for what will truly be a stellar event in IAFP's history"

As we prepare for the July issue of *Food Protection Trends*, June is just now upon us. As Vickie related in her President's Column, the US Memorial Day holiday traditionally marks the beginning of summer for America. It is something we always look forward to, but this year even more so with the extreme winters most of the USA endured.

In IAFP, June marks a new beginning for our European Symposium on Food Safety. I say it is a new beginning because for the first five years, this symposium was held in October or November and now this year, we have moved it forward on the calendar to June. This came at the advice of our organizing committee and the change in date, along with the selection of Dublin, has proven to be a successful combination. It is still too early to report on a financial outcome or final attendance number, but it appears we will have more than 275 people in attendance with a possibility to reach 300 or more. This compares to totals of 215 last year and 209 the year before.

Needless to say, we are very pleased to see the support shown through these registration numbers. In addition, we are equally happy with the eager support provided by the exhibitors and sponsors of the European Symposium. We will provide a full report along with a sponsor listing and pictures in the August issue of *Food Protection Trends*. We are excited to continue with the organization of our European Symposia in the second quarter of the year and expect to announce the 2011 date and location in the coming months.

It has been a challenge for the IAFP staff to simultaneously organize the European Symposium and IAFP 2010. There are a number of functions for both meetings that have run on parallel tracks over the past couple of months. Program preparations, speaker communications, exhibit sales, registrations and hotel reservations all have been underway for both events. I want to take just a minute to recognize the great IAFP staff we have working in our Des Moines office. It is their extra effort and dedication to IAFP Members that have allowed us to plan and conduct these two superb meetings at the same time. It has not been without challenges and frustrations, but the end result will be worth the effort put forth. Thank you to the IAFP staff!

Of course we cannot make meetings happen without the help of many of our Members. We have an energetic organizing committee for the European Symposium who have also dedicated many hours of their time to ensure the program content will be top notch. There are countless hours of time taken to verify presentation timing, proper title and subject matter focus and then the presenters also have to provide their time in preparing a presentation abstract and their actual presentation. So, we must thank everyone who combined their effort and donated their time to help the IAFP European Symposium on Food Safety be such a success.

I mentioned IAFP 2010 in Anaheim is also in full swing for preparations as it will begin just seven short weeks after the Dublin Symposium concludes. All of the print materials for IAFP 2010 are in their final layout phases and at the same time we had been working to complete the handout materials for Dublin. So many of the functions for one conference were taking place at, or about, the very same time as they were taking place for the second conference. We are fortunate to have a dedicated staff to keep it all straight!

It is also appropriate to thank, in advance, everyone who is working to make IAFP 2010 a great success! This includes our exhibitors and sponsors who support IAFP 2010 financially along with each of our

session organizers and convenors who help bring together top-level speakers on subjects of great interest to our attendees. And as was mentioned for the Dublin Symposium, the individuals who prepare their presentations for our Annual Meeting audiences receive our sincere thanks for their time and effort.

Just when we begin to think, it cannot be time already for the European Symposium to take place; it will quickly draw to a conclusion and become another memory. Then, thinking ahead seven weeks, IAFP 2010 will also come and go so quickly. The most important resources derived from both the European Symposium and IAFP 2010 is the knowledge gained through sharing of information AND the continuing friendships either newly established or renewed with colleagues from around the world.

We hope you will join us in Anaheim for what will truly be a stellar event in IAFP's history. Also, when you have the opportunity to join a future European or International Symposium (next one in Bogota, Colombia this September), we invite your participation whenever and wherever it might be possible!

ARTICLES
Food Protection Trends, Vol. 30, No. 7, Pages 404–411

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International Association for Food Protection

Impact of Oregano and Rosemary Oleoresins on Native Microflora and *E. coli* O157:H7 Growth on Sliced and Grated Carrots

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ABSTRACT

The microbiological safety of fresh produce has been a cause for concern among consumers and within the food industry. Considering the demand for current information, the biocontrol exerted on *E. coli* by the native microflora on carrots was studied. Oregano and rosemary oleoresins were applied and *E. coli* O157:H7 was inoculated at a medium level (4–5 $\log_{10}$ CFU/g) on sliced and grated carrots. Samples were stored at 20 and 10°C for 96 h to monitor changes in native microflora and pathogen growth. Biocontrol exerted on *E. coli* O157:H7 by the native microflora was not significant at storage temperatures of 20 and 10°C in both types of processed carrot. The use of oregano and rosemary at higher concentration exerted an inhibitory effect on the native microflora of sliced carrot and on *E. coli* O157:H7 growth in sliced and grated carrots. However, sensory analysis revealed that acceptance was inversely related to the concentration of the oleoresins used. Inhibition of the pathogen was more evident at 20 than at 10°C in both types of processed carrot. The bacteriostatic effect of oleoresins on the pathogen could be enhanced by synergistic effects together with other preservation technologies.

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INTRODUCTION

Minimally processed vegetables are experiencing increasing popularity, mainly due to their convenience, freshness and associated health benefits. Sliced and grated carrots have predominated in the fresh-cut vegetable market because of their pleasant flavor and nutritional benefits as well as versatility of use *(1)*.

Shredded or grated carrots usually have a short shelf life, about 3 to 4 days. The enhanced physiological/biochemical responses caused by the surface area increase created by shredding or slicing lead to increased microbial and non-microbial spoilage during storage, resulting in a negative impact on sensory quality *(1, 9)*.

In general, microbial counts on minimally processed vegetables after processing range from 4 to 6 $\log_{10}$ CFU/g representing predominantly Gram negative bacteria *(16, 17)*. Preservation treatments applied during minimal processing play a fundamental role in the stability, safety and overall quality of minimally processed vegetables. The use of bio-

preservatives *(4, 7)* for controlling or eliminating pathogenic bacteria while maintaining overall product quality *(7)* represents an interesting approach to improving the microbial safety of fresh produce. A wide range of natural products from plants, animals or microorganisms can be used to extend food shelf life. The antimicrobial properties of some types of bacteria are of interest to researchers involved in finding new biocontrol strategies to be used in foods. The native microorganisms present on the surface of fresh produce are assumed to play an important role in maintaining the safety of ready-to-eat vegetables *(12)* by out-competing pathogens for physical space and nutrients and/or by producing antagonistic compounds that negatively affect the viability of pathogens *(10, 13)*.

Another alternative for biopreservation is the use of plant extracts. Spice oleoresins constitute the true essence of spices in their most concentrated form, containing volatile as well as non-volatile components and differing from essential spice oils in that they have all the flavoring ingredients of a particular spice. In addition, they are the most convenient substitutes for raw spices in the food processing industry, since they are free of bacteria and may be standardized to a desired flavor strength *(15)*. It is well known that the antimicrobial potency of essential oils and oleoresins is generally lower in food systems than *in vitro*, depending on the food composition, processing steps and storage temperature, all of which could strongly influence the effectiveness of these antimicrobial agents *(4)*. Accordingly, larger amounts of oleoresins are required in food systems, which could seriously interfere with the food's final sensory properties. Among several oleoresins that may be useful as antimicrobial agents, oregano and rosemary may have the greatest potential for use in industrial applications *(5)*.

The incidence of foodborne infections caused by bacterial pathogens, especially *Escherichia coli* O157:H7, continues to be a problem in the industry. This pathogen attaches preferentially to cut edges of vegetables and penetrates into the plant tissue, where it remains unaffected by various sanitizing treatments *(19)*. These facts have led investigators to search for novel methods of controlling *E. coli* O157:H7 contamination in vegetables *(6, 18)*. Raw materials, such as carrots, have been subjected to processing operations that commonly increase the risk of contamination by this pathogen *(11)*. In this context, the aims of the present work were to evaluate the effectiveness of the endogenous microflora of sliced and grated carrots in controlling *E. coli* O157:H7 and to determine the effectiveness of oregano and rosemary oleoresins to control pathogen growth. In addition, the ability of the oleoresins to control growth of the native microflora were evaluated at two storage temperatures, 10 and 20°C.

MATERIALS AND METHODS

Sample preparation

Carrots (*Daucus carota L.*) were grown and harvested at optimal maturity in Sierra de los Padres, Mar del Plata, Argentina, and were immediately transported to the laboratory. Carrots of about 140–180 mm in length and 40 mm in diameter (upper end) were precleaned with tap water, knife-peeled, topped and then grated or sliced by use of a multi-purpose belt cutting machine manufactured by Braun (Kronberg, Germany). Finally, carrots were washed, centrifuged and aseptically transferred to packages of PET materials (10 × 10 cm).

Culture maintenance and inoculum preparation

E. coli O157:H7, ATCC 25158 provided by CIDCA (Centro de Investigación y Desarrollo en Criotecnología de Alimentos, La Plata, Argentina) was used. In previous work, Moreira et al. *(11)* reported no significant differences in sensitivity to essential oils among different *E. coli* strains (*E. coli* O157:H7, ATCC 25158, ATCC 32922 and CI and CII, isolated from foods). For this reason, only one strain of *E. coli* O157:H7 (ATCC 25158) was used in the present work.

A stock culture was maintained in tryptic soy broth (Britania, Buenos Aires, Argentina) at 4°C. Before use, *E. coli* O157:H7 was cultured in brain heart infusion broth (BHI, Britania, Buenos Aires, Argentina) for 24 h at 37°C. The culture was transferred to 9.0 ml of BHI at two consecutive 24-h intervals immediately before each experiment.

Effectiveness of endogenous microflora on *E. coli* O157:H7 control

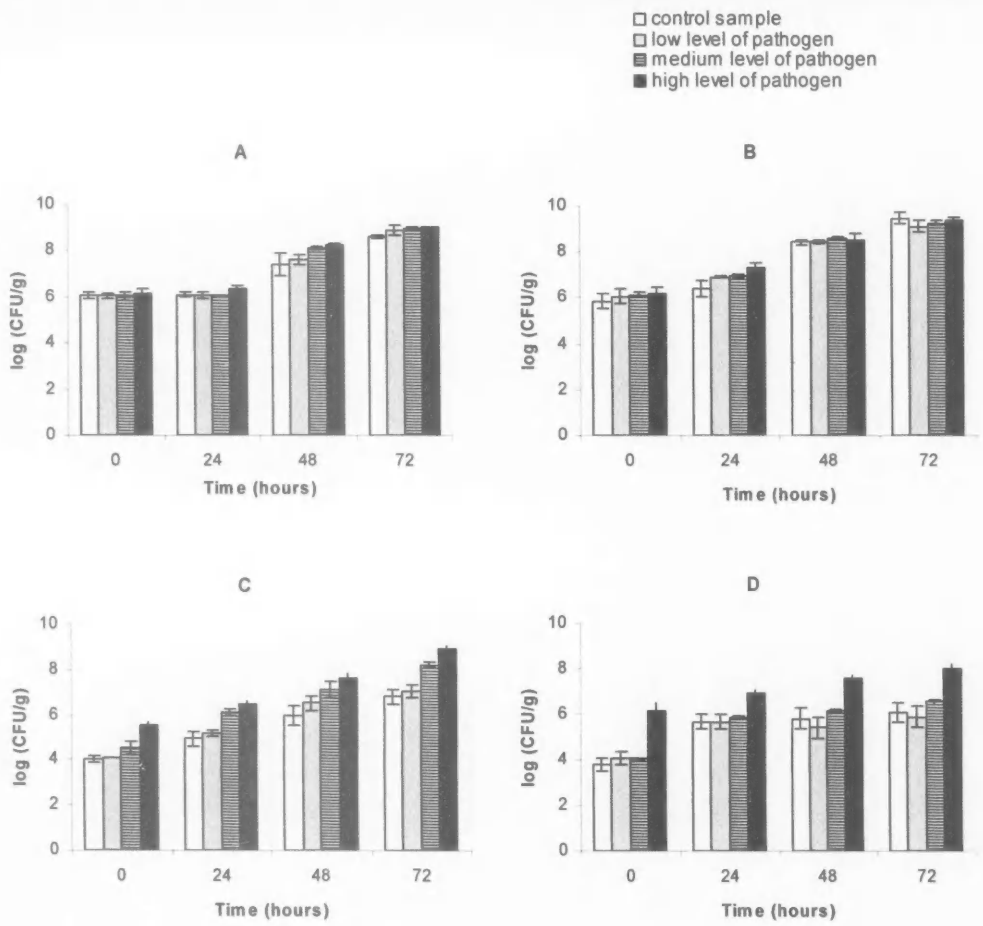
Grated or sliced carrots (100 g) were inoculated with 100 µl of *E. coli* O157:H7 active culture in the form of several drops. Carrot samples were vigorously shaken to distribute the inoculum and immediately covered with film (Resinite AF 50). The pathogen was inoculated at three levels (low: 2–3 $\log_{10}$, medium: 4–5 $\log_{10}$ and high: 6–7 $\log_{10}$, approximately). To account for possible growth of native *E. coli* strains, a control sample without added *E. coli* O157:H7 was used. Carrot samples were stored for 72 h at saturated relative humidity and two temperatures: 10°C (representing inadequate refrigeration storage) or 20°C (representing an abusive, room temperature). Each assay was performed in duplicate in four independent experimental runs.

Effect of oregano and rosemary on *E. coli* O157:H7 inoculated in carrot samples

Rosemary (*Rosmarinus officinalis*) and oregano (*Origanum vulgare*) oleoresins used in this work were provided by Pionherb, Buenos Aires, Argentina. Food grade oleoresins were obtained from fresh herbs by alcohol steam distillation.

One hundred grams of grated or sliced carrots were thoroughly mixed with oleoresins at two concentrations: 0.5 and 1% w/w. Samples with oleoresins were immediately inoculated with *E. coli* O157:H7 by placing 100 µl bacterial suspension on grated or sliced carrots in the form of several drops, reaching a pathogen concentration of approximately 10^4–10^5 CFU/g, representing a medium contamination level. Inoculated carrot samples were shaken vigorously to evenly distribute the inoculum and immediately covered with film (Resinite AF 50). To compare the effectiveness of oleoresins on *E. coli* O157:H7 growth, a sample without oleoresin was used as control. Carrot samples were stored for 96 h at 10°C or 20°C. Each assay was performed in duplicate in four independent experimental runs.

FIGURE 1. Aerobic microflora in sliced (A) and grated (B) carrots and *E. coli* in sliced (A) and grated (B) carrots stored at 20°C



Enumeration of aerobic (mesophilic) microflora and *E. coli* O157:H7

Survival and growth of *E. coli* O157:H7 and aerobic background microflora on carrot samples were evaluated at regular intervals during the storage period. Samplings for viable cells were carried out at 0, 24, 48, 72 and 96 h. For both sliced and grated carrots, with or without oleoresins, extension of the storage period was established taking into account the organoleptic attributes. To allow an adequate contact between the oleoresins and the microorganisms, samples reported as corresponding to time 0 had 5 min of contact *(14)*. After homogenization in a stomacher (Led Techno, Stomacher Lab-Blender 400), dilution series were made and the appropriate dilutions were pour-plated on eosin methylene blue agar (EMB; Britania, Buenos Aires, Argentina), a selective medium that allows the characterization of typical *E. coli* colonies (in this study, only those greenish and with a metallic sheen). Aerobic microflora were determined by surface plating on plate count agar (PCA, Britania, Buenos Aires, Argentina) and counting colonies after incubation at 37°C for 24–48 h. At each assay time, controls without oleoresin were also tested.

Sensory evaluation

During sensory evaluation, carried out by nine laboratory members, changes in taste, color, firmness, fresh-like aroma and general acceptance were assessed. A 5-point hedonic scale was used, where 5 = very good, 3 = limit of marketability and 1 = poor *(14)*.

Statistical analysis

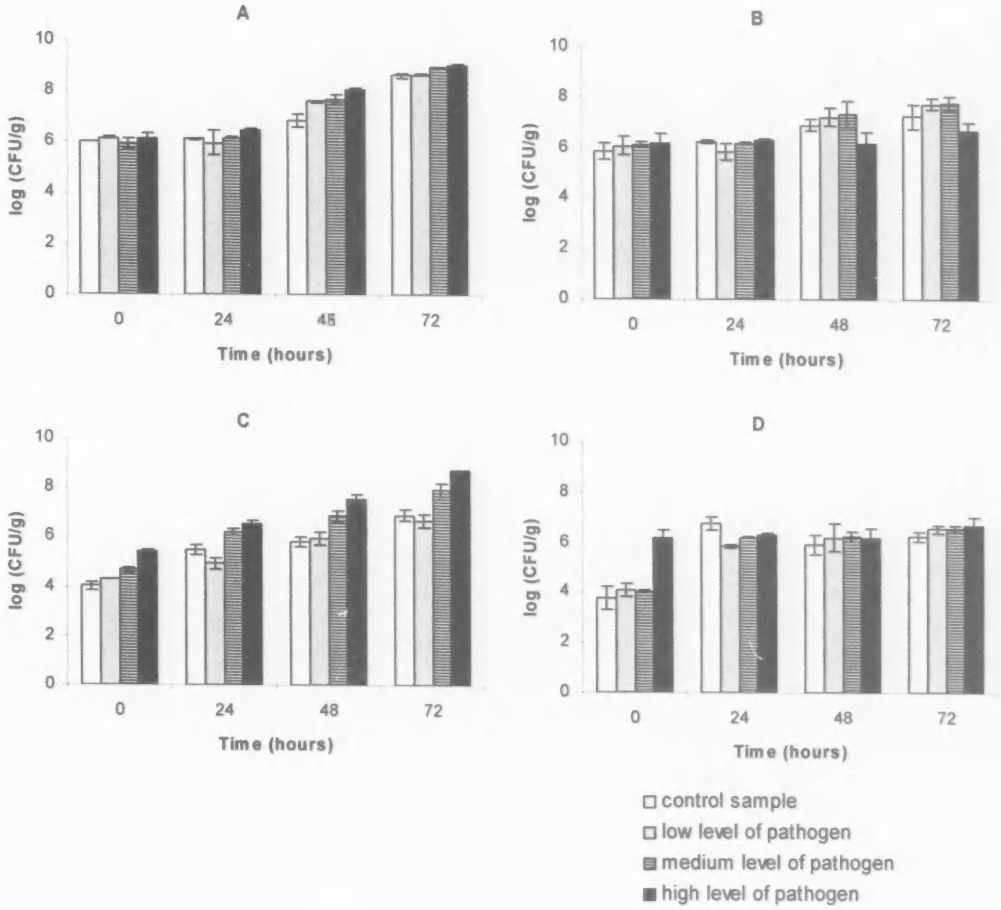
Each assay was performed in duplicate on three independent replicates. Differences among samples were tested by analysis of variance *(3)*. When differences are reported as significant, a 99.9% confidence level was used.

