MAY 1998 · VOL. 18 · NO. 5 · PAGES 265-332

ISSN: 1043-3546
PERIODICALS
6200 Aurora Avenue•Suite 200W
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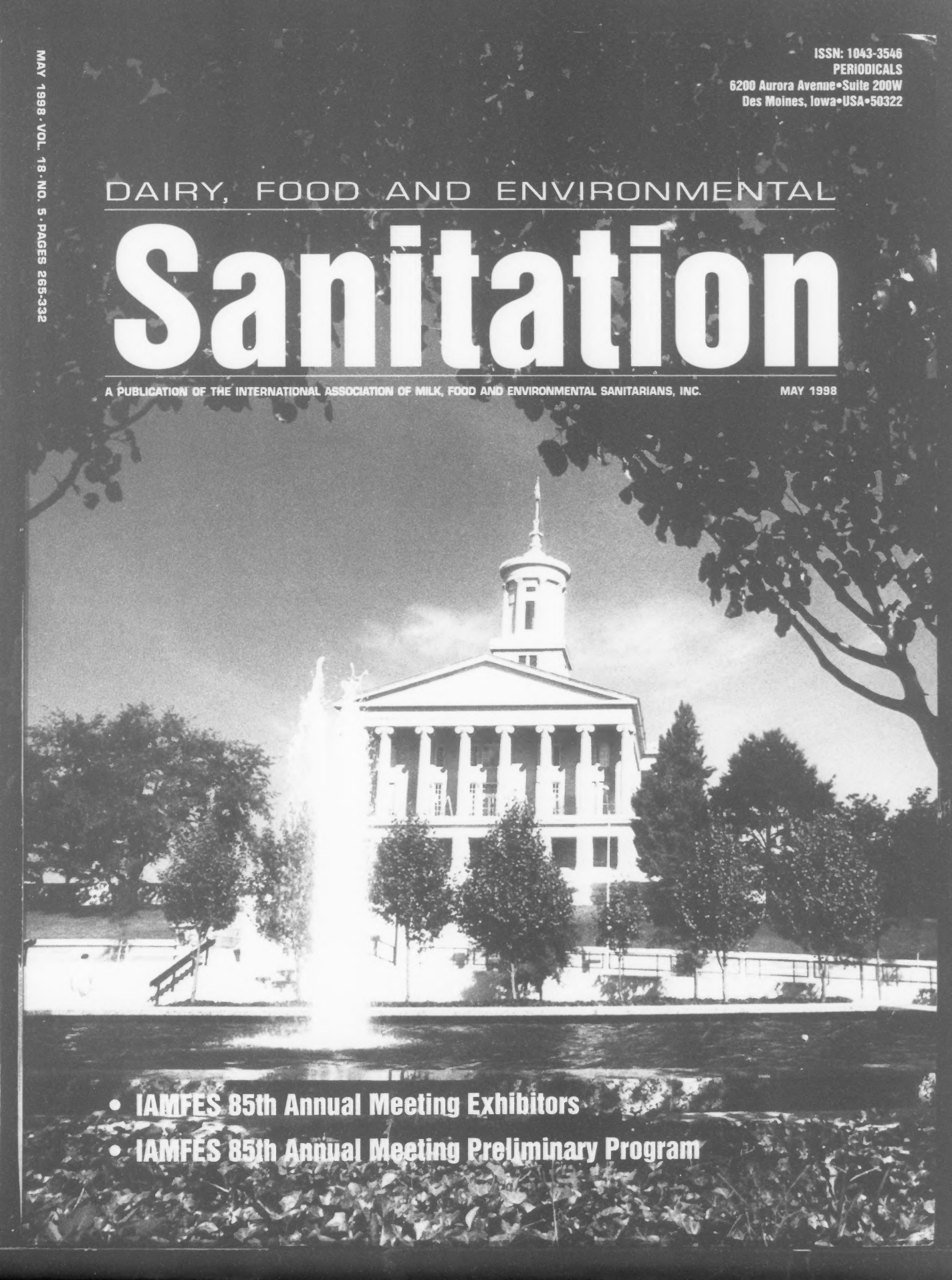
DAIRY, FOOD AND ENVIRONMENTAL

Sanitation

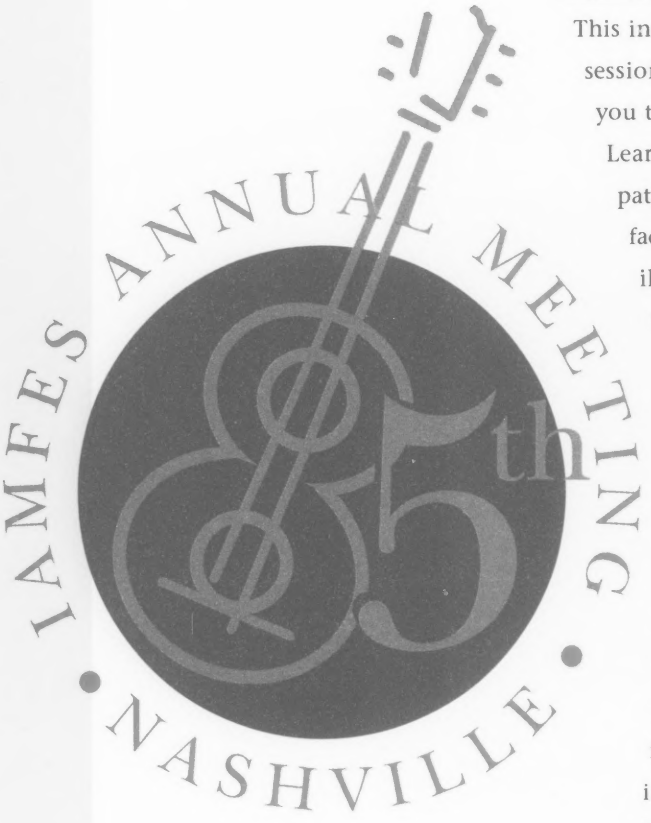
A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC. MAY 1998



- IAMFES 85th Annual Meeting Exhibitors
- IAMFES 85th Annual Meeting Preliminary Program

Advancing Food Safety Worldwide

Nashville, Tennessee is the site and **August 16-19, 1998** is the date that leading authorities in food safety from around the world will gather to share and discuss the latest advances in protecting the world's food supply at the **IAMFES 85th Annual Meeting**.



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Plan now to attend the IAMFES 85th Annual Meeting! Call today for registration information: 800.369.6337; 515.276.3344; Fax: 515.276.8655; E-mail: iamfes@iamfes.org; or visit our Web site: www.iamfes.org for the latest program information.

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August 16-19, 1998

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IAMFES Fellows Award

IAMFES welcomes your nominations for its new Fellows Award. The IAMFES Fellows Award will be presented at the IAMFES 85th Annual Meeting's Opening Session.

The purpose of the Fellows Award is to recognize a member's contributions to IAMFES and its Affiliates as well as contributions to the food safety profession.

To request nomination criteria, contact:

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6200 Aurora Ave., Suite 200W
Des Moines, IA 50322-2863
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655; E-mail: iamfes@iamfes.org

Nominations must be received no later than May 20, 1998.

ABOUT THE COVER...

The Tennessee State Capitol Building photo courtesy of the Nashville Convention and Visitors Center.

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Sanitation
A PUBLICATION OF THE INTERNATIONAL ASSOCIATION OF MILK, FOOD AND ENVIRONMENTAL SANITARIANS, INC.

Doiry, Food ond Environmentol Sonitotion (ISSN-1043-3546) is published monthly beginning with the January number by the Internationol Associotion of Milk, Faad and Environmentol Sonitorions, Inc. 6200 Auroro Avenue, Suite 200W, Des Moines, IA 50322-2863, U.S.A. Each volume comprises 12 numbers. Printed by Heuss Printing, Inc., 911 N. Secand Street, Ames, IA 50010, U.S.A. Periodicol Postoge poid ot Des Maines, IA 50318 and additionol entry offices.

Monuscripts: Carrespondence regarding monuscripts should be addressed to Corol F. Mouchko, Monoging Editar, IAMFES, Inc.

News Releoses, Updotes, Coming Events ond Cover Photos: Carrespondence far these materials shauld be sent ta Danna A. Bohun, Publicotions Specialist, IAMFES, Inc.

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Postoge: Outside U.S. add $22.50 per journal (*DFES* ar *JFP*) far surface delivery; add $95.00 per journal (*DFES* ar *JFP*) far air mail delivery. U.S. FUNDS ONLY – ON U.S. BANK. Single copies add $9.00 per issue.

Cloims: Notice of failure ta receive copies must be reparted within 30 doys domestic, 90 days outside U.S. Correspondence regarding changes of oddress ond dues must be sent ta Julie A. Cottonoch, Membership/ Meeting Coordinator, IAMFES, Inc.

Postmoster: Send oddress chonges to **Doiry, Food ond Environmentol Sonitotion,** 6200 Auraro Avenue, Suite 200W, Des Moines, IA 50322-2863, U.S.A.

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COMMENTS

FROM YOUR PRESIDENT

By GALE PRINCE
IAMFES President

"Plan now to attend"

If you have anything to do with food safety, the IAMFES Annual Meeting August 16-19 in Nashville is the place to be! Today, I'm in Nashville for another meeting and certainly have enjoyed the city. There are so many things to do and see. The hotel for the IAMFES meeting is outstanding and conveniently located in the heart of downtown Nashville. This prime location offers many choices for evening activities for the attendees and their guests. Across from the hotel is the Ryman Auditorium, which was home for many years to the Grand Ole Opry. If you love country music you can still catch the Opry every Saturday night out at Opryland. In fact IAMFES has reserved tickets for the Saturday night show. Order them from IAMFES. Other events we have arranged, include a golf tournament, tours, and a Monday Evening Social at the Wildhorse Saloon. However, entertainment isn't the only thing IAMFES has planned. We have a full educational meeting schedule as well.

On Saturday we have pre-conference workshops scheduled. They are "Proper Cleaning and Uses of Stainless Steel in the Food and Beverage Industries," and "ICMSF's Proposal for the Management of the Microbiological Safety of Foods." See page 322 in this issue for more details. Both promise be to excellent and will provide our Members an opportunity for continuation of their education and assist with problem solving.

Sunday morning and afternoon will be devoted to committee meetings and I encourage you to attend the ones of interest to you. It is an excellent chance to get together and share expertise on a common interest while serving your association and the membership. Committee meeting times are listed in this issue on page 325. The opening session on Sunday evening will be an exciting time. This year we are planning the introduction of the IAMFES Fellows Award. I am also delighted to have Dr. Christine Bruhn as our Ivan Parkin Lecturer who will talk about food safety from a consumer viewpoint. Dr. Bruhn is widely known for her involvement in consumer education on food safety. I'm looking forward to her presentation.

Your program committee began putting together the 1998 Annual Meeting program about a year ago. They met in January to review and select the scientific papers for presentation and finalize the program. We have over 250 presentations scheduled on various food safety topics.

There are four half-day sessions devoted strictly to dairy as well as a considerable number of presentations on fresh fruits and vegetables, which is a very timely subject. Other topics include seafood and meat HACCP after implementation, foodborne disease surveillance, and pest management. The general session promises to be timely and interesting.

Don't leave early or you'll miss out on a great Wednesday session that will cover one of the most important elements of food safety – a food handler's hands! Proper hygiene is a strategic element in any food safety program. We have a session devoted to hands as a transmission source, handwashing, hand sanitizing, and gloves – are they the solution? This should prove to be an interesting session.

Remember we will close the Meeting with our Annual Awards Banquet, which will honor distinguished Members for their service to IAMFES and to the field of food protection.

Look the program over in detail and make plans on what sessions or workshop your going to attend, then be sure to register early. Share the program with a collegeaue and bring them along. With the rapidly changing food safety field we all need to expand our knowledge in order to be on the leading edge.

THE IAMFES FOUNDATION FUND WILL BE SPONSORING A SILENT AUCTION AT THE 85TH ANNUAL MEETING!

WATCH FOR ADDITIONAL INFORMATION ON THE SILENT AUCTION

We are looking for members to donate items for the Silent Auction. All proceeds go to the IAMFES Foundation Fund.

What is the IAMFES Foundation Fund?

The Foundation Fund is supported by membership of IAMFES sustaining members and from individual members. Sustaining members are corporations, companies, and individuals whose business interests reflect the goals and mission of IAMFES. Funds in the Foundation are kept separate from the operating funds of IAMFES and are used for worthy causes which enrich the Association.

The Foundation Fund supports:

- Ivan Parkin Lecture
- Audio-Visual Lending Library
- Co-sponsorship of the Crumbine Award
- Developing Scientist Oral and Poster Competition
- Shipment of volumes of surplus *JFP* and *DFES* journals to developing countries through FAO in Rome
- Recruitment of exceptional speakers for the IAMFES Annual Meetings

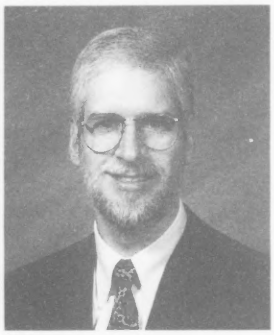
Why should I contribute to the IAMFES Foundation Fund?

Any contribution, no matter how large or small will help build a secure Foundation for the future of IAMFES. The future of IAMFES depends on how well we can meet the needs of our membership in providing educational programs, journals, products, and services, and on how well IAMFES fulfills its mission. The Foundation Fund was created to provide a long-lasting legacy of information and service for protecting the milk, food, water, and environment throughout the world.

If you would like to donate to the Foundation Fund and/or the Silent Auction, please contact Lisa Hovey at 800.369.6337; 515.276.3344; Fax: 515.276.8655; or E-mail: lhovey@iamfes.org.

COMMENTARY

FROM THE EXECUTIVE DIRECTOR



By DAVID W. THARP
IAMFES Executive Director

"The focal point of the Meeting is the presentations on food safety"

This May issue of *DFES* contains the latest information for the 1998 IAMFES Annual Meeting in Nashville, Tennessee this August. We suggest you pay particular attention to the preliminary program on page 311. It is a great way to pre-plan your schedule. There are more than 25 sessions over the three-day period with topics related to seafood, meat, poultry, dairy, produce, pest elimination, restaurant inspection, risk management, and hand hygiene. Something of interest for everyone, no matter where your expertise lies! Check our Web site at www.iamfes.org for the latest Annual Meeting program and information.

I also want to direct your attention to the special events associated with this 85th IAMFES Annual Meeting. On Saturday night, we have a group of tickets reserved for the mainstay of Nashville, The Grand Ole Opry. This promises to be a fun-filled evening with your IAMFES friends. So be sure to be included and enjoy entertainment at its best! Speaking of best, the IAMFES Best-Ball Golf Tournament will tee off early Sunday morning at the Hermitage Golf Course. This beautiful course is located on the banks of the Cumberland River. The Tournament is open to golfers of all skill levels, so don't be shy; join the fun.

Companion tours begin on Sunday with the Music City Sites tour. Included on this tour are downtown landmarks as well as Music Row (recording studios) and the Country Music Hall of Fame. On Monday, our tour concentrates on Historic Nashville with a drive through Centennial Park where the Parthenon is located. After touring the Parthenon, it's on to President Andrew Jackson's home, The Hermitage, for lunch and a historical tour. Tuesday's tour includes a Tennessee landmark – the Jack Daniel's Distillery. First you will stop at the Tennessee Walking Horse Museum in nearby Shellbyville, then proceed to the historic town square of Lynchburg. After lunch, it's on to Jack Daniel's for an entertaining tour of the Distillery. There is so much to entertain you in and around Nashville, you'll want to bring your family and friends!

Sunday evening, we open the 85th IAMFES Annual Meeting with the Ivan Parkin Lecture. This year's honored Lecturer is Dr. Christine Bruhn from the Center for Consumer Research at the University of California-Davis. Following the Ivan Parkin Lecture is the Cheese and Wine Reception in the exhibit hall. This is a great time to greet old friends and meet new ones! Don't dare miss this evening.

After attending sessions on Monday, you'll be ready for some fun. We have just what you're looking for. Our Monday Social is an evening at the famous Wildhorse Saloon. You've probably seen dancing and other events televised from the Wildhorse Saloon. It's Nashville's best-known country music night-spot and has a variety of entertainment. You might even want to join in with the dancing!

Tuesday evening, you have the night to enjoy with colleagues and friends. The entertainment district of Nashville is right outside of your hotel door. Speaking of the hotel, contact the Renaissance Nashville Hotel at 800.327.6618 to make your reservations. We have a limited number of rooms available and they will fill-up fast!

Our Annual Awards Banquet concludes the Meeting on Wednesday evening. It is a night to honor IAMFES Members who have excelled in the field of food protection. We are fortunate to have so many well deserving Members who have dedicated their lives to protecting the food supply.

There you have a quick summary of the events surrounding the 85th IAMFES Annual Meeting. The focal point of the Meeting is, of course, the more than 250 presentations on food safety. An important part of any gathering of professionals is the opportunity to socialize and nework outside of the sessions. We have events available to allow this networking – now you need to act by registering for the Meeting and events! We're looking forward to seeing you in Nashville on August 16th.

Dairy, Food and Environmental Sanitation, Vol. 18, No. 5, Pages 278-287

Consumer Response to Pesticide/Food Safety Risk Statements: Implications for Consumer Education

Christine M. Bruhn, Carl K. Winter, Gary A. Beall, Steven Brown, Jan O. Harwood, Cathi L. Lamp, Gwendolyn Stanford, Yvonne J. Steinbring, and Barbara Turner

SUMMARY

Scientists, regulators, and advocacy groups have tried to quantify risk and communicate information about risk. Concern about pesticide risk has led some consumers to reduce consumption of health-promoting fruit and vegetables. This study evaluates consumer response to eight statements describing pesticide risk. Consumers rated statements as to believability, perception of hazard, influence on eating, and usefulness. While the statements differed with respect to complexity of scientific information, economic impacts, and types of risks compared, they were scientifically accurate. Consumer assessment of believability and usefulness of the various messages differed. The simple statement "The pesticide causes cancer" caused participants to be more cautious about consuming produce than a statement that gave more detailed information, such as the high doses required to cause cancer in laboratory animals or the magnitude of cancer risk. Information on the economic impacts of pesticide use on consumer prices was considered useful by many. These findings support the importance of providing background information to consumers on pesticide use and persistence; agricultural techniques that reduce pesticide use, such as integrated pest management; and ways consumers can handle food to reduce risk.

INTRODUCTION

The public is concerned about pesticide residues in the food supply. National consumer attitude surveys indicate that over the past decade, between 72% and 82% of U.S. consumers considered pesticide residues to be a serious hazard *(9)*. A longitudinal study among Pennsylvania consumers found that trust in safe use of pesticides by farmers declined from 84% in 1965 to 62% in 1984 *(11)*. Only 40% of California consumers believed farmers carefully managed the safe use of pesticides *(1)*. A study of Washington, Idaho, and Oregon consumers showed that 85% felt strongly or somewhat strongly that the government should be doing more to regulate pesticide use *(4)*.

Since pesticides are used for their toxic effect, concern about residues is not unexpected. Dittus and Hillers *(3)* found that trust in regulation of pesticides was most strongly related to whether benefits of their use were identified. Respondents with low trust in the regulation of pesticides had the highest concern about the impact of pesticide residues on human health.

TABLE 1. Risk statements in order of presentation

1. You read in the newspaper thot a small amount of a pesticide may be present on a food. The pesticide causes concer.
2. You read in the newspaper that a smoll omount of o pesticide may be present on a food. In laboratory studies, some animals given large doses of the pesticide hove developed concer.
3. You reod in the newspaper that a smoll amount of a pesticide moy be present on a food. While scientists moy not agree on the actuol risk of the pesticide to the consumer, o worst-cose estimote is that lifetime exposure to the pesticide could result in one concer per million people exposed. Other estimotes suggest o much lower risk.
4. You read in the newspaper that a small amount of a pesticide moy be present on a food. The risks from exposure to the pesticide are much lower than the risks from eating a peanut butter sandwich.
5. You read in the newspoper that a small amount of a pesticide may be present on a food. The risks from exposure to the pesticide ore much lower thon the risks from driving an outomobile around the block.
6. You read in the newspaper that a smoll omount of a pesticide moy be present on a food. Lifetime exposure to the pesticide may result in o slight heolth risk, but food produced without the pesticide will cost 25% more.
7. You reod in the newspoper thot a small amount of a pesticide may be present on a food. Lifetime exposure to the pesticide may result in a slight heolth risk, but most food experts ogree that this risk is greatly outweighed by the heolth benefits of eoting the food.
8. You read in the newspaper thot o small amount of o pesticide may be present on a food. Lifetime exposure to the pesticide may result in a slight heolth risk, but the pesticide prevents the production of more risky, noturally-occurring chemicols.

Non-scientific factors also contribute to consumer perception of risk and tend to magnify perceptions derived from scientific risk assessment. These include whether the risk is voluntary or involuntary, the controllability and/or familiarity with the risk, risk equity, whether the risk is natural or artificial, and the immediate or delayed consequences of the risk *(6, 12)*. Exposure to pesticides is typically involuntary, because the use of pesticides is controlled by others. Pesticides are often synthetic chemicals with potential to cause delayed effects, such as cancer. Consumer risk from pesticide use may be considered unfair, because pesticide users may be considered the beneficiaries, with consumers absorbing the risks.

Consumer perception of risk may also be influenced by the way risk is described. Scientific risk assessment is burdened with uncertainty, which allows the depiction of risk to be presented in a variety of different messages *(13, 14)*. For example, in cancer risk assessment, numerous conservative assumptions are factored into the process, and the final risk estimate may be exaggerated to the point of very little societal value. Many scientists, regulators, legislators, and others unfamiliar with the risk assessment process fail to understand the conservatism behind the final risk estimates. As a result, risk estimates are often subjected to "body count" analysis in which estimates are multiplied by population, resulting in a false estimate of the actual number of persons that may develop cancer from a particular exposure. This approach was used in the highly-publicized Natural Resources Defense Council report that estimated that 5,500 to 6,200 of current U.S. preschoolers may eventually get cancer solely because of their exposure before age six to the plant growth regulator daminozide (Alar) *(7)*. The direct translation of theoretically derived and highly conservative estimates of cancer risks into actual human cancers in thousands of preschoolers, which is scientifically inappropriate, conveys the message to society that actual cases of cancer will be caused by the chemical.

Typical studies of risks from chemicals in foods have focused primarily on non-scientific factors such as the voluntary nature of the risks and the degree of consumer control and familiarity with the risks and have ignored the content of the risk message upon risk perception. A handbook of different ways to present risk information, including mathematical depiction and comparison techniques *(2)* has been criticized when responses of focus groups were not as predicted *(10)*.

This study investigates the influence of different messages used to present scientific risk information on consumer perception of pesticide risks in foods. The project explores public concern about pesticide residues, assesses consumer response to the usefulness of pesticide risk information, and identifies the types of information consumers find useful. Results can be used to assist in the development of optimal strategies for communicating food safety and risk information to the public.

METHODS

Eight statements were developed to represent the types of information consumers may read about pesticide/food safety risks (Table 1). All statements attributed the information to a newspaper article. Although the majority of the scientific community considers each statement to be accurate, it was anticipated that consumer reaction to the statements

TABLE 2. Demographic characteristics of focus group participants

Location in California	Percentage
Northern	29
Central	42
Southern	29
Age	
Under 20	1
20-29	6
30-39	56
40-49	31
50-59	6
Occupation	
Homemaker	38
Clerical	17
Professional/technical	16
Sales	7
Service worker	3
Other	9
Education level	
Not high school graduate	4
High school graduate	10
Some college	43
College graduate	36
Advanced degree	7
Annual family income (× $1,000)	
Less than $20	18
$20-49	51
$50-69	18
$70 or more	10
Prefer not to answer	3
Ethnicity	
Caucasian	75
African American	10
Hispanic	8
Asian American	4
Native American	3

n=69

TABLE 3. Consumer information and confidence in food safety

	Very	Somewhat	Not very	Not at all
	%	%	%	%
Consumer confidence in food safety	12	72	0	16
Informed about food safety	12	75	10	3

n=69

would be expected to vary. Three of the statements represent scientific depiction of specific risks from pesticide residues in foods; the other statements involve comparisons to other food risks or the economic implications of pesticide use to consumers. For each statement, participants were asked to use a five-point Likert scale to rate each statement as to believability, riskiness, likelihood they would eat the food, likelihood they would serve the food to children, and usefulness of the information.

Seven focus groups were held in urban and rural communities in northern, central, and southern California in 1992 to 93. Participants were asked to complete a questionnaire that addressed their confidence in food safety, their concern about specific food safety issues in the news, and their reaction to the eight pesticide risk statements presented in the same order as in Table 1. After they completed the questionnaire, they were asked about risk information they found the most and least useful and how they made decisions when they received conflicting information. Responses were analyzed using SPSS/PC (Statistical Package for Social Science/Personal Computer).

Sixty-nine people, sixty-six of whom were women, participated in the study. Fifty-six percent of the participants were 30 to 39 years old (Table 2). Most (90%) had children under 20 years of age living at home, with 70% having children 5 to 12 years old and 56% having children less than 5 years old. Most were married, 38% were homemakers, 16% held professional or technical occupations and 17% were clerical workers. Almost all had at least a high school education, with 43% having a college degree. Fifty-one percent reported an annual family income of $20,000 to $49,000. Most were Caucasians, with African Americans and Hispanics representing 10% and 8%, respectively.

TABLE 4. Consumer concern with food-related attributes

	Majar concern %	Minar cancern %	Na concern %	Uncertoin %	Nat fomilior %
Solmonello and ather bocterio	67	31	1	0	1
Pesticide residues in food	63	35	1	1	0
Antibiatic and harmane residues in onimol products	54	36	4	1	4
Nitrates in faad	41	43	6	3	7
Food additives and preservatives	38	54	7	1	0
Food irrodiotion	34	25	13	5	23
Cholesteral in food	33	57	9	1	0

n=69

TABLE 5. Consumer rating believability of risk-related pesticide information

		Percentoge Ratings				
		Very Believable			Not Very Believable	
Abbrevioted stotement	Mean*	1	2	3	4	5
Animols given lorge doses develop concer	2.13[a]	35	33	20	8	4
Without pesticides food casts mare	2.12[a]	36	32	22	4	6
Lifetime expasure results in 1/mil cancer risk	2.36[ab]	29	28	27	10	6
Heolth benefits of eoting the food outweighs risks	2.49[b]	26	33	22	4	15
Pesticide couses concer	2.52[b]	19	29	39	7	6
Pesticide prevents develapment of more risky noturol chemicols	3.07[c]	23	20	16	7	34
Risk is less thon eoting peanut butter sandwich	3.18[c]	13	19	33	7	28
Risk is less thon driving a cor	3.43[c]	13	12	29	13	33

n=69

Statements with lawer means are more believable

*Means with different superscripts differ significantly ($P<0.05$)

RESULTS

Most of the participants considered themselves somewhat or very well informed and confident about the safety of the food supply (Table 3). Concern about a range of food-related attributes was comparable to that found in national samples (Table 4). Sixty-three percent expressed major concern about pesticide residues, whereas national studies conducted during the same time found 79% concerned about pesticide residues *(8)*. Similarly, 54% expressed major concern about antibiotics and hormones, 38% about food additives, 41% about nitrate, and 34% about food irradiation. These results are similar to result with national samples, in which major concern about the same issues was expressed by 55% for antibiotics and hormones, 23% for food additives, 35% for nitrate and 35% for food irradiation. These similarities suggest that responses to the pesticide risk questions may be comparable to those that would be obtained from a nationwide sample.

Believable risk statements

The statements believed by the largest percentage (68%) of participants are that animals fed large doses

TABLE 6. Consumer rating riskiness when given specific information

		Percentage Ratings				
		Very Risky				Not Very Risky
Abbreviated statement	Mean*	1	2	3	4	5
Pesticide causes cancer	2.68[a]	17	28	33	13	9
Withaut pesticides faad costs mare	2.84[a]	14	32	19	25	10
Withaut pesticides faad casts mare	3.20[b]	7	19	41	13	20
Pesticide prevents development of more risky natural chemicals	3.42[bc]	7	9	43	16	25
Risk is less than driving a car	3.61[cd]	4	16	31	13	36
Health benefits of eating the food outweighs risks	3.61[cd]	6	16	26	16	36
Lifetime exposure results in 1/mil cancer risk	3.65[cd]	6	17	19	22	36
Risk is less than eating peanut butter sandwich	3.67[cd]	4	10	35	16	35

n=69

Lower means are more risky

*Means with different superscripts differ significantly ($P<0.05$)

TABLE 7. Consumer likelihood of eating a food item after receiving information on pesticide risk

		Percentage Ratings				
		Very Likely				Nat Very Likely
Abbreviated statement	Mean*	1	2	3	4	5
Risk is less than eating peanut butter sandwich	2.46[a]	27	25	30	9	9
Health benefits of eating the food autweighs risk	2.61[ab]	22	26	32	10	10
Risk is less than driving a car	2.72[bc]	17	25	34	17	7
Lifetime expasure results in 1/mil cancer risk	2.91[cd]	16	20	34	17	13
Pesticide prevents development of more risky natural chemicals	3.01[d]	15	17	43	16	16
Withaut pesticides faad casts mare	3.06[d]	13	19	33	19	16
Animal given large does develop cancer	3.55[e]	7	13	28	22	30
Pesticide causes cancer	3.71[e]	4	15	20	28	33

n=69

Lower likely to eat with lower means

TABLE 8. Consumer likelihood of serving a food to children after receiving information on pesticide risk

		Percentage Ratings				
		Very Likely				Nat Very Likely
Abbreviated statement	Mean*	1	2	3	4	5
Risk is less than eating peanut butter sandwich	2.77[a]	22	19	35	10	14
Health benefits af eating the faad autweighs risk	2.83[ab]	22	17	33	12	16
Risk is less than driving a car	3.01[bc]	15	16	40	12	17
Withaut pesticides faad casts mare	3.25[cd]	12	13	35	20	20
Lifetime expasure results in 1/mil cancer risk	3.27[cd]	12	14	32	19	23
Pesticide prevents develapment af mare risky natural chemicals	3.35[d]	10	13	36	13	28
Animal given large daes develop cancer	3.91[e]	7	5	20	26	42
Pesticide causes cancer	4.09[e]	3	7	19	20	51

n=69

Mare likely ta eat with lawer means

*Means with different superscripts differ significantly ($P<0.05$)

of a pesticide develop cancer and that, without pesticides, food would cost more (Table 5). That the lifetime exposure to the pesticide could result in one cancer per million people and that the health benefits of eating the food outweighed any risks were believed by almost 60% of the participants. Least believable statements were that using pesticides prevented the development of more hazardous naturally occurring chemicals and that pesticide risks were comparable to risks associated with driving a car.

Degree of hazard

The different statements influenced consumer perception of the seriousness of the pesticide hazard. Reading the generalizations that pesticides cause cancer and that animals fed large doses of pesticides developed cancer led almost half of the consumers to rate pesticides as risky, with 17% and 14%, respectively, considering them very risky (Table 6). Significantly more people rated pesticides risky on the basis of these statements than any other.

Pesticide residue was considered less risky when the risk was described as comparable to driving a car or eating a peanut butter sandwich, or when the statement was that health benefits outweighed risks and lifetime exposure could produce only one additional cancer in a million people.

Even though people were asked to respond to each question individually, the order of receiving information may well influence perception and response. It is likely that the strong risk response to the first statement, that pesticides cause cancer, is due in part to the order of presentation.

Influence on eating

More than half of the participants indicated they were not likely to eat food with a pesticide residue when informed the pesticide caused cancer or that animals given large doses develop cancer (Table 7). These statements generated significantly greater aversion to consumption than any of the others. Comparing the risk to that of eating a peanut butter sandwich or noting that health benefits outweigh risk, however, generated the greatest likelihood (75%) that people would continue eating the food.

Participants were most protective of their children's diets upon hearing that laboratory animals fed large doses developed cancer, with 68% indicating they were unlikely to serve the food (Table 8). This statement may have generated greater avoidance in planning a child's diet than an adult's because parents are protective of their children. Comparing the risk to that of eating peanut butter and noting health benefits led the largest number, about 40%, to indicate they would serve food with a residue.

Usefulness of information

All statements except those referring to peanut butter or cars were considered very or somewhat useful by half or more participants (Table 9). Responses to questions on usefulness of the remaining six statements did not differ statistically.

TABLE 9. Consumer rating of usefulness of risk information

		Percentage Ratings				
		Very Useful				Not Very Useful
Abbreviated statement	Mean*	1	2	3	4	5
Animals given large doses develop cancer	2.20[a]	39	28	16	8	9
Pesticide causes cancer	2.23[a]	38	23	22	4	13
Lifetime expasure results in 1/mil cancer risk	2.35[a]	33	25	23	12	7
Health benefits af eating the faad autweighs risk	2.49[a]	29	29	21	4	16
Without pesticides faad costs mare	2.54[a]	29	26	23	6	16
Pesticide prevents development af more risky natural chemicals	2.59[a]	26	29	22	6	17
Risk is less than eating peanut butter sandwich	3.03[b]	25	19	17	7	32
Risk is less than driving a car	3.54[c]	12	16	20	12	40

n=69

Statements with lawer means are considered more useful

*Means with different superscripts differ significantly ($P<0.05$)

Information sources

Parenting, environmental, and farming magazines, along with newer cookbooks, were the most frequently used sources of food safety information. Some participants received information from food packaging. Participants also cited newspapers as an information source, but many claimed they did not believe the newspaper unless a credible person or organization was quoted. Newspapers were valued for their accessibility, but criticized because they gave only highlights and were biased toward the spectacular. Many said they believed information from Cooperative Extension (CE), but were concerned and less inclined to believe CE information when funding came from private industry. They believed objectivity would be greater if all support came from the government. Many trusted the FDA, although some were concerned that industry may have influenced decisions. Participants trusted impartial professionals such as nutritionists and other health professionals. Doctors were considered credible, but several participants were concerned that a doctor's food safety information may not be current. Several commented that advocacy groups served a useful purpose in keeping a debate open but "do not do the research to back up their claims." Many believed these groups are only "thinking about themselves."

Credibility was judged by personal weighing of information. Many participants wanted to hear all sides of a controversy. They judged the reliability of the information and looked for hidden bias. Participants also observed how frequently an issue was discussed. If they saw a story only once, they thought it may not be credible. If the story was picked up and repeated many times in a variety of media, it was thought more likely to be true.

Some volunteered they had changed practices as a result of media stories. One participant commented, "If I read something negative in the paper, I stopped buying the product for awhile." Another had misinterpreted news coverage, thinking a physical handling problem was a food safety problem. This participant had stopped buying the pre-cut chicken she preferred and reluctantly cut up the chicken herself. She stated, "I