

VOL. 24, NO. 12

ISSN: 1541-9576

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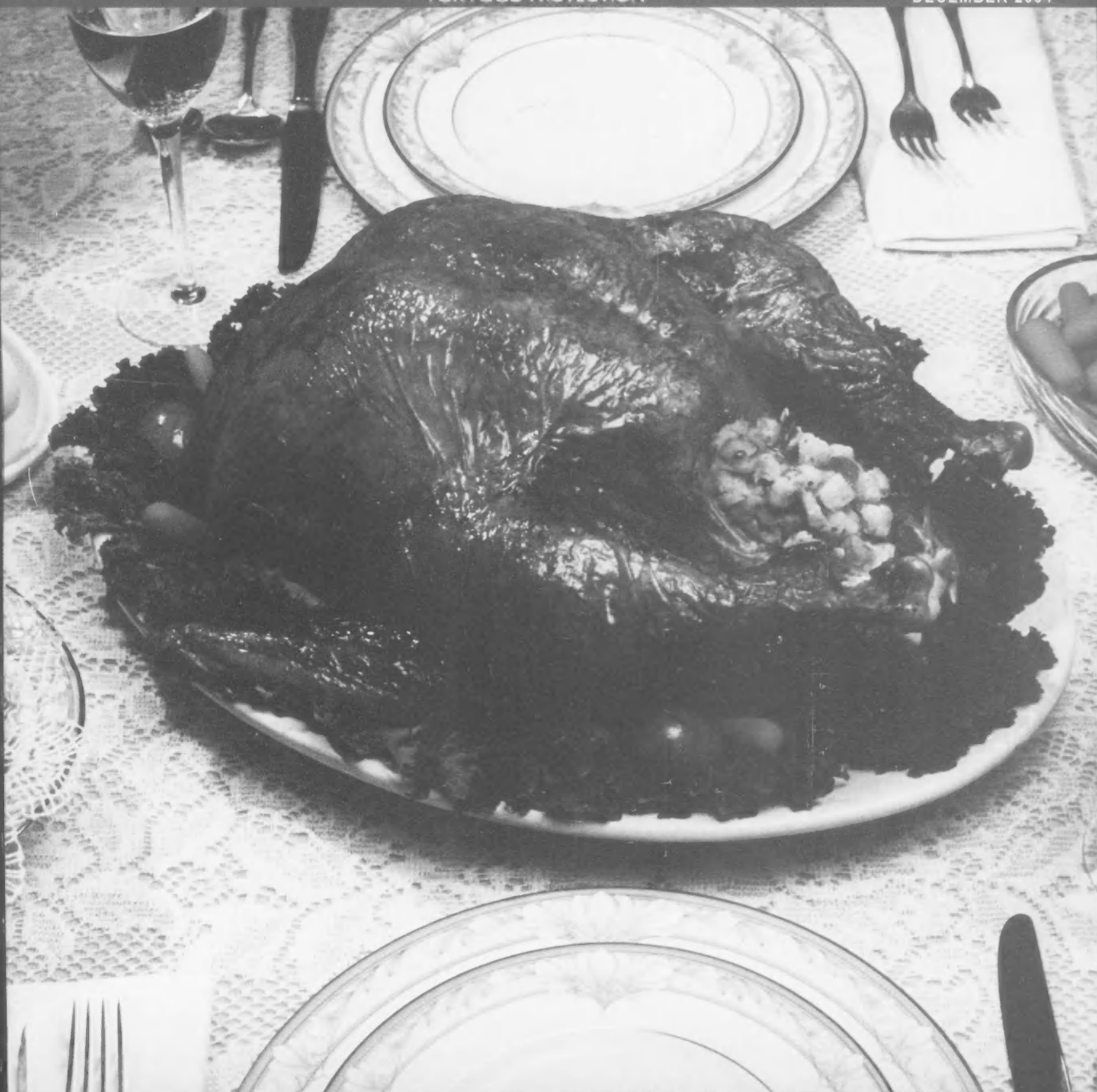
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FOOD PROTECTION TRENDS

SCIENCE AND NEWS

FROM THE
INTERNATIONAL ASSOCIATION
FOR FOOD PROTECTION

DECEMBER 2004



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FOOD PROTECTION TRENDS

VOLUME 24, NO. 12

ARTICLES

- 946** **Line-level Training Needs Related to Commercial Production of Fully-cooked Meat and Poultry Products**
Kerri L. Harris, Bradley P. Marks, Toby A. Ten Eyck, Alden M. Booren, and Elliot T. Ryser
- 953** **Minimizing *Listeria* Contamination in Smoked Seafood: Training Plant Personnel**
Doris Hicks, Martin Wiedmann, Virginia N. Scott, Robert Collette, Michael L. Jabncke, and Ken Gall
- 961** **Availability, Accuracy and Response Time of Instant-read Food Thermometers for Consumer Use**
Sandra M. McCurdy, Elaine Mayes, Val Hillers, Dong-Hyun Kang, and Miriam Edlefsen

ASSOCIATION NEWS

- 940** Sustaining Members
- 942** A View from Wisconsin
- 944** Commentary from the Executive Director
- 980** Affiliate Officers
- 988** New Members

DEPARTMENTS

- 990** Updates
- 991** News
- 996** Industry Products
- 1000** Coming Events
- 1007** Advertising Index
- 1008** Career Services Section

EXTRAS

- 972** Call for Award Nominations
- 974** IAFP 2005 — Call for Abstracts
- 978** IAFP Policy on Commercialism for Annual Meeting Presentations
- 986** Committee Chairpersons, PDGs and Affiliate Council
- 1001** Index to *FPT* Volume 24
- 1007** IAFP Financial Report
- 1009** *Journal of Food Protection* Table of Contents
- 1010** Audiovisual Library Order Form
- 1011** Booklet Order Form
- 1012** Membership Application

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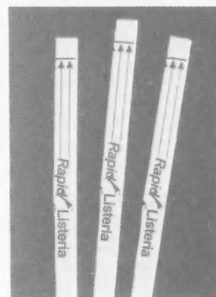
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Food Protection Trends (ISSN-1541-9576) is published monthly beginning with the January number by the International Association for Food Protection, 6200 Aurora Avenue, Suite 200W, Des Moines, Iowa 50322-2864, USA. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc., 911 N. Second Street, Ames, Iowa 50010, USA. Periodical Postage paid at Des Moines, Iowa 50318 and additional entry offices.

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

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Subscription Rates: *Food Protection Trends* is available by subscription for \$227.00 US, \$242.00 Canada/Mexico, and \$257.00 International. Single issues are available for \$26.00 US and \$35.00 all other countries. All rates include shipping and handling. No cancellations accepted. For more information contact Julie A. Cattanaach, Membership Services, International Association for Food Protection.

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

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"A VIEW FROM WISCONSIN"

This is the season for Affiliate meetings. We were pleased to see that the IAFP Executive Board Speaker Program was well utilized this fall, with Board members visiting the Wisconsin, New York, Metropolitan, Florida, Mexico, and Brazil affiliates. Personally, I am writing this column on the trip home from an exceptional educational conference held by the Florida Association for Food Protection. As is the experience for all our Board members, it was a great privilege to be invited to join an agenda with outstanding speakers, have the opportunity to meet new people and enjoy the friendship of some "IAFP regulars." This year, I had the added bonus in Florida of being treated to a cruise on a pirate ship as their featured evening social event. *Aarrh, matey... it was a gem of a good meeting!* I admire the resilience (and good humor) of the Florida affiliate members who have worked hard to meet their professional commitments while coping with the disastrous aftermath of the four hurricanes that hit the state in 2004.

As Executive Board members attend affiliate meetings, we find ample evidence that our affiliates play a major role in advancing our Association's mission. IAFP affiliates provide educational programs that focus on the needs of their local food safety professionals, those in local and state or provincial health and agricultural departments, retail and food service managers, small manufacturers, and local university programs. In addition, because the



By **KATHLEEN A. GLASS**
PRESIDENT

***"Our affiliates
play a major
role in advancing
our Association's
mission"***

meetings are local and are scheduled for only one to two days, the costs to the attendee and their employer are kept to a minimum in terms of travel expenses and time, allowing more employees of an organization to be able to attend.

While IAFP Strategic Plan has a goal to increase the number of affiliate members who belong to the parent organization, I also want to encourage our IAFP-only members to become involved with their local affiliate. If you are a regular attendee of the Annual IAFP Meeting or are an active member of our professional development groups, it is

likely that you have developed skills and experience that could benefit your colleagues at the local level. I strongly encourage you to check out the Affiliate section on the IAFP Web site (www.foodprotection.org) for contact information in your region. As a member of the Wisconsin Association for Food Protection, I know first hand that affiliates are always looking for volunteers such as newsletter editors, webmasters, Board members, educational program coordinators, and ideas for program topics and speakers. At the same time, we ask that you become IAFP ambassadors to the affiliates. We realize that there is a substantial pool of professionals with food safety responsibilities who do not belong to IAFP, or even may have never heard of our organization. We ask that you share your experiences with IAFP activities, and the value of its journals, the Annual Meeting, involvement in committees and professional development groups, and the professional contacts and friendships made through the Association.

IAFP strives to be attentive to the needs of our profession. One sentiment that we hear during meetings is that many professionals want to see more applied food safety research that can be readily put into practice by field inspectors, retail managers, product developers, or quality assurance departments. As an Association we can fulfill this request in a variety of ways. Affiliates can respond to this need by the addition of practical presentations

at their workshops and other educational conferences. I also encourage researchers, professors and students to consider submitting manuscripts that provide practical information, such as the ones found in this month's *Food Protection Trends*. Furthermore, we would like to expand our applied food safety programming at the IAFP Annual Meeting. Although we are still an association that highlights basic science, we are in need of abstracts for applied research that provide viable solutions to our food safety problems. In addition, we encourage submissions in the area of applied food toxicology as it pertains to current food safety questions. We are finding that many of our

members wear more than one hat; that is, they need solutions to food toxicological and allergen issues as well as microbial safety concerns.

Although we just published the summary of our 2004 Annual Meeting last month, IAFP is already starting to plan for the 2005 meeting. Abstracts for technical oral and poster presentations are due in just a few short weeks. Deadline for submissions is January 12, 2005. You are encouraged to submit your abstract online through our Web site. Click on the Annual Meeting button and look under "Call for Abstracts" for additional details. Be sure to follow the instructions for preparing abstracts, paying close attention to the "selection criteria"

section. Submissions will also be accepted via E-mail. Additionally, we continue our commitment to foster the professional development of graduate or undergraduate students studying in our field and encourage students to enter the Developing Scientist Awards Competition when they submit their abstracts.

As we near the beginning of 2005, we look forward to another successful year as an Association.

On behalf of the IAFP Executive Board and Staff, our best wishes to you and your loved ones for a healthy and Happy New Year. As always, I welcome your ideas and comments. Please feel free to E-mail me at kglass@wisc.edu and let me know your view.

IT'S A FACT

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"COMMENTARY" FROM THE EXECUTIVE DIRECTOR

In December each year, we present financial results for our fiscal year ending the preceding August and this December is no different. Page 1007 shows the results for the year ending August 31, 2004. We were excited about last year's results and had hoped for success two years in a row and **WE DID IT!** I am proud to report that we had the best financial year ever for IAFF!!! This year's results add more than \$160,000 to our now positive General Fund balance, which stands at just over \$190,000 as of August 31, 2004.

We had a fantastic Annual Meeting that contributed nicely to the year-end results. Attendance was up, sponsorship was up, and the number of exhibitors was up; all playing a role in the net results related to Annual Meeting. Two of our three Workshops did well this year and overall, we had a nice gain from those efforts. In addition, our publication of the *Journal of Food Protection* also produced positive revenue for the Association.

So, from this report, the Association's financial condition is the best that it has been for more than 15 years and maybe the best that it has ever been! Our General Fund Balance now stands at \$190,724. Now, that may sound real nice, but if you recall in my December 2003 column, I pointed out that it is recommended that associations have a fund balance equal to one half of their operating budget. For IAFF, that amount is more than \$800,000. So, we are short of one quarter of the way there and making great progress!

We expect to continue to work towards building our General Fund Balance and our indicators for the current fiscal year (ending August 31,



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

***"As we wrap up
another year,
please know
the Association
is in the strongest
financial
condition ever"***

2005) look good. IAFF 2005 will be held next August in Baltimore, right in the middle of the East Coast (USA) population base. We expect participation to again break records and to affect our financial condition in a positive way.

As Wilbur Feagan, our Black Pearl Award Sponsor says, if you have money in reserves, it makes managing the business (or Association in our case) so much easier. Decisions can be made based on risk and potential reward rather than only considering that a project must cover its expenses entirely. In other words, every project

approved will increase the visibility of IAFF, some will contribute positively to the financial condition, others negatively. But if the reward to IAFF and its Members is worth pursuing, then, in some cases, the financial reward may not be the most important factor.

Another area that we have made great progress over the past few years is with the Foundation Fund. The balance as of August 31, 2004 in the Foundation Fund was \$223,842. The Board and Foundation Fund Committee have set a goal to grow the Foundation Fund to \$1 million by the year 2010. This is an achievable goal and one that we will be working very hard to accomplish. You will begin to see more about the Foundation and the programs it supports. In addition, the Foundation will begin to sponsor new efforts as the Fund grows. We look forward to the expanded efforts of the IAFF Foundation Fund!

There is a listing of contributors to the Foundation Fund on page 970. We have also included information about the Foundation Fund on the facing page. If you have not made a contribution to the IAFF Foundation Fund this year, you might consider doing so. The Foundation is a non-profit entity and your contribution qualifies as a tax-deductible contribution (in the USA).

As we wrap up another year, please know that the Association is in the strongest financial condition ever! We are very pleased to be able to share this news with you, the Members of IAFF who have been so very supportive over all these years of working our way back. Thanks to you, the International Association for Food Protection will prosper.

We hope that you have a great Holiday Season and a Happy New Year. Best wishes for a wonderful 2005!

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Line-level Training Needs Related to Commercial Production of Fully-cooked Meat and Poultry Products

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SUMMARY

Commercial cooking systems in the meat and poultry industry still depend on human operators, which means that the effectiveness of those systems, in terms of product safety, quality, and uniformity, depends on operator knowledge, beliefs, and actions. However, very few, if any, third-party training materials are directed at this specific workforce. The hypothesis for this study was that training resources directed at oven operators will have a positive impact on the workforce and in turn on the safety and quality of the product. Telephone interviews (n=50) were conducted with supervisors or professionals responsible for oven operations in USDA-FSIS-inspected facilities. The results were analyzed in terms of response distributions and statistical relationships. Several significant relationships ($\alpha = 0.05$) were found between respondents' background and perceptions regarding regulatory burden and oven operator training. For example, the respondent job title was significantly related to attitudes regarding the potential impact of oven operators on product safety, yield, quality and variability. The results indicate that third-party training resources directed at line-level oven operators will have a positive impact on the workforce (78%) and on the product being produced (80%). The results of this study will be useful in optimizing the format and content of oven operator training materials.

INTRODUCTION

The development of training materials for commercial oven operators in the meat and poultry industry is motivated by the continuing shift of USDA-FSIS regulations toward lethality performance standards (10, 13). Given that most cooking systems still depend on human operators, the effectiveness of those systems, in terms of product safety, quality, and uniformity, continues to depend on operator knowledge, beliefs, and actions. However, few, if any, third-party training materials are directed at oven operators. Additionally, the potential impact of operator training has not been assessed.

The regulations that encompass the shift to pathogen lethality standards are USDA-FSIS Regulations 318.17 and 381.150(a) (11). Regulation 318.17 states that production of cooked beef, roast beef, and cooked corned beef products must use processes that ensure a 6.5-log₁₀ reduction of *Salmonella* or an equivalent probability that no viable salmonellae remain. Regulation 381.150(a) requires a 7-log₁₀ reduction of *Salmonella* for fully cooked poultry products and partially cooked poultry breakfast strips. Additionally, the USDA-FSIS has proposed to extend the performance standards to all

A peer-reviewed article

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ready-to-eat products containing meat and poultry (13).

In light of these changes, it is important to analyze the current state of knowledge throughout the meat and poultry industry, especially among oven operators. In addition, the ability of the industry to meet these regulations must be examined, along with the need for additional training and the recommended format and content of training resources.

The industry affected by these regulatory changes accounts for over \$28 billion in sales (13). Additionally, more than 1,600 establishments in the United States produce ready-to-eat products (13). Given likely growth in the ready-to-eat product category, proper operation of cooking systems will become increasingly important in terms of both product safety and economic returns.

Line-level employees are critically important in food safety programs. The meat and poultry industry employs an estimated 520,000 people (2). The capacity of the industry to meet food safety regulations governing cooked products is directly impacted by these workers. If line-level employees do not understand, value, or accept regulatory or processing changes, they may take actions that put the consumer at risk.

One possible solution to reducing such risk is to introduce additional operator training to help insure that oven operators accept and are aware of the importance of their actions, in terms of product safety, quality, and value (4). However, before developing training resources, the needs must be assessed in order to maximize effectiveness. In the cooked meat and poultry industry, oven operator duties range from setting computer programs to manually setting temperatures and times for various products. Therefore, human error is a risk in the operation. Smaller facilities may have the largest barriers to acquiring better equipment and knowledge to protect against errors. However, large facilities have more employees and therefore more individual operator decisions occurring in a given facility. In general, the capability of these line workers to control oven operations is a primary driving force for training, in order to ensure appropriate understanding and actions associated with ready-to-eat products.

Therefore, the hypothesis for this study was that training resources targeted at line-level oven operators in the meat and poultry industry would have a positive impact on the workforce, leading to

a safer and higher quality product. This paper is based on perceptions of industry personnel, rather than actual product safety measurements (microbiological analysis, etc.). To test the hypothesis, the objectives of this study were: (1) to assess perceptions of supervisors or professionals responsible for oven operations, regarding lethality performance standards for ready-to-eat products, (2) to determine the perception of how training materials for oven operators might impact ready-to-eat products, (3) to determine the preferred content and format of training materials for line-level oven operators, and (4) to analyze the relationships between various demographic factors and industry perceptions regarding regulatory standards, potential impact of training on oven operators, and the format of training materials.

METHODS

Data were collected via semi-structured telephone interviews of randomly selected supervisors or professionals responsible for oven operations in USDA-FSIS-inspected facilities. Interviews included 22 primary questions (8), with opportunities for additional input from the subjects. Questions were designed to determine regulatory knowledge, as well as respondents' views on the necessity of training materials, their potential impact, and their best possible design.

The primary reason that telephone interviews, rather than written surveys, were used was that there was no existing database of individual names for the targeted subjects to which we could send surveys. In addition, written surveys can yield unknown, potentially low, response rates and numerous unanswered questions or insufficient responses (5). Therefore, identification of subjects was done by telephoning facilities, often through receptionists or administrative assistants.

Interviews

Supervisors, managers, or those familiar with oven operators and their daily functions (presidents, quality assurance, quality control, etc.) were interviewed. These individuals were contacted in USDA-FSIS-inspected facilities producing fully and/or partially cooked meat and poultry products. Oven operators were not interviewed, as they cannot report what they do not know, what additional knowledge would enhance their jobs, where sufficient information is lacking, or

the impact of that deficiency. Given that the focus of this study was both to assess current knowledge and to identify critical gaps in that knowledge, it was important to interview individuals able to discuss both what the oven operators knew, and what they needed to know. Potential interview subjects were selected from the USDA's Meat and Poultry Inspection Directory (12) by two methods. Approximately half were selected from the directory by use of a random number generator (Microsoft Excel, version XP 2000). The other half were identified through interviewee suggestion or USDA employee recommendations (based on prior knowledge of subject eligibility). All identification methods were used as guides to determine which facilities fell under the pathogen lethality regulations for cooked meat and poultry products.

The selected subjects were screened according to whether the company fully and/or partially cooked meat and poultry products, as well as each subjects' responsibilities at the facility. The subjects were further screened according to authority, interaction, and familiarity with oven operators and the daily operations of oven systems. Out of a pool of 347 contacts, 50 telephone interviews were conducted.

Data analysis

Interviews were conducted via telephone and recorded, with subject consent, on a portable cassette recorder (Marantz, model PMD 221, Aurora, IL). Detailed notes were taken, rather than recording the interviews, for three respondents who did not consent to being recorded.

Responses were grouped according to similar key words, phrases, and/or themes. These grouped responses were then coded into categories, which were analyzed for frequency distribution and for X by Y (correlation) comparisons (chi-square) to determine significant relationships ($\alpha = 0.05$) among variables, via JMP (Version 4, SAS Institute, Cary, NC).

RESULTS AND DISCUSSION

A sample size of 50 was selected, mainly on the basis of statistical rationale. The minimum sample size suggested for chi-square analyses is 25 to 30 (6). A sample size greater than 50 interviews was not needed, because the results became relatively stable by the 50th interview (6).

These interviewees represented 39 different companies, from all regions of

TABLE I. Frequency distributions of respondent characteristics

Question/Characteristic	Percentage	Categorized Responses
Job Title	58	Quality Assurance/ Quality Control
	42	Operation/Production
Area of Study	49	Food Science
	17	Business
	17	Engineering
	17	Other
Education Level	43	High School Graduates and/or Associate Degree
	57	At least a Bachelors Degree
Years of Work Experience	17	10 or Less
	22	11-15
	41	16-20
	20	21 or More
How familiar are you with the USDA's requirements on pathogen lethality/performance standards for fully cooked products?	36	No/Maybe
	22	Fairly Well
	26	Above Average
	16	Unequivocally Yes
Have you found a way to meet these regulations?	6	No
	94	Yes
How do you meet these regulations?	79	Safe Harbor
	21	Other

the United States. Using USDA-FSIS definitions for facility size, the distribution of respondents across "Large" (more than 500 employees), "Small" (10-500 employees), and "Very Small" (less than 10 employees) facilities was 51%, 44%, and 5%, respectively. Eighty-two percent of these companies process both meat and poultry, and 18% process only one or the other.

The raw data consisted of 300 single-spaced pages of transcribed responses from the interviews (8). Response data are presented as frequency distributions, in order to characterize the respondents, regulatory knowledge of the industry, and industry perceptions related to training. Additionally, results of statistical testing (chi-square) are presented to show association of respondent background to the results. Throughout this paper, the terms "oven operators" and "line employees" are used interchangeably. Additionally, the terms "interviewees", "subjects", "re-

spondents", and "supervisor/managers" are used synonymously.

Response frequencies

The respondents had a wide range of job titles, educational backgrounds, levels of experience, and regulatory knowledge (Table 1). Regarding familiarity with the regulations, interviewees were given "Unequivocally Yes" ratings when they could either quote the regulations or give a sufficient synopsis of them. "Above Average" ratings were assigned when interviewees could not give information on the regulations, but generally knew of their existence without having them read to them. A "Fairly Well" rating was given when interviewees, after having the regulations read, could recall hearing about them and subsequently gave answers that were sufficient to demon-

strate prior knowledge. A "No/Maybe" rating was given when interviewees did not have a grasp of the regulations throughout the interview or admitted to being unfamiliar with them.

The respondents were also asked a variety of questions to characterize their oven operators (Table 2). Contrary to the situation with some other line-level employee groups (1, 7), most interviewees (90%) reported little or no turnover in the oven operator position, due to better pay and benefits for this particular position than for most other line-level positions in the industry. This position also requires more responsibility, which may lead to job pride and confidence (3). Therefore, companies tend to be more particular about whom they place in this position. However, only 10% of oven operators had education beyond high school, and almost all (~82%) had been trained via apprentice (hands-on) methods. Consequently, any training materials aimed at this audience needs to be developed using appropriate language, technical content, and delivery methods.

The respondents also provided their perspectives on the regulatory "burden" associated with the lethality performance standards and on the need for oven operator training (Table 3). Out of 83 answers from 46 respondents to the open-ended question about meeting the lethality performance standards, "equipment" and "inadequate scientific information" were noted as the top barriers to meeting the goals of the regulations. The "equipment" category included post-cooking solutions, such as better chilling methods; easier thermometer calibration techniques; equipment maintenance; equipment to limit human contact with product; facilities; thermometers; thermocouples; oven validation and calibration, ample refrigeration, and automated recordkeeping, such as documentation and validation. The category of "scientific information" included the influence of product differentiation, lethality determination, process differentiation, field testing, lethality documentation, consistent models, lethality studies in food matrices, relationship of oven steam flow to temperatures, verification of air flow, product-by-product information, and integrating process control. The "training" category included employee monitoring, education, employee error, turnover, the concept of Hazard Analysis Critical Control Points (HACCP) and training on time/temperature tools, training materials to validate data, and employee repetition. The category of "understanding regulations" con-

TABLE 2. Frequency distribution of responses characterizing oven operators

Question	Percentage	Categorized Responses
Are your line employees, especially oven operators, familiar with pathogen lethality standards for fully cooked products?	68	No
	16	Maybe
	16	Yes
Are they aware of their importance and the consequences that may follow if the regulations are not followed?	96	Yes
	4	No
Do you have trouble keeping your oven operators? What is the average turnover rate?	10	High
	90	Low
How are they trained for this job?	82	Apprentice
	18	Other
In general, what is the education level of your present oven operators?	35	Less than High School
	55	High School Graduates
	10	More than High School

TABLE 3. Frequency distribution of responses related to training

Question	Percentage	Categorized Responses
Do you feel oven-operator training is useful?	22	No
	78	Yes
Largest barriers to meeting the USDA regulations	22	Equipment Function
	22	Lack of Scientific Information
	12	Regulatory Language
	16	Training Deficiencies
	12	Other
In your opinion, would third party, oven-operator training materials help to enhance product safety, yield, quality, and variability?	20	No
	80	Yes
What format or media would you recommend for this training, for example, booklets, CD ROMs, web pages or videos?	17	Booklet
	58	Video
	10	CD ROM
	15	Person/Lecture

sisted of the following: use of language, change in regulations, zero tolerance standards, and non-valid, unreasonable USDA regulations. Of those who said "None" to these categories, some felt the regulations were easy to meet, or just did not think of an answer. In general, the anticipated barriers to meeting the pathogen lethality regulations were consistent with expectations. Training was often mentioned as a priority. In a subsequent question, the majority responded that oven operator training would positively impact product safety, yield, quality, and variability.

With regard to preferred format for training oven operators, a majority of the interviewees selected video. It was originally hypothesized that a booklet would be more helpful, because it could be available at all times to the employees. Many of the individuals did recommend using booklets as supplements to videos and lectures, as a tool for in-plant use and future review. Although not listed in the given examples for this question, lectures were another popular choice. The preference for video training is consistent with some previous recommendations for worker training (9).

Factors affecting response data

The following section describes the chi-square results that revealed significant ($\alpha = 0.05$) relationships that were directly relevant to the project objectives (Table 4). We were particularly interested in how respondent background affected knowledge about the relevant regulations and perceptions related to oven operator training.

First, the significant relationship between job title and interviewee familiarity with the regulations was not surprising. Professionals in quality assurance/control are often responsible for the overall safety of their products and the documentation of regulatory compliance and therefore have greater regulatory knowledge. While sufficient knowledge of safety procedures and regulations is necessary for professionals in production and operation, assuring regulatory compliance is generally not a part of their core job responsibilities. Therefore, they would be expected to be somewhat less familiar with the regulations.

In terms of attitudes about training, respondents in quality assurance/control were divided on the potential impact of third-party training materials (34% said "No"; 66% said "Yes") while all those in production/operation were all in agree-

ment (100% said "Yes") regarding the ability of third-party training materials to enhance product safety, yield, and quality and to reduce variability. This difference may be due to several factors. Perhaps previous third-party resources had not been adequate in meeting specific, individual company goals. Most likely, production/operation employees are in a better position to see, firsthand, the potential impact of training, because they are working more directly with the target audience. Production/operation personnel may also directly observe a need for employee empowerment associated with any weaknesses in communication between line employees and management. That is, training might give line-level employees tools to make informed, on-the-spot decisions to correct or report work station problems.

A relationship between respondent regulatory familiarity and preferred format for oven operator training was also identified (Table 4). It might be logical, in producing training resources, to give greater weight to the preferences of those more familiar with the regulations. Because these individuals understand the regulations and their requirements, they are perhaps in a better position to understand the potential impact of training strategies on the target group, with respect to product safety. Therefore, video would be the recommended training format, because it was the overall favorite for both groups, but especially for those familiar with the regulations.

The method being used to meet the requirements of the regulations also was related to the preferred training method. Safe harbor temperatures are used by the majority (79%); however, those using other methods (21%), including their own validation methods, more strongly (100% vs. 78% of those using safe harbors) favor videos and personal methods. These individuals were already implementing methods in addition to apprenticeship training and therefore may already be noting improvements in product and employee performance.

The interviewees generally reported that both general training materials and third-party training materials were useful. Only 8% of respondents felt that oven operator training would be useful, but not if it came from third parties. Even though 22% replied that training in general would not be "useful," 45% of those indicated that third-party training materials would enhance safety, yield, quality, and variability. More importantly, 89% of the respondents who felt that additional train-

ing materials would be useful also believed that third-party training materials would improve product safety, yield, quality and variability. Overall, any type of training was seen as valuable, including the use of materials developed by a third party.

Respondents who were already using other methods of training (18%), including classes on HACCP, GMP, SOPs, etc., were already aware of the importance of additional training, while some of those utilizing apprentice-style training did not necessarily expect that additional training information would be useful for oven operators. These individuals often felt that the oven operators did not need to be concerned with regulatory compliance. Their premise was that oven operators do the physical work, but based only on the instruction of management. They felt that because oven operators do not make the time/temperature decisions, they do not need to fully understand the regulations themselves, but only need to follow the orders associated with them. However, those who felt that additional training was necessary and/or useful often said that the oven operators have too many responsibilities to be unaware of the importance of the regulations. Further understanding may enhance their desire and ability to do their jobs, specifically in the area of safety. It may also enhance perceptions of self worth in line workers, leading to positive behavior change and accountability.

The type of training currently used was related to whether or not employees understand the regulations. Over 90% of the respondents who felt their employees were unfamiliar with the regulations used apprenticeship training. These are the respondents whose employees are expected to do their jobs simply as instructed, whereas those who are trained by additional methods may be exposed to various aspects surrounding their jobs, including food safety regulations. Therefore, additional training would be expected to provide oven operators with additional knowledge useful for their work.

In terms of oven operators, those with less than a high school education were more likely ($\alpha = 0.05$) to be unfamiliar with the regulations (88%) than those with a high school education or higher (13%). This supports the need to have training materials directed at individuals at an 8th grade reading level.

No significant relationships were found between the number of company employees, the size of the company, the location of the facility, or the type of prod-

ucts produced by the company and interviewee perceptions on training, training materials, and regulatory knowledge.

SUMMARY

Four key conclusions can be drawn from this study. First, the interviewees believed that oven operator training should have a positive effect on product safety, yield, quality, and variability. However, interviewee perceptions were influenced by their professional background and current job responsibilities.

Second, there is a need for broader education related to food safety standards in the meat and poultry industry. This conclusion is based on interviewee familiarity with the USDA regulations, perception of the hardest barriers to overcome, and the need for additional technical information and tools. This is no surprise, given that regulations change quickly, and that some in industry are forced to play "catch-up". Although the job of oven operator, like other line-level positions, is very important, few training materials are directed at this group. While current skills and development orientation training programs should be continued, this study supports the premise that additional growth and development materials are needed to further enhance the knowledge and behavior of these individuals. Even some of the interviewees could use additional training, specifically to simplify and explain regulatory language.

Third, training resources for oven operators should be targeted for an 8th grade reading level and should be in video format with supplemental reading materials. Regarding the preference for video format, the results of this study cannot be used to determine whether this was due to perceptions of effectiveness or perceptions of convenience.

Lastly, two distinct, fundamental viewpoints on oven operator training were reflected in responses regarding employee familiarity with the USDA regulations, existing training methods, usefulness of training, and the product enhancement capabilities of training. One side of this issue is illustrated by the respondent who said, "...as far as [training] the operator himself, he's only doing what he's being asked to do." The other side is typified by the respondent who said, "Yes! Training is just huge! You can't tell people enough [about what] they need to be doing for any aspect of the job." One of the largest perceived problems in this category is lack of management support. If managers fail to see the need for additional

TABLE 4. Factors affecting characteristics of respondents and employees ($\alpha = 0.05$)

Question	Demographic Variable Related to Survey Question	Results
How familiar are you with the USDA's requirements on pathogen lethality/performance standards for fully cooked products?	Job title	Those in quality assurance/quality control had a higher level of familiarity with the regulations than those in production and operation.
Do you think third-party training material may help enhance product safety, yield, quality, and variability?	Job title	Those in production/operation were more likely to feel third-party training materials could enhance products.
What format or media would you recommend for this training, for example, booklets, CD ROMs, web pages or videos?	Interviewee familiarity with USDA regulations	Those familiar with the pathogen lethality regulations were more likely to prefer a video/booklet format.
What format or media would you recommend for line-employee training on lethality performance standards?	Methods of meeting regulations	Those who use methods other than safe harbor temperatures to meet regulations were more likely to prefer Videos/Booklets for training versus CD ROM/Web site.
Do you think training materials on lethality performance standards may be of use specifically with line personnel?	Training methods for line employees	Those using training methods in addition to apprenticeship training were more likely to feel additional training materials were useful.
Do you think training materials on lethality performance standards may be of use specifically with line personnel?	Ability of third-party training materials to enhance products	The majority of respondents felt either type of training was useful. Many of those who felt general training materials were not useful still felt third-party training materials would be useful.

training of line-level workers, training materials will not reach oven operators, who play an important role in ensuring the safety of ready-to-eat meat and poultry products.

ACKNOWLEDGMENTS

This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, US Department of Agriculture, under Agreement No. 00-51110-9778.

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Minimizing *Listeria* Contamination in Smoked Seafood: Training Plant Personnel

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SUMMARY

The Smoked Seafood Working Group (SSWG), a collaboration of two national industry trade organizations, smoked seafood processors and academia, has developed guidelines for controlling *Listeria monocytogenes* in smoked seafood operations. The SSWG identified five elements in a complete *L. monocytogenes* control program: *Listeria*-specific sanitation and GMP controls, employee training, environmental monitoring and testing, raw material controls, and finished product controls. This manuscript describes specific employee training strategies for enhancing sanitation and GMP controls to minimize *Listeria* contamination in smoked seafood operations. Three employee-training programs in the form of PowerPoint™ presentations are described. One provides generic training for all employees, the second provides training to workers who handle finished products to minimize cross contamination, and the third provides training for all individuals who conduct cleaning and sanitizing activities to ensure that both general and specific procedures to control *Listeria* are implemented and conducted properly. All three employee-training programs can be downloaded from the following Web site at Cornell University: <http://www.foodscience.cornell.edu/wiedmann/TrainingIndex.htm>.

INTRODUCTION

Since 2001, a collaborative effort between two national industry trade associations, representatives from smoked seafood processing companies across the US, and academia has been under way to develop guidelines to minimize *Listeria monocytogenes* contamination in smoked seafood manufacturing plants. The intent of this effort is to gather current information on *Listeria monocytogenes* and on appropriate measures to reduce its prevalence in smoked seafood products, and to help processors of smoked seafood products evaluate and implement effective controls in their operations. The individuals and organizations involved in this effort are working together as the Smoked Seafood Working Group (SSWG) of the National Fisheries Institute and the National Food Processors Association. Representatives of both national industry trade organizations, individuals from at least 10 smoked seafood firms, and food safety or seafood specialists from Cornell University, Virginia Tech and the Sea Grant programs in New York and Delaware are participating in SSWG activities. The SSWG utilized the experience and expertise of industry, trade association and academic participants to adapt and apply general guidelines for *Listeria* control to the specific environment of smoked seafood processing plants.

A peer-reviewed article

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L. monocytogenes is a Gram-positive, foodborne pathogen that can grow under many different environmental conditions, including at temperatures from 1° to 45°C (34° to 113°F) and between zero and 10% water phase salt (NaCl). Under current US regulatory policy, if any *L. monocytogenes* is detected in a 25-gram sample of a Ready-To-Eat (RTE) product, including smoked seafood, the product is considered adulterated. Its presence in smoked fish and other RTE food products has resulted in numerous product recalls and economic loss. *L. monocytogenes* is widespread in the environment and can be readily isolated from humans, domestic animals (including pets), raw agricultural commodities, food processing environments, and the home (21). The organism is found in a wide variety of foods, including meats, poultry, vegetables, dairy products, and fishery products (5, 11, 19, 21). It has frequently been isolated from smoked seafood (4, 6, 11, 16, 18). Previous studies have reported a prevalence of 6-36% in RTE cold-smoked salmon and cooked fishery products (3). A recent survey by the National Food Processors Association Research Foundation suggests a prevalence of about 5% in smoked seafood in the US (11). Although *L. monocytogenes* present in raw fish may survive process treatments typical for many minimally processed seafoods, such as cold-smoked products (7), contamination from the processing plant environment during or after processing appears to be the major source of finished product contamination for smoked seafood, as well as for other RTE foods (1, 13, 20, 26).

Because *L. monocytogenes* is ubiquitous, there can be a constant re-introduction of the organism into the plant environment. Contamination of smoked seafood that supports growth of *L. monocytogenes*, even with small quantities of this organism, is a particular concern to the food industry because of the organism's ability to multiply at refrigeration temperatures during storage.

L. monocytogenes can survive in non-host environments, including processing plants, into which it may be introduced via a variety of routes, including raw materials, employees' shoes or clothes, and containers and equipment (boxes, crates, carts). *L. monocytogenes* tolerates and can grow in conditions (e.g., refrigeration temperatures and high salt levels) that prevent the growth of many other foodborne pathogens. *L. monocytogenes* also has the tendency to establish persistent resident

populations that colonize niches in the plant (13, 17, 25, 26) that are not easily eliminated by routine sanitation procedures and general-purpose cleaners and sanitizers.

An Institute of Food Technologists (IFT) expert panel identified several methods to control *L. monocytogenes* in the smoked seafood processing environment. Reduction of *L. monocytogenes* in the processing plant was directly dependent on adherence to Good Hygienic Practices (GHPs) and Good Manufacturing Practices (GMPs) (15). Employees and processing personnel represent a potential source for the introduction of *L. monocytogenes* into the processing plant environment; not only can they transfer *L. monocytogenes* from one area of the plant to another on their shoes, clothing, hands, etc., but they may also serve as direct sources of contamination if they are involved in post-processing handling of products. It has been shown that 1-10% of healthy adults may be fecal carriers of *L. monocytogenes* (8, 23).

Training in the area of food safety, particularly of the training-the-trainer type, has been shown to have a substantial impact in changing the audience's attitudes and behaviors about food handling. This holds true whether the training is for extension agents (who are trained to educate consumers), food service managers, food processing operators, regulators, or plant workers (2, 9). Food safety training is common sense and an essential part of good food operations; having well-trained employees may provide benefits such as avoiding the costs related to a foodborne illness outbreak, improving employee performance and morale, and increasing customer satisfaction, and increasing compliance with regulations. In addition, Sagoo et al. (22) have shown a direct relationship between microbial quality of ready-to-eat salad vegetables and the food safety training of management and the implementation of effective food safety procedures. The Hunter Health (14) training materials produced by the Australian government also indicate that groups that cater to high-risk populations, such as nursing homes, can benefit from targeted food safety training. A 2002 USDA (27) study that surveyed 861 meat slaughter and processing plants about HACCP costs and food safety technologies found that almost 100% indicated that on-the-job training and specific instructional training for both new and experienced workers on safe food handling practices was best. Stivers and Gates (24), in a survey of gro-

cery store seafood employees, found that HACCP awareness positively influenced seafood sales and recommended that it be included in employee training programs.

The first manuscript in this series described targeted sanitation procedures and GMP controls that should be considered when developing a *Listeria* control plan for smoked seafood operations (10). This manuscript will focus on the employee training programs that the SSWG determined are necessary to ensure that *Listeria* controls are effective and properly implemented.

TRAINING PLANT PERSONNEL

To implement an effective *Listeria* Control Program, each employee must understand his or her role in the program, why it is important, and the expectations of management. Control strategies are not likely to be effective if employees do not cooperate or do not understand what they are expected to do, why control strategies are important, and that expected procedures or behavior will be monitored and actions taken to reward compliance or penalize those who are non-compliant. Firms involved in the SSWG determined that employee training is best accomplished through a series of focused training activities conducted in the plant, by plant managers or other company personnel. Training is an ongoing process that should be conducted when employees are hired, before they start work, or if their position is changed, and then at least once per year afterwards. All training activities should be documented for all employees.

Three targeted training programs for *Listeria* control

The SSWG determined that three different targeted training programs should be delivered to employees and evaluated by each plant as part of their overall *Listeria* control plan: (1) Basic training for all employees who work at the plant, to ensure that they understand the importance of *Listeria* controls and their role in a firm's control plan; (2) Training for all employees who handle or work in exposed finished product areas, to ensure that they understand how to prevent cross contamination and; (3) Training for all employees who conduct cleaning and sanitation tasks or activities, to ensure that they understand the sanitation procedures necessary to reduce or eliminate *Listeria* contamination in the plant.

The basic training program should be conducted first and include basic information on *Listeria* as well as importance of employee hygiene, hand washing, and of adhering to established control procedures. Next, an additional training program should be provided to employees who work in areas where exposed finished products are handled to ensure that employees understand and follow procedures to prevent cross contamination, including descriptions of procedures or policies regarding work attire, hand washing, and the movement of equipment and personnel. Finally, individuals responsible for cleaning and sanitizing operations in all areas of the plant need to be trained to ensure they understand and follow established plant procedures necessary to reduce or eliminate *L. monocytogenes*. Basic training lessons, videos and support materials have been produced to help company personnel design and deliver training that will have the greatest impact in each individual situation. Specific on-site demonstrations of plant procedures should be included wherever possible.

Basic training can be accomplished in one session for all employees or can be separated into several sessions for employees who work in specific areas of the plant. After the basic training for all employees is completed, the two additional special training sessions should be conducted.

Cornell University and New York Sea Grant developed three training programs in collaboration with the Universities of Delaware and Maryland, Virginia Tech, Louisiana State University, the National Fisheries Institute, and National Food Processors Association. Each program is a PowerPoint™ (PPT) slide presentation that can be used by plant personnel to deliver the training in their plants. The PPT presentations consist of a series of slides designed to emphasize the information that should be delivered to employees during the training program. Each slide is accompanied by a set of "instructor notes" designed to provide ideas on how to deliver these programs, what points to emphasize, and demonstrations that can be used to facilitate training.

Obtaining the three employee training programs

Each of the employee training programs can be downloaded from the Internet at the following Cornell Univer-

sity Website: <http://www.foodscience.cornell.edu/wiedmann/TrainingIndex.htm>. At the bottom of the page is the following description:

"Each of the three training programs consists of a set of PowerPoint slides that can be used by management to train their employees. Each slide is accompanied by an extensive set of "speaker notes" designed to help plant management deliver an effective training program. These training programs are available on-line. Please click on the training program of interest to view the material on-line or download each presentation to your computer."

- *Listeria* Training Program for All Employees
- Plant Cleaning & Sanitizing Training Program for *Listeria* Control
- Cross Contamination Prevention Training for *Listeria* Control Program

Note: If you are unable to download the programs from the Internet they are also available from New York Sea Grant. Contact Ken Gall by E-mail at klg9@cornell.edu. The PPT slide programs can be sent as attached files via E-mail or on a CD.

Conducting employee training in the plant

Specific training programs may need to be delivered in different ways. One session for all employees could be used to deliver the basic training program, or training can be separated into several sessions for employees who work in specific areas of the plant. These PPT training presentations can be presented using an LCD (liquid crystal display) projector or, for small groups of people, they can be shown on a computer screen. Another option for training small groups of people is to show the PPT training programs on your desk or laptop computer screen on a table or desk that everyone can see. If a simpler format is necessary (for example, if there is no access to a computer screen or to a LCD projector) overheads or handouts can be produced directly from the PPT presentations. With overheads (slides copied onto clear acetate sheets), the training can take place with small or larger groups. If no audiovisual aids are available, employees can simply follow along with the discussion by providing each employee with a printed copy of each slide in the presentation as a handout. For all training formats, providing copies of the slides in each PPT training presen-

tation can help reinforce the important points covered in the training session.

Before conducting employee training, it is important that each company evaluate its policies and make any necessary modifications regarding employee hygiene, hand washing, and movement in the plant. Each company must decide ahead of time, how policies and procedures that are taught in these training programs will be monitored and enforced before conducting training. If changes or modifications in company procedures are needed to enhance *Listeria* control, the employee training programs provide a good opportunity to start the implementation process. It may also be easier for employees to understand and adopt these changes if the changes are discussed in the context of specific actions to control *Listeria*.

Firms should also determine who is going to conduct the training. Training can be conducted by one or more instructors, including plant supervisors, managers, owner, or quality control/assurance personnel. A team of one or several individuals in these roles could be involved in each specific training program. Each plant will need to decide who will be involved in training to maximize effectiveness and facilitate the implementation of the specific policies and procedures needed for an effective *Listeria* control plan. Each company must decide ahead of time how policies and procedures that are taught in these training programs will be monitored and enforced. Each of the training programs includes hands-on activities and demonstrations suggested to reinforce what is taught. Each company trainer needs to think through, plan and determine how the demonstrations will be staged. For example, one demonstration may focus on hand washing, and the instructor will need to think through how this demonstration will be conducted. The instructor should determine how and where to demonstrate hand washing, who will be involved and whether or not supplemental materials such as the use of Glo Germ™ (www.glogerm.com) will be used, as suggested in the instructor notes of the PPT presentation.

It is important to document and keep records of the date and type of training received by each employee. Instructors should decide what procedures would be used to document training prior to conducting the training program. A procedure should also be in place to ensure that employees receive the training relevant to their job(s) at least once per year.

Figure 1. PPT training program for all employees

Listeria Controls for Smoked Fish

- What is Listeria?
- Why are we concerned about Listeria?
- Where is Listeria found?
- What can I do as an employee of a smoked fish, crab or crawfish processing plant?



Figure 2. Preventing cross contamination PPT training presentation

Listeria Controls in Finished Product (Higher Risk) Areas

Preventing Cross Contamination



Figure 3. Cleaning and sanitation PPT training presentation

Plant Cleaning and Sanitation to Control Listeria



Basic Listeria training for all employees

The basic *Listeria* Training Program for All Employees is a short PowerPoint™ presentation that can be used to train all company employees, including office workers, management, and sales and maintenance staff, as well as plant production personnel. All employees need to understand what *Listeria* is and why it is a concern. All employees, even those who visit production areas only infrequently, should understand the firm's *Listeria* control efforts and the role of employees in preventing the movement of contamination in the plant. In this way, all employees can be vigilant and part of the firm's team effort to help control this tenacious organism.

The PPT training program can be downloaded from the Cornell Web site as described above by clicking on the words: *Listeria* Training Program for All Employees. The first slide in this presentation is provided in Fig. 1.

Major topics included in this training program are: (1) Background information that includes an introduction to *Listeria*, potential impacts on customers (high-risk groups, mortality rate, etc.) and companies (recalls, examples of plants closing, etc., that can result in loss of employee jobs and income), FDA/FSIS risk assessment and current regulations. (2) A review of company policies and procedures related to personal and bathroom hygiene, food handling practices, and movement in the plant. (3) A review of company policies and procedures on hand washing; this may include a demonstration on how to wash hands properly and a review of when to wash hands.

Focused training for workers in areas where finished products are handled

All employees who handle exposed finished products or work in finished product areas should receive this training. For smoked seafood operations, this will likely include employees who smoke product and employees who handle, trim, slice and pack exposed finished products. This training is a "How To" session and should be conducted on site. Employees should understand what cross contamination is, how their activities or mistakes can cause finished product to become contaminated with *Listeria*, and the potential consequences of that contamination. All of the necessary employee

Figure 4a and 4b. Example slide (A) and accompanying instructor notes (B) for the plant cross contamination training program

You prevent Cross Contamination by Washing Your Hands



- ✓ Before you start work
- ✓ After using the bathroom
- ✓ After leaving your work area
- ✓ Before returning to your work area
- ✓ After touching your body
- ✓ After touching dirty objects

Sample Slide Instructor Notes:

This slide is designed to focus on how people in the plant can cause cross contamination with their hands. Give examples of how your hands can get contaminated:

- On your way to work
- While you're in the bathroom
- When you leave the work area for lunch, breaks or go to raw product areas
- When you touch your body such as your face, nose, mouth, hair, etc.
- When you touch dirty objects such as the floor, trashcans, waste bins, etc.

Emphasize that the only way to prevent the transfer of bacteria from these sources is to properly clean and sanitize your hands before working with products.

hygiene and food handling practices should be discussed and demonstrated, as well as any sanitation procedures that these employees conduct.

This PPT training program can be downloaded from the Cornell Web site as described above by clicking on the words Cross Contamination Prevention Training for *Listeria* Control Program. The first slide in this presentation is provided in Fig. 2.

Major topics included in this training program are: (1) Overview and control of cross contamination; (2) Description of how the movement of employees

and equipment into and out of specific areas of the plant can result in contamination of products by racks, carts, splashing, materials, and other plant utensils; (3) Importance of hand washing and sanitizing after touching unsanitary objects such as raw product, trash containers, surfaces from outside areas, floors and other specific contamination sources in the plant; this may include demonstrations on hand washing and (4) Description of special company policies and procedures for employee attire, hygiene and hand washing procedures in finished product areas.

Focused training for cleaning and sanitation personnel

This training program is designed to provide instruction on how and when cleaning and sanitation procedures should be conducted. All employees who conduct these activities should be trained. Specific training may need to be conducted for individuals responsible for cleaning and sanitizing specific areas of the plant, since the procedures used in finished product areas may be different from those in raw material handling areas. Individuals responsible for specialized cleaning and sanitation tasks, such as cleaning and sanitizing coolers, smokehouses, smoker racks carts, dollies, etc., may also need specialized training. This training program should be conducted on site in small groups to demonstrate how to do all of the different sanitation procedures correctly and should be primarily a "How To" session. Companies need to be sure that they make all necessary changes in their sanitation procedures, including the type of cleaners and sanitizers that will be used, the equipment and cleaning tools that will be used, color coding schemes, procedures, and monitoring requirements, before they conduct this training.

This PPT training program can be downloaded from the Cornell Web site as described above by clicking onto the words: Plant Cleaning & Sanitizing Training Program for *Listeria* Control. The first slide in this PPT presentation is provided in Fig. 3.

Major topics included in this training program are: (1) Overview of company procedures for cleaning and sanitation of each plant area and a description of the products and equipment used and when the procedures must be conducted; (2) Detailed description and demonstration of specific procedures conducted by those who are being trained; specific procedures may need to be covered for drains, end-of-shift/day cleaning and sanitizing, utensils and portable items, coolers, smokehouses, racks and other conveyances, special equipment such as slicers and other procedures as necessary; and (3) Monitoring, reporting, and problem solving and other special procedures to be used when problems are identified.

Using PPT instructor notes to help deliver the training programs

Instructor notes are included in each of the three PPT training program to help the instructor(s) plan and deliver their training sessions. The instructor notes can

TABLE 1. Learning objectives of the safe food depends on your training guide

1. Trained workers will understand the importance of and adopt good hand washing techniques, wear appropriate attire in the processing plant, and practice proper hygiene.
2. They will understand how proper cooling and storage methods, recommended cooking times and temperatures, and holding methods minimize risk.
3. Workers will learn how cross contamination occurs and how to prevent it from happening.
4. The workers will understand the importance of proper cleaning and sanitizing procedures.

be found below the image of each slide when the presentation is opened in the appropriate view. Selecting the "Notes Pages" as the option under "Print What" can also print out a copy of the slide with instructor notes. The instructor notes are talking points designed to remind the instructor what points to cover with each slide in the presentation. Tips for demonstrations or other activities are also included in this section of the presentation so that the instructor can provide additional information to help the plant workers who are being trained to understand the material better. An example of the slide and instructor notes provided in the cross contamination *Listeria* PPT training program are in Fig. 4A and 4B.

Customizing the training materials

The PowerPoint™ presentations were designed to provide a structure that will help plant management deliver effective training on *Listeria* controls. They were specifically designed for smoked fish and other seafood processors, but can be easily adapted for use in plants processing other RTE foods. Inserting pictures of your own plant, employees, and equipment to replace the photographs that are provided in the presentations can also customize the presentations. The sample procedures provided in the presentations can also be customized to include the specific cleaning, sanitizing, hand washing, and hygiene procedures and policies used in each individual plant. The tools needed to customize these presentations are widely available and include a digital camera to take appropriate photos in the plant, commonly available software for loading digital photos into a computer, and the

PowerPoint™ software program. Firms who have used these training programs have provided positive feedback on their success in customizing them for their specific plant and employees.

OTHER TRAINING RESOURCES

Other resources to facilitate employee training are available from a number of public and private sources. These materials can include a variety of different training aids including lessons, videotapes, manuals, workbooks, and activities. A specific training program developed for food handlers in processing plants entitled "Safe Food Depends on You" is described in detail below. A brief list of government, trade association, and other Web sites that contain lists of other training resources available from a variety of sources is provided at the end of this section.

Safe food depends on you – training guide for food handlers

A training tool that can be used to supplement the basic employee PowerPoint training programs described above and help instructors plan specific activities or demonstrations is the "Safe Food Depends on You" Training Guide. The purpose of this publication is to assist in training entry-level, English and Spanish-speaking workers in the food processing industry (12). "Safe Food Depends On You" was developed by food safety specialists from the University of Delaware and the University of Maryland, with partial funding provided by USDA CSREES Food Safety and Quality Competitive Project Number 95-EFSQ-1-4157. The

Training Guide emphasizes the importance of food handling practices that can reduce the risk of foodborne illness. These training materials were designed for low-literacy workers, but can be used with all educational levels. The materials were designed to help the food industry meet the continuing high expectations for a safe food supply and the HACCP regulations, which require a more formal educational program for all workers, including those working directly on the processing line. The theme or underlying story of "Safe Food Depends on You" emphasizes a system of values and sharing of the learning (training) process. For many workers, knowledge gained from the training provided in the video and activities in this guide can be practiced at home and with their co-workers. "Safe Food Depends on You" is designed to teach workers, using an enjoyable and not-too-technical approach, how and why we handle food products a certain way.

The "Safe Food Depends On You" training materials cover four important areas that are critical for workers to understand in order to follow a company's Sanitation Standard Operating Procedures (SSOP). Table 1 lists the learning objectives of the "Safe Food Depends On You" Training Guide. In addition to the Training Guide, there is a video that can be used by itself or with the Guide to help illustrate what happens in actual processing plants. The "Safe Food Depends on You" training manual also includes hands-on activities to help reinforce each of these learning objectives. In addition, there are pre- and post-tests, in English and Spanish, to help assess the effectiveness of the training. The manual can be downloaded from the Internet at the Maryland Sea Grant Web site: http://www.mdsg.umd.edu/Extension/safe_seafood.pdf.

In addition to the Training Guide and video, ten food safety posters have been designed to assist with training and serve as reminders of appropriate behavior in the food processing facility. An example is provided in Fig. 5. The trainer can use these posters to explain appropriate food safety practices during the training. The poster can then be placed in appropriate places in the plant to remind employees of what they learned and how they can help keep the food the company produces safe to eat.

Other resources for information on *Listeria* and training resources

Many resources are available to food processors, retailers and food service busi-

TABLE 2. Web site resources for information on *Listeria monocytogenes* and training

Government Agencies –

USDA/FDA Foodborne Illness Education Information Center –
<http://www.nal.usda.gov/fnic/foodborne/haccp/index.html>

FDA <http://www.cfsan.fda.gov>

USDA <http://www.usda.gov/>

AFDO <http://afdo.org/>

National Seafood HACCP Alliance for Education and Training –
<http://www-seafood.ucdavis.edu/haccp/training/training.htm>

Trade Organizations –

National Fisheries Institute – <http://www.nfi.org/>

National Food Processors Institute – <http://www.nfpa-food.org/>

University Resources –

UC Davis web site Training Resources –
<http://seafood.ucdavis.edu/Pubs/99resources.htm>

Cornell Department of Food Science –
<http://www.foodscience.cornell.edu/wiedmann/index.html>

New York Sea Grant –
<http://www.nyseagrant.org/seafoodtechnology>

University of Delaware Sea Grant –
<http://www.ocean.udel.edu/seagrant/outreach/seafood.html>

University of Maryland Sea Grant –
<http://www.mdsg.umd.edu/Extension/sftechnology.html>

Virginia Tech – <http://www.cfast.vt.edu/>

Louisiana State University Department of Food Science –
<http://www.agctr.lsu.edu/foodscience/>

Pennsylvania State University –
<http://foodsafety.cas.psu.edu/>

nesses to provide additional information and help. These resources include professionals from the private sector and public universities and cooperative extension programs, such as the authors of this manuscript, government agencies, trade organizations, the Internet, research papers and reviews, and consultants. Table 2 gives brief list of some of the key Internet sites providing information that can be used as training material and in training programs for employees in seafood and other food processing plants, retail stores, restaurants, and other food service businesses. Many of these sites contain information specific to *L. monocytogenes* and

its control. Links to almost all of these materials can be found at the first location on the list, the USDA/FDA Foodborne Illness Education Information Center.

SUMMARY

Employee training is an integral part of an effective *Listeria* control program, and the SSWG has identified three different targeted training programs that should be delivered to employees in the plant and taught by plant personnel. These training programs consist of: (1) Basic training for all employees who work at the plant, to ensure that they understand

Figure 5. Example of poster icons used in safe food depends on you



Keep Area Clean/Mantengan Superficie Limpia

the importance of *Listeria* controls and their role in a firm's control plan, (2) Training for all employees who handle or work in exposed finished product areas, to ensure that they understand how to prevent cross contamination of product, and (3) Training for all employees who conduct cleaning and sanitation tasks or activities, to ensure that they understand the sanitation procedures necessary to reduce or eliminate *Listeria* in the plant. Three PowerPoint™ (PPT) slide presentations developed by Cornell University and New York Sea Grant in collaboration with the Universities of Delaware and Maryland, Virginia Tech, Louisiana State University and the National Fisheries Institute and National Food Processors Association, are available to help plant personnel deliver training programs. Sources for other training resources are also available from government, trade association and university programs.

ACKNOWLEDGMENTS

The authors wish to thank and acknowledge the individuals from the smoked seafood firms who participated in the Smoked Seafood Working Group (SSWG), including: Frank Costanzo, Service Smoked Fish Corporation, Brooklyn, NY; Dusty Batley and Mike Strang, Ducktrap River Fish Farm, Belfast, ME; Jim Yonker, Ocean Beauty Seafood, Seattle, WA; Doug Mohar, Morey's Seafood International, Golden Valley, MN; Ken Molfese, Vita Food Products, Chicago, IL; and Dave Caslow, Acme Smoked Fish, Brooklyn,

NY. The experience, expertise, time and commitment that each of these individuals contributed to this effort provides an exceptional example of the type of industry collaboration and cooperation needed to solve difficult food safety issues such as those posed by *Listeria monocytogenes* for manufacturers of ready-to-eat foods like smoked seafood.

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Availability, Accuracy and Response Time of Instant-read Food Thermometers for Consumer Use

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SUMMARY

Availability, accuracy and ease of use are important attributes of food thermometers if consumers are to be persuaded to use them routinely to determine cooking endpoint in thin or small meat items. The objective of this project was to determine the availability of instant-read food thermometers to consumers in rural and urban areas of Idaho and Washington states and to determine the accuracy and response time of a sampling of thermometers. Instant-read food thermometers were most available in kitchen specialty stores (88% of stores surveyed), department stores (76%), and grocery stores (73%) and were also available in some drug/variety stores and hardware stores. Food thermometers were less available in rural than in urban areas. Both dial and digital instant-read thermometers were accurate, reading within 2°F when tested in a 160°F calibrated water bath. Both types required an average of about 20 seconds to register the temperature at 160°F, although some took as little as 10 seconds and others as much as 30 seconds. In general, urban-living and internet-savvy consumers can be pleased with the selection and accuracy of food thermometers available to them.

INTRODUCTION

It is important that all ground or mechanically tenderized meat items be cooked to an internal temperature of 160 F to ensure that any pathogens present are destroyed (6). Because of the grinding and mixing process, ground beef, as well as other ground meats such as sausage and ground poultry products, may be contaminated with pathogens throughout, requiring that all portions of the item be heated to a safe endpoint during cooking. Similarly, meat that has been punctured for brine delivery or tenderization may contain pathogens in their inner portions (1, 7).

As scientists' knowledge of safe cooking has progressed, consumers have been subjected to a number of different messages regarding the cooking of ground beef. "Cook hamburger until brown" was the message issued when ground beef was implicated in cases of foodborne illness from *Escherichia coli* O157:H7. This message was replaced by "cook to 160 F" after it had been determined that cooked ground beef patty color was not an accurate indicator of safety (9). Use of an instant-read food thermometer is recommended to assure pathogen-free cooking

A peer-reviewed article

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TABLE 1. Types and numbers of stores surveyed and types of thermometers carried

Store type	Total number of stores surveyed in WA and ID	Number of stores with thermometers of surveyed types (percent of total store type with thermometer)			Number of stores with no thermometers
		All thermometer types	Dial	Digital*	
Department	42	32 (76%)	28 (67%)	27 (64%)	10 (24%)
Grocery	40	29 (73%)	27 (68%)	14 (35%)	11 (27%)
Specialty	25	22 (88%)	19 (76%)	17 (68%)	3 (12%)
Hardware	18	6 (33%)	5 (28%)	4 (22%)	12 (67%)
Drug/variety	13	7 (54%)	7 (54%)	1 (8%)	6 (46%)
Total	138	96 (70%)	86 (62%)	63 (46%)	42 (30%)

*Includes all types of digital thermometers: pocket, those with remote probes, and forks.

TABLE 2. Number of brands and models, and price ranges for 237 instant-read thermometers surveyed in 96 stores in Washington and Idaho

	Dial instant-read pocket thermometers	Digital pocket thermometers	Digital probes with remote controls	Digital fork thermometers
Number of thermometers	114	72	14	37
Number of different models	37	33	10	19
Number of different brands	21	19	10	16
Price range	\$3.99–\$19.00	\$8.99–\$29.95	\$14.99–\$69.99	\$5.92–\$32.50

of these meat items. A panel of food safety experts has ranked the use of a thermometer to cook foods adequately as primary in importance for the prevention of illness caused by *Campylobacter jejuni*, *Salmonella* species, *E. coli* O157:H7, *Toxoplasma gondii* and *Yersinia enterocolitica* (8). However, although use of an instant-read thermometer has increased slowly among consumers — for example, from 3% in 1998 to 6% in 2001 (10) — adoption of this behavior is low.

Consumers usually receive insufficient detail about how to choose and use the different types of food thermometers available for them to be able to measure the temperature of ground meat patties accurately. The USDA Thermo™ Campaign (4) and the Washington State University/University of Idaho *Now You're Cooking...Using a Food Thermometer* educational material, (on consumer food thermometer use, including a brochure,

recipe cards and a video developed in a USDA-funded project) aim to increase the awareness and practice of food thermometer use when cooking meat items.

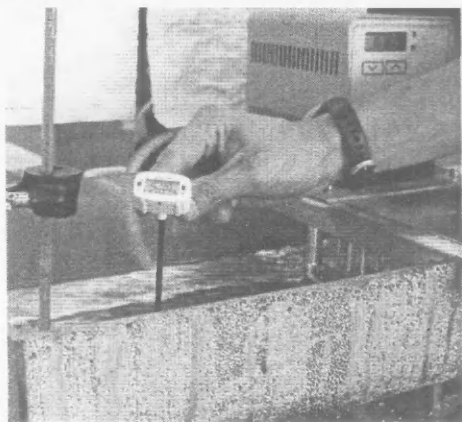
Three main types of instant-read food thermometers are available to consumers and suitable for testing temperature of ground meat patties and other thin foods—thermocouples, thermistor digital thermometers, and bimetallic coil dial thermometers.

- Thermocouples are fast and accurate and have a very small sensing unit, but they are also costly and difficult for consumers to find.
- Instant-read thermistor digital thermometers are commonly available in kitchen specialty stores and often in grocery stores. The thermistor, located in the tip of the probe, is a ceramic semiconductor whose electrical resis-

tance changes with temperature. To measure temperature accurately, the tip of the probe must be inserted at least 1/2-inch deep into the middle of the thickest part of the food. When testing thin or small items for temperature, it is best to insert the thermometer probe into the side of the item.

- Instant-read dial thermometers use a bimetallic coil to sense temperature; the bimetal coil generally occupies the lower 2 to 2.5 inches of the thermometer stem, so for these thermometers the entire lower 2 to 2.5 inches of the stem must be inside the food. For thin foods, it must be inserted sideways. One food safety expert believes that bimetal coil thermometers are not appropriate for thin items (11, 12).

Figure 1. Certified thermometer and testing of a digital thermometer in a 160°F circulating water bath



"Instant-read" refers to thermometers that are used to test for doneness near the end of the cooking time; they are not designed to be left in the food during cooking, unless the thermometer is an oven cord model, in which the probe is attached by an oven-safe cord to the digital display.

Because availability, accuracy and ease of use are important attributes of food thermometers if consumers are to be persuaded to use them routinely to determine cooking endpoint in thin or small meat items, the objective of this project was to determine the availability of instant-read thermometers to consumers in rural and urban areas of Idaho and Washington states and to determine the accuracy and response time of a sampling of thermometers.

METHODS

Thermometer availability

To determine the availability of consumer food thermometers suitable for measuring the endpoint temperature of thin meat items, we surveyed the types and prices of thermometers available to consumers living in Washington and Idaho. Surveys of a sampling of stores most likely to carry food thermometers for consumer use were conducted in four counties in Washington (Grant, King, Spokane, and Yakima) and six counties in Idaho (Ada, Bonneville, Boundary, Kootenai, Latah, and Twin Falls). A total of 138 stores, consisting of department (42), grocery (40), kitchen specialty (25), hardware (18), and drug/variety (13), were visited to learn about the food thermometers offered for sale; 22 internet retailers

and mail order catalogs specializing in kitchen/cooking equipment were also investigated. Brands, types, and prices were recorded. The surveys were conducted in October 2001 through May 2002.

The store surveyors were consumers who were instructed to record information for the types of thermometers offered for sale that were suitable for use in measuring the temperature of thin food items; these included both dial and digital instant-read pocket thermometers, digital thermometer forks, and digital thermometers with extra features such as a timer and probe attached to the digital display via an oven-safe cord so that the probe can remain in the oven during the cooking process. The surveyors were also instructed to survey a variety of stores most likely to be used by consumers looking for a food thermometer to purchase. The surveys represent a sampling of stores, rather than a survey of every possibility within a county. The information recorded included brand, model number, thermometer type, package instructions for use (if visually available on the unopened package), and price. Via the internet, surveys of mail order catalogs were conducted by a consumer instructed to search for such information.

Thermometer accuracy and response time

Twenty-one models of instant-read pocket food thermometers (8 dial models and 13 digital models) were obtained by purchase at local grocery, department and hardware stores, by catalog/internet order, or free from the Idaho Beef Commission during 2002 and 2003 (Table 3). Three units of each model were obtained, when possible.

The accuracy (at 160°F) and the response time of the dial and digital instant-read food thermometers were measured by use of a temperature-controlled water bath (12 × 18 × 5 inches deep, maintained at 160°F by a VWR Scientific Heater/Pump model 1130A)(Fig. 1). Prior to testing each instant-read thermometer, the accuracy of the water bath temperature was verified by checking a glass, certified thermometer that was factory calibrated to standards by the National Institute of Standards and Technology (NIST) (Ertco, 122 to 176°F, partial immersion thermometer) and that was maintained in the water bath at a depth of 4 inches throughout testing. The stem of each instant-read thermometer (at room temperature, 75–81°F) was immersed in the 160°F water to a controlled depth (2.5 inches for dial thermometers and 1.5 inches for digital thermometers). As the thermometer was lowered into the water bath, a stopwatch timer was started. Timing was halted when the thermometer came within 0.5°F of its final temperature (determined in preliminary trials). If off by 1°F or more, thermometers that could be calibrated were adjusted to 160°F before the response time test. Response time was tested three times for each thermometer.

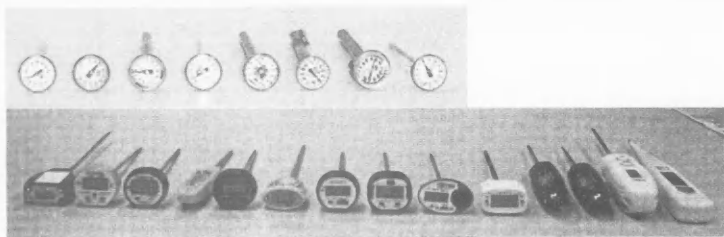
RESULTS

Thermometer availability

Of the 138 stores where our consumer surveyors thought they would find instant-read thermometers, 42 did not have thermometers (Table 1). Thermometers were more available in specialty kitchen stores (88% of these stores), department stores (76%), and grocery stores (73%) than in drug/variety stores (54%) and hardware stores (33%). The surveys found thermometers in a total of 96 stores, including chain stores and local independent stores. Because some chain stores were visited in multiple counties, the total number of chain and independent stores represented was 56. Of the 237 thermometers identified in the survey, 35% were found in department stores, including chain discount type stores, with major national discounters accounting for more than half of these. Thirty-seven percent of the thermometers were located in specialty stores, 19% in grocery stores, 5% in hardware stores, and 4% in drug/variety stores. Within a chain of stores, some locations had digital thermometers and some did not; for example, the devices might be available in larger towns but not in more rural areas.

Thermometers were more generally available in urban locations, with some

Figure 2. Dial and digital thermometers tested



rural areas having very little choice. Some hardware stores sell digital food thermometers and may be a source in small towns in which they are not available in other stores. For example, a hardware store in a rural Idaho town (county population 9,871) carried two digital probe models and one dial model, while the three grocery stores surveyed had no food thermometers. In general, grocery and department stores carried one brand of thermometer, often with one dial model and one digital model of that brand; kitchen specialty stores often offered a greater choice of brands. Dial thermometers were more widely available than digital thermometers, being found in 62% and 46% of the stores, respectively.

A summary of the number of instant-read thermometer brands, models, and prices found in stores in Washington and Idaho is recorded in Table 2. Surveyors recorded information for 237 thermometers in the 96 stores that had thermometers available on the day of visit. Numerous manufacturers are producing numerous models of food thermometers; there were 21 (dial) to 32 (digital) different brands represented. One hundred and seventy-three thermometers, with seventy-eight different models, were found in the Washington survey. Sixty-four thermometers, with forty-five different models were identified in the Idaho survey. The digital thermometer found most often in both states was the Good Cook Instant Read Thermometer, model number 25111, manufactured by Bradshaw International. This thermometer was found in 9 stores in Washington and 5 stores in Idaho. Manufacturers that have the greatest market share in digital thermometers found in the survey were Component Design Northwest (CDN) (36), Bradshaw International (Good Cook) (35), Taylor (34), Chaney Instrument Company (Acu-Rite) (19), and Pyrex (14) (numbers are the total number of times each brand was found in the survey). Component Design Northwest products did not appear in the Idaho survey. The manufacturer Comark Instru-

ments, Inc. appeared several times in the Idaho survey but not at all in Washington.

The price of dial pocket thermometers averaged \$8.32, less than that of digital pocket thermometers, which averaged \$14.93. Fork thermometers averaged \$16.33, and digital probes with remote controls averaged \$32.49. Price ranges are shown in Table 2.

The search of the internet for thermometers to purchase yielded a vast amount of information. Many sellers of instant-read thermometers can be identified by using the terms "food thermometer" in an internet search engine. A majority of the brands and models encountered in retail stores could be obtained from internet stores. However, in many cases, detailed information such as one would get from the packaging was not available at online sites, although pictures of the thermometer were common.

Of the 99 models of thermometers identified in the store surveys, 12 models had no instructions regarding use, cleaning, or calibration that were visible. Sixty-four models had some instructions for use on the label, and 25 of these also had some cleaning instructions. Eight out of the 37 dial models had instructions for calibration on the label. Twenty-three models of thermometers (all types) had some instructions enclosed in the package. Of these, 7 were models of fork thermometers and 9 were models of probes with remote controls.

Thermometer accuracy and response time

The thermometers tested are shown in Fig. 2 and information about them is provided in Table 3. All of the dial thermometers could be calibrated by adjusting the hex nut at the top of the stem; three of the digital models could be calibrated. Six of the thermometer models carried the symbol for NSF certification, indicating that NSF International has assessed and certified thermometer confor-

mity with the relevant NSF/ANSI Standard. The cost of the dial thermometers (7 models) averaged \$7.10 (excluding the free one) and that of the digital thermometers (13 models) averaged \$17.45 (not including tax or shipping). Six of the 21 models had cooking endpoint temperatures listed on the thermometer sheath.

The results of the thermometer testing are shown in Table 4. When the instant-read pocket thermometers were placed in a 160 F water bath, the pointer or digits moved rapidly to 150–155 F and then slowed down as they approached the endpoint. All but one of the 57 individual thermometers were acceptably accurate (within 2 F or less according to the 2001 *Food Code* (3)) in their measurement of the temperature of the 160 F water bath when they were used for the first time after removal from the packaging. Six of the 22 dial thermometers were adjusted to 160 F before the response time test because they were off by 1 F and we wanted to test response time to reach 160 F.

The response time to reach 160 F from ambient temperature for dial thermometers (8 models) was 16 to 25 seconds (average 21 seconds) and for digital thermometers (13 models) was 10 to 31 seconds (average 18 seconds). The response time of replicate thermometers within brand and model was reasonably consistent, with the exception of Cooper DPP400W.

DISCUSSION

Thermometer availability

Because consumers who cook meat probably visit a grocery store more frequently than other stores, the availability of instant-read food thermometers in grocery stores is of interest to food safety educators. We found that sixty-eight percent of the grocery stores surveyed sold dial instant-read thermometers, but only 35% carried digital models. Large chain supermarkets were apt to offer digital food thermometers in many locations, but they were not found in the smallest towns. This may reflect the local market, or slower turnover of such products in small towns.

In towns large enough to support a department store, consumers are likely to find affordably priced dial and digital food thermometers in these stores; each type was available in about two-thirds of the department stores we surveyed. The lowest price found for a digital probe pocket thermometer was \$8.99, with most being \$13 to \$15. Kitchen specialty shops in metropolitan areas offer the greatest selection and variety of food thermometers,

TABLE 3. Instant-read thermometers obtained for testing of accuracy and response time

Brand	Model	Purchase source	NSF certified?	Cooking temperatures provided on case?	Able to calibrate?
Dial Thermometers					
Acurite Chaney Instrument Co., WI	00640W	Department store	Yes	Yes	Yes
No brand shown	—	Commodity council	No	No	Yes
Cooper Cooper Atkins Corp., CT	1246-02	Internet	Yes	No	Yes
Ekco World Kitchen, Inc., NY	23010	Grocery store	No	No	Yes
Good Cook Bradshaw International Inc., CA	25110	Grocery store	No	Yes	Yes
GS G & S Metal Products Co., OH	3442	Drug/variety store	No	No	Yes
Norpro Norpro, WA	5979	Grocery store	No	Yes	Yes
Taylor Taylor Precision Products, NC	5989	Specialty kitchen store	Yes	No	No
Digital Thermometers					
Acurite Chaney Instrument Co., WI	00755	Department store	Yes	Yes	No
CDN Component Design Northwest, OR	DWP302	Internet	No	Yes	No
Chaney Instruments Chaney Instrument Co., WI	03113	Internet	Yes	No	No
Cooper Cooper Instruments Co., CT	DPP400W Pen-style	Internet	No	No	No
	DPP450W	Internet	Yes	No	Yes
	DT300	Internet	No	No	No
Good Cook Bradshaw International Inc., CA	25111	Grocery store	No	Yes	No
Polder Polder, Inc., NY	369-90	Internet	No	Yes	No
Pyrex Robinson Knife Co., NY	17021 Rotary Head	Internet	No	Yes	No
Redi-Check Maverick Industries Inc., NJ	ET-3*	Catalog	No	No	No
Taylor Taylor Precision Products, NM	9840 9842 Antibacterial 9878 High Precision	Hardware store Internet Internet	No No No	No No No	No Yes Yes

* Model has been discontinued

TABLE 4. Accuracy and response time of 21 instant-read thermometer models (57 individual thermometers)

Brand and model	Replicate	Temperature reading in 160°F water bath**	Temperature reading —Average of replicates—	Response time*** (seconds ±standard deviation)	Response time (sec) —Average of Replicates—
Dial Thermometers					
Acurite 00640W	1	160°	160°	18 ± 2.9	16 ± 2.7
	2	160°		13 ± 1.0	
	3	160°		17 ± 1.5	
Beef Council	1	160°	na	24 ± 2.9	na
Cooper 1246-02	1	160°	160°	22 ± 1.0	25 ± 2.9
	2	160°		24 ± 1.0	
	3	160°		28 ± 1.7	
Ekco 23010	1	159°	159°	22 ± 2.6	22 ± 3.4
	2	159°		24 ± 3.2	
	3	159°		20 ± 4.4	
Good Cook 25110	1	160°	160°	23 ± 0.0	22 ± 3.3
	2	160°		23 ± 1.0	
	3	160°		16 ± 1.0	
	4	160°		21 ± 1.0	
	5	160°		25 ± 2.0	
GS 3442	1	159°	159.3°	24 ± 1.7	20 ± 3.1
	2	159°		18 ± 0.6	
	3	160°		20 ± 2.1	
Norpro 5979	1	160°	160°	18 ± 2.0	17 ± 2.1
	2	160°		14 ± 1.2	
	3	160°		18 ± 0.6	
Taylor 5989	1	161°	na	19 ± 1.7	na
Digital Thermometers					
Acurite 00755	1	158.1°	157.6°	22 ± 0.6	23 ± 1.0
	2	157.1°		23 ± 1.5	
CDN DWP302	1	159.2°	160.5°	15 ± 1.5	20 ± 3.9
	2	161.0°		21 ± 2.1	
	3	161.4°		23 ± 2.3	
Chaney Instruments 03113	1	159.9°	159.0°	12 ± 0.6	13 ± 0.8
	2	158.0°		13 ± 0.6	
Cooper DPP400W	1	160.3°	160.6°	44 ± 1.5	31 ± 10.1
	2	160.6°		22 ± 5.0	
	3	160.8°		27 ± 3.1	
Cooper DPP450W	1	161.8°	160.8°	11 ± 0.6	10 ± 1.3
	2	160.6°		9 ± 0.0	
	3	159.9°		12 ± 1.2	
Cooper DT300	1	158.9°	158.7°	22 ± 1.5	22 ± 2.5
	2	158.5°		23 ± 3.5	
	3	158.7°		22 ± 3.0	
Good Cook 25111	1	160.5°	160.5°	11 ± 1.2	14 ± 3.8
	2	160.8°		11 ± 0.6	
	3	159.9°		16 ± 0.6	
	4	160.1°		21 ± 1.5	
	5	161.2°		12 ± 1.2	
Polder 369-90	1	161.4°	161.7°	17 ± 1.7	17 ± 1.7
	2	162.0°		17 ± 2.0	
Pyrex 17021	1	160.3°	160.4°	17 ± 5.1	17 ± 4.2
	2	160.5°		20 ± 3.6	
	3	160.3°		15 ± 3.1	

TABLE 4. (continued) Accuracy and response time of 21 instant-read thermometer models (57 individual thermometers)

Brand and model	Replicate	Temperature reading in 160°F water bath**	Temperature reading in —Average of replicates—	Response time*** (seconds ± standard deviation)	Response time (sec) —Average of Replicates—
Redi-Check ET-3*	1	160.8°	na	10 ± 0.6	na
Taylor 9840	1	160.2°	160.6°	18 ± 3.5	18 ± 2.6
	2	160.3°		17 ± 1.0	
	3	161.2°		20 ± 2.1	
Taylor 9842	1	159.9°	160.4°	14 ± 1.0	13 ± 1.2
	2	160.6°		12 ± 0.6	
	3	160.7°		12 ± 0.6	
Taylor 9878	1	160.9°	160.7°	21 ± 0.6	26 ± 4.7
	2	160.5°		30 ± 1.5	

* Model has been discontinued.**The six dial thermometers that did not read exactly 160°F were calibrated to 160°F prior to measuring response time.***Average of three measurements

including models with features such as probes on oven safe cords and timers. Prices for these went as high as \$69.99. Kitchen stores in more rural areas sometimes did not carry food thermometers. In many locations, drug/variety stores and hardware stores were not a good source of food thermometers. Consumers can find a large selection of thermometers available from internet retailers.

Thermometer accuracy and response time

The dial and digital consumer instant-read food thermometers assessed in this study were accurate; that is, they were within 2°F of the actual temperature (3) when assessed at 160°F, with one exception. This is important because consumer educators need to feel confident when they urge consumers to use a food thermometer for food safety that the thermometer will accurately determine the endpoint temperature of cooked meat. However, it should be noted that 27% of the dial thermometers were shown to be off by 1°F, when tested at 160°F (Table 4), and were recalibrated by us prior to testing the response time. Although all the dial thermometers in this study could be calibrated, only 22% in our store survey had instructions for calibration (that could be viewed through the unopened packaging). Calibration instructions generally use the 32°F ice bath method or the boiling water (212°F at sea level) method (5), which assumes that consumers will know the boiling temperature of water at their elevation. Neither method ensures accuracy of the thermometer at the tempera-

ture appropriate for checking the endpoint of meat (160°F), since the calibration is conducted at a temperature more than 50°F from the target temperature. In addition, accuracy is also dependent on the thermometer being used correctly. If only the tip of a bimetallic coil dial thermometer, rather than the entire 2 to 2.5-inch sensing area, is inserted into the food, the food temperature measurement can be wrong by 10 to 48°F (12). Thus, clear use instructions on the packaging are also an important aspect of thermometer purchase.

The time required for the 21 models of instant-read thermometers to go from room temperature to 160°F in a water bath varied from 10 to 31 seconds. Response time is an important attribute, because if thermometer use adds significantly to the time or complication of meal preparation, it is unlikely to be adopted by consumers. In focus groups conducted with consumers after they had used food thermometers in the cooking of small meat items, a number of participants reported that use of a food thermometer takes too much time and extra work and is inconvenient and awkward. The FSIS fact sheet *Kitchen Thermometers* (5) reports that dial bimetallic coil thermometers require 15 to 20 seconds to register food temperature and thermistor-style digital food thermometers require "roughly 10 seconds." Our measurements of response time in a water bath indicate that 50 percent of the 22 dial thermometers tested and 40 percent of the 35 digital thermometers tested reached the endpoint temperature in this time frame. ("Roughly 10 seconds" was interpreted to include response times up to 15 seconds).

The remainder required longer times to register the 160°F target temperature.

Cooks Illustrated (CI), a consumer cooking magazine that features recipe and equipment research, has reported the response time, as well as other features, of eight models of dial and digital thermometers (2). Response time was assessed in boiling water. Five of these models were the same as ones used in our tests, but there was little agreement of results. CI found three of the thermometer models measured temperature 2°F high (no data were reported for the other two). CI also reported response times that were 6 to 15 seconds longer for four models and 8 seconds shorter for one model than the response times recorded in our tests. It is possible that the difference in target endpoints (212°F versus 160°F) or procedures such as immersion depths accounts for the variation.

In summary, the accuracy of dial and digital instant read food thermometers available to consumers for measuring endpoint temperature in small meat items is quite good (within 2°F for 56 of the 57 individual thermometers tested). Response time to reach 160°F from room temperature varied from 10 to 31 seconds; long response times may discourage consumers from routine use of food thermometers to determine cooking endpoint in thin or small meat items. Although three digital models had average response times of 13 seconds or less, shorter than any dial model average, two of the digital models also provided the longest response time averages (26 and 31 seconds). The availability of food thermometers is good for urban consumers, but instant-read food thermometers may be more difficult to locate for rural consumers; consumers

who are able to order food thermometers from internet retailers have a wide variety of choice. It is important that consumers receive accurate instruction about the insertion depth required, 2 to 2.5-inches or 0.5-inch, for dial and digital instant read thermometers, respectively.

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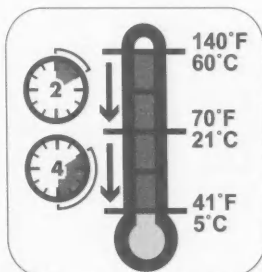
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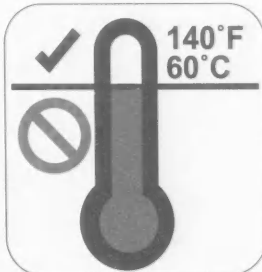
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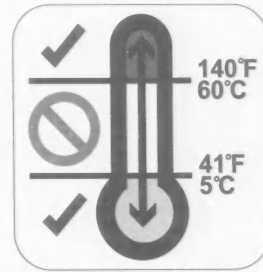
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The above list represents individual contributors to the Association Foundation Fund during the period November 1, 2003 through October 15, 2004. In addition, a portion of the Sustaining Member dues are allocated to support this Fund. Your contribution is welcome. Call the Association office at 800.369.6337 or 515.276.3344 for more information on how you can support the Foundation.

IAFP Foundation FUND

The International Association for Food Protection (IAFP) Foundation Fund was established in the 1970s to support the mission of IAFP – "To provide food safety professionals worldwide with a forum to exchange information on protecting the food supply."

We live in a global economy and the way food is grown, processed, and handled can impact people around the globe. From a public health perspective, it often provides unique challenges to the food safety professional. Combine these issues with the complexity of protecting the food supply from food security threats and the challenges seem overwhelming. However, with your support the Foundation can make an impact on these issues. Funds from the Foundation could help to sponsor travel for deserving scientists from developing countries to our Annual Meeting, sponsor international workshops, and support the future of food scientists through scholarships for students or funding for students to attend IAFP Annual Meetings.

The Foundation is currently funded through contributions from corporations and individuals. A large portion of the support is provided from the Sustaining

Members of IAFP. The Sustaining Membership program is a unique way for organizations to partner with the Association. Contact the Association office if you are interested in this program.

Support from individuals is also crucial in the growth of the Foundation Fund. Contributions, big or small, make an impact on the programs supported by the IAFP Foundation. Programs currently supported by the Foundation include the following:

- Ivan Parkin Lecture
- Travel support for exceptional speakers at the Annual Meeting
- Audiovisual Library
- Developing Scientist Competition
- Shipment of volumes of surplus *JFP* and *FPT* journals to developing countries through FAO in Rome

Donate Today!

It is the goal of the Association to grow the Foundation to a self-sustaining level of greater than \$1.0 million over the next 10 years. This would allow the Foundation to provide additional programs in pursuit of our goal of *Advancing Food Safety Worldwide!*

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International Association for
Food Protection®

Award Nominations

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

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

Nominations deadline is March 14, 2005. You may make multiple nominations. All nominations must be received at the IAFP office by March 14, 2005.

- ◆ Persons nominated for individual awards must be current IAFP Members. Black Pearl Award nominees must be companies employing current IAFP Members. NFPA Food Safety Award nominees do not have to be IAFP Members.
- ◆ Previous award winners are not eligible for the same award.
- ◆ Executive Board Members and Awards Committee Members are not eligible for nomination.
- ◆ Presentation of awards will be during the Awards Banquet at IAFP 2005 – the Association's 92nd Annual Meeting in Baltimore, Maryland on August 17, 2005.

Nominations will be accepted for the following Awards:

Black Pearl Award — Award Showcasing the Black Pearl

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

Sponsored by Wilbur Feagan and FEH Food Equipment Company

Fellow Award — Distinguished Plaque

Presented to Members who have contributed to IAFP and its Affiliates with quiet distinction over an extended period of time.

Honorary Life Membership Award — Plaque and Lifetime Membership in IAFP

Presented to Members for their devotion to the high ideals and objectives of IAFP and for their service to the Association.

Harry Haverland Citation Award — Plaque and \$1,000 Honorarium

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

Sponsored by Zep Manufacturing Company

Harold Barnum Industry Award — Plaque and \$1,000 Honorarium

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

Sponsored by Nasco International, Inc.

Educator Award — Plaque and \$1,000 Honorarium

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

Sponsored by Nelson-Jameson, Inc.

Sanitarian Award — Plaque and \$1,000 Honorarium

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

Sponsored by Ecolab, Inc., Food and Beverage Division

Maurice Weber Laboratorian Award — Plaque and \$1,500 Honorarium

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

Sponsored by Weber Scientific

International Leadership Award —

Plaque, \$1,000 Honorarium and Reimbursement to attend IAFP 2005

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

Sponsored by Unilever – Safety and Environmental Assurance Centre

Food Safety Innovation Award —

Plaque and \$2,500 Honorarium

Presented to an individual or organization for creating a new idea, practice, or product that has had a positive impact on food safety, thus, improving public health and the quality of life.

Sponsored by 3M Microbiology

NFPA Food Safety Award — Plaque and \$3,000 Honorarium

This Award alternates between individuals and groups or organizations. In 2005, the award will be presented to an individual in recognition of a long history of outstanding contributions to food safety research and education.

Sponsored by National Food Processors Association



Call for Abstracts

IAFP 2005

The Association's 92nd Annual Meeting

August 14-17, 2005

Baltimore, Maryland

General Information

1. Complete the Abstract Submission Form.
2. All presenters must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
3. There is no limit on the number of abstracts registrants may submit. However, presenters must present their presentations.
4. Accepted abstracts will be published in the Program and Abstract Book. Editorial changes will be made to accepted abstracts at the discretion of the Program Committee.
5. Photocopies of the abstract form may be used.
6. Membership in the Association is not required for presenting a paper at IAFP 2005.

Presentation Format

1. Technical – Oral presentations will be scheduled with a maximum of 15 minutes, including a two to four minute discussion. LCD projectors will be available.
2. Poster – Freestanding boards will be provided for presenting posters. Poster presentation surface area is 4' high by 8' wide. Handouts may be used, but audiovisual equipment will not be available. The presenter will be responsible for bringing pins and velcro.

Note: The Program Committee will make the final decision on presentation format.

Instructions for Preparing Abstracts

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

Abstract Submission

Abstracts submitted for IAFP 2005 will be evaluated for acceptance by the Program Committee. Please be sure to follow the format instructions above carefully; failure to do so may result in rejection. Information in the abstract data must not have been previously published in a copyrighted journal.

Abstracts must be received no later than January 12, 2005. Return the completed abstract form through one of the following methods:

1. Online: Use the online abstract submission form located at www.foodprotection.org. You will receive an E-mail confirming receipt of your submission.
2. E-mail: Submit via E-mail as an attached text or MS Word™ document to abstracts@foodprotection.org.

Selection Criteria

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

Rejection Reasons

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

Projected Deadlines/Notification

Abstract Submission Deadline: January 12, 2005.
Submission Confirmations: On or before January 13, 2005. Acceptance/Rejection Notification: February 16, 2005.

Contact Information

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

Program Chairperson

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Abstract Form

DEADLINE: Must be Received by January 12, 2005

(1) Title of Paper _____

(2) Authors _____

(3) Full Name and Title of Presenter _____

(4) Institution and Address of Presenter _____

(5) Phone Number _____

(6) Fax Number _____

(7) E-mail _____

(8) Format preferred: Oral Poster No Preference

The Program Committee will make the final decision on presentation format.

(9) Category: Produce Foods of Animal Origin Seafood Other Food Commodities

Risk Assessment Education General Microbiology and Sanitation

Antimicrobials Pathogens Dairy

(10) Developing Scientist Awards Competition Yes Graduation date _____

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

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

Call for Entrants in the Developing Scientist Awards Competitions

Supported by the International Association for Food Protection Foundation

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

Purpose

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

Presentation Format

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

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

General Information

1. Competition entrants cannot have graduated more than a year prior to the deadline for submitting abstracts.
2. Accredited universities or colleges must deal with environmental, food or dairy sanitation, protection or safety research.
3. The work must represent original research completed and presented by the entrant.
4. Entrants may enter only one paper in either the oral or poster competition.
5. All entrants must register for the Annual Meeting and assume responsibility for their own transportation, lodging, and registration fees.
6. Acceptance of your abstract for presentation is independent of acceptance as a competition finalist. Competition entrants who are chosen as finalists will be notified of their status by the chairperson by May 27, 2005.

7. All entrants with accepted abstracts will receive a complimentary, one-year Student Membership. This membership will entitle you to receive *JFP* Online.
8. In addition to adhering to the instruction in the "Call for Abstracts," competition entrants must check the box to indicate if the paper is to be presented by a student in this competition. A signature and date is required from the major professor or department head.

Judging Criteria

A panel of judges will evaluate abstracts and presentations. Selection of up to five finalists for each competition will be based on evaluations of the abstracts and the scientific quality of the work. All entrants will be advised of the results by May 27, 2005. Only competition finalists will be judged at the Annual Meeting and will be eligible for the awards.

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

Judging criteria will be based on the following:

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

Finalists

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

Awards

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

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

Policy on Commercialism

for Annual Meeting Presentations

1. INTRODUCTION

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

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

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

2. TECHNICAL CONTENT OF SUBMISSIONS AND PRESENTATIONS

2.1 Original Work

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

2.2 Substantiating Data

Submissions and presentations should present technical conclusions derived from technical data. If products or services are described, all reported capabilities, features or benefits, and performance parameters must be substantiated by data or by an acceptable explanation as to why the data are unavailable (e.g., incomplete, not collected, etc.) and, if it will become available, when. The explanation for unavailable data will be considered by the Program Committee chairperson

and/or technical reviewers selected by the Program Committee chairperson to ascertain if the presentation is acceptable without the data. Serious consideration should be given to withholding submissions and presentations until the data are available, as only those conclusions that might be reasonably drawn from the data may be presented. Claims of benefit and/or technical conclusions not supported by the presented data are prohibited.

2.3 Trade Names

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

2.4 "Industry Practice" Statements

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

2.5 Ranking

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

2.6 Proprietary Information (See also 2.2.)

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

2.7 Capabilities

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

3. GRAPHICS

3.1 Purpose

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

3.2 Source

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

3.3 Company Identification

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

3.4 Copies

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

4. INTERPRETATION AND ENFORCEMENT

4.1 Distribution

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

4.2 Assessment Process

Reviewers of submissions and presentations will accept only those that comply with this policy. Drafts of submissions and presentations will be

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

4.3 Author Awareness

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

4.4 Monitoring

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

4.5 Enforcement

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

4.6 Penalties

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

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6200 Aurora Avenue, Suite 200W
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December 2004

Fellow IAFP Members:

As we prepare for a new year, I want to encourage you to become involved in the International Association for Food Protection's Committees and Professional Development Groups (PDGs). From personal experience, I can tell you that participation in IAFP's Committees and PDGs is truly a win-win. Through your involvement, you can help provide guidance and information for the association, your profession, and fellow IAFP Members. And while you are helping the Association and others, you'll be networking with leading experts in the field, learning from their experiences, and developing valued relationships.

Committees and PDGs are a vital component of IAFP. They meet during the Annual Meeting and share information throughout the year via conference calls or E-mail. Therefore, even if you're unable to attend IAFP 2005 in Baltimore, your involvement is still possible. Please review the Committees and PDGs listed on the following pages and, if any of them sound interesting, simply contact the Chairperson of the group to let them know you want to get involved. Getting started is really that simple.

For those of you who have participated in our Committees or PDGs in the past, I want to thank you for your service and encourage you to stay involved. Your continued participation is important.

As usual, your comments, questions, and suggestions are welcomed. Please do not hesitate to contact the IAFP office or myself if we can be of help.

In closing, remember that learning is a lifelong journey. I invite you to take an important step in this journey by getting involved in IAFP's Committees or PDGs. Together, we'll learn from one another and help advance food safety worldwide.

Best Regards,

Frank Yiannas
Vice President, IAFP

Our mission is to provide food safety professionals worldwide with a forum to exchange information on protecting the food supply."
Publisher of the *Journal of Food Protection* and *Food Protection Trends*

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WYOMING**Sherry Maston**

Wyoming Dept. of Agriculture
Wheatland

UPDATES

Silliker, Inc. Names Pamela Meijer Technical Sales Manager

Pamela Meijer has joined Silliker, Inc. as a technical sales manager. Prior to joining Silliker, she served as a technical sales specialist with International BioProducts in Bothell, WA, and in supervisory positions with the ABC Research Corporation in Gainesville, FL. Meijer is based at the company's Stone Mountain, GA,

laboratory and will be responsible for sales and customer service activities in the Southeast region of the US.

Ron Mellow New Chilled Food Association Chairman

Ron Mellow of H. J. Heinz Ltd. is the new chairman of Chilled Food Association (CFA). Previously CFA's vice chairman, Ron has been a member of CFA's Executive Committee since 1999.

Ron started his career with Unilever in 1971, on their graduate management scheme and worked in a variety of roles and locations in the UK and Africa. In 1988 he joined United Biscuits in a business subsequently acquired by Heinz in 1999, where he is currently divisional director for the Marks and Spencer businesses. He has also been instrumental in Heinz's entry into branded chilled foods.

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“Free-Range” Chicken — No Guarantee It’s Free of *Salmonella*

There is no discernible difference in *Salmonella* levels between free-range, organically produced poultry and conventionally produced birds, an Agricultural Research Service scientist has found. ARS microbiologist J. Stan Bailey of the Poultry Microbiological Safety Research Unit at the Richard B. Russell Research Center in Athens, GA, examined 110 processed free-range chickens from three organic producers and found that about 25 percent of the chickens tested positive for *Salmonella*. Chickens raised conventionally had about the same levels.

Thus, the decision to purchase free-range chickens shouldn’t be based on the belief that such a chicken is microbiologically superior, according to Bailey. But that shouldn’t deter people from buying free-range chicken if they prefer it for other reasons, according to Bailey, who presented his findings recently at the annual meeting of the American Chemical Society, in Philadelphia, PA.

“Free-range” chickens—which are free to roam outside cages or other confined areas—make up less than 1 percent of the billions of chickens produced in the United States each year. Organic growers often raise their chickens under free-range conditions. *Salmonella*, an intestinal parasite that can cause diarrhea, fever and abdominal cramps, is commonly transmitted by undercooked or uncooked foods.

According to the Centers for Disease Control and Prevention, about 40,000 cases of *Salmonella* infection are reported in the United States each year.

However, many milder cases are not diagnosed or reported, so the actual number of infections may be up to 30 times greater.

FDA Proposes Further Action to Improve Farm-to-Table Shell Egg Safety

The US Food and Drug Administration proposed a regulation to further improve the safety of shell eggs on the farm. When implemented, the production changes defined by the regulation will significantly reduce the number of illness caused by eggs contaminated with *Salmonella* Enteritidis (SE).

An estimated 118,000 illnesses per year are caused by consumption of SE-contaminated eggs. If an individual eats an SE-contaminated egg that is not fully cooked the individual may suffer mild to severe gastrointestinal illness, short term or chronic arthritis, or death.

“The implementation of the provisions of this rule would reduce the number of SE-related illnesses by 33,500 and is a major step in realizing our public health goal of a 50% reduction in all salmonellosis and a 50% reduction in SE outbreaks by 2010,” said Acting Commissioner Dr. Lester M. Crawford. “Today’s action builds upon the safe consumer handling labeling and egg refrigeration and retail rule of 2000.”

The proposed regulation would require implementation of SE prevention measures for all egg producers with 3,000 or more laying hens that produce shell eggs for retail sale and do not process their eggs with a treatment, such as pasteurization, to ensure their

safety. The proposed rule’s SE prevention measures include:

- Provisions for procurement of chicks and pullets
- A biosecurity program
- A pest and rodent control program
- Cleaning and disinfection of poultry houses that have had an environmental sample or egg test positive for SE
- Refrigerated storage of eggs at the farm
- Producer testing of the environment for SE in poultry houses—if the environmental test is positive, FDA proposes that egg testing for SE be undertaken, and that, if the test is positive, the eggs be diverted from the table egg market
- Identification of a person responsible for SE prevention at each farm

Through these proposed measures, FDA believes SE prevalence will be reduced in the poultry house environment and consequently in the eggs themselves.

Most SE contamination of eggs is a result of SE infection in the laying hen’s reproductive tract, known as transovarian contamination. The proposed prevention measures are designed to reduce the likelihood of transovarian contamination.

To fully implement this proposed rule will cost an estimated \$82 million annually for the more than 4,100 farms that have 3,000 or more hens. The actual cost will vary with the number of poultry houses and layers under production and will range from a low of 19 cents per layer to \$1.00 per layer per year.

While today’s proposal focuses primarily on the farm, FDA is aware



of illnesses and outbreaks associated with serving undercooked eggs at retail establishments. Therefore, FDA is soliciting comment on whether to propose potential retail establishment requirements to address their concern.

The proposed rule is part of a joint and coordinated strategy by FDA and the Food Safety Inspection Service (USDA) to more effectively deal with egg safety for both shell eggs and egg products. FDA and FSIS will continue to work closely together to ensure that our egg safety measures are consistent, coordinated and complementary.

WHO: Improve Capacity to Respond Quickly to Food Contamination

The World Health Organization (WHO) has urged countries to improve their capacity to respond to emergencies posed by natural, accidental and intentional contamination of food.

Addressing the WHO Regional Committee for the Western Pacific in Shanghai, China, Dr. Shigeru Omi, WHO regional director for the Western Pacific, said this will require greater emphasis on food safety, including the allocation of additional resources and greater sharing of information.

"Rapid globalization of food production and trade has increased the potential for international incidents involving food contamination with microbial or chemical hazards," said Dr. Omi. "Reducing the risk of foodborne disease is achieved most effectively by targeted prevention throughout the production, processing and marketing chain and through greater cooperation and information sharing."

The Regional Committee met September 13 to 17 to review

WHO's work and map future health directions. Over a hundred representatives, including several health ministers from member states, attended the meeting.

Dr. Omi raised three important issues on food safety: the emergence in Asia of zoonoses — diseases transmitted to humans from animals; the potential of terrorist threats to food and the importance of rapid sharing of information to fight against such threats; and the ongoing health and economic consequences of food contamination and foodborne illnesses in the region.

Citing the recent outbreak of H5N1 avian influenza and the ongoing concerns with contaminated food in the region, Dr. Omi pointed out that, "If the risk of both foodborne disease and zoonoses are to be reduced, there needs to be close collaboration between health ministries and those responsible for agriculture and trade as well as comprehensive and integrated approach to food safety, with the producers, processors, traders and consumers all playing a role. Without a comprehensive and integrated approach along the food chain, food will be left unprotected and human health will be placed at risk."

Dr. Omi further noted that cross-border concerns associated with both food safety and zoonoses must be tackled not only at the national level, but also through closer links amongst authorities at international and regional levels. The Regional Committee urged member states to: improve information sharing and cooperative action in relation to food safety and international and regional levels; ensure greater cooperation among ministries, producers, industry and consumers to address all aspects of food safety; pay immediate attention to human health aspects and regulate control of live birds and

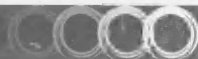
animals for food, to reduce the risk of emerging zoonoses giving rise to a new pandemic.

In support of its member states, WHO will give greater emphasis to food safety at the regional level and build effective partnerships to better protect human health and more effectively control emerging zoonoses.

Australian and Canadian Food Agencies Sign Agreement to Share Food Safety Emergency Information

Food Standards Australia New Zealand (FSANZ) and the Canadian Food Inspection Agency (CFIA) signed a Memorandum of Understanding (MOU) to share information about food safety emergency issues that may pose a serious or unacceptable risk or threat to the health of consumers. The Hon. Rob Knowles, chairman of the FSANZ Board and Robert Carberry, vice president of the CFIA, formalized the MOU at the Inaugural Food Safety Conference at the Gold Coast.

At the signing ceremony, Mr. Knowles said this was a significant occasion for the two agencies. "Food safety is now an international issue. Food is no longer grown and consumed locally and a food product manufactured the other side of the world could be on the shelves of our supermarkets in a matter of weeks or even days. A food emergency anywhere in the world can become a matter for concern here in Australia within hours. Food regulators around the world need to continue to work collaboratively to address these food safety issues and this agreement between FSANZ and CFIA is an example of this collaboration."



"FSANZ recognizes the importance of the global economy in the area of food and this is one of the reasons why we are developing agreements with other countries so that we can share interests, have a common purpose and build an infrastructure. Last year we signed a MOU with the Chinese Ministry of Science and Technology to ensure ongoing collaboration in the important areas of food safety," Mr. Knowles said.

Mr. Carberry said that the MOU built on the already productive relationship between Canada and Australia on food safety matters. "This MOU will enable both CFIA and FSANZ to assist with protecting public health and safety by allowing us to share information at the earliest possible time when there is a food emergency that puts the health of consumers at risk. This is a plus for both countries."

Unmasking the Genes of Food-poisoning *Campylobacter*

What's your favorite way to prepare chicken? Whether you grill, fry, roast or bake it, as long as you cook it thoroughly, you'll kill any *Campylobacter jejuni* food-poisoning bacteria that may be on or in it.

But raw chicken juice, or raw or undercooked chicken, could harbor this microbe and lead to campylobacteriosis food poisoning. In fact, *Campylobacter* is thought to be the leading cause of food poisoning worldwide.

To foil *Campylobacter*, Agricultural Research Service scientists in Albany, CA, and their colleagues at The Institute for Genomic Research, Rockville, MD, have decoded the sequence, or structure, of all of the genes in a specially selected *C. jejuni* strain.

Investigations of these *C. jejuni* genes may lead to the discovery of faster, more reliable ways to detect the microbe in samples from food, animals, humans and water.

What's more, the gene-based research opens the door to simpler, less-expensive tactics for distinguishing look-alike species and strains of *Campylobacter* and its close relatives, so that culprit microbes in food poisoning outbreaks can be fingered more quickly.

Finally, the studies may lead to innovative, environmentally friendly techniques to circumvent the genes that make *C. jejuni* strains so successful in causing human gastrointestinal upset and, in some cases, paralysis or even death.

The research represents the first time that a *C. jejuni* strain from a farm animal — in this case, a market chicken — has been sequenced. That farm-animal origin is important, because chicken is the leading source of this bacterium in food. Earlier *C. jejuni* genome sequencing, done elsewhere, was based on a specimen from a gastroenteritis patient and was lacking key features, such as the ability to colonize chickens.

Read more about the research in the October issue of *Agricultural Research* magazine, available online at: <http://www.ars.usda.gov/is/AR/archive/oct04/genes1004.htm>.

Outbreak of *Salmonella* Newport Infection Associated with Lettuce in the UK

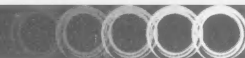
A total of 368 cases of *Salmonella* Enterica serovar Newport infection have been confirmed in England and Northern Ireland since September 9, 2004 by the Health Protection Agency's Laboratory of Enteric Pathogens. Molecular typing of 122

of the isolates has shown that 109 of the strains are indistinguishable from each other and from 14 isolates that have been confirmed by the Scottish *Salmonella* Reference Laboratory since September 13, 2004.

At least 372 confirmed or suspected cases are being investigated locally in Lincolnshire (147), the West Midlands (95), Northern Ireland (113) and the Isle of Man (17), with a small number of cases occurring throughout England. All 14 confirmed cases in Scotland are being investigated. Most cases are aged between 20 and 40 years. Thirty-three hospital admissions (9% admission rate) have been reported. Available onset dates (n=195) range from August 21 to September 25. Food histories collected in England, the Isle of Man and Northern Ireland have commonly implicated fast-food premises and take-away restaurants as a source of illness.

Case-control studies have been undertaken in Lincolnshire, the West Midlands and in Northern Ireland to try to identify the likely vehicle/vehicles of infection within fast-food premises and take-away restaurants. Patients with confirmed or suspected *S. Newport* infection were interviewed and asked to identify controls who had eaten in fast-food/take-away restaurants at the same time but who had not developed symptoms.

In Lincolnshire, studies focusing on two premises which accounted for most of the cases found that the consumption of lettuce (Odds Ratio (OR) 11.43; 95% Confidence Interval (CI) 1.86–70.27; $P = 0.009$ and OR 12.8; 95%CI 3.34–49.12; $P < 0.001$, respectively) was associated with a case of *S. Newport* infection. The case-control study undertaken in Northern Ireland has also shown an association with lettuce (OR 5.95; 95%CI 1.6–22.2; $P = 0.008$). The case-control study in the West Midlands is ongoing.



Extensive environmental investigations have been carried out and are continuing in an attempt to trace a common source. Enternet's European participants were alerted to the outbreak on September 9 and 27, 2004. To date, no increase above what would normally be expected has been reported in any other European country.

Revised WHO Drinking Water Guidelines to Help Prevent Water-related Outbreaks and Disease

Ensuring drinking water is safe is a challenge in every part of the world, from water piped into people's homes, to rural wells and water provided to refugee camps in an emergency. Contamination of drinking water is too often detected only after a health crisis, when people have fallen ill or died as a result of drinking unsafe water. On September 21, 2004, WHO released new recommendations which will help to pre-empt drinking water contamination.

WHO advises national and local drinking water regulators, and the enterprises and organizations which actually provide drinking water to 5 billion people around the world, that the challenge of providing safe drinking water is growing. WHO's updated guidelines for drinking water quality will help regulators and water service providers the world over maintain and improve the quality of their drinking water. The revised guidelines will allow public health management to focus on prevention of microbial and chemical contamination of water supplies. They are as applicable for

urban drinking water systems in North America as for protected wells in the developing world. This new approach exhorts all parties working on drinking water provision and control to act in such a way that outbreaks of waterborne diseases can be further reduced. Traditionally, drinking water regulations have emphasized testing water samples for levels of chemical and biological contaminants. Relying on this approach means that problems are detected long after water is consumed – a remedial rather than preventive approach. Outbreaks caused by microbes in drinking water can affect hundreds of thousands of people. In recent years, communities large and small in some of the world's most developed countries have been affected by contaminated drinking water. Disease outbreaks caused by *E. coli* O157 and *Campylobacter* in Canada, or by *Cryptosporidium* in the United States, Japan and France show what can happen if vigilance is not maintained. The hepatitis E outbreak currently sweeping through internally displaced persons camps in Darfur (Sudan) and refugee camps in neighboring Chad is one example of how waterborne disease affects poor and disadvantaged populations. These new guidelines on drinking-water quality include new guidance on their application in specific settings such as emergencies and disasters. The updated guidelines represent a paradigm shift in advice on how to manage the provision of drinking water, both in the developed and developing world, in large urban settings and in rural areas or villages. Henceforth, according to the revised guidelines, the recommended approach for

regulators and operators is to manage drinking-water quality in a holistic, systematic fashion from source to tap.

This includes ensuring water reservoirs or local wells are not at risk of contamination from human and animal waste, to checking basics such as the regular changing of water filters. According to the International Water Association, this third edition of the guidelines for drinking water quality is the most significant water-related public health development since the introduction of chlorine. The guidelines' requirement for drinking water safety plans should be incorporated in regulations across the world. The new edition has reviewed and revised the recommended values for chemical limits in drinking water in line with the latest scientific evidence. It also reconfirms guideline values for over 100 chemicals. Because routine monitoring for all of the chemicals is not possible, the guidelines set out practical approaches to rule out some chemicals and to prioritize others using readily available information. In the accompanying annex, two examples from around the world show how much more of an impact prevention rather than response can have in maintaining drinking water quality. A list of national technical experts available for interviews and who have been part of the Technical Committee working on the revision of the guidelines can be found at <http://www.who.int/mediacentre/news/releases/2004/pr67/en/index2.html> and further information on drinking water at http://www.who.int/topics/drinking_water/en/.



Food Retailers Worldwide Committed to Toughen Up Even More on Food Safety

The Food Business Forum, the Paris-based independent global food business network, and secretariat of the Global Food Safety Initiative (GFSI) announced that retailers have taken a firm stance on food safety by publishing a new version of the Guidance Document. The mission of the retailer-led initiative, representing over 70% of food retail revenue worldwide, is to strengthen consumer confidence, primarily in the safety of retailer brand food products, purchased in retail outlets.

The 4th edition of the Guidance Document will help to improve the management of food safety standards through a set of new criteria, which can be used to benchmark standards. The document focuses strongly on improving the quality in the results of auditing. The revised version of this document will also be used to benchmark the food safety requirements of agricultural standards (farm assurance standards). Issues such as the environment and animal welfare will not however be taken into consideration.

GFSI is also pleased to announce a new round of benchmarking. Owners of standards that had previously been successfully benchmarked are now invited to re-submit their standard for benchmarking, in order to retain their status of a compliant GFSI standard. Other standard owners are also encouraged to submit their stan-

dards, according to the procedure outlined in the Guidance Document.

New GFSI chairman, Chris Anstey, product integrity manager at Tesco plc highlighted the multiple benefits and value to consumers by stressing that the use of the revised edition of the Guidance Document is a major step forward to toughen up and streamline the auditing process and maximize efficiency in the whole food chain. Through the use of benchmarked standards, suppliers can work more effectively by reducing the number of audits, while allowing retailers to reduce travel costs. Such an approach means that resources can be redirected to ensure the quality of food produced and sold worldwide.

The International Food Safety Community will gather in Rome, Italy at the CIES International Food Safety Conference, on February 3rd & 4th, 2005 to discuss the developments of the Global Food Safety Initiative and other food safety issues such as food safety in retail outlets, traceability and risk management.

To download the 4th edition of the Guidance Document and for further details on the conference, visit our Web site www.ciesnet.com.

Food Safety Policy Center to be Established at Michigan State University

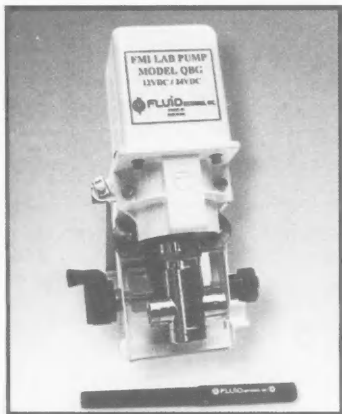
Dr. Ewen C. D. Todd, director of the National Food Safety and Toxicology Center, announced the establishment of the Food Safety Policy Center at Michigan State University (MSU) through a five-year \$1.5 million MSU Research Excellence Fund grant.

Public concern about food and water safety has escalated in recent years as the globalization and consolidation of food supply chains around the world continue to transform the food industry, both in the US and around the world, says Todd. The response from key funding agencies has been an unprecedented flow of resources aimed at improving food and water safety and allaying consumers' fears. USDA, NIH, the EU, the World Bank and USAID are among those agencies that have expanded food safety programming, for several specific reasons: first as a measure to improve public health and security (including the threat of bioterrorism), and second as a measure to enhance international food and agricultural trade.

"Despite the persistent and growing uncertainty regarding food and water safety, and the resources and public debate over how to improve the system and how to guard against the threat of bioterrorism, there exists a glaring void in science-based research aimed at improving food and water safety policy. The FSPC will be the first university-based center solely dedicated to food safety policy anywhere in the United States," Todd said.

Lead faculty will work with experts in risk assessment, characterization, management and communication both at MSU and elsewhere. The Food Safety Policy Center will be housed at the NFSTC, and will be led by MSU faculty members Les Bourquin, Larry Busch, Daniel Clay, Craig Harris, Deepa Thiagarajan and Ewen Todd.

INDUSTRY PRODUCTS



Fluid Metering, Inc.

Low Current DC Pumps for Extended Operation in Remote Locations from Fluid Metering

Valveless Piston Metering Pumps from Fluid Metering Inc. provide precision fluid control for environmental monitoring, sampling, and treatment applications. The low current DC motor is ideal for extended 12/24 Volt battery operation in remote locations.

The unique design of FMI's CeramPump® utilizes one moving part, a rotating and reciprocating ceramic piston to accomplish both pumping and valving functions without valves.

The piston and mated liner are made of dimensionally stable, sapphire-hard ceramics which ensure long term, drift-free accuracy of 1% or better for millions of maintenance-free cycles. The inert fluid path of ceramic and fluorocarbon is ideal for injection of concentrated tracer dyes and water treatment chemicals.

Pump models are available in all standard voltages as well as low current DC voltage making them ideal for remote field operation.

Fluid Metering, Inc.
516.922.6050
Syosset, NY
www.fmipump.com

General Industrial Controller Now Supports High Temperature, Chemically Inert, PEEK Conductivity Sensor

Walchem Corporation announces the availability of PEEK electrodeless conductivity sensors with built-in signal conditioning to provide compatibility with Walchem's WGI controller. Four ranges of conductivity are offered and all PEEK sensors are rated to 190°F. Also announced is the release of a CPVC electrodeless conductivity sensor rated to 158°F.

Key applications for these higher temperature rated, chemically inert sensors include hot alkaline cleaner solutions and hot, oily chemical solutions, especially for customers who provide chemicals for pretreatment of metals prior to painting.

The PEEK sensors have built-in signal conditioning, providing compatibility with WGI. Four ranges of conductivity are offered: 0.1 to 1 mS/cm, 1 to 10 mS/cm, 10 to 100 mS/cm, and 100 to 1000 mS/cm. All sensors are rated to 190°F. PEEK sensors are supplied with 1: NPTM threads for submersion mounting and stainless steel

2" NPTM in-line adapters are available separately. In addition to the new PEEK sensors, Walchem has released a 0.1 to 1 mS/cm version of the CPVC electrodeless conductivity sensor which is rated to 158°F.

Walchem Corporation
508.429.1110
Holliston, MA
www.walchem.com

Eagle Introduces New "Touch-Free" Handwashing System

Eagle Foodservice Equipment announces the introduction of its new Touch-Free Handwashing System. This unique, new handwashing system incorporates ingenious design features that enable foodservice workers to establish safer handwashing practices, thereby helping to improve food safety and minimize contamination.

Eagle's touch-free handwashing system consists of a stainless steel wall-mounted handsink featuring a positive drain bowl for complete water evacuation, along with MICRO-GARD® antimicrobial protection for enhanced antibacterial capabilities. The hand sink also features an "electronic eye" faucet that activates water flow via an optical sensor beam, thus eliminating the need for sink handles. An adjustable water pre-mix feature allows a comfortable water temperature to be pre-set for every use. Another key design feature is an off-the-floor slide-in/ slide-out refuse container, allowing for better sanitation and easier clean-up under the sink.

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INDUSTRY PRODUCTS

In addition to the stainless steel handsink, Eagle's touch-free handwashing system incorporates several other wall-mounted components that represent the state-of-the-art in safety and bacterial protection. Among them are an automated touchless towel dispenser from Georgia Pacific, a touch-free hand soap dispenser from GOJO Industries, and a touch-free hand sanitizer dispenser from Purell. The handsink system also includes a glove rack from FoodHandler that dispenses single-service gloves.

The introduction of Eagle's new touch-free handwashing system underscores the company's commitment to promoting better hygiene in the foodservice workplace. The company is a founding member of the *Handwashing Leadership Forum*. Established in 2000, the Forum is an alliance of advocates committed to lowering the risk of foodborne illness. The Forum provides education and information to foodservice establishments on proper handwashing practices. It has also developed the *Team Rally/Handwashing for Life Olympics*, where competing teams of workers compete for the best handwashing "performance" the cleanest hands.

According to Larry McAllister, president of Eagle Foodservice Equipment, better hygiene comes from both good equipment and good planning. "Placing handsinks in areas that are heavily trafficked is vital to achieving high participation," says McAllister. "Workers are often blamed for not washing their hands, but it's not practical for people to keep running to out-of-the-way sink locations between tasks. Ideally, sinks should be located within five feet of each foodservice workstation, and it's a

good idea for a handsink to be located at or between each prep location, warewashing station and server station, in addition to the chef work areas," he notes.

Eagle Foodservice Equipment
800.441.8440
Clayton, DE
www.eaglegrp.com



Torrey Pines Scientific, Inc.

New, Compact "Electronic Ice Cube" Replaces Ice Buckets for Chilling Samples at Your Work Station

Torrey Pines Scientific, Inc. announces a compact, inexpensive replacement for ice baths and chillers without any of the mess or maintenance.

The IC10 "Ice Cube" which is 6.5" (16.5 cm) x 4.75" (12 cm) takes virtually no bench space and uses aluminum samples blocks that can accommodate nearly all routine sample containers. Included are centrifuge tubes of 0.2 ml, 0.5 ml and 1.5 ml as well as PCR tubes and plates, 96-well and 384-well assay plates, plus test tubes and more.

The Peltier driven Model IC10 works from a small bench-top universal power supply that takes AC inputs from 95 to 265VAC, 50/60Hz, and converts that automatically to 12 volts DC to operate the unit. The Ice Cube is UL, CSA and CE compliant. The

IC10 chills to 30°C below ambient on its surface and can chill the largest sample blocks to 4°C with ease.

The Model IC10 comes complete with chiller module, universal power supply, AC line cord for the country of use, and instructions.

Torrey Pines Scientific, Inc.
760.471.9100
San Marcos, CA
www.torreypinesscientific.com

New Rack and Pinion, Double Acting and Spring Return Pneumatic Actuators, Size 06 to 26 from Ultraflo

Ultraflo has announced the 100 Series actuator product line. The 100 Series is a pneumatically driven rack and pinion actuator available in double acting and spring return designs, both providing a 90° rotation. The 100 Series features a compact, economical package incorporating many standard features only offered as options on many competitive models. Eight different models provide output torques at 80 psi from 300 lb. inches up through 29,000 lb. inches.

The 100 Series offers mounting to the complete line of Ultraflo butterfly valves, as well as NAMUR standards for mounting of Ultraflo accessories. The 100 Series actuators are designed primarily for pneumatic actuation up to a maximum pressure of 140 psig (10 Bar) and for temperatures ranging from -40°F (-40°C) to +200°F (+95°C). These actuators are also available for operation with alternative media such as hydraulic oil and water.

Special features include pre-loaded, contained cartridge spring packs in the Spring Return units. The spring packs offer enhanced safety,

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INDUSTRY PRODUCTS

ease of maintenance and reduced space requirements. Conversion between Spring Return and Double Acting units is accomplished simply by the insertion or removal of the spring packs. All other components are identical. The pre-loaded spring packs eliminate the need to control spring tension by the end caps and retaining bolts.

The Ultraflo 100 Series pneumatic actuator is a fully enclosed and self-contained unit designed for ease of use and maintenance. Integral porting eliminates the need for costly, cumbersome and easily damaged external tubing. Integral travel stops are housed in each end cap to precisely control the degree of travel operation.

The Series 100 actuators feature a one-piece pinion machined from hardened alloy steel and zinc-plated for corrosion resistance. Permanently lubricated acetal bearings support the pinion at both top and bottom. The die-cast aluminum pistons travel on lubricated acetal piston guides and rings that work in conjunction with the pinion bearings to absorb operator side thrust and reduce the coefficient of friction. This results in extended service life and more efficient torque output. For increased corrosion protection, the extruded aluminum body is anodized and the die cast end caps are polyester coated.

Ultraflo Corporation
800.950.1762
Ste. Genevieve, MO
www.ultraflo.com

BioControl® Introduces Innovative Rapid Test for Chemical Concentration

BioControl Systems, Inc. announces an innovation in sanitation monitoring — a cost-effective and precise method for measuring sanitizer and

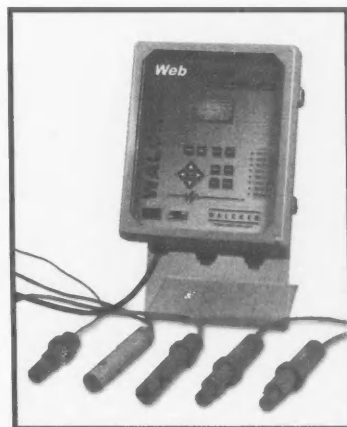
cleanser solution concentrations. An industry first, the LIGHTNING MVP Conductivity Probe is a reusable probe that allows food processors to measure sanitizer concentration and conductivity with the same instrument they use to measure ATP, pH and temperature. This addition to the LIGHTNING MVP system will allow food manufacturing plants to save money and reduce risk by tightly controlling their sanitizer concentrations.

Providing a precise measurement for managing sanitizer concentration presents a significant economic benefit to end-users. Overmixing sanitizers and cleansers by even a few percentages can quickly amount to tens of thousands of dollars a year in wasted chemicals. Conversely, undermixing can endanger plant safety when the use solution does not effectively sanitize a surface. Current methods of measuring sanitizer concentration, such as chemical strips and titration kits, offer results as a range and are subjective, based on an employee-interpreted color change. This method produces an accuracy rate of only $\pm 25\%$. The LIGHTNING MVP provides a single, accurate number with variation of $\pm 5\%$ are reported in parts-per-million (ppm) which is automatically logged, creating a strong, unalterable audit trail.

"ATP measurement as an indicator of plant sanitation has been widely used throughout the food industry. We've always had the vision that the LIGHTNING MVP would provide value far beyond sanitation monitoring," states Philip Feldsine, president and CEO of BioControl. "By adding concentration/ppm and conductivity to its measurement capabilities, we offer an instrument that monitors both sanitation and HACCP programs — reducing both cost and risk for our customers."

The LIGHTNING MVP Conductivity Probe and its multiple uses are just two of the many innovative features of the LIGHTNING MVP system. The LIGHTNING MVP is the industry's first multi-parametric instrument to combine ATP monitoring with measurements of other common quality measurements including temperature and pH. The LIGHTNING MVP allows users to collect, analyze and report data from multiple quality indicators with a single instrument and is the only system to offer room temperature stable ATP sampling devices and in-house calibration.

BioControl Systems, Inc.
425.603.1123
Bellevue, WA
www.biocontrolsys.com



Span Tech, LLC

Span Tech Introduces WhisperTrax™ Wedge Conveyor for Elevating Product in Small Floor Space Situations

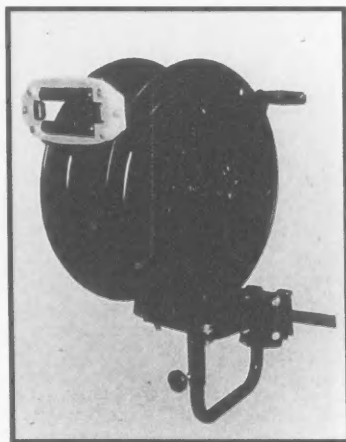
SpanTech LLC has introduced its WhisperTrax™ Wedge Conveyor. The dual-chain design allows users to incline or decline product in a small

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INDUSTRY PRODUCTS

footprint, saving precious floor space. Configurable for a wide variety of applications, the continuous gripping chain crimps around product at the in-feed and transports it in a variable angle of incline or decline, up to 90°. WhisperTrax™ Wedge Conveyor models come manually adjustable for fixed position or fully adjustable with a hand crank. Variable speed ranges are available and elevation changes up to 30 feet (9.14 m) are possible. There are two models offered and options to fit almost any application.

SpanTech, LLC
270.651.9166
Glasgow, KY
www.spantechllc.com



Hannay Reels Inc.

Hannay PW-2 Series Reels Specially Designed for Pressure Wash Industry

The versatile Hannay PW-2 Series reel is designed to quickly mount to almost any type of pressure washer. It is ruggedly constructed of 12 and

16 gauge steel, with a black powder coat finish.

The PW-2 Series reel has a pressure rating of up to 4000 psi and can handle product temperatures from +20°F to +250°F. Its 1/2" schedule 80 Hub pipe delivers flow rates of more than 12 gpm at 15 fps. An adjustable split bearing brake assembly allows for an infinite number of tension settings, and a captive hose guide roller assembly provides smooth payout and rewind. The PW-2 Series also features a permanently attached direct crank rewind. A variety of optional mounting kits and accessories are also available.

Hannay Reels Inc.
1.877.GO.REELS
Westerlo, NY
www.hannay.com

Ecolab Boosts CIP Product Line with Next Generation CIP Cleaners

Ecolab Inc. announces the addition of two new CIP detergents. Exxelerate™ CIP and Solodigm™ are two unique products for general cleaning applications in dairy and food processing facilities. Both products are designed to help processors reduce the total cost of cleaning and effluent.

Exxelerate CIP is a chlorinated detergent with reduced alkalinity and a special surfactant. This versatile product penetrates soil faster than traditional chlorinated detergents and helps speed the cleaning process. The lower level of caustic helps the product rinse freely faster and also reduces the total amount of water used in the cleaning process.

Solodigm, a liquid enzymatic detergent, saves both time and water by combining proteolytic enzymes, water conditioners, wetting agents, and alkaline builders into one product. Solodigm is chlorine free and helps to greatly reduce sodium and chlorine discharges, as well as the time needed for cleaning and rinsing of dairy processing equipment.

Both products have a strong advantage over traditional CIP cleaners in terms of impact on effluent. Laboratory tests conducted to compare Sodium, chlorine and chloride ion output, show Ecolab products Exxelerate CIP and Solodigm, when combined with Ecolab Matrixx® peroxyacetic acid based, EPA-registered sanitizer are far superior to traditional commodity programs and traditional cleaners and sodium hypochlorite sanitizers.

For the comparison, models of four cleaning and sanitizing programs were created. The commodity program included 50% caustic and bleach. The traditional cleaner and bleach consisted of a standard chlorinated alkaline cleaner and sodium hypochlorite, EPA-registered sanitizer.

The combination of Exxelerate CIP detergent and Matrixx EPA-registered sanitizer reduces by half the amount of chlorine and chloride ions compared to a traditional cleaning program. For an even greater reduction, the combination of Solodigm and Matrixx reduces sodium, chlorine and chloride ions to levels unattainable with any other cleaning and sanitizing program available on the market today.

Ecolab Inc.
651.293.2549
St. Paul, MN
www.ecolab.com

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COMING EVENTS

JANUARY

- **6, HACCP: A Management Summary**, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **17-19, Principles of Microbiological Troubleshooting in Your Factory: Real Problems/Real Answers**, San Diego, CA. For more information, contact Robert Behling at 608.273.0140; E-mail: rbehling@msn.com.
- **19-20, ServSafe® for the Food Industry and Food Service**, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **24-25, International Poultry Scientific Forum**, Georgia World Congress Center, Atlanta, GA. For more information, call 770.493.9401 or go to www.poultryegg.org.

FEBRUARY

- **7-8, HACCP IV: Validation & Verification of Your HACCP Plan**, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.
- **8-11, Food Pasteurization with Electronic Irradiation**, College Station, TX. For more information, contact Tom A. Vestal at 979.458.3406; E-mail: t-vestal@tamu.edu.

- **10-12, Expo Carnes 2005**, Cintermex, Monterrey, N.L., Mexico. For more information, outside Mexico call +52.81.83.69.66.60.64 y 65; E-mail: lizapex@cintermex.com.mx.
- **15-17, NFPA's 2005 Food Claims and Litigation Conference**, Ojai, CA. For more information, call 202.639.5950; Web site: www.nfpa-food.org/documents/FoodLitRegForm05.pdf.
- **16-17, Arizona Environmental Health Association Southwest Food Safety Conference and Exhibition**, Riverside Resort Hotel & Casino, Laughlin, NV. For more information, contact Chris Reimus at 480.870.7655 ext. 202; E-mail: creimus@mail.maricopa.gov.
- **17, Georgia Association for Food Protection Annual Spring Meeting**, University of Georgia, Food Science Bldg., Athens, GA. For more information, contact Mark Norton at 404.656.3621 E-mail: mnorton@agr.state.ga.us.
- **22-24, Kentucky Association of Milk, Food & Environmental Sanitarians Annual Spring Meeting**, Executive Inn West, Louisville, KY. For more information, contact Laura Strevels at 859.363.2022; E-mail: laura.strevels@ky.gov.
- **28-March 1, Effective Food Security**, Guelph Food Technology Centre, Guelph, Ontario, Canada. For more information, contact Marlene Inglis at 519.821.1246; E-mail: minglis@gftc.ca.

MARCH

- **10-13, IAFIS 2005 Annual Conference**, San Francisco Fairmont, San Francisco, CA. For more information, call 703.761.2600 or go to www.iafis.org.
- **16-18, Food Safety Summit**, Washington DC Convention Center, Washington, D.C. For more information, call 800.746.9646 or go to www.foodsafetysummit.com.

MAY

- **12-17, The 30th National Conference on Interstate Milk Shipments**, Hyatt on Capitol Square, Columbus, OH. For more information, contact Leon Townsend at 502.695.0253; E-mail: ltownsend@ncims.org.
- **17-18, Pennsylvania Association of Milk, Food and Environmental Sanitarians Annual Spring Meeting**, Penn State University, State College, PA. For more information, contact Gene Frey at 717.397.0719; E-mail: erfrey@landolakes.com.
- **23-26, AOAC Midwest Section Meeting and Expo**, Kansas City, MO. For more information, contact Ron Jenkins at 816.891.0442; Web site: www.midwestaoac.org.
- **24-26, Penn State Food Microbiology Short Course Detection and Control of Foodborne Pathogens**, Penn State University, Berks-Lehigh Valley College, Reading, PA. For more information, contact Dr. Hassan Gourama at 610.396.6121; E-mail: hxg7@psu.edu; <http://foodsafety.cas.psu.edu>.

IAFP UPCOMING MEETINGS

AUGUST 14-17, 2005
Baltimore, Maryland

AUGUST 13-16, 2006
Calgary, Alberta, Canada

JULY 8-11, 2007
Lake Buena Vista, Florida

The index and/or table of contents has been removed and photographed separately within this volume year.

For roll film users, this information for the current volume year is at the beginning of the microfilm. For a prior year volume, this information is at the end of the microfilm.

For microfiche users, the index and/or contents is contained on a separate fiche.

DuPont Food Risk Assessment	Inside Front Cover, Issue 2; Inside Front Cover, Issue 3; Inside Front Cover, Issue 4; Inside Front Cover, Issue 5; Back Cover, Issue 9; Back Cover, Issue 10	Oxoid Inc.	Inside Back Cover, Issue 2; 375, 571
		Quality Management, Inc.	57, 379, 561, 577, 721, 933
		R & F Laboratories	513, 581, 675
DuPont Qualicon	Inside Front Cover, Issue 1; 338, Inside Back Cover, Issue 7; Inside Front Cover, Issue 9; Inside Front Cover, Issue 11	Roche Applied Science	373, 479
		Shat-R-Shield Inc.	327, 385, 506
Ecolab, Inc.	301, 469, 803	Strategic Diagnostics	Inside Front Cover, Issue 7; 935
Food Processors Institute	41, 61, 189, 209, 322, 430, 497, 581, 686, 786, 919, 952	Tech Help	513
Glo Germ Company	Inside Back Cover, Issue 1; Back Cover, Issue 5; 567	Warnex Diagnostics	Back Cover, Issue 1; Back Cover, Issue 2; Back Cover, Issue 3; Back Cover, Issue 4; 299, 473
Nasco	334, 572	Zep Manufacturing	369, 526, 801
National Food and Toxicology Center	32		

In Memory of...

Professor David A. A. Mossel The Netherlands

IAFP would like to extend our deepest sympathy to the family and friends of Professor David A. A. Mossel who passed away in August 2004.

Professor Mossel obtained his Ph.D. in 1949 in Utrecht after defending his thesis on water binding and water determination in foods. As a food microbiologist, his interest was primarily focused on transfer of microorganisms by food. He felt the significance of integrated quality control in the food chain with respect to contamination with and outgrowth of pathogenic microorganisms as the cause of a number of diseases and even death. This concept was developed by Wilson, but it was Mossel's merit to demonstrate its significance everywhere. He initiated many research projects and taught numerous courses all over the world.

In 1973, Mossel was appointed as a full professor at Utrecht University in The Netherlands. He was very involved at the Eijkman Foundation where his aim was creating postgraduate training and starting research projects in the field of public health microbiology. The crown on this work was the module "Public Health Microbiology of Food and Drinking Water" in the International Distance Learning, M.Sc. Education for Public Health Science: Food and Drinking Water (University of Hertfordshire, Hatfield, UK). The international recognition for his work was reflected in several doctorates *honoris causa*, and in a number of honorary memberships.

Professor Mossel was a member of IAFP since 1969. IAFP will always have sincere gratitude for his contributions to the Association and the profession.

**INTERNATIONAL ASSOCIATION
FOR FOOD PROTECTION**

**General Fund Statement of Activity
For the Year Ended August 31, 2004**

Revenue:

Advertising	\$ 124,884
Membership & Administration	449,024
Communication	739,201
Annual Meeting	724,673
Workshops	23,668
Total revenue	<u>\$ 2,061,450</u>

Expense:

Advertising	103,671
Membership & Administration	624,064
Communication	711,709
Annual Meeting	445,323
Workshops	14,026
Total expense	<u>\$ 1,898,793</u>

Change in General Fund \$ 162,657

Net Assets as of 8/31/04:

General Fund	190,724
Foundation Fund	223,842
Restricted Fund	41,897
Speaker Travel Fund	38,304
Total net assets	<u>\$ 494,767</u>

ADVERTISING INDEX

Arizona Environmental Health Association	968
BD Diagnostics	937
BioSys	Outside Back Cover
Food Processors Institute	952
Quality Management, Inc.	933
Strategic Diagnostics	935

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CAREER SERVICES SECTION

Senior Scientist Microbiology

Position Overview

The Senior Scientist Microbiologist position will primarily be a research position based in the microbiology laboratory at The Coca-Cola Headquarters in Atlanta. The successful applicant will be responsible for conducting research on new antimicrobials suitable for beverage applications. This research will include:

- Developing a thorough understanding of the current state of knowledge related to antimicrobials.
- Designing and executing internal experiments using state-of-the-art technologies to screen and evaluate antimicrobial agents.
- Collaborating with external institutes on confidential Coca-Cola funded antimicrobial research projects

Other primary responsibilities include:

- Contributing to the maintenance of a fully functioning microbiological lab that is capable of responding rapidly to Company needs. Maintenance activities will include upkeep of microbiological equipment and the laboratory's culture collection.
- Providing microbiological analytical support to The Company on an as needed basis.
- Developing an active role within the Company's microbiological and technical communities.

Secondary responsibilities include:

- Field support to plants and other operations.
- Providing microbiological advice to different groups within The Company.

Education: Ph.D. preferred

Experience: 7-10 years industry experience preferred

For further information, contact:

Rich Gensler
rgensler@na.ko.com

CAREER SERVICES SECTION

List your open positions in *Food Protection Trends*. Special rates for this section provide a cost-effective means for you to reach the leading professionals in the industry. Call today for rate information.

Ads appearing in *FPT* will be posted on the Association Web site at www.foodprotection.org at no additional cost.

Send your job ads to Donna Bahun at dbahun@foodprotection.org or to the Association office: 6200 Aurora Ave., Suite 200W, Des Moines, IA 50322-2864; Phone: 800.369.6337; 515.276.3344; Fax: 515.276.8655.



International Association for
Food Protection®

IAFP Members

Did you know that you are eligible to place an advertisement if you are unemployed and looking for a new position? As a Member benefit, you may assist your search by running an advertisement touting your qualifications.

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Journal of Food Protection®

ISSN: 0362-026X
Official Publication



International Association for
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Vol. 67 November 2004 No. 11

Letters to the Editor

"Public Health Consequences of Macrolide Use in Food Animals: A Deterministic Risk Assessment," A Comment on: J. Food Prot. 67(5):980-992 (2004) Linda Tollefson, Hide Kruse, and Henrik C. Wegener.....	2368
"Public Health Consequences of Macrolide Use in Food Animals: A Deterministic Risk Assessment," A Comment on: J. Food Prot. 67(5):980-992 (2004) Peter Collignon.....	2369
Response H. Scott Hurd.....	2370

Articles

Efficacy of Sanitizers To Inactivate <i>Escherichia coli</i> O157:H7 on Fresh-Cut Carrot Shreds under Simulated Process Water Conditions Rolando J. Gonzalez, Yaguang Luo,* Saul Ruiz-Cruz, and James L. McEvoy.....	2375
Survival of <i>Escherichia coli</i> O157:H7 and <i>Salmonella</i> in Apple Cider and Orange Juice as Affected by Ozone and Treatment Temperature Robert C. Williams, Susan S. Sumner, and David A. Golden*.....	2381
Occurrence of <i>Escherichia coli</i> , Noroviruses, and F-Specific Coliphages in Fresh Market-Ready Produce Paul B. Allwood, Yashpal S. Malik, Sunil Maherchandani, Kevin Vought, Lee-Ann Johnson, Craig Braymen, Craig W. Hedberg, and Sagar M. Goyal*.....	2387
<i>Escherichia coli</i> O157:H7 in a Cohort of Weaned, Preconditioned Range Beef Calves John R. Dunn,* James E. Keen, Ron Del Vecchio, Thomas E. Wittum, and R. Alex Thompson.....	2391
Spread of Marine Bacteria from the Hides of Cattle in a Simulated Livestock Market and at an Abattoir V. J. Collins, C.-A. Reid, M. L. Hutchison, M. H. Davies, K. P. A. Wheeler, A. Small, and S. Bunick*.....	2397
A Mathematical Model for the Transmission of <i>Salmonella</i> Typhimurium within a Grower-Finisher Pig Herd in Great Britain Renata Ivanek,* Emma L. Snary, Alasdair J. C. Cook, and Yrjö T. Grohn.....	2403
Juice Irradiation with Taylor-Couette Flow: UV Inactivation of <i>Escherichia coli</i> L. J. Forney,* J. A. Pierson, and Z. Ye.....	2410
Egg Consumption Patterns and <i>Salmonella</i> Risk in Finland S. Leivonen,* A. S. Havulinna, and R. Majala.....	2416
Real-Time PCR Identification of <i>Listeria paraheмоcyticus</i> in Opsters Using an Alkanalase Matrix G. E. Kaufman, G. M. Blackstone, M. C. L. Vickary, A. K. Bai, J. Bowes, Michael D. Bowen, Richard F. Meyer, and A. DePaolo*.....	2424
Biochemical and Virulence Characterization of <i>Listeria</i> but Nonculturable Cells of <i>Listeria paraheмоcyticus</i> Hin-Chung Wong,* Chi-Tsung Shen, Chia-Ni Chang, Yeong-Sheng Lee, and James D. Oliver.....	2430
Effects of Recovery, Plating, and Inoculation Methods on Quantification of <i>Escherichia coli</i> O157:H7 and <i>Listeria monocytogenes</i> from Strawberries Y. Han, R. H. Linton,* and P. E. Nelson.....	2436
Fate of <i>Escherichia coli</i> O157:H7 and <i>Listeria monocytogenes</i> in Strawberry Juice and Acidified Media at Different pH Values and Temperatures Y. Han and R. H. Linton*.....	2443
Decontamination of Strawberries Using Batch and Continuous Chlorine Dioxide Gas Treatments Y. Han, T. L. Selby, K. K. Schultze, P. E. Nelson, and R. H. Linton*.....	2450
Control of <i>Listeria monocytogenes</i> on Frankfurters with Antimicrobials in the Formulation and by Dipping in Organic Acid Solutions I. M. Bampalá, I. Geomaras, K. E. Belk, J. A. Scanga, P. A. Kendall, G. C. Smith, and J. N. Solos*.....	2456
Control of Growth and Survival of <i>Listeria monocytogenes</i> on Smoked Salmon by Combined Potassium Lactate and Sodium Diacetate and Freezing Stress during Refrigeration and Frozen Storage K. S. Yoon,* C. N. Burnette, K. A. Abou-Zeid, and R. C. Whiting.....	2465
Effect of Prepackage and Postpackage Pasteurization on Postprocess Elimination of <i>Listeria monocytogenes</i> on Deli Turkey Products Peter Muriana,* Nanditha Ganda, Will Robertson, Brad Jordan, and Suparna Mitra.....	2472
Prevalence and Typing of <i>Listeria monocytogenes</i> in Ready-to-Eat Food Products on the Belgian Market Els Van Coillie,* Hadewig Werbrouck, Marc Heyndrickx, Lieve Herman, and Nancy Rijpens.....	2480
Strain-Specific Differences in the Attachment of <i>Listeria monocytogenes</i> to Alfalfa Sprouts Lisa Gorski,* Jeffrey D. Palumbo, and Kimanh D. Nguyen.....	2488
Dairy Farm Reservoir of <i>Listeria monocytogenes</i> Sporadic and Epidemic Strains Monica K. Borucki,* James Reynolds, Clive C. Gay, Katherine L. McElwain, So Hyun Kim, Donald P. Knowles, and Jinxiu Hu.....	2496
Longitudinal Studies on <i>Listeria</i> in Smoked Fish Plants: Impact of Intervention Strategies on Contamination Pathways Victoria R. Lappi, Joanne Timothea, Kendra Kerr Nightingale, Kenneth Gall, Virginia N. Scott, and Martin Wiedmann*.....	2500
Direct Detection and Identification of Lactic Acid Bacteria in a Food Processing Plant and in Meat Products Using Denaturing Gradient Gel Electrophoresis Hajime Takahashi, Bon Kimura,* Miwako Yoshikawa, Seitaro Gotou, Iitaru Watanabe, and Taiso Fujii.....	2515
Sequencing of the Tyrosine Decarboxylase Cluster of <i>Lactococcus lactis</i> IPLA 655 and the Development of a PCR Method for Detecting Tyrosine Decarboxylase Lactic Acid Bacteria Maria Fernández, Daniel M. Linarez, and Miguel A. Alvarez*.....	2521
Comparison of Pressure and Heat Treatments of <i>Clostridium botulinum</i> and Other Endospores in Modified Carrots Dirk Margosch, Matthias A. Ehrmann, Michael G. Gänzle,* and Rudi F. Vogel*.....	2530
Radiation-Heat Synergism for Inactivation of <i>Alicyclobacillus acidoterrestres</i> Spores in Citrus Juice M. Nakama, K. Saito, T. Katayama, M. Tada, and S. Todoriki*.....	2538
Efficacy of Acidic Electrolyzed Water Ice for Pathogen Control on Lettuce Shigenobu Koseki,* Seichiro Isobe, and Kazuhiko Itoh.....	2544
Spectroscopic Quantification of Bacteria Using Artificial Neural Networks Methala J. Gupta, Joseph Irudayaraj,* and Chintia Debroy.....	2550
Detection and Identification of Bacteria in a Juice Matrix with Fourier Transform-Near Infrared Spectroscopy and Multivariate Analysis L. E. Rodriguez-Saona, F. M. Khambaty, F. S. Fry, J. Dubois, and E. M. Calvey*.....	2555
Determination of Thermal Inactivation Kinetics of Microorganisms with a Continuous Microflow Apparatus C. R. Ross and J. H. Holchak*.....	2560
High-Performance Liquid Chromatography-Multiresidue Method for the Determination of <i>N</i> -Methyl Carbanthran in Fruit and Vegetable Juices Consuelo Sánchez-Brunete, Beatriz Albero, and José Luis Tadeo*.....	2565
Home Storage Temperatures and Consumer Handling of Refrigerated Foods in Sweden I. M. Marklinder, M. Lindblad, L. M. Eriksson, A. M. Finsson, and R. Lindqvist*.....	2570
Observations Versus Self-Report: Validation of a Consumer Food Behavior Questionnaire Patricia A. Kendall,* Anne Elsebrand, Kelly Sinclair, Mary Schroeder, Gang Chen, Verna Bergmann, Virginia N. Hillers, and Lydia C. Medeiros.....	2578
An Application of Meta-Analysis in Food Safety Consumer Research to Evaluate Consumer Behaviors and Practices Sumet R. Patel,* Roberta Morales, Sheryl Cates, Donald Anderson, and David Kendall.....	2587
Inactivation of <i>Saccharomyces cerevisiae</i> Suspended in Orange Juice Using High-Intensity Pulsed Electric Fields Pedro Elez-Martínez, Joan Escobé-Hernández, Robert C. Soliva-Fortuny, and Olga Martín-Belloso*.....	2596

Research Notes

Colicin Concentrations Inhibit Growth of <i>Escherichia coli</i> O157:H7 in Vitro T. R. Callaway,* C. H. Stahl, T. S. Edrington, K. J. Genovese, L. M. Lincoln, R. C. Anderson, S. M. Lonergan, T. L. Poole, R. B. Harvey, and D. J. Nisbet.....	2603
Antibacterial Effect of Water-Soluble Tea Extracts on Foodborne Pathogens in Laboratory Medium and in a Food Model S. Kim,* C. Ruengwinyup, and D. Y. C. Fung.....	2608
Identification of Enterobacteriaceae from Washed and Unwashed Commercial Shell Eggs Michael T. Musgrove,* Deana R. Jones, Julie K. Northcutt, Nelson A. Cox, and Mark A. Harrison.....	2613
Demonstration of the Applicability of the Weibull-Log-Logistic Survival Model to the Lethal and Nonlethal Inactivation of <i>Escherichia coli</i> K-12 MG1685 Maria G. Corradini and Michela Peleg*.....	2617
Detection of Aflatoxin-Producing Molds in Korean Fermented Foods and Grains by Multiplex PCR Zheng-You Yang, Won-Bo Shim, Ji-Hun Kim, Seon-Ja Park, Sung-Jo Kang, Baik-Sang Nam, and Duck-Hwa Chung*.....	2622

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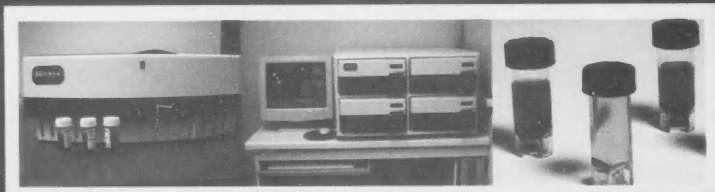
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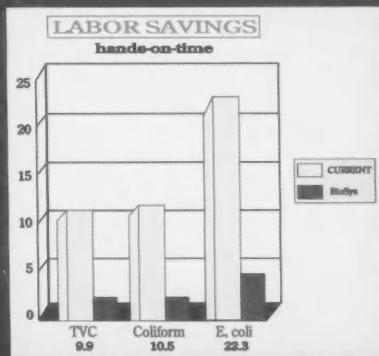
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