RESULTS

Effectiveness of carrot native microflora in *E. coli* control

Figure 1 shows results obtained from grated and sliced carrots inoculated with three inoculum levels of *E. coli* O157:H7 and stored at 20°C. Initial counts of native microflora in the control and in the three inoculated sliced carrot samples were approximately 6.00 $\log_{10}$ CFU/g (Fig. 1A). Similar values were obtained for grated carrot (Fig.

FIGURE 2. Aerobic microflora in sliced (A) and grated (B) carrots and *E. coli* in sliced (A) and grated (B) carrots stored at 10°C



1B). At 72 h of storage, native microflora counts in sliced carrot samples were in the range of 8.50–9.00 $\log_{10}$ CFU/g. At the same time, bacteria counts in the control grated carrot (Fig. 1B) were approximately 1 log higher compared to control sliced carrot (Fig. 1A). In contrast, there were no significant differences in aerobic bacterial counts between sliced and grated carrot samples inoculated with three pathogen levels at 72 h of storage (Fig. 1A-B).

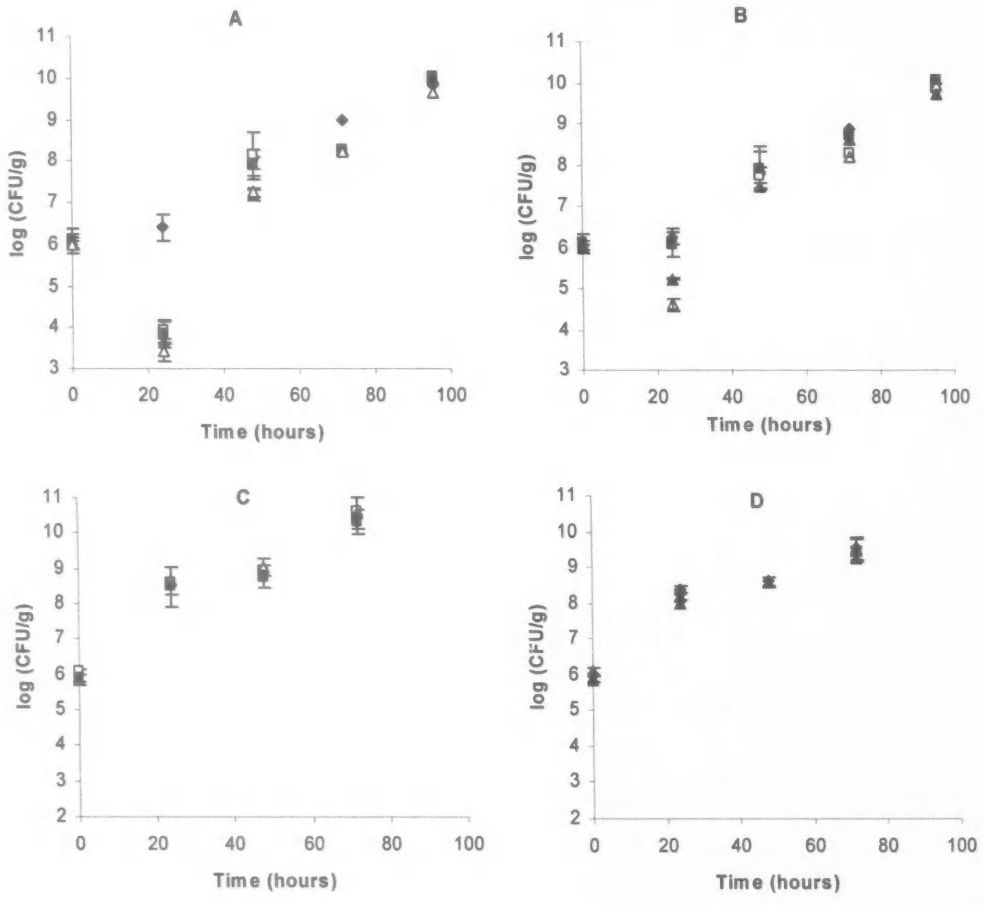
Initial *E. coli* counts in control and samples inoculated with low and medium levels of pathogens were similar in both types of processed carrot (Fig. 1C and D). At the end of storage, *E. coli* counts in all sliced carrot samples were in the range of 6.80–8.90 $\log_{10}$ CFU/g (Fig. 1C), whereas lower *E. coli* counts (6.00–8.00 $\log_{10}$ CFU/g) were observed in grated carrot samples (Fig. 1D).

Figure 2 shows the results obtained from sliced and grated carrots inoculated with three levels of *E. coli* O157:H7 and stored at 10°C. In both types of processed carrot samples, initial aerobic microflora counts were in the range of 5.80–6.20 $\log_{10}$ CFU/g. At 72 h of storage, aerobic counts in sliced carrot were 1.80–2.20 log higher than the counts in grated carrot (Fig. 2A and B). In agreement with what was observed at 20°C, no significant differences were found between initial *E. coli* counts corresponding to control samples and low and medium inoculated samples (Fig. 2C and D). At 72 h of storage, *E. coli* counts in sliced and grated carrot samples were in the range of 6.70–7.80 and 6.20–6.70 $\log_{10}$ CFU/g, respectively. The biocontrol exerted by native microflora on *E. coli* growth, in both types of processed carrot, was not significant. Storage temperature was not a factor, as similar results were observed in carrot samples stored at 20 and 10°C.

Inhibitory effects of oregano and rosemary oleoresins on native microflora and *E. coli* O157:H7 inoculated in carrot samples stored at 10 and 20°C

The effect of oleoresin application on *E. coli* in carrots was determined immediately after treatment and during storage. The microbial load of aerobic mesophilic microflora and E. coli present in sliced and grated carrots was determined. For the inoculated sample with the addition of oleoresins, we selected a medium level of pathogen inoculation, simulating an accidental contamination.

FIGURE 3. Aerobic microflora counts in sliced carrot at 20 (A) and 10°C (B) and in grated carrots at 20 (C) and 10°C (D). Samples were treated with oregano and rosemary at different concentrations: Control sample (♦); carrot plus oregano at 0.5% (□) and 1% (□); rosemary 0.5% (□) and 1% (Δ)



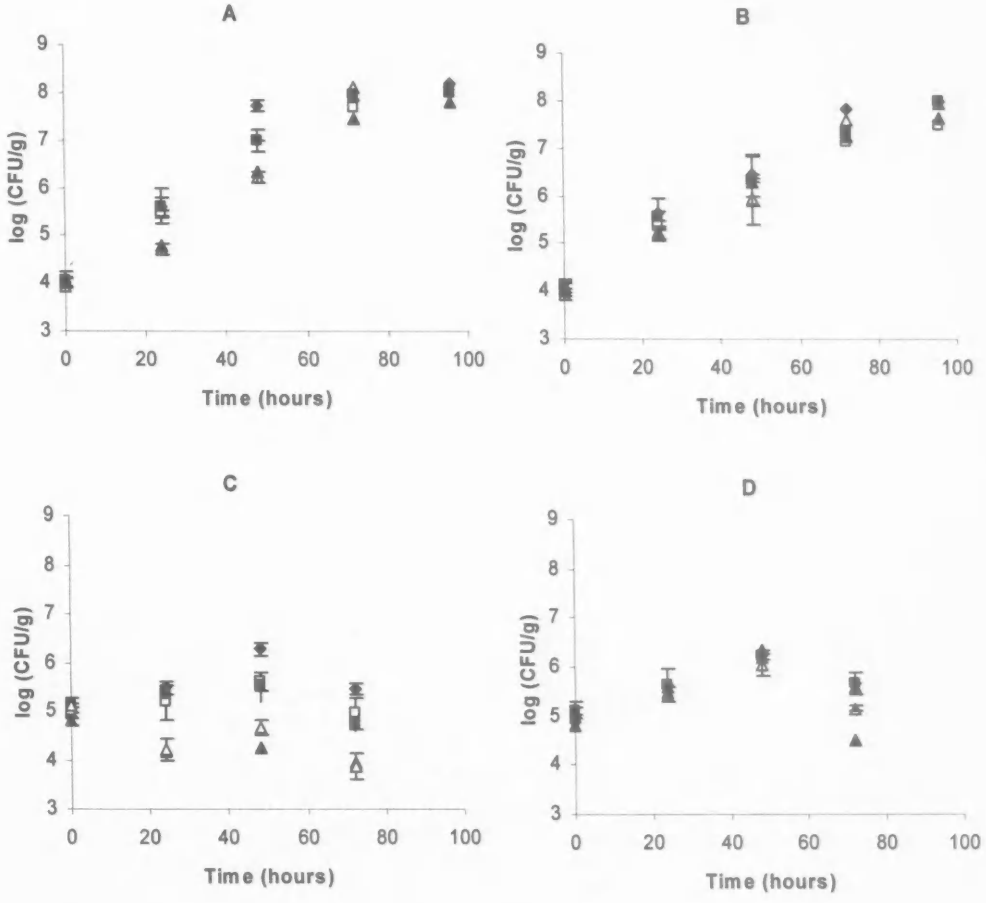
Effectiveness of oleoresins on native microflora of carrot samples

Effects of rosemary and oregano at 0.5 and 1% on aerobic microflora growth during storage of sliced and grated carrots are shown in Fig. 3. Figure 3A and B presents the changes of the native microflora in sliced carrot samples, during storage at 20 and 10°C, respectively. Initial aerobic bacterial counts were not significantly different in control and treated samples stored at either temperature. When the sliced carrot samples were stored at 20°C (Fig. 3A) oleoresins at 0.5 and 1% exerted a significant inhibitory effect on native microflora growth at 24 h of storage (2.5 to 3.0 log reductions). At 10°C, oleoresins exerted an inhibitory effect on native microflora of sliced carrot samples only at the higher concentration (1%) (1.0 to 1.6 log reductions) at 24 h of storage (Fig 3B). At the end of storage, these inhibitory effects were no longer observed (Fig 3A and B).

In grated carrot samples stored at both temperatures (Fig. 3C and D), no significant differences were recorded in the initial microbial counts (5.88–6.00 $\log_{10}$ CFU/g) between control samples and samples treated with different oleoresins. During storage, no significant differences were observed in total microflora counts between all samples, indicating that changes were similar for treated and non-treated samples. A linear increment was observed with total bacteria counts between 3.5 and 4.5 $\log_{10}$ CFU/g higher at the end of storage. In contrast to the results obtained with sliced carrots (Fig. 3A and B), oleoresins caused no observed inhibitory effect on native microflora of grated carrots.

Figure 4 presents *E. coli* counts in sliced and grated carrots treated with oregano and rosemary oleoresins during storage at 20 and 10°C. Figure 4A-B shows that initial *E. coli* counts were not significantly ($P < 0.05$) different between sliced control samples and those treated with oleoresins at either of the two storage temperatures. During storage at 20°C, *E. coli* populations in untreated samples and in samples treated with oleoresins at 0.5% presented a similar increase, reaching values approximately 4.0 $\log_{10}$ CFU/g higher at the end of storage. Oleoresins applied at 1% exerted a bactericidal effect at 24 and 48 h (0.8 to 1.4 log reductions) on treated sliced carrot samples (Fig. 4A).

FIGURE 4. *E. coli* counts in sliced carrot at 20 (A) and 10°C (B) and in grated carrots at 20 (C) and 10°C (D). Samples were treated with oregano and rosemary at different concentrations: Control sample (♦); carrot plus oregano at 0.5% (□) and 1% (□); rosemary 0.5% (□) and 1% (Δ)



As shown in Fig. 4C and D, initial *E. coli* counts were not significantly ($P < 0.05$) different in grated control carrot and samples treated with oleoresins at both storage temperatures. When grated carrot was stored at 20°C, *E. coli* populations in control samples increased (1.4 $\log_{10}$ CFU/g) up to 48 h, and then slightly decreased. A similar change in *E. coli* counts was observed in grated carrot treated with oleoresins at 0.5%. Samples treated with 1% oregano and rosemary had a significant ($P < 0.05$) decrease (0.85–1.2 log) in *E. coli* counts, from 24 h until the end of storage (Fig. 4C). During storage at 10°C, *E. coli* populations in control and treated grated samples showed an increase (1–1.3 log) up to 48 h of storage and then a slow decrease, which became more evident in samples treated with rosemary and oregano at 1%, with reductions of 1 and 1.5 log CFU/g, respectively, compared with control samples and samples treated with oleoresins at 0.5% (Fig. 4C and D).

Sensory evaluation

Grated and sliced carrot samples as well as samples treated with the two oleoresins (0.5 and 1%) during storage at 10 and 20°C were evaluated organoleptically. Initially, oleoresin application produced no perceptible changes in overall acceptability, color, texture and aroma of fresh sliced and grated carrots stored at 10 and 20°C. During storage (24 h) at both temperatures, severe browning was observed in both sliced and grated samples treated with oleoresins. However, flavors in treated samples were imperceptible up to 24 h of storage. At 72 h and 20°C, all grated samples were unacceptable and sliced samples were within acceptability limits (score 3). However, for samples stored at 10°C, higher scores for overall quality and texture indices (3.75) were obtained in both types of processed carrots.

DISCUSSION

Technologies that substantially reduce or inhibit Gram negative bacteria by food-grade compounds are of considerable interest to the food industry, since there are both public health and economic concerns. In food protection, Gram negative spoilage organisms and pathogens are especially problematic because of their inherent resistance to some antimicrobials

that are applicable or present in food *(2)*. One alternative for natural preservation technologies is the use of plant extracts. Consequently, the objectives of the present study were to examine the effectiveness of the endogenous microflora of sliced and grated carrots in controlling *E. coli* O157:H7 and to determine the effectiveness of oregano and rosemary oleoresins on growth of this pathogen and on native microflora.

Even though several studies have been conducted on the *in vitro* antibacterial properties of plant essential oils and extracts, only a few studies on the activity of essential oils in food systems have been published *(4, 8, 11, 14)*. It is well known that the antimicrobial potency of essential oils and oleoresins in food systems is generally reduced when compared to *in vitro* work, as the presence of fats, carbohydrates, proteins, salts and pH strongly influence the effectiveness of these agents. Accordingly, larger amounts of oleoresins and essential oils are required in food systems, and such amounts can seriously interfere with organoleptic properties. Among several essential oils and oleoresins that may be useful as antimicrobial agents, oregano and rosemary are the most active against strains of *E. coli*, and thus they may have the greatest potential for use in industrial application *(4, 5)*.

Results obtained in this work indicate that the cutting method (slicing, grating) did not introduce any difference in the final aerobic counts on carrot samples stored at 20°C (Fig. 1A and B). However, when carrot samples were stored at 10°C, native microflora counts in sliced carrots were approximately 2.0 logs higher than in grated carrot at the end of storage (Fig. 2A and B). This fact could be attributed to better temperature transference in grated carrot samples, enhancing the effect of refrigerated storage.

The competitive power of native microflora is important in controlling pathogen growth. Wei et al. *(21)* indicated that the native microflora/pathogen ratio and competition for binding sites could play an important role. However, in this work the biocontrol exerted by the native microflora on *E. coli* growth, in both types of processed carrot, stored at 10 and 20°C, was not significant (Fig. 1 and 2). This fact could be attributed to the surface roughness and exposed surface area of grated and sliced carrots that allowed native microflora and the pathogen to proliferate. The large exposed surface and the physical conditions of processed carrot have a major impact on the adhesion of *E. coli* O157:H7 and therefore on the pathogen control exerted by the native microflora. In agreement with our results, Wang et al. *(20)* working with orange, apple, and cantaloupes, reported a positive correlation of roughness and adhesion strength of *E. coli* on the ineffectiveness of the sanitizer.

On the other hand, it was evident that the initial endogenous *E. coli* counts in control samples were so high that they could mask any potential bacteriostatic effect of native microflora. Therefore, at 10 and 20°C the native microflora did not exert significant control on pathogen growth inoculated in both sliced and grated carrot samples (Figs. 1 and 2).

Oregano and rosemary oleoresins, applied on sliced carrot, exerted a significant inhibitory effect on the native microflora at 24 h of storage at 10 and 20°C. Similarly, Burt *(4)* reported antimicrobial activity of oregano and rosemary against native microflora of vegetables.

The antimicrobial action of oleoresins on *E. coli* growth depended on the concentration of oleoresins and the storage temperature (Fig. 4). Inhibition of the pathogen was more evident at high than at low temperature in both types of processed carrot, a fact that could be explained by the higher diffusion coefficients of volatile components. Similar results were found by Moreira et al. *(11)* working with blanched spinach treated with essential oils and stored at 10 and 20°C. Similiarly, Singh et al. *(18)* analyzed the effect of oregano essential oils on survival of *E. coli* on lettuce and carrot and found a significant reduction in pathogen counts.

In this work, we report an inhibitory effect obtained by applying oleoresins at high concentration. However, the effect was limited from the point of view of guaranteeing vegetable safety. The scant inhibitory effects of oleoresins on *E. coli* growth could be explained by the fact that the resistance of Gram-negative bacteria is mainly due to the outer membrane, which acts as an efficient barrier against biopreservatives *(4)*.

Consequently, higher oleoresin concentrations may be required to produce a particular level of pathogen inhibition in vegetables. However, sensory analysis revealed that acceptance is inversely related to the concentration of the oleoresins used. As a result, synergistic effects need to be exploited to maximize the antibacterial activity of oleoresins and to minimize the concentrations required to achieve a particular antibacterial effect without adversely affecting the sensory acceptability.

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Food Safety Training Needs Assessment for Independent Ethnic Restaurants: Review of Health Inspection Data in Kansas

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ABSTRACT

Each year, commercial foodservice operations in the United States serve over 70 billion meals/snacks. The majority of foodborne disease outbreaks have been attributed to commercial foodservice establishments, and independent ethnic restaurants received poorer inspection scores than the non-ethnic or chain restaurants. These findings imply additional need for food safety training for ethnic restaurant employees. To identify specific food safety training needs, online health inspection reports of 500 randomly-selected independent restaurants in 14 Kansas counties were reviewed. Food code violations were recorded and categorized for further analysis. Numbers of critical and non-critical violations, inspections within 12 months, and violations within each category for ethnic and non-ethnic restaurants were compared, using independent t-tests. Ethnic restaurants had more critical (4.52 ± 2.97) and non-critical violations (2.84 ± 2.85) and more frequent inspections (2.29 ± 1.63) than non-ethnic restaurants (2.90 ± 2.83, 1.71±1.94, and 1.76 ± 1.11, respectively, $P < 0.001$). Significantly more ($P < 0.05$) violations were reported in ethnic restaurants for several categories: time and temperature control of PHFs, physical facility maintenance, protection from contamination, hand hygiene, proper use of utensils, demonstrated knowledge, and food temperature control for non-PHF. The data suggested that ethnic restaurant personnel need increased food safety training, especially for critical behaviors such as time and temperature control and hand washing.

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INTRODUCTION

Dining in restaurants is an important part of the American lifestyle, as evidenced by the more than 70 billion meals or snacks served by restaurants annually, generating $566 billion in sales *(20)*. A major trend in the restaurant industry is the growing number of ethnic restaurants. This growth is a result of changing demographics and increased interest in ethnic cuisine. According to the U.S. Census Bureau, 34.4% of the U.S. population in 2008 was expected to be in a racial/ethnic minority group *(32)*. As the minority population increases, so does demand for ethnic foods.

Of the racial/ethnic minorities in the U.S., the Hispanic and Asian populations are the two largest groups likely to be involved in the restaurant business. Economic census data of 2002 show that minority-owned businesses account for 10.2% of accommodation and foodservice businesses, representing 11.0% of total sales in this sector *(29)*. Specifically, Asian and Hispanic business owners, the two largest minority ethnic groups, comprise 85.3% of total minority business owners and create 88.0% of total sales generated by minority businesses in this sector *(30, 31)*.

The Centers for Disease Control and Prevention (CDC) estimated that foodborne illnesses cause approximately 76 million illnesses, 325,000 hospitalizations, and approximately 5,000 deaths each year in the U.S. *(19)*. The actual number of foodborne illnesses may be even higher, as many foodborne illnesses are not reported. Food safety in restaurants is especially important because the results of poor food handling behaviors can affect more than one individual.

Of the reported cases of foodborne outbreaks, 60% were traced to a restaurant *(10)*. By definition, foodborne outbreaks affect two or more people, but when outbreaks are linked to restaurants, many more people may be affected. For example, the Jack in the Box *E. coli* outbreak in 1993 resulted in approximately 700 illnesses and four deaths from a single cause — infected meat *(9)*. Over 600 people were infected with Hepatitis A in one restaurant in 2003 after eating mild salsa that contained contaminated green onions grown in Mexico *(35)*. In addition to these examples, restaurants were responsible for numerous cases of outbreaks in the U.S. *(10, 22)*.

Ethnic restaurants are not exempt from foodborne illness cases associated with operations. Consumers are often aware of poor food handling techniques and environmental cleanliness at ethnic restaurants and rate ethnic restaurants lower on these attributes than on other attributes *(14)*. In addition, researchers have found increased concerns about food handling at ethnic restaurants *(1, 2, 17, 26, 27)*. Foodborne illness data from CDC showed that total outbreaks associated with ethnic foods rose from 3% to 11% of total cases between 1990 to 2000 *(26)*. *Bacillus cereus* outbreaks were frequently associated with unsafe cooling practices for fried rice *(4, 18)*, which is commonly served in ethnic restaurants. According to the CDC database, 1,662 individuals were affected by *Bacillus cereus* in 73 outbreaks in the U.S. from 1990 to 2006. Of those, 25 outbreaks were traced back to the restaurant setting, with rice or fried rice dishes being the most common source (13 of 25 restaurant outbreaks and 31 of 73 total outbreaks) *(4)*. A review of 29.5 million laboratory-diagnosed foodborne illnesses confirmed unique associations between frequency of certain foodborne illnesses and racial/ethnic groups *(13)*. Researchers speculated that there might be different high-risk consumption behaviors for different racial/ethnic groups and recommended targeting different groups with pertinent food safety education information *(13)*. These racially/ethnically specific high-risk consumption behaviors may be because the family is a major source of information on how to handle food *(12)*.

The restaurant industry, especially the ethnic restaurant segment, provides a familiar working environment for many first-generation immigrants who may have language barriers *(15, 34)*. The associations between racial/ethnic groups, common foodborne illnesses *(13)*, and certain food handling behaviors *(12)* indicate a necessity for additional food safety training for members of ethnic minority populations, who typically own and operate ethnic restaurants.

The most recent (2008) data published by the CDC indicated that foodborne illness incidences have not changed from the 2005–2007 data *(5)*. The CDC recommends continued education of restaurant employees and consumers about foodborne illness risks and prevention measures *(5)*. Along with this recommendation, the associations among racial/ethnic groups, undesirable food handling practices *(12, 13)*, and the increased prevalence of outbreaks in ethnic restaurants *(26)* may justify emphasis in food safety training for personnel working in ethnic restaurants. Furthermore, Simonne et al. contended that current general food safety training may not be adequate to reduce the number of foodborne outbreaks associated with ethnic foods because of the lack of specificity of this training to ethnic food handling practices *(26)*.

Researchers have demonstrated that food safety training improves food handling practices in restaurants. The inspection scores of pre- and post-sanitation class interventions were significantly different, showing that improvement had occurred following the food sanitation classes *(6)*. Managers who were mandated to take the class because of either a documented foodborne illness from their operation or a serious sanitation breach on their most recent inspection improved their facility's inspection score by an average of 14.7 points. Even those who voluntarily attended the class without problematic inspection scores improved by an average of 7.5 points, compared to no improvement for control group participants *(6)*.

Despite consumer perceptions about food safety in ethnic restaurants *(14)* and reports by food safety researchers of increased needs for food safety training for ethnic restaurants *(1–3, 6, 17, 26, 27)*, little research has been conducted to describe and analyze food handling behaviors in independent ethnic restaurants. One of the barriers to identifying food handling practices in ethnic restaurants is the unwillingness of ethnic restaurant personnel to participate in research *(24, 25)*. Nonetheless, research and extension activities specifically targeting food handling behaviors at these restaurants may be needed to ensure food safety.

In Kansas, there are 4,671 licensed eating-and-drinking places, employing nearly 130,000 workers and generating over $3 billion in sales *(21)*. At the time

of this study, health inspection reports from the Kansas Department of Health and Environment (KDHE) were posted on the Internet in the public domain for anyone to review. KDHE reports include detailed information on violations of Kansas food codes, which help researchers identify and target food code violations. The Web site provides information about the different types of health inspections conducted for a one-year period. The types include routine, licensure, customer complaint-driven, and follow-up re-inspection completed after the restaurant has received poor performance ratings on a routine or complaint inspection. The KDHE is mandated to inspect all establishments once annually, but more inspections are required to ensure that an establishment has become compliant with the food code. In September 2008, the Kansas Department of Agriculture assumed the role of restaurant inspectors in the state, and they too make inspection results available on the Internet. As a proxy measure for food handling behaviors in independent ethnic restaurants, restaurant inspection reports were analyzed from a readily available, government internet site.

The purpose of this research project was to identify the food safety training needs of independent ethnic restaurants. Specific objectives were to identify the frequencies and types of food code violations and to compare and contrast food safety inspection reports of ethnic and non-ethnic independent restaurants.

MATERIALS AND METHODS

Study sample

Five hundred randomly selected independent restaurant inspection reports (for 250 ethnic and 250 non-ethnic restaurants) in 14 Kansas counties with the highest numbers of Hispanic and Asian populations were selected as the study sample. The sample was drawn from the list of foodservice establishments, including both commercial and non-commercial establishments, that were subject to KDHE health inspections.

From the list of foodservice establishments in the 14 counties, all chain restaurants, non-commercial foodservices (i.e., schools, churches, and community centers), and convenience stores were eliminated. Of the 2,097 remaining, 541 were identified as ethnic and 1,556 as non-ethnic restaurants. Although there were about three times as many non-ethnic restaurants as ethnic restaurants, equal numbers as restaurants (250 ethnic and 250 non-ethnic) were randomly selected as the study sample to assure a balanced sample for statistical analysis. Because publicly available data were used without contacting human subjects, no approval from the institutional review board was necessary.

Variables and data collection

For the 500 restaurants selected, health inspection results were reviewed online (http://kansas.kdhe.state.ks.uspls/certop/fssearch). Using the KDHE inspection guide, a data collection form was created so that research assistants could easily record necessary information from the online report. Code numbers of 275 Kansas food codes were listed on the data collection form so that the number of violations of each code could be entered. Spaces were provided for recording the numbers of critical and non-critical violations, the date of the health inspection with the greatest number of critical violations between September 1, 2007 and August 31, 2008, the total number of inspections during the 12-month period, and the inspection type (e.g., routine inspection, complaint-driven inspection, re-inspection after poor performance on previous inspections, etc.). For each randomly-selected facility, the one inspection report that indicated the most violations was selected from the multiple inspection reports during the specified period. This decision was made because reviewing the most recent inspection may result in selecting re-inspection reports, which are usually better than the preceding report. During October and November 2008, two research assistants reviewed the KDHE Web site and completed the data collection form. After the data had been recorded, the information was cross-checked by a different research assistant to ensure accuracy of data entry. Data were then entered into a Microsoft Access database, cross-checked to verify correct data entry, and converted to SPSS Version 15.0 for statistical analyses *(28)*.

Statistical analyses

Descriptive statistics, consisting of frequencies, cross-tabulations, means, and standard deviations of continuous variables (i.e., number of violations and inspections), were calculated. Pearson χ^2 analyses were conducted to evaluate differences between numbers of independent ethnic and non-ethnic restaurant establishments where individual food code violations were cited. Independent sample t-tests were conducted to compare differences in mean numbers of critical, non-critical, and within-category violations.

Individual food codes were grouped based on KDHE categories. KDHE categories were further combined to reduce the number of variables. For example, KDHE had separate categories for toilet facilities, hot and cold water availability, sewage and waste water disposal, and garbage and refuse disposal. Because these were all related to maintenance of physical facilities, we created the category "*Physical Facility Maintenance*" by combining them. The number of violations within each category was calculated using the "compute" function of SPSS for further analyses. Independent t-tests and ANOVA with Scheffe's post hoc analyses were conducted to evaluate differences in number of violations in different categories between ethnic and non-ethnic independent restaurants and among different categories of ethnic restaurants. Statistical significance was established at $P < 0.05$.

RESULTS

Of all inspection reports included (n = 500), 360 (72.0%) were reports of routine inspections, and 79 (15.8%) were triggered by customer complaints. There was no statistical difference in types of inspections between ethnic and non-ethnic independent restaurants.

Numbers of critical and non-critical violations and inspections

Independent restaurants were cited for an average of 3.71 ± 2.90 critical and 2.28 ± 2.40 non-critical food code violations on average per inspection. Independent t-tests revealed significant differences in the number of critical and non-critical inspections between ethnic and non-ethnic restaurants. Ethnic restaurants had more critical (4.52 ± 2.97) and non-critical violations (2.84

TABLE 1. Mean number of critical and non-critical violations and inspections by types of ethnic restaurants

	Asian (n = 123)	Mexican or Latin American (n = 106)	Italian & Other (n = 21)	Non-Ethnic Other (n = 250)		
Dependent Variable	**Mean Number[b] ± SD**				***F***	***P*[a]**
Critical Violations[b]	4.73 ± 2.93[x]	4.29 ± 3.06[x]	4.38 ± 2.78[zy]	2.90 ± 2.83[y]	13.38	< 0.001
Non-critical Violations[b]	3.26 ± 3.06[x]	2.32 ± 2.42[yz]	2.95 ± 3.28[xyz]	1.71 ± 1.94[z]	11.83	< 0.001
Inspections[c]	2.43 ± 1.68[x]	2.22 ± 1.59[xy]	1.86 ± 1.46[xyz]	1.76 ± 1.11[z]	7.21	< 0.001

Note: Means with different superscripts (x, y, z series) differed significantly by Scheffe's post hoc test, $P < 0.05$

[a]Results from Analysis of Variance (ANOVA)

[b]Number of violations found in one health inspection report with the most violations between September 1, 2007 and August 31, 2008

[c]Frequencies of health inspection visits between September 1, 2007 and August 31, 2008

± 2.85) than non-ethnic restaurants (2.90 ± 2.83, 1.71 ± 1.94, respectively, $P < 0.001$). The average number of inspections during the 12-month study period for the entire sample was 2.03 ± 1.37, with ethnic restaurants inspected more frequently (2.29 ± 1.63) than non-ethnic restaurants (1.76 ± 1.11, $P < 0.001$).

When the number of critical and non-critical violations and the number of inspections were further compared among different types of ethnic restaurants, by use of ANOVA with Scheffe's post hoc analyses, significant ($P < 0.001$) differences were found. As shown in Table 1, non-ethnic restaurants had significantly fewer critical violations and inspections than Asian and Mexican or Latin American ethnic restaurants. In addition, Asian ethnic restaurants had the greatest number of non-critical violations, compared Mexican or Latin American ethnic restaurants and non-ethnic restaurants.

Prevalence of individual food code violations

Regardless of the type of ethnic restaurant, the food code category with the greatest number of violations was "*Time and Temperature Control of Potentially Hazardous Foods* (PHF, also known as TCS [time/temperature control for safety] foods)." Of the individual codes in this category, 39.2% (n = 196) of the establishments in the sample violated the code stating that *PHF must be maintained at appropriate temperature of 5°C or less.* Other food codes such as *Equipment and utensils must be clean to sight and touch* (n = 144, 28.8%), *Employees wash hands at appropriate times* (n = 113, 22.6%), *Food should be clearly marked to indicate the date food should be consumed by, sold, or discarded* (n = 94, 18.8%), and *Person in charge is able to demonstrate knowledge of foodborne disease prevention and application of HACCP* (n = 88, 17.6%) were also violated in many independent restaurants. All of these food codes are considered critical food safety requirements.

Table 2 shows all individual food codes violated by 10% or more of establishments. Food code violations that differed significantly in number between ethnic and non-ethnic independent restaurants are indicated. When prevalence of violations were compared by use of Pearson χ^2 analyses, significant differences between ethnic and non-ethnic independent restaurants were found in 21 individual food codes. Except for the one food code related to discarding food based on time and temperature control or time as the only control measure, all 20 of the other food codes were violated more often by ethnic restaurants than by non-ethnic restaurants. According to the Kansas food code *(11)*, the majority (25 of 33) of the food codes listed in Table 2 are considered critical food safety requirements.

Number of food code violations per category

The number of food code violations per category was computed by taking all violations within each category and computing an average across the entire sample. As illustrated in Table 3, the mean number of violations within each code ranged from 0.01 to 0.99. The five most prevalent violation categories regardless of restaurant type, were "*Time and Temperature Control of PHF*" (0.99 ± 0.98), "*Physical Facility Maintenance*" (0.83 ± 1.11), "*Protection from Contamination*" (0.78 ± 0.95), "*Control of Hands as a Vehicle of Contamination*" (0.73 ± 1.09), and "*Food & Non-food Contact Surface Maintenance and Ware Washing Facilities*" (0.60 ± 0.96).

TABLE 2. Number of independent ethnic and non-ethnic restaurants where selected individual food code violations were reported[a]

Food Code Violation Categories *Individual Food Code Descriptions (Critical or Non-Critical)*	Ethnic Restaurants (n = 250)	Non-Ethnic Restaurants (n = 250)	χ^2	*P*[b]
	No. of Establishments (%)			
Time and Temperature Control of Potentially Hazardous Food				
§ Potentially hazardous foods must be maintained at appropriate temperature of 5°C or less	111 (44.4)	85 (34.0)	11.16	0.004
§ Food should be clearly marked to indicate the date food should be consumed by, sold, or discarded	55 (22.0)	39 (15.6)	4.90	NS
§ Cooked foods need to be cooled from 57°C to 21°C within 2 hours. Within a total of 6 hours from 57°C to 5°C	C32 (12.8)	14 (5.6)	8.14	0.017
§ Ready-to-eat or PHF must be discarded based on time and temperature control or after a maximum of 4 hours if time is the only control; written procedures about removing food from service must be established and maintained	13 (5.2)	34 (13.6)	12.50	0.002
Physical Facility Maintenance (e.g., hot & cold water availability, toilet, sewage & waste water, garbage & refuse disposal)				
§ Physical facilities maintained in good repair & cleaned as often as necessary to keep them clean	51 (20.4)	22 (8.8)	15.11	0.001
§ Water reservoir of fogging devices maintained & cleaned Plumbing system maintained in good repair	45 (18.0)	15 (6.0)	17.05	< 0.001
§ Water capacity & pressure adequate to meet facility demands	8 (3.2)	0 (0.0)	8.13	0.004
Designated dressing rooms/lockers used by employees	5 (2.0)	0 (0.0)	5.05	0.025
Protection from Contamination				
§ Equipment and utensils must be clean to sight and touch	77 (30.8)	67 (26.8)	0.98	NS
§ Separation of food items to prevent cross-contamination	55 (22.0)	26 (10.4)	14.62	0.001
§ Chemical sanitizers used in sanitizing must meet criteria in accordance with manufacturer's label use instructions	27 (10.8)	22 (8.8)	0.57	NS
Food & Non-Food Contact Surface Maintenance & Ware Washing Facilities				
Ware washing equipment maintained free of encrusted grease/soil deposits	41 (16.4)	25 (10.0)	4.47	0.035
Nonfood-contact surfaces cleaned at frequency to prevent buildup of residue	41 (16.4)	16 (6.4)	12.38	< 0.001
§ Utensils/food-contact surfaces made of safe, durable, smooth materials	41 (16.4)	5 (2.0)	31.03	< 0.001
§ Contact surfaces and equipment must be sanitized before use and after cleaning	38 (15.2)	17 (6.8)	9.01	0.003
Thermometer for testing sanitizing water temperature &/or test kit for measuring sanitizer concentration provided	37 (14.8)	28 (11.2)	1.43	NS
Control of Hands as a Vehicle of Contamination				
§ Employees wash hands at appropriate times	65 (26.0)	48 (19.2)	3.42	NS
§ Preventing contamination from hands, including minimizing bare hand contact with ready-to-eat food	39 (15.6)	19 (7.6)	9.64	0.008
§ Appropriate hand drying provisions available	32 (12.8)	28 (11.2)	0.30	NS
§ Employees use the correct hand washing procedure	23 (9.2)	1 (0.4)	21.18	< 0.001

TABLE 2. Number of independent ethnic and non-ethnic restaurants where selected individual food code violations were reported[a] *(continued)*

Food Code Violation Categories *Individual Food Code Descriptions (Critical or Non-Critical)*	Ethnic Restaurants (n = 250)	Non-Ethnic Restaurants (n = 250)	χ^2	P[b]
	No. of Establishments (%)			
Contamination Prevention through Pest Control, Storage, and Personal Cleanliness				
§ Eating, drinking, and using tobacco only happens in designated areas	46 (18.4)	26 (10.4)	6.49	0.011
§ Effective pest control measures in place; dead or trapped pest removed from traps at adequate frequency	32 (12.8)	27 (10.8)	2.75	NS
§ Openings to outside protected against entry of pest; Protective barriers provided for exterior walls/roofs	29 (11.6)	18 (7.2)	3.44	NS
Food stored 6" off the floor in clean, dry location & not stored in prohibited areas	26 (10.4)	9 (3.6)	9.75	0.008
§ Stored frozen foods shall be maintained frozen. Cooling shall be accomplished in accordance with the time and temperature criteria	20 (8.0)	8 (3.2)	5.45	0.020
Safe Cooling, Thawing, Hot Holding Methods & Working Thermometer				
§ Thawing hazardous foods can be done under refrigeration, submerged under running water, or as part of a cooking process	34 (13.6)	8 (3.2)	17.57	< 0.001
§ Cooling and heating foods and holding cold and hot foods, shall be sufficient in number and capacity to provide food temperature requirements	33 (13.2)	22 (8.8)	2.47	NS
§ Cooked foods need to be cooled from 57°C to 21°C within 2 hours. Within a total of 6 hours from 57°C to 5°C	32 (12.8)	14 (5.6)	8.14	0.017
Chemical Handling				
§ Working containers containing toxic or poisonous chemicals clearly labeled with the common name	40 (16.0)	28 (11.2)	2.45	NS
§ Poisonous or toxic materials shall be stored so they cannot contaminate food, equipment, utensils, linens, and single service and single-use articles	27 (10.8)	21 (8.4)	0.83	NS
Proper Utensil Use & Storage				
In-use utensils properly stored between uses	48 (19.2)	24 (9.6)	9.35	0.002
Approved Sources				
§ Food shall be safe, unadulterated, and honestly presented	46 (18.4)	33 (13.2)	2.54	NS
Demonstration of Knowledge				
§ Person in charge is able to demonstrate knowledge of foodborne disease prevention and application of HACCP	63 (25.2%)	25 (10.0%)	19.91	< 0.001

HACCP: Hazard Analysis Critical Control Point

NS: No statistical significance

§ This symbol at the beginning of each food code indicates it is a critical violation

[a]Only statistically significant results ($P < 0.05$) based on Pearson χ^2 analyses and Food Codes violated by > 10% of establishments are reported

[b]Results from Pearson χ^2 analyses

TABLE 3. Mean number of violations in selected food code categories observed in ethnic and non-ethnic independent restaurants

Food Code Violation Categories	No. Codes[a] (max)	Ethnic Restaurants (n = 250)	Non-Ethnic Restaurants (n = 250)	T	P[c]
		Mean ± SD[b]			
Time and Temperature Control of Potentially Hazardous Food	7	1.12 ± 0.96	0.85 ± 0.98	3.09	0.002
Physical Facility Maintenance (e.g., hot & cold water availability, toilet, sewage & waste water, garbage & refuse disposal)	78	1.04 ± 1.22	0.63 ± 0.95	4.20	< 0.001
Protection from Contamination	14	0.93 ± 1.01	0.64 ± 0.86	3.42	0.001
Control of Hands as a Vehicle of Contamination	14	0.91 ± 1.16	0.55 ± 0.98	3.76	< 0.001
Food & Non-Food Contact Surface Maintenance & Ware Washing Facilities	48	0.80 ± 1.09	0.40 ± 0.77	4.70	< 0.001
Contamination Prevention through Pest Control, Storage, & Personal Cleanliness	23	0.56 ± 0.93	0.36 ± 0.68	2.82	0.005
Safe Cooling, Thawing, Hot Holding Methods & Working Thermometer	7	0.43 ± 0.64	0.21 ± 0.48	4.32	< 0.001
Chemical Handling	21	0.44 ± 0.62	0.32 ± 0.60	2.13	0.033
Proper Utensil Use & Storage	13	0.33 ± 0.55	0.21 ± 0.48	2.59	0.010
Approved Sources	18	0.29 ± 0.51	0.20 ± 0.44	2.17	0.030
Demonstration of Knowledge	3	0.26 ± 0.46	0.10 ± 0.30	4.62	< 0.001
Good Hygienic Practices	3	0.18 ± 0.39	0.10 ± 0.31	2.56	0.011
Food Labeling	6	0.02 ± 0.14	0.00 ± 0.00	2.25	0.025
Conformance with Approved Practices	4	0.02 ± 0.13	0.02 ± 0.15	0.00	NS
Employee Health	5	0.02 ± 0.13	0.00 ± 0.06	1.35	NS

SD: standard deviation

NS: No statistical significance

[a]Number of Food Codes within each category

[b]Number of violations found in one health inspection report with the most violations between September 1, 2007 and August 31, 2008

[c]Results from independent sample *t*-tests

When the mean numbers of food code violations within individual categories were compared, results were significantly different between ethnic and non-ethnic independent restaurants in most categories. A greater number of food code violations were reported for ethnic restaurants in most of the categories (Table 3).

When mean scores were further analyzed among the different types of ethnic restaurants, by use of ANOVA and Scheffe's post hoc analyses, significant differences were found in the mean number of food code violations within each category (See Table 4). In most cases, however, these differences were found between Asian and non-ethnic restaurants. Violations in Italian and other restaurants were not significantly different from those in non-ethnic, Asian, and Mexican or Latin American restaurants. Asian and Mexican or Latin American restaurants had more food code violations in the "*Safe Cooling, Thawing, Hot Holding Methods and Working Thermometer*" category ($P < 0.01$), and Mexican or Latin American restaurants had food code violations than non-ethnic restaurants in the "*Demonstration of Knowledge*" category ($P < 0.01$).

DISCUSSION

Results from this study, which utilized publicly-available health inspection reports to identify specific food safety training needs associated with independent ethnic restaurants, provide evidence of the need for food safety training in independent restaurants and more specifically in independent ethnic restaurants.

Our results show that ethnic restaurants had a greater frequency of health inspections than non-ethnic restaurants. In Kansas, each foodservice establishment receives one unannounced inspection per year. Multiple health inspec-

TABLE 4. Comparison of numbers of violations in different categories based on ethnicity of independent restaurants

Food Code Violation Categories	No. Codes[a] (max)	Asian (n = 123)	Mexican or Latin American (n = 106)	Italian & Other (n = 21)	Non-Ethnic (n = 250)	F	P[c]
		Mean ± SD[b]					
Time and Temperature Control of Potentially Hazardous Food	7	1.14 ± 0.91	1.08 ± 0.99	1.24 ± 1.14	0.85 ± 0.98	3.35	0.019
Physical Facility Maintenance (e.g., hot & cold water availability, toilet, sewage & waste water, garbage & refuse disposal)	78	1.11 ± 1.23^{x}	0.96 ± 1.20^{xy}	1.05 ± 1.32^{xy}	0.63 ± 0.95^{y}	6.20	< 0.001
Protection from Contamination	14	1.08 ± 1.08^{x}	0.78 ± 0.94^{xy}	0.76 ± 0.83^{xy}	0.64 ± 0.86^{y}	6.11	< 0.001
Food & Non-Food Contact Surfaces Maintenance & Ware Washing Facilities	48	0.94 ± 1.20^{x}	0.64 ± 0.90^{xy}	0.76 ± 1.22^{xy}	0.40 ± 0.77^{y}	9.39	< 0.001
Control of Hands as a Vehicle of Contamination	14	0.94 ± 1.34^{x}	0.85 ± 0.90^{xy}	1.05 ± 1.16^{xy}	0.55 ± 0.98^{y}	4.96	0.002
Contamination Prevention through Pest Control, Storage, & Personal Cleanliness	23	0.66 ± 1.06^{x}	0.44 ± 0.73^{xy}	0.57 ± 0.93^{xy}	0.36 ± 0.67^{y}	4.00	0.008
Proper Utensil Use & Storage	13	0.40 ± 0.58^{x}	0.26 ± 0.52^{xy}	0.29 ± 0.46^{xy}	0.21 ± 0.48^{y}	3.60	0.014
Safe Cooling, Thawing, Hot Holding Methods & Working Thermometer	7	0.40 ± 0.61^{x}	0.46 ± 0.66^{xy}	0.48 ± 0.75^{xyz}	0.21 ± 0.48^{z}	6.50	< 0.001
Chemical Handling	21	0.39 ± 0.61	0.47 ± 0.64	0.52 ± 0.60	0.32 ± 0.60	2.02	NS
Approved Sources	18	0.38 ± 0.58^{x}	0.21 ± 0.41^{xy}	0.19 ± 0.40^{xy}	0.20 ± 0.44^{y}	4.57	0.004
Demonstration of Knowledge	3	0.27 ± 0.46^{x}	0.26 ± 0.46^{x}	0.19 ± 0.40^{xy}	0.10 ± 0.30^{y}	7.35	< 0.001
Good Hygienic Practices	3	0.18 ± 0.38	0.18 ± 0.39	0.24 ± 0.44	0.10 ± 0.31	2.36	NS
Food Labeling	6	0.04 ± 0.20^{x}	0.00 ± 0.00^{yz}	0.00 ± 0.00^{xyz}	0.00 ± 0.00^{z}	5.28	0.001
Conformance with Approved Practices	4	0.03 ± 0.18	0.00 ± 0.00	0.00 ± 0.00	0.02 ± 0.15	1.11	NS
Employee Health	5	0.02 ± 0.15	0.01 ± 0.10	0.00 ± 0.00	0.00 ± 0.06	1.23	NS

Note: Means with different superscripts (x, y, z series) differed significantly by Scheffe's post hoc test, $P < 0.05$

SD: Standard Deviations

NS: No statistical significance

[a]Number of Food Codes within each category

[b]Number of violations found in one health inspection report with the most violations between September 1, 2007 and August 31, 2008

[c]Results from Analysis of Variance (ANOVA)

tions occur if the results of the routine inspection show poor performance that warrants a re-inspection. Customer complaints can trigger additional inspections. Therefore, the number of inspections in the 12-month period indirectly measures potential problems in safe food handling in foodservice facilities.

Results also indicate a significantly higher number of food safety violations in ethnic restaurants than in non-ethnic restaurants. Detailed information posted by KDHE enabled researchers to identify not only the number of violations, but also the specific code violations that occurred in each restaurant. Because reviewing the most recent inspection may not provide a consistent description of food handling across facilities, researchers selected the one health inspection report with the greatest number of critical violations. Researchers observed that re-inspections usually detected significantly fewer food code violations than the proceeding inspection reports. Thus, by selecting the one inspection with the largest number of critical violations, potential bias was eliminated.

The types of food code violations found in this study may be related to the causes of foodborne illnesses in restaurants. Time and temperature abuse, poor personal hygiene, and cross-contamination problems are the most significant contributors to foodborne illnesses, according to a Food and Drug Administration (FDA) report *(7)*. In this study, "*Time and Temperature Control of PHF*" was identified as the most frequently violated food code category; with 39.2% of the sample restaurants violating this code. This percentage is similar to the finding reported by Walczak *(33)* that 43% of restaurants violated time and temperature, control codes during food preparation and storage. The FDA also reported that only 60% of full-service restaurants were adhering to FDA Food

Code requirements with regard to controlling risk factors, such as personal hygiene and temperature control *(8)*. Despite the emphasis that has been placed on the importance of time and temperature control for PHF, significant number of establishments did not comply with the regulation.

Food codes in "*Control of Hands as a Vehicle of Contamination*," "*Protection from Contamination*," and "*Food and Non-food Contact Surface Maintenance*" categories were also violated by many independent restaurants, both ethnic and non-ethnic. These code violations are related to personal hygiene and cross-contamination, the major causes of foodborne illnesses originating in restaurants *(7)*. Although the researchers did not observe food handling behaviors firsthand in the field, the consistency in the findings from our review of health inspection reports with previously published data supports the validity of our data. Data from this study could be used to identify food safety training needs for independent restaurants.

It is not clear why ethnic restaurants had more food code violations in general and within selected categories than non-ethnic restaurants. However, cultural traditions of food preparation handed down through generations may be a contributing factor *(12)*. Poor food handling behaviors, as revealed in this study, could be the source of the greater numbers of foodborne outbreaks associated with ethnic foods *(26)*.

Results of this study provide empirical evidence that help justify concerns about the safety of food served in ethnic restaurants. Owners and managers of independent ethnic restaurants need to be more diligent in training their employees about safe food handling. The majority of violations in ethnic and non-ethnic restaurants were considered critical violations, including time and temperature control of PHF, storage temperatures for PHF, and employee hand washing practices. The impact of poor food handling in restaurants is much more serious than in a home setting because of the number of individuals who can be infected with foodborne illnesses.

The findings from this study identified areas where food safety training should be focused: time and temperature control; physical facility and food & non-food contact surface maintenance; and control of hands, including hand washing. The types of frequent violations were not necessarily different from those reported in previously published studies *(8, 16, 33)*. However, differences observed between and among different types of independent ethnic restaurants and non-ethnic restaurants reflected the need for increased food safety training for employees of ethnic restaurants, especially Asian and Mexican or Latin American restaurants. Researchers have addressed the inadequacy of current generalized food safety training with regard to specific food handling of ethnic foods *(26)*. Other researchers have identified barriers to food safety training in restaurants and pointed out that increasing knowledge alone may not improve food handling practices *(23)*. However, no ethnic restaurants were included in the study samples of these researchers *(24, 25)*. Future research should address attitudes toward food safety training, behavioral controls, and barriers to food safety training in ethnic restaurants.

Future studies should investigate ways to overcome barriers to food safety training and identify the most cost effective method to train independent ethnic restaurant employees. High employee turnover and lack of resources may be reasons why independent restaurant managers are not enthusiastic about training their employees. However, the cost of having a foodborne illness outbreak attributed to a restaurant is far greater than the cost of training. Food safety educators may need to address tangible and intangible risks associated with foodborne illnesses in order to increase managers' awareness of the need for training.

Another factor to be explored is the role of language barriers in understanding and following proper food safety practices. There were no significant differences in performance between European ethnic restaurants and non-ethnic restaurants, especially for the *"Demonstration of Knowledge"* category (e.g., identifying person in charge or explaining foodborne disease prevention and application of HACCP). While researchers postulate that language barriers may be a factor in code violations for some ethnic restaurants, there is no evidence to support language barriers being the cause of poor performance in this category.

Findings of this study are limited to 14 county regions in Kansas and cannot be generalized to restaurants in other geographic locations. Several other states also publish health inspection reports online, but the lack of specificity of these reports makes it difficult to compare them with our results. The results are also limited to independent restaurants and therefore cannot be generalized to restaurants operated with franchise agreements or by large corporations, which often exercise internal controls to ensure food safety, with resources available from the parent companies, and which may thus be more likely to perform better than independent restaurants during health inspections.

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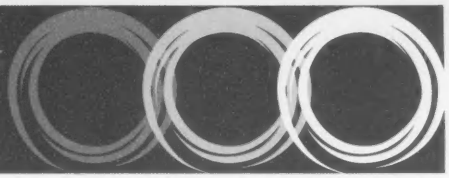


USDA Announces New Performance Standards for *Salmonella* and *Campylobacter*

Agriculture Secretary Tom Vilsack has announced new performance standards to reduce *Salmonella* and *Campylobacter* in young chickens (broilers) and turkeys, fulfilling another key recommendation of the President's Food Safety Working Group. USDA's Food Safety and Inspection Service (FSIS) also released a compliance guide to help the poultry industry address *Salmonella* and *Campylobacter* and a compliance guide on known practices for pre-harvest management to reduce *E. coli* O157:H7 contamination in cattle.

"There is no more important mission at USDA than ensuring the safety of our food, and we are working every day as part of the President's Food Safety Working Group to lower the danger of foodborne illness. The new standards mark an important step in our efforts to protect consumers by further reducing the incidence of *Salmonella* and opening a new front in the fight against *Campylobacter*," said Sec. Vilsack

After 2 years under the new standards, FSIS estimates that 39,000 illnesses will be avoided each year under the new *Campylobacter* standards, and 26,000 fewer illnesses each year under the revised *Salmonella* standards.

The announced standards are the first-ever for *Campylobacter*, and mark the first revision to the *Salmonella* standards for chicken since 1996 and for turkeys since the first standards were set in 2005. The performance standards set a level in percentage of samples testing positive for a given pathogen an establishment must achieve and play a key role in reducing the prevalence of foodborne pathogens and preventing harm to consumers. The President's Food Safety Working Group has set a goal of having 90 percent of all poultry establishments meeting the revised *Salmonella* standard by the end of 2010.

FDA Takes Steps to Increase Safety of Foods during Transport

The U.S. Food and Drug Administration is asking commercial food transporters to follow new guidance that the agency is issuing to reduce the chances of physical, chemical, biological and other risks during transportation of foods while the agency reviews current food safety transportation regulations.

In an advance notice of proposed rulemaking (ANPRM) published in the *Federal Register*, the FDA has requested input on writing the new rules from all interested parties, including the food and transportation industries and consumer interest organizations. The ANPRM is the first step in creating new regulations to govern sanitary practices by shippers, carriers by motor vehicle or rail vehicle, receivers, and others engaged in the transportation of food products for people and animals.

The new industry guidance covers safety measures that should be employed while the regulations are being written and finalized. They include ensuring that food in transit is maintained at appropriate temperatures; that such food is closely monitored for pests; that the vehicles used to transport foods are sanitary and in proper working condition; that pallets used are of good quality; and that sanitary measures are followed in the loading and unloading of foods.

"Our aim is to look at every component of the system to assess hazards, and to take science-based action where appropriate to maximize the safety of our food from farms all the way to consumers' tables," said FDA's Associate Commissioner for Food Protection, Jeff Farrar. "Although contamination of food product during commercial transport is relatively infrequent, the potential harm can be widespread and serious."

After evaluating comments received in response to the ANPRM, the FDA will propose specific regulations. The FDA will coordinate with the U.S. departments of Agriculture and Transportation in the rulemaking process.

AOAC RI Launches GovVal Program: Validation of *Listeria* Test Kits in Ready-to-Eat Meats and on Stainless Steel Compared to Health Canada Reference Method – MFHPB-30

There are many validated *Listeria* detection test methods on the market today. However, most of the validated *Listeria* test methods were compared to the U.S. FDA *Bacteriological Analytical Manual* (BAM) reference method, the USDA FSIS *Microbiology Laboratory Guidebook* (MLG) reference method, the AOAC OMA 993.12 or the ISO 11290 reference method for *Listeria*. Countries like Canada have reference methods that differ from the U.S. and ISO reference methods for pathogen detection and are therefore left without certified rapid methods with direct comparison to the Health Canada reference meth-

ods. AOAC RI's GovVal Program has been developed to address this need. The GovVal program provides method extensions to existing *Performance Tested Methods*℠ (PTM) and *Official Methods of Analysis*℠ (OMA) validated methods for comparison to other reference methods, in this case the Health Canada reference method for detection of *Listeria monocytogenes* in ready-to-eat meats and *Listeria* species on stainless steel surfaces.

The GovVal program is based on the *Performance Tested Methods*℠ (PTM) program operated by the AOAC Research Institute. Candidate test kit methods will be evaluated using blind coded samples and the results reviewed by the AOAC General Referee for Microbiology, Health Canada (HC) and Canadian Food Inspection Agency (CFIA). Successful candidate methods that have demonstrated equivalency to MFHPB-30 through the GovVal process will be invited by HC and CFIA to submit the AOAC report, along with raw and summary data to the Editor of the Compendium of Analytical Methods. This data will be reviewed by the Microbiology Methods Committee (MMC) for consideration as an acceptable method for regulatory testing in Canada. The project is anticipated to take less than seven months to complete. A conference call with *Listeria* test kit method developers will be scheduled in the next three to four weeks, after which GovVal method extension applications will be accepted. Interested participants should contact AOAC Research Institute.

The GovVal program takes advantage of the existing pool of PTMs. All of these methods have been extensively evaluated, but may not have been evaluated in comparison to the Health Canada reference method for detection of *Listeria* (MFHPB-30). The GovVal program is designed to evaluate these previously AOAC-approved methods for the specific needs of the Canadian Food Inspection Agency to enforce Health Canada standards for regulatory testing, in this case *Listeria monocytogenes* in ready-to-eat meats and *Listeria* species on stainless steel surfaces as compared to the Health Canada reference method.

NSF International Receives Accreditation for Food Safety Management Systems Registration

NSF International has announced it has obtained ISO 22000 accreditation from the ANSI-ASQ National Accreditation Board (ANAB). ISO 22000 Food Safety Management Systems Registration accreditation enables NSF, through its subsidiary NSF International Strategic Registrations (NSF-ISR), to register food safety management systems for companies worldwide.

Maintaining food safety throughout the entire global supply chain has become a main priority for food companies, including crop producers, food manufacturers and processors, and producers of equipment and packaging materials. Food companies are demanding that quality assurance standards and systems be in place to enhance their overall safety and quality efforts, and implementing ISO 22000 is an effective way to demonstrate this commitment.

ISO 22000 was created by the International Organization of Standardization to ensure proper and universally-accepted food safety procedures are being followed throughout the supply chain. ISO 22000 shares the same foundation with the universally-accepted Quality Management Standard ISO 9001 but has a greater focus on food safety management and incorporates Hazard Analysis Critical Control Points (HACCP) principles.

Earning accreditation for ISO 22000 provides NSF International with more credibility in the worldwide food market and complements NSF's existing portfolio of food safety management services, including certifications to Global Food Safety Initiative (GFSI)-benchmarked standards such as Safe Quality Food (SQF) and British Retail Consortium (BRC).

In order to earn accreditation, NSF International had to follow a rigorous application and auditing process that included a formal review of processes and procedures, auditor qualifications and a witness audit. The witness audit verified that NSF International auditors are highly competent and can perform the audits to the standard's requirements. To maintain accreditation, NSF International will undergo an annual office and witness audit.

Changes at the Center for Food Safety and Applied Nutrition

Stephen F. Sundlof, D.V.M., Ph.D., has announced he is stepping down from his position leading the Center for Food Safety and Applied Nutrition (CFSAN) to accept a two-year assignment with the Virginia-Maryland Regional College of Veterinary Medicine.

Dr. Sundlof has been providing leadership at FDA for 16 years, including 14 years as the director of the Center for Veterinary Medicine (CVM). We will miss him, but we are pleased for him as he returns to his academic roots. We are particularly pleased that Steve will be developing a program that will directly benefit FDA by providing a continuous source of highly competent professionals to meet our food safety and public health goals. This new role reflects Dr. Sundlof's sustained dedication to FDA's mission, and

we are grateful for that. We are also fortunate that Steve will continue to be available to the Foods Program as a senior advisor.

Steve began his career in 1980 on the faculty of the University of Florida's College of Veterinary Medicine. His research interests in drug residues in livestock eventually led to interactions with the FDA, first as a member and later as the chair of the FDA's Veterinary Medicine Advisory Committee. In 1994, he was named the CVM director by FDA Commissioner David Kessler.

We are pleased to announce that Michael Landa, who has been deputy director for regulatory affairs at CFSAN since 2004 and began his FDA career in 1978 as assistant chief counsel for enforcement, medical devices and veterinary medicine, has agreed to serve as acting director. In addition, Roberta Wagner and Donald Kraemer, who have extensive experience at FDA, both at headquarters and in the field, will serve as acting deputy directors.

Roberta Wagner, who joined FDA in 1987 as a laboratory analyst in the Baltimore district, has served as director of CFSAN's Office of Compliance since 2008. Donald Kraemer, who joined FDA in 1977 as a consumer safety officer in the New Orleans district, has been deputy director of CFSAN's Office of Food Safety since 2007.

Eriez® Announces Promotion of John Klinge to Product Manager–Metal Detection

Eriez®, announces the promotion of John Klinge to product manager—metal detection. Klinge will report to Jeff Kaveney, manager of product marketing.

In his new role, Klinge will oversee metal detection inquiries, orders, product development and improvements, marketing, training and sales forecasts. Mr. Klinge joined Eriez in 2008, previously serving as a technical sales representative.

"John's extensive training in our magnetic separation, vibratory, metal detection and x-ray inspection system products have prepared him well for his new position," says Kaveney. "John brings impressive technical knowledge, talent and energy to Eriez," he adds.

Mr. Klinge holds a bachelor's degree in political science and business, and military science from the University of Pittsburgh. He has served as a captain in the U.S. Army.

Component Hardware Group Appoints Ed Whartnaby as Executive Vice President, Sales and Marketing

Component Hardware Group (CHG), a manufacturer and distributor of premium plumbing and hardware products for commercial, foodservice, institutional and healthcare applications, has announced that Ed Whartnaby is the new executive vice president, sales and marketing.

Mr. Whartnaby brings more than 20 years of experience in strategic leadership, and implementing sales and marketing campaigns for the technical equipment and hardware industries in North America. In his new role, Whartnaby will build the company's sales efforts through the sales team and distributors with new product implementation in the market segments CHG serves.

Prior to joining the sales and marketing team at CHG, Whartnaby worked for Technical Concepts® (recently acquired by Newell Rubbermaid) as the vice president of sales and the director of segment marketing. In these positions, he led the North American sales team to double-digit revenue growth by improving sales effectiveness. He led the company in developing new channels of distribution and focus on key end-user segments.

Mr. Whartnaby's professional career was preceded by a bachelor's degree in business management and economics from Widener University in Chester, PA. He currently serves as a board member of Teen Mothers Choice International and is a member of the Barnabas Group Chicago Chapter.

FMI Elects New Officers, Board Members

Food Marketing Institute (FMI) announced the election of two new vice chairmen and five new members of its Board of Directors.

Elected as FMI vice chairman of independent retailers and wholesalers is David Ball, president and CEO of Ball's Price Chopper/Hen House Markets, Kansas City, KS.

Elected as FMI vice chairman of finance is Steven A. Burd, chairman, president and CEO of Safeway Inc., based in Pleasanton, CA.

New members of FMI's Board of Directors:

- Jim Donald is currently the president and CEO of Haggen, Inc., headquartered in Bellingham, WA, with 33 stores in the Northwest.
- Dennis Eidson, president and chief executive officer of Spartan Stores, a grocery wholesaler and retailer based in Grand Rapids, MI.
- Joey Hays, owner and president of five supermarkets under the Food Rite banner, based in Dyer, TN.
- Tom Heinen, president and COO of Heinen's Fine Foods, Inc., based in Cleveland, OH.
- Steve Junqueiro, president of Save Mart Supermarkets, Modesto, CA.

INDUSTRY PRODUCTS

Mettler Toledo

Mettler Toledo Announces the New One Click™ Weighing Solutions Powered by LabX2010 for All XP and XS Balances

Mettler Toledo introduces One Click™ Weighing Solutions powered by LabX. These solutions are complete product bundles consisting of an Excellence XP/XS Balance, corresponding accessories and the new LabX 2010 software. One Click™ Standard Preparation offers fast, secure and easy standard and sample preparation with full-user guidance on the balance.

Users are guided through the standard preparation procedure with instructions on the balance touchscreen. The user only needs to input the sample ID and respond to the commands on the balance. The One Click™ Weighing Solution performs all calculations and documentation automatically and hence the time to prepare a standard solution is reduced from around 15 minutes to less than four.

To start the application, the user simply presses the One Click™ shortcut on the balance touchscreen. The comprehensive guidance ensures the SOP is followed exactly. Flask labels can be printed automatically as part of the procedure and ensures that no essential information is omitted. All data is saved to ensure full traceability and results can be printed automatically at the end in a personalized report to fulfill documentation requirements.

The first One Click™ Weighing Solutions focus on common weighing procedures performed every day in many laboratories. In addition to Standard and Sample Preparation, LabX 2010 contains methods for Loss on Drying and Sieve Analysis. All methods are started with a One Click™ shortcut on the instrument and benefit from the increased process security provided by LabX 2010. The complete solution can be tailored to meet individual process requirements, e.g., selection of the correct balance. LabX 2010 has built-in design tools to allow customization of the library methods or development of new methods.

Mettler Toledo
614.438.4936
Columbus, OH 43240
www.mt.com

Onset Announces Wireless Sensors for Energy and Environmental Monitoring

Onset, a supplier of data loggers, announced the HOBO® ZW Series, a family of wireless data nodes for centralized monitoring of energy use and environmental conditions in buildings.

HOBO ZW Series data nodes reduce the cost and complexity of data collection by measuring, recording and transmitting real-time energy use and environmental data – from dozens of points – to a central PC. Different from traditional data loggers, HOBO data nodes work together in a self-healing wireless network to transmit logged data to a PC at regular intervals. This eliminates the need of having to spend time retrieving collected data from individual data loggers deployed throughout a facility.

The wireless nodes can measure temperature, relatively humidity, kilowatt hours, CO_2, AC voltage, amps, gauge pressure, and a variety of other parameters.

"With HOBO data nodes, we've combined the industry-proven reliability of HOBO data loggers with wireless MESH sensor technology to make energy and environmental data collection fast, simple, and economical," said Frank Deshaies, product marketing manager for Onset. "Whether you are a facility manager looking at indoor air quality, a building energy manager tracking energy use, or a warehouse manager keeping an eye on temperature and humidity levels, HOBO data nodes take portable data logging to a new level of flexibility and convenience."

Easy to install in any facility, HOBO data nodes harness the power of self-healing MESH networking technology. This ensures that data is automatically routed back to a PC without manual intervention, while

making it fast and easy to set up a sensor network.

Accompanying HOBOware® Pro 3.0 software lets you quickly and easily configure data node networks, view real-time energy and environmental data, and set alarms for any sensors on the network. Alarm notifications can be sent via text messaging to your cell phone, and/or email to your PC. The software also provides a Network Map feature that provides an at-a-glance view of your network, and allows exporting of data to Microsoft Excel and other spreadsheet programs with a single click.

Onset
800.564.4377
Bourne, MA
www.onsetcomp.com

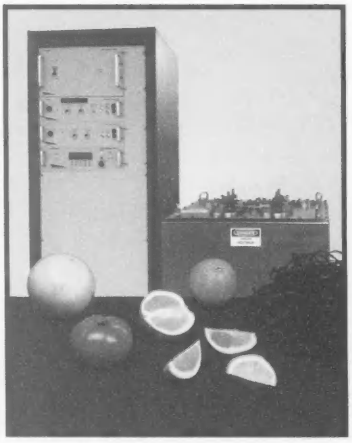
New Dual Fill Dispenser from Warsaw Chemical

Warsaw Chemical Co., Inc. introduces the "Dual Fill" dispenser, a portable, safe and cost-effective method for dispensing cleaning chemicals. Connect Dual Fill dispensers to an ordinary hose to fill bottles, buckets, automatic scrubbers and more. These dispensers have been preset to dispense the precise amount of concentrated product and water, for safe and effective cleaning. The dilution rate can be easily changed from 2 ounces per gallon to 12 ounces per gallon, allowing the Dual Fill dispenser to be used for multiple products.

The Dual Fill dispensing system is cost effective and eliminates the need for costly wall mounted dispensing equipment. Simple to use and requiring virtually no installation or employee training, the Dual Fill dispenser utilizes concentrated products for economical end-use cost. Patented technology allows the dispensing system to operate in a range of water conditions, resulting in accurate dilutions in relatively low pressure/low flow and hard water areas.

Pre-installed dispensing systems create a completely closed, chemical-contact system, providing a tamper-resistant package and insuring employee safety. Product concentrates must be attached to the Dual Fill dispenser in order to dispense product.

Warsaw Chemical Co., Inc.
800.548.3396
Warsaw, IN
www.warsaw-chem.com



Diversified Technologies, Inc.

PEF Cell Extraction Laboratory Unit Breaks Cell Walls in Food and Plant Tissues

A PEF (pulsed electric field) laboratory unit that facilitates cell extraction for juicing prefermentation, predigestion, and other processes is available from Diversified Technologies, Inc.

Diversified Technologies' PEF Cell Extraction Unit passes food and plant materials through a treatment chamber and subjects them to brief pulses of very high voltage which break cell walls without denaturing proteins. Accelerating extraction processes to provide higher throughput, this non-thermal and non-chemical unit reduces total energy consumption, claims the firm.

Essentially making more of the cell contents accessible for extraction, Diversified Technologies' PEF Cell Extraction Unit features a 300 l/h capacity, with 25 kV, 25 kW power levels to permit a wide range of process development studies. This FDA-approved unit is scalable to production environments with up to 10,000 l/h throughput.

Diversified Technologies, Inc.
781.275.9444
Bedford, MA
www.divtecs.com

The Beast Has Been Unleashed: Eriez P-REX Scrap Drum Revolutionizes Metal Recovery

Eriez® introduced the P-REX Scrap Drum at the 2010 Scrap Recycling Industry Expo. "The separation capabilities P-REX offers will bring more profits to your scrap-recycling operation," says Tim Shuttleworth, Eriez president and CEO. "P-REX enables better meatball recovery than ever before thought possible."

Engineering breakthroughs give P-REX the advantage in critical performance areas: superior edge-to-edge separation, no 'transfer

point' drop in magnetic force and no decline in performance due to heat rise. "Prior to the introduction of P-REX, processors have had to accept reduced revenue because of more limited metal recovery systems — but no longer," says Mr. Shuttleworth.

With today's electromagnetic drum magnets, a steel core is used to project the magnetic field. These cores generate a limited magnetic force at the drum edge because the electric coil that is wound around the core takes valuable space across the width of the drum, resulting in weak zones at the edges. These weak zones can amount to 20 percent or more of the surface of the drum.

Because the P-REX is a permanent magnet, it extends to the edge of the drum. That means wider and more efficient separation. Wider separation means greater profits through greater recovery.

Today's design of electro-axial drums have a significant reduction in magnetic strength at the transfer point, or "flip" point, along the arc of the ferrous material's travel, resulting in lost recovery. Not with the patent-pending P-REX. The ferrous material is powerfully transferred and flipped from magnetic pole to magnetic pole to magnetic pole, resulting in a cleaner product and more recovery.

Electro Drums consume power and heat up much like a light bulb does during use. The higher the heat, the greater is the loss in strength. Shuttleworth explains, "Check the gauss strength of your drum at the end of the shift and you will see that the electro drum has lost up to 30 percent of its strength." He adds, "In the summer and in southern climates, this can be an even greater issue."

P-REX's permanent magnets are permanent; they maintain their strength. P-REX lasts forever and uses no electricity. It is very strong with an attractive force that surpasses the largest and strongest electro drums on the market today. When comparing P-REX Drums to Electros, P-REX outperforms them by more than 20 percent during both hot and cold conditions.

When drum magnets don't operate at peak performance, large sphere-shaped meatballs and knuckles become impossible to capture. Fragments of electric motors and alternators and other items containing copper, aluminum and steel are missed, money is lost and dangerous fluff fires often result.

Eriez
800.345.4946
Erie, PA
www.eriez.com

Biohit Inc.

New PCR Starter Kits from Biohit

Biohit's new mLINE PCR Starter Kit offers an easy start for PCR applications. The kit includes three pipettes covering the standard volumes used in PCR along with sterile and certified SafetySpace Filter™ Tips which guarantee contamination-free and safe pipetting.

In addition, the kit includes a Pipette Holder, Color Coded Caps, Microtube Opener/Calibration Tool, Cooling Rack, Cryo Pen and Instructive Literature.

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

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To be determined

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No award given in 2010

AFFILIATE AWARDS

C. B. SHOGREN MEMORIAL

Ontario Association for Food Protection

BEST AFFILIATE OVERALL MEETING

Upper Midwest Dairy Industry Association

BEST AFFILIATE EDUCATIONAL

North Dakota Environmental Health Association

BEST AFFILIATE COMMUNICATION MATERIALS

Southern California Association for Food Protection

AFFILIATE MEMBERSHIP ACHIEVEMENT

Ohio Association for Food Protection

COMMITTEE MEETINGS

TIMES	MEETING	ROOM
All Committee meetings at the Anaheim Hilton		
Saturday, July 31		
2:30 p.m. - 5:00 p.m.	International Food Protection Issues	Capistrano AB
3:00 p.m. - 4:30 p.m.	Membership	LaJolla
3:30 p.m. - 4:30 p.m.	Past Presidents'	Coronado
Sunday, August 1		
7:00 a.m. - 10:00 a.m.	**Affiliate Council**	Pacific Ballroom A
8:00 a.m. - 5:00 p.m.	Committee on Control of Foodborne Illness	Balboa A
9:00 a.m. - 11:00 a.m.	Applied Laboratory Methods	Laguna AB
9:00 a.m. - 11:00 a.m.	Beverage	Balboa C
9:00 a.m. - 11:00 a.m.	Dairy Quality and Safety	Palos Verdes AB
9:00 a.m. - 11:00 a.m.	Food Hygiene and Sanitation	San Clemente
9:00 a.m. - 11:00 a.m.	Food Law	Oceanside
9:00 a.m. - 11:00 a.m.	Seafood Safety and Quality	Lido C
10:00 a.m. - 12:00 p.m.	Audiovisual Library	Balboa B
10:00 a.m. - 12:00 p.m.	*JFP* Management	Capistrano AB
10:00 a.m. - 12:00 p.m.	Meat and Poultry Safety and Quality	Huntington ABC
10:00 a.m. - 12:00 p.m.	Pre-Harvest Food Safety — **Organizational Meeting**	Lido B
11:00 a.m. - 12:00 p.m.	Awards	Lido C
11:00 a.m. - 12:00 p.m.	Constitution and Bylaws	Balboa C
11:00 a.m. - 12:30 p.m.	Packaging — **Organizational Meeting**	Oceanside
12:00 p.m. - 1:30 p.m.	Student	Pacific Ballroom A
1:00 p.m. - 3:00 p.m.	3-A Committee on Sanitary Procedures	Balboa B
1:00 p.m. - 3:00 p.m.	Food Safety Education	San Clemente
1:00 p.m. - 3:00 p.m.	Fruit and Vegetable Safety and Quality	Laguna AB
1:00 p.m. - 3:00 p.m.	Viral and Parasitic Foodborne Disease	Lido C
2:00 p.m. - 4:00 p.m.	Food Chemical Hazards and Food Allergy	Balboa C
2:00 p.m. - 4:00 p.m.	Food Defense — **Organizational Meeting**	Lido B
2:00 p.m. - 4:00 p.m.	*FPT* Management	Capistrano AB
2:00 p.m. - 4:00 p.m.	Microbial Modelling and Risk Analysis	Palos Verdes AB
2:00 p.m. - 4:00 p.m.	Retail Food Safety and Quality	Huntington ABC
2:00 p.m. - 4:00 p.m.	Water Safety and Quality	Oceanside
3:00 p.m. - 4:30 p.m.	Foundation	San Clemente
3:30 p.m. - 4:30 p.m.	Nominating	Balboa B
4:00 p.m. - 5:00 p.m.	Young Professionals — **Organizational Meeting**	Laguna AB

IAFP Members are welcome to attend Committee Meetings.
Both Members and Non-members are welcome to attend and participate in PDG Meetings.

Committee Meetings represented in blue; PDG Meetings represented in orange.

Ivan Parkin Lecture

Improving Food Safety from Farm to Table: Fostering Prevention and Building Partnerships

MICHAEL R. TAYLOR

Deputy Commissioner for Foods
U.S. Food and Drug Administration
Washington, D.C.

Presented at the Opening Session
Sunday, August 1
6:00 p.m. – 7:30 p.m.

Mr. Michael R. Taylor was named Deputy Commissioner for Foods at the U.S. Food and Drug Administration (FDA) in January 2010. He is the first individual to hold the position, which was created along with a new Office of Foods in August 2009. Mr. Taylor is leading FDA efforts to develop and carry out a prevention-based strategy for food safety; plan for new food safety legislation; and ensure that food labels contain clear and accurate information on nutrition.

Mr. Taylor joined the FDA in July 2009, as Senior Advisor to the Commissioner of Food and Drugs, with responsibility for overseeing the planning and implementation of food safety reform at FDA.

From June 2000 until joining FDA, Mr. Taylor worked in academic and research settings as a research professor at The George Washington University School of Public Health and Health Services, a professor at the University of Maryland's School of Medicine, and a senior fellow at Resources for the Future.

Mr. Taylor has served in government as Administrator of USDA's Food Safety and Inspection Service (1994–1996), Deputy Commissioner for Policy at the Food and Drug Administration (1991–1994), and FDA Staff Lawyer and Executive Assistant to the FDA Commissioner (1976–1981).

In the private sector, he established and led the food and drug law practice at King & Spalding (1981–1991 and November 1996–September 1998) and was Vice President for Public Policy at Monsanto Company (October 1998–January 2000).

Mr. Taylor has served on several National Academy of Sciences committees studying food-related issues. Until joining the FDA, he was a senior fellow with The Partnership to Cut Hunger and Poverty in Africa and a board member of Resolve, Inc. and the Alliance to End Hunger.

Mr. Taylor received his law degree from the University of Virginia and his B.A. in Political Science from Davidson College.

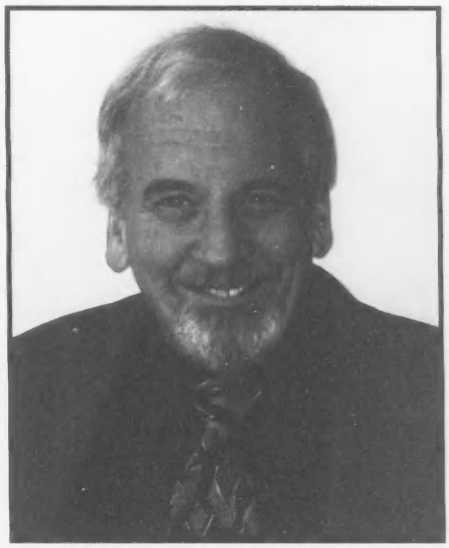
John H. Silliker Lecture

Understanding Foodborne Microorganisms, A Matter of Perspective

ROBERT L. BUCHANAN, PH.D.

Director and Professor, Center for Food Safety and Security Systems
College of Agriculture and Natural Resources
University of Maryland
College Park, Maryland

Wednesday, August 4
4:00 p.m. – 4:45 p.m.



Dr. Robert L. Buchanan received his B.S., M.S. M. Phil, and Ph.D. degrees in Food Science from Rutgers University, and post-doctoral training in Mycotoxicology at the University of Georgia. Since then, he has had over 30 years of experience teaching and conducting research in food safety, first in academia, then with the USDA Agricultural Research Service and the Food and Drug Administration.

Dr. Buchanan recently joined the faculty of the University of Maryland as Professor and Director of the new Center for Food Safety and Security Systems. His scientific interests are diverse and include extensive experience in predictive microbiology, quantitative microbial risk assessment, microbial physiology, mycotoxicology, and food safety systems. He has published over 400 manuscripts, book chapters, and abstracts on a wide range of subjects related to food safety, and has given hundreds of invited lectures on five continents. Additionally, he is one of the co-developers of the widely used USDA Pathogen Modeling Program, and served on the boards of editors of several journals.

Dr. Buchanan holds an ongoing interest in the development of science-based public health policy. He served as the FDA Center for Food Safety and Applied Nutrition's Senior Science Advisor, as the Director of the CFSAN Office of Science, the FDA Lead Scientist for the U.S. Food Safety Initiative, and as Deputy Administrator for Science with the USDA Food Safety and Inspection Service.

Dr. Buchanan served on numerous national and international advisory bodies, including as the U.S. Delegate to the Codex Alimentarius Commission Committee on Food Hygiene and a permanent member of the International Commission on Microbiological Specification for Foods. Dr. Buchanan also served as a member of the National Academy of Science's Institute of Medicine Committee on Emerging Microbial Threats, the National Advisory Committee on Microbiological Criteria for Foods, and numerous international expert consultations for the FAO and WHO. Dr. Buchanan received numerous national and international honors and is a Fellow of both the American Academy for Microbiology and the Institute of Food Technologists.

Special Contributors

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IAFP 2010 Preliminary Program

SUNDAY, AUGUST 1

Opening Session – 6:00 p.m.

Ivan Parkin Lecture – *Improving Food Safety from Farm to Table: Fostering Prevention and Building Partnerships*, Michael R. Taylor, Deputy Commissioner for Foods, U.S. Food and Drug Administration, Washington, D.C.

MONDAY, AUGUST 2

Poster Session

- Antimicrobials
- Seafood
- Risk Assessment
- Novel Laboratory Methods
- Beverages and Water
- Sanitation
- Epidemiology
- Communication Outreach and Education
- Dairy and Other Food Commodities

Morning

Symposia

- Data Deluge, Interacting Players, and Complex Networks in Food Sciences- Computational Tools to Tackle Food-related Complexities
- Global Water Shortages – Their Impact on Water Safety and Quality
- Microbiological Environmental Testing and Validation: Leading Edge Issues for Low-moisture Foods
- Human Pathogens Associated with Edible Plants
- Government, Academic, and Industry Collaborations to Advance the Development and Use of Microbiological Risk Assessments
- Converging Industry Initiatives on Traceability
- Ripple or Tsunami? Riding the Regulatory Wave to Safer Bottled Water and Water Beverages

Roundtable

- Research Needs a Roundtable: Retail and Foodservice Food Safety

Technical Session

- Applied Laboratory and Novel Laboratory Methods

Afternoon

Symposia

- Buy Local? Addressing the Safety Issues Behind Green Food Trends
- Less Recognized and Presumptive Pathogens: What Now, What Next?
- What's Been Keeping You Up at Night? – Selected Unanswered Food Safety Questions
- 'Ingredient' is a Ten-letter Word for Financial Disaster
- Good Agricultural Practices and the Small Scale Producer: What's Really Going on Out There?
- Flour Food Safety: The Changing Landscape – *E. coli* O157:H7

Technical Sessions

- Pathogens, Sanitation and Seafood
- Antimicrobials and Microbial Food Spoilage

TUESDAY, AUGUST 3

Poster Session

- Applied Laboratory Methods
- Microbial Food Spoilage
- Non-microbial Food Safety
- General Microbiology
- Pathogens
- Food Toxicology

Morning

Symposia

- Risk-based Design of Thermally Processed Foods – A Look into the Future
- European Concept on Hygiene Monitoring in the Food Supply Chain – 'Farm-to-Fork' Concept in Practice
- National Institute of Food and Agriculture Showcase
- The *Salmonella* Smorgasbord: The Problem with Too Many Choices
- Food Packaging Technology: Opportunities and Challenges That Enhance Food Safety
- Significance and Detection of STEC or Non-O157:H7 *E. coli*
- Global Product Safety Harmonization: Exploring the Comparative Differences of International Policies

Technical Sessions

- Produce
- Meat and Poultry

Afternoon

Symposia

- The Emergence of Non-culture Diagnostics and Their Impact on Global Foodborne Disease Surveillance
- Way before the Fork: Impact of Pre-harvest Management Programs and Supply Chain Influences on the Control of Shiga Toxin-producing *E. coli* Contamination in Beef
- Food and Food Environment Test Considerations in View of Changing Regulations
- Human Noroviruses: Attribution, Transmission, and Control
- Advances in Detection Technologies to Address Food Safety and Food Defense Needs

Technical Sessions

- Produce and Communication Outreach and Education
- Risk Assessment and Epidemiology

WEDNESDAY, AUGUST 4

Poster Session

- Produce
- Meat and Poultry

Morning

Symposia

- Global Issues and Impact of Gluten Allergy and Celiac Disease
- Foodborne Disease Outbreak Update
- Food Safety in Developing Countries
- Setting the Science-based Agenda for Co-management of Watershed Quality and Produce Safety
- A Practical Approach to Risk Communication: Engaging Stakeholders and the Public
- Maintaining Consumer and Market Continuity during Animal Disease Outbreaks

Afternoon

Symposia

- Bacterial Toxins: A Past or an Emerging Issue for Food and Beverage Safety?
- WHO's Epidemiological Approach to Estimating Foodborne Diseases – WHO FERG
- Tools for Predictive Microbiology and Microbial Risk Assessment
- Issues in the Production and Manufacture of Nuts and Nut-containing Products: Nuts to You
- Risk Benefit Analysis of Food Production and Consumption
- New Definitions in Imported Seafood Safety

4:00 p.m. – 4:45 p.m.

John H. Silliker Lecture – *Understanding Foodborne Microorganisms, A Matter of Perspective*, Robert L. Buchanan, Ph.D., Director and Professor, Center for Food Safety and Security Systems, University of Maryland, College Park, MD

Activities

SATURDAY, JULY 31

COMMITTEE MEETINGS
2:30 p.m. - 5:00 p.m.

WELCOME RECEPTION
5:00 p.m. - 6:30 p.m.
Sponsored by Eurofins Scientific

SUNDAY, AUGUST 1

COMMITTEE MEETINGS
7:00 a.m. - 5:30 p.m.

STUDENT LUNCHEON (ticket required)
12:00 p.m. - 1:30 p.m.

EDITORIAL BOARD RECEPTION (by invitation)
4:30 p.m. - 5:30 p.m.

OPENING SESSION AND IVAN PARKIN LECTURE
6:00 p.m. - 7:30 p.m.

CHEESE AND WINE RECEPTION
7:30 p.m. - 9:30 p.m.
Sponsored by Kraft Foods, Inc.

MONDAY, AUGUST 2

COMMITTEE AND PDG CHAIRPERSON BREAKFAST (by invitation)
7:00 a.m. - 9:00 a.m.

EXHIBIT HALL LUNCH
12:00 p.m. - 1:00 p.m.
Sponsored by Johnson Diversey

EXHIBIT HALL RECEPTION
5:00 p.m. - 6:00 p.m.
Sponsored by DuPont Qualicon

TUESDAY, AUGUST 3

EXHIBIT HALL LUNCH
12:00 p.m. - 1:00 p.m.
Sponsored by DNV

BUSINESS MEETING
12:15 p.m. - 1:00 p.m.

EXHIBIT HALL RECEPTION
5:00 p.m. - 6:00 p.m.
Sponsored by 3M Food Safety

PRESIDENT'S RECEPTION (by invitation)
6:00 p.m. - 7:00 p.m.

WEDNESDAY, AUGUST 4

JOHN H. SILLIKER LECTURE
4:00 p.m. - 4:45 p.m.

AWARDS RECEPTION AND BANQUET
6:00 p.m. - 9:30 p.m.

IAFP JOB FAIR

Sunday, August 1 through Wednesday, August 4

Employers, take advantage of the opportunity to recruit the top food scientists in the world! Post your job announcements and interview candidates.

TOURS

IAFP has partnered with Southern California Gray Line to offer daily sightseeing tours to all major Southern California attractions. Specialty tours include LA/Hollywood and San Diego/Tijuana city tours, OC beaches, shopping excursions, movie stars' homes and Catalina Island. Book your tours now at www.graylin-eanaheim.com with your special IAFP discount coupon available under 'Special Promotions.' Or visit the IAFP Registration Desk once you arrive in Anaheim to arrange your tours.

FOUNDATION GOLF TOURNAMENT

Saturday, July 31

Tustin Ranch Golf Club 6:30 a.m. – 2:00 p.m.

This championship 18-hole Ted Robinson designed course is unique to Orange County and extremely popular. Experience breathtaking scenery, sparkling lakes and cascading falls at this course. Voted the *Best Orange County Golf Course 2009* by the readers of the *Orange County Register* and 4-Star recipient of *Golf Digest Magazine's Places to Play*.

Your registration fee helps to support the IAFP Foundation.

General Information

REGISTER ONLINE

Register online at www.foodprotection.org.

REGISTRATION

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

- Program Book
- Welcome Reception
- Ivan Parkin Lecture
- Cheese and Wine Reception
- Technical Sessions
- Poster Presentations
- Symposia
- Roundtables
- Exhibit Hall Admittance
- Exhibit Hall Lunch (Mon. & Tues.)
- Exhibit Hall Reception (Mon. & Tues.)
- John H. Silliker Lecture
- Awards Banquet

GUEST REGISTRATION

Guest registration includes:

- Welcome Reception
- Ivan Parkin Lecture
- Cheese and Wine Reception
- Exhibit Hall Admittance
- Exhibit Hall Lunch (Mon. & Tues.)
- Exhibit Hall Reception (Mon. & Tues.)

Please note that Guest registration applies to those individuals who are not employed in the food safety arena.

PRESENTATION HOURS

Sunday, Aug. 1	
Opening Session	6:00 p.m. – 7:30 p.m.
Monday, Aug. 2	
Symposia & Technical Sessions	8:30 a.m. – 5:00 p.m.
Tuesday, Aug. 3	
Symposia & Technical Sessions	8:30 a.m. – 5:00 p.m.
Wednesday, Aug. 4	
Symposia & Technical Sessions	8:30 a.m. – 3:30 p.m.
Closing Session	4:00 p.m. – 4:45 p.m.

FOUNDATION GOLF TOURNAMENT

Saturday, July 31

Tustin Ranch Golf Club — 6:30 a.m. – 2:00 p.m.
Benefiting the IAFP Foundation

EVENING EVENTS

Sunday, Aug. 1	
Opening Session	6:00 p.m. – 7:30 p.m.
Cheese and Wine Reception	7:30 p.m. – 9:30 p.m.
Sponsored by Kraft Foods	
Monday, Aug. 2	
Exhibit Hall Reception	5:00 p.m. – 6:00 p.m.
Sponsored by DuPont Qualicon	
Tuesday, Aug. 3	
Exhibit Hall Reception	5:00 p.m. – 6:00 p.m.
Sponsored by 3M Food Safety	
Wednesday, Aug. 4	
Awards Banquet Reception	6:00 p.m. – 7:00 p.m.
Awards Banquet	7:00 p.m. – 9:30 p.m.

SPECIAL EVENTS

Tuesday, Aug. 3

NFPA Alumni and Friends Reception at Buca di Beppo
7:30 p.m. – 9:30 p.m.

EXHIBIT HOURS

Sunday, Aug. 1	7:30 p.m. – 9:30 p.m.
Monday, Aug. 2	10:00 a.m. – 6:00 p.m.
Tuesday, Aug. 3	10:00 a.m. – 6:00 p.m.

HOTEL INFORMATION

A special rate of $149 per night is available at the Hilton Anaheim. Reservations can be made from the IAFP Web site. The Hilton Anaheim is adjacent to the Anaheim Convention Center where the sessions, exhibits and events will be held.

CANCELLATION POLICY

Registration fees, less a $50 administration fee and any applicable bank charges, will be refunded for written cancellations received by July 16, 2010. No refunds will be made after July 16, 2010 however, the registration may be transferred to a colleague with written notification. Refunds will be processed after August 9, 2010.

Event and extra tickets purchased are nonrefundable.

International Association for Food Protection

6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2864, USA
Phone: +1 800.369.6337 • +1 515.276.3344
Fax: +1 515.276.8655
E-mail: info@foodprotection.org
Web site: www.foodprotection.org

Workshops

IAFP Workshops will be held at or depart from the Hilton Anaheim

WORKSHOP 1	WORKSHOP 2
Characterization and Identification of Spoilage-causing Fungi: A Hands-on Workshop	Microbial Challenge Testing for Foods
Friday and Saturday July 30—July 31 8:00 a.m. - 5:00 p.m.	**Friday and Saturday July 30—July 31 8:00 a.m. - 5:00 p.m.**

REGISTRATION — (Payment must be received by July 16, 2010 to avoid late registration rates.)
Cancellations received by July 16 will be refunded, less a $50.00 administrative fee. No refunds will be made after this date.

	Early Rate	Late Rate		Early Rate	Late Rate
Member	$615.00	$690.00	Member	$480.00	$555.00
Non-Member	$715.00	$790.00	Non-Member	$580.00	$655.00

Student rates available, contact Julie at jcattanach@foodprotection.org for more information.

Workshop 1 — Characterization and Identification of Spoilage-causing Fungi: A Hands-on Workshop

Friday, July 30 and Saturday, July 31 • 8:00 a.m. — 5:00 p.m.

Laboratory Host:

Dr. Anuradha Prakah, Chapman University

Description:

Mitigating the risks of yeasts and mold contamination remains a constant battle within certain segments of the food and beverage industry. Molds and yeasts cause significant food spoilage losses and mycotoxigenic molds pose significant food safety/regulatory hazards. Fungal identification is a scientific challenge requiring both art and technical expertise. There are a limited number of scientists who understand and have developed the art of fungal identification to a sound science. This workshop provides attendees a unique opportunity to interact first-hand with a group of experts, learning the best practices for isolating different fungi as well as the basics of classical identification methods. This workshop will also cover current molecular methods that are used to identify yeast and mold. Fifty percent of the workshop will involve live demonstration and a direct hands-on experience in a laboratory setting.

Note: Workshop participants will meet each day at the Hilton Anaheim and be transported to laboratory facilities at Chapman University.

Topics:

- Cultural Methods and Mold Identification
- Method Demonstrations Including Molecular Tools for Mold Identification
- Case Studies

Instructors:

Emilia Rico, BCN Research Laboratories, Inc.
Frank Burns, DuPont Qualicon
Shawn Johnson, Universal Sanitizers Inc.
Dave Pincus, bioMérieux, Inc.

Organizers:

Julie Castro, Pepsico
Mangesh Palekar, Kraft Foods, Inc.

Intended Audience:

This course is aimed at microbiologists working in academia or the food and beverage industry who want to gain a better understanding of the types and challenges of fungal contamination in food and beverage products. The main purpose of the workshop is to provide attendees the opportunity to gain hands-on experience and expertise in a live wet lab setting for the identification of industrially significant yeasts and molds.

Workshop 2 — Microbial Challenge Testing for Foods

Friday, July 30 and Saturday, July 31 • 8:00 a.m. — 5:00 p.m.

Description:

The food industry routinely uses challenge testing to determine whether a specific food requires time and temperature control for safety, or is suitably formulated. When laboratory testing is used to support a change in how the product is handled in a food establishment (e.g., refrigerated to unrefrigerated holding, extending shelf life, increasing ambient temperature storage or eliminating the need for date marking), the data are submitted to a state or local regulatory agency or directly to the FDA in the form of a variance application for approval. Food establishments or manufacturers submitting laboratory data to support their proposals must ensure the study is appropriate for the food and pathogen of concern and incorporate the necessary elements into the study to yield a valid design and conclusion. Because of the many questions raised by regulatory and industry professionals about the appropriate use of challenge studies, the National Advisory Committee on Microbiological Criteria for Foods (NACMCF) was asked to provide guidance on the topic of challenge studies and their use. This workshop will present the NACMCF report and instructors will guide the students though use of the material in the report to develop actual challenge study protocols based on NACMCF recommendations.

Topics:

- Overview of challenge study design (purpose of study, product description, product assessment, pathogens of concern, sampling intervals, test conditions, other controls, pass/fail criteria).
- Introduction to models and their use (examples of models, applicability of models to different foods, pathogen growth ranges used in modeling programs).
- Purpose of study, product description and assessment (purpose of the study, time/temperature control, lethality, formulation efficacy, product, ingredients, preparation, storage, ph and water activity).
- Pathogens of concern (selection criteria, ecology and epidemiology, use of models and the literature, inactivation study parameters).
- Sampling intervals and test conditions (growth vs. inactivation studies, strain selection, inoculation methods, packaging, sample size and replicates).
- Other controls and pass/fail criteria (surrogates, un-inoculated controls, pass/fail criteria selection and limitations of study).

Instructors:

Kathy Glass, University of Wisconsin-Madison
Linda Harris, University of California-Davis
Don Schaffner, Rutgers, The State University of New Jersey

Organizer:

Don Schaffner, Rutgers, The State University of New Jersey

Intended Audience:

Food industry professionals, testing lab personnel and regulators

One of the best conferences of the year... many ideas and useful information taken away. Good combination of regulatory, scientific and best practices.

Sharon P. Wood
H-E-B
San Antonio, Texas

REGISTRATION RATES

Late Fees apply after July 6, 2010

REGISTRATION FEES	MEMBERS	NONMEMBERS
Registration	$ 445 ($ 495 late)	$ 665 ($ 715 late)
Association Student Member	$ 80 ($ 90 late)	Not Available
Retired Association Member	$ 80 ($ 90 late)	Not Available
One Day Registration* ☐ Mon. ☐ Tues. ☐ Wed.	$ 240 ($ 265 late)	$ 370 ($ 395 late)
Guest* (Name): _____	$ 60 ($ 60 late)	$ 60 ($ 60 late)
Children 15 & Over* (Names): _____	$ 25 ($ 25 late)	$ 25 ($ 25 late)
Children 14 & Under* (Names): _____	FREE	FREE
*Awards Banquet not included		
Additional Awards Banquet Ticket - Wednesday, 8/4	$ 55 ($ 65 late)	$ 55 ($ 65 late)
Student Luncheon - Sunday, 8/1	$ 10 ($ 15 late)	
ADDITIONAL FEES		
FOUNDATION GOLF TOURNAMENT		
Tustin Ranch Golf Club - Saturday, 7/31	$ 195 ($ 225 late)	$ 195 ($ 225 late)
SPECIAL EVENTS		
NFPA Alumni and Friends Reception	$ 35 ($ 45 late)	$ 35.00 ($ 45 late)
ABSTRACTS		
Annual Meeting Abstracts (citable publication to be distributed in Anaheim)	$ 30	$ 30
PRE-MEETING WORKSHOPS		
Workshop 1-Characterization and Identification of Spoilage-causing Fungi: A Hands-on Workshop	$ 615 ($ 690 late)	$ 715 ($ 790 late)
Workshop 2-Microbial Challenge Testing for Foods	$ 480 ($ 555 late)	$ 580 ($ 655 late)

Register online at www.foodprotection.org

PHONE: +1 515.276.3344 FAX: +1 515.276.8655

Exhibitors

as of June 2, 2010

Indicates IAFP Sustaining Member

1 Priority Biocidal-BioSpray
817.590.8100 www.go1bio.com

3-A Sanitary Standards
703.790.0295 www.3-a.org

3M Food Safety
651.737.8286 www.3m.com/microbiology

A2LA-The American Association for Laboratory Accreditation
301.644.3248 www.a2la.org

Advanced Analytical Technologies Inc.
515.296.6600 www.aati-us.com

Advanced Instruments, Inc.
781.320.9000 www.aicompanies.com

AdvisorCare Research Services
828.528.4900 www.advisorcare.com

AEMTEK
510.979.1979 www.aemtek.com

AES Chemunex
609.235.9272 www.aeschemunex.com

AIB International
785.537.4750 www.aibonline.org

Alchemy Systems
512.637.5100 www.alchemysystems.com

Alpha Biosciences, Inc.
410.467.9983 www.alphabiosciences.com

American Council for Food Safety & Quality
916.561.5900 www.agfoodsafety.org

American Proficiency Institute
800.333.0958 www.api-pt.com

ASI Food Safety Consultants
800.477.0778 www.asifood.com

ASM Press
800.546.2416 http://estore.asm.org/

BD Diagnostics
410.316.4000 www.bd.com/ds

BioControl
425.603.1123 www.biocontrolsys.com

BioGX
205.250.8055 www.biogx.com

BioLumix, Inc.
734.984.3100 www.mybiolumix.com

bioMérieux
314.731.8658 www.biomerieux-usa.com

Biomist, Inc.
847.0850.5530 www.biomistinc.com

Bio-Rad Laboratories
800.876.3425 www.bio-rad.com

Biotest Microbiology Corporation
973.625.1300 www.biotestusa.com

BioVir Laboratories, Inc.
800.GIARDIA www.biovir.com

BSK Associates—Food & Dairy Laboratories
559.277.6960 www.bskassociates.com

Certified Laboratories
516.576.1400 www.800certlab.com

Charm Sciences
978.687.9200 www.charm.com

CHEMSTAR Corporation
800.327.0777 www.chemstarcorp.com

Chestnut Labs
417.829.3772 www.chestnutlabs.com

ClorDiSys Solutions, Inc.
908.236.4100 www.clordisys.com

Covance Laboratories, Inc.
608.395.3652 www.covance.com

CRC Press—Taylor & Francis Group LLC
561.998.2507 www.crcpress.com

Creatv MicroTech, Inc.
301.983.1650 www.creatvmicrotech.com

EXHIBIT HOURS

Sunday, August 1
7:30 p.m. - 9:30 p.m.

Monday, August 2
10:00 a.m. - 6:00 p.m.

Tuesday, August 3
10:00 a.m. - 6:00 p.m.

Hours subject to change.
See final program for actual hours

Decagon Devices
509.332.2756 www.decagon.com

Deibel Laboratories
608.241.1177 www.deibellabs.com

DNV
281.396.1770 www.dnvcert.com

DuPont Qualicon
302.695.5244 www.qualicon.com

Ecolab Inc.
651.293.2233 www.ecolab.com

ELISA SYSTEMS Pty Ltd.
61.7.3857.8600 www.elisasystems.net

EMD Chemicals, Inc.
800.222.0342 www.emdchemicals.com

Environmental Health Testing/National Registry of Food Safety Professionals
800.446.0257 www.nrfsp.com

Eurofins Scientific
504.251.0098 www.eurofinsus.com

Exponent
888.656.3976 www.exponent.com

FDA/Center for Food Safety and Applied Nutrition
301.436.2268 www.fda.gov

Fisher Scientific
412.490.8300 www.fishersci.com

Food Quality Magazine—A Wiley-Blackwell Publication
515.292.0140 www.wiley.com/go/food

Food Safety Magazine
818.842.2829 www.foodsafetymagazine.com

Food Safety Net Services
210.308.0675 www.food-safetynet.com

Food Safety News
206.346.1888 www.foodsafetynews.com

GOSSELIN
33.328.4193.03 www.plastiques-gosselin.fr

Hanna Instruments
401.765.7500 www.hannainst.com

Hardy Diagnostics
805.346.2766 www.hardydiagnostics.com

Hertzler Systems Inc.
574.533.0571 www.hertzler.com

HiMedia Laboratories Pvt. Ltd.
91.22.40951919 www.himedialabs.com

Hygiena
805.388.8841 www.hygiena.net

Idaho Technology Inc.
801.736.6354 www.idahotech.com

IEH Laboratories and Consulting Group
206.522.5432 www.iehinc.com

IFC
913.782.7600 www.indfumco.com

The IMPACT Marketing Group
410.688.4461 www.theimpactmarketinggroup.com

International Association for Food Protection
800.369.6337 www.foodprotection.org

International Association for Food Protection—Student PDG
800.369.6337 www.foodprotection.org

International Food Hygiene
44.0.1377.241724 www.positiveaction.co.uk

International Food Protection Training Institute
269.441.2995 www.ifpti.org

Interscience Laboratories Inc.
781.792.2133 www.intersciencelab.com

Life Technologies
650.638.5715 www.appliedbiosystems.com

Log 5 Corporation
240.544.2050 www.log5.com

Marshfield Food Safety, LLC
888.780.9897 www.marshfieldfoodsafetyllc.com

MATRIX MicroScience, Inc.
303.277.9613 www.matrixmsci.com

Medical Wire/ABSP
919.724.4010 www.mwe-usa.com

Meritech Inc.
303.790.4670 www.meritech.com

Michelson Laboratories, Inc.
562.928.0553 www.michelsonlab.com

Michigan State University Online Master of Science in Food Safety
517.884.2078 www.online.foodsafety.msu.edu

Microbial-Vac Systems
801.523.3962 www.m-vac.com

MicroBioLogics
320.253.1640 www.microbiologics.com

Microbiology International
301.662.6835 www.800ezmicro.com

MO BIO Laboratories
760.929.9911 www.mobio.com

MOCON, Inc.
763.493.7231 www.mocon.com

Nasco Whirl-Pak
800.558.9595 www.enasco.com/whirlpak

The National Food Lab
925.551.4205 www.thenfl.com

The National Institute for Hometown Security
606.451.3440 www.thenihs.org

Nelson-Jameson Inc.
715.387.1151 www.nelsonjameson.com

Neogen Corporation
517.372.9200 www.neogen.com

Neutec Group, Inc.
516.870.0877 www.neutecgroup.com

Northwest Analytical Inc.
503.224.7727 www.nwasoft.com

NSF International
734.769.8010 www.nsf.org

Orkin Commercial Services
800.675.4666 www.orkincommercial.com

Pall GeneSystems
33.299.055.790 www.pall.com/genedisc

Q Laboratories, Inc.
513.471.1300 www.qlaboratories.com

QMI-SAI Global
416.401.8700 www.qmi-saiglobal.com

Quality Assurance & Food Safety Magazine
330.523.5400 www.qualityassurancemag.com

R & F Laboratories
630.969.5300 www.rf-labs.com

Remel
913.895.4240 www.remel.com

Rochester Midland Corporation, Food Safety Division
585.336.2200 www.rochestermidland.com

Romer Labs
636.583.8600 www.romerlabs.com

SA Scientific, Ltd.
210.699.8800 www.sascientific.com

Safe Quality Food Institute
202.220.0635 www.sqfi.com

SDIX
800.544.8881 www.sdix.com

Seward Laboratory Systems, Inc.
631.750.5660 www.sewardusa.com

SGS
973.575.5252 www.foodsafety.sgs.com

Siemens Industry Inc.
847.941.6470 www.usa.siemens.com/buildingtechnologies

Silliker, Inc.
708.957.7878 www.silliker.com

Society for Applied Microbiology
44.0.1234.761752 www.sfam.org.uk

Springer
212.460.1500 www.springer.com

Stericycle ExpertRECALL
317.275.7588 www.expertrecall.com

Steton
435.656.5655 www.steton.com

University of Wisconsin-Madison Food Research Institute
608.263.7777 http://fri.wisc.edu

USDA/FSIS
202.690.6408 www.fsis.usda.gov

Varcode
972.3.9380835 www.varcode.com

Vista Enterprises Incorporated
925.755.0511 www.vistaenterprisesinc.com

Weber Scientific
609.584.7677 www.weberscientific.com

Wiley-Blackwell
515.292.0140 www.wiley.com/go/food

SPECIAL EXHIBIT HALL EVENTS

CHEESE AND WINE RECEPTION

Sunday, August 1 7:30 p.m. – 9:30 p.m.
Sponsored by Kraft Foods

EXHIBIT HALL BREAKS

Monday, August 2 10:00 a.m. Pastries and Coffee
Sponsored by Deibel Laboratories

3:00 p.m. Coffee Break
Sponsored by Idaho Technology Inc.

Tuesday, August 3 10:00 a.m. Pastries and Coffee
Sponsored by Springer

3:00 p.m. Coffee Break
Sponsored by Covance

EXHIBIT HALL LUNCH

Monday, August 2 12:00 p.m. – 1:00 p.m.
Sponsored by JohnsonDiversey

Tuesday, August 3 12:00 p.m. – 1:00 p.m.
Sponsored by DNV

EXHIBIT HALL RECEPTIONS

Monday, August 2 5:00 p.m. – 6:00 p.m.
Sponsored by DuPont Qualicon

Tuesday, August 3 5:00 p.m. – 6:00 p.m.
Sponsored by 3M Food Safety

COMING EVENTS

JULY

- **30–31, IAFP Workshops,** Anaheim Convention Center, Anaheim, CA. For more information, go to www.foodprotection.org.

AUGUST

- **1–4, IAFP 2010 Annual Meeting,** Anaheim Convention Center, Anaheim, CA. For more information, go to www.foodprotection.org.
- **5–7, 18th Annual National Association of Local Boards of Health Conference,** Omaha, NE. For more information, go to www.nalboh.org.
- **5–11, 6th Food Science International Symposium,** Beijing, China. For more information, go to www.chnfood.cn/index.php?id=284.
- **10–14, HACCP Prerequisite Workshop,** SpringHill Suites Marriott, Sanford, FL. For more information, call 407.290.2754 go to www.newslow.com.
- **16–20, Introduction to Food Science,** New Brunswick, NJ. For more information, go to www.cpe.rutgers.edu.
- **18–19, 5th Innovative Foods Conference: Higher Valued Foods (FIESTA 2010),** Melbourne, Australia. For more information, go to www.innovativefoods2010.com.
- **18–22, 1st Sustainable Food Chain (SFCH) World Summit,** Budapest Castle, Budapest, Hungary. For more information, go to http://events.foodlawment.com/eng/.
- **25–26, 2010 BioPro Expo,** Cobb Galleria Centre, Atlanta, GA. For more information call 800.332.8686 or go to www.tappi.org.
- **30–Sept. 3, FoodMicro 2010,** Copenhagen, Denmark. For more information, go to www.foodmicro.dk/.

SEPTEMBER

- **9, Georgia Association for Food Protection Fall Meeting,** Russell Research Center, Athens, GA. For more information, contact Pam Metheny at 678.450.3061; E-mail: pam.metheny@waynefarms.com.
- **9, Quebec Food Protection Association Annual Meeting,** Quebec City, Canada. For more information, contact Julie Jean at 418.656.2131 ext. 13849; E-mail: julie.jean@fsaa.ulaval.ca.
- **13–15, International Dairy Show,** Dallas Convention Center, Dallas, TX. For more information, call 202.737.4332 or go to www.idfa.org/events.
- **14–16, Sustainable Packaging Forum & Expo,** Arizona Grand Resort, Phoenix, AZ. For more information, call 610.935.2183 or go to www.packstrat.com.
- **21–22, Sensory Evaluation,** New Brunswick, NJ. For more information, go to www.cpe.rutgers.edu.
- **21–23, New York State Association for Food Protection 87th Annual Meeting,** Syracuse, NY. For more information, contact Janene Lucia at 607.255.2892; E-mail: jgg@cornell.edu.
- **21–24, IAFP's Latin American Symposium of Food Safety,** Bogota, Colombia. For more information, go to www.acta.org.co/Congreso2010.php.
- **22–23, Wisconsin Association for Food Protection Joint Education Conference,** Holiday Inn, Eau Claire, WI. For more information, go to www.wafp-wi.org.
- **22–24, Kansas Environmental Health Association Fall Conference,** Great Wolf Lodge, Kansas City, KS. For more information, go to www.e-keha.org.
- **22–24, Labelmaster's 5th Annual Symposium for Dangerous Goods Shipping Instructors,** Embassy Suites Hotel, Chicago, IL. For more information, call 800.621.5808 ext. 2201 or go to www.airregs.com/conferences.
- **22–24, Washington Association for Food Protection Annual Conference,** Campbell's Resort, Lake Chelan, WA. Contact Stephanie Olmsted at 206.660.4594 or go to www.waffp.org.
- **23, Making Sense of the Numbers: Statistics for Food Scientists,** New Brunswick, NJ. For more information, go to www.cpe.rutgers.edu.
- **26–29, Indiana Environmental Health Association Fall Educational Conference,** Abe Martin Lodge, Brown Co. State Park, Nashville, IN. For more information, go to http://iehaind.org/conference.html.
- **28–29, Arkansas Association for Food Protection Annual Meeting,** Tyson Foods, Springdale, AR. For more information, contact Mike Sostrin at 479.277.8641 or go to http://arkafp.org.

OCTOBER

- **5–6, Iowa Association for Food Protection Annual Conference,** Quality Inn & Suites, Ames, IA. For more information, contact Lynn Melchert at 563.599.2394 or E-mail lynne.melchert@swissvalley.com.
- **6–7, Associated Illinois Milk, Food and Environmental Sanitarians Fall Conference,** Hotel Pere Marquette, Peoria, IL. For more information, go to http://aimfes.org/calendarofevents.html.
- **7–8, 10th Annual GLOBAL G.A.P. Conference,** London, UK. For more information, go to www.summit2010.org.
- **13, Metropolitan Association for Food Protection Fall Seminar,** Douglass Student Center, Rutgers University, New Brunswick, NJ. For more information, contact Carol Schwar at cschwar@co.warren.nj.us or go to www.metrofoodprotection.org.
- **17–20, Food Microbiology Symposium,** River Falls, WI. For more information, go to www.uwrf.edu/afs-all/institutes/foodmicro/.
- **26–28, North Dakota Environmental Health Association**

COMING EVENTS

Annual Conference, Bismarck, ND. For more information, go to www.ndeha.org.

- **31– Nov. 3, PACK Expo International 2010,** McCormick Place, Chicago, IL. For more information, contact Amy Riemer at 978.475.4441 or go to www.packexpo.com.

NOVEMBER

- **3–5, Dairy Practices Council Conference,** Ramada Plaza Hotel and Conference Center, Columbus, OH. For more information, go to www.dairypc.org.
- **4–6, Mexico Association for Food Protection Annual Meeting,** Puerto Vallarta, Mexico. For more information, contact Javier Castro Rosas at jcastro@uaeh.edu.mx or capicr@hotmail.com.
- **6–10, American Public Health Association Annual Meeting and Expo,** Denver, CO. For more information, go to www.apha.org/meetings/.
- **10–11, China International Food Safety and Quality Conference & Expo,** Shanghai, Longemont Hotel, P.R.C. For more information, go to www.chinafoodsafety.com.
- **17, Ontario Food Protection Association Fall Conference,** Mississauga Convention Centre, Mississauga, Ontario, Canada. For more information, contact Victoria Rosa at 519.265.4119 or visit info@ofpa.on.ca.

DECEMBER

- **9–10, 2nd Food Safety Congress,** Military Museum, Istanbul, Turkey. Organized by the Turkish Food Safety Association. For more information, go to www.ggd.org.tr.

IAFP UPCOMING MEETINGS

AUGUST 1-4, 2010
Anaheim, California

JULY 31-AUGUST 3, 2011
Milwaukee, Wisconsin

JULY 22-25, 2012
Providence, Rhode Island

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	*International Food Safety Icons and International Food Allergen Icons CD	25.00	25.00	
	Pocket Guide to Dairy Sanitation (minimum order of 10)	.75	1.50	
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	Before Disaster Strikes... *Spanish language version* – (minimum order of 10)	.75	1.50	
	Food Safety at Temporary Events (minimum order of 10)	.75	1.50	
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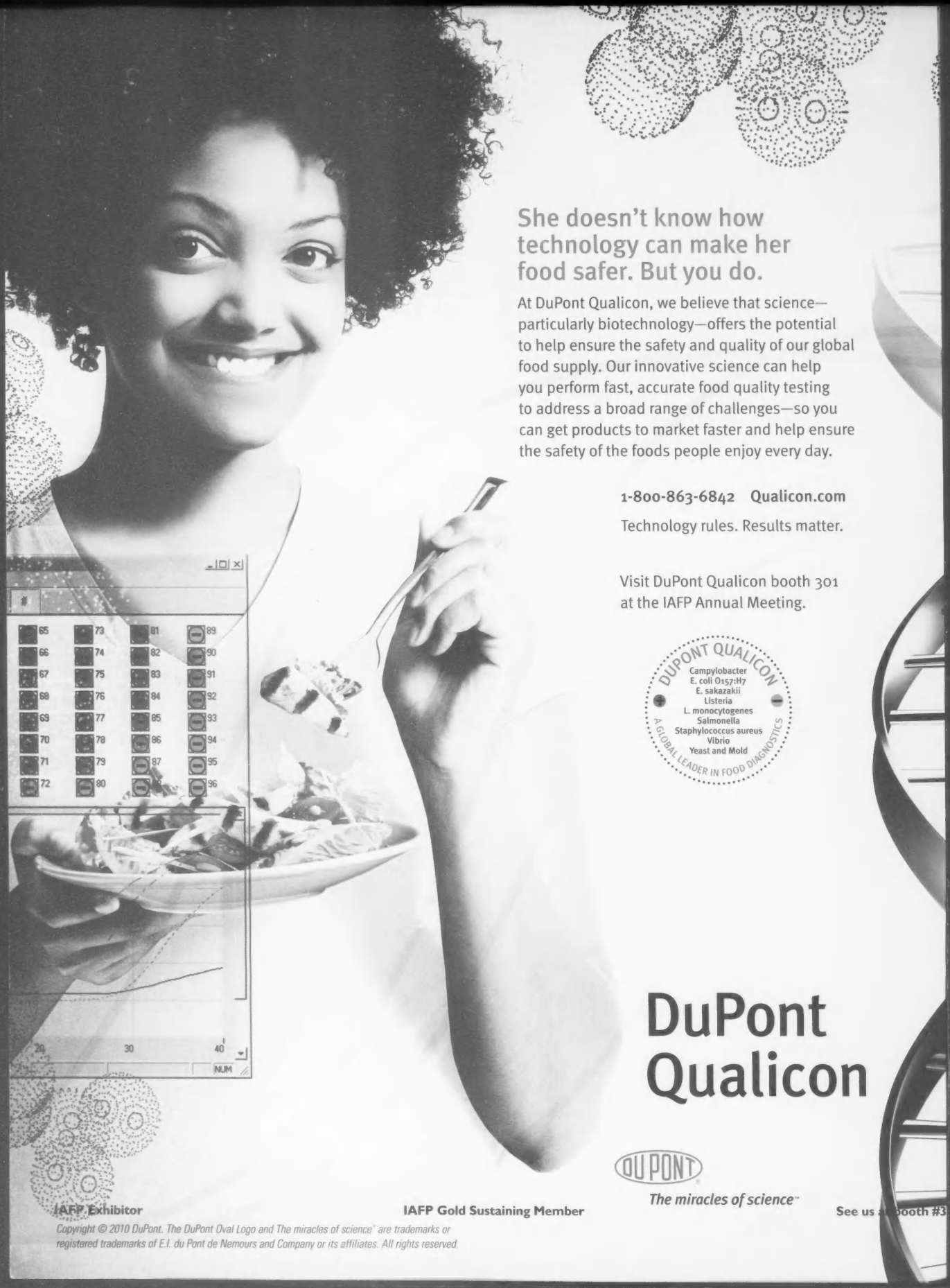

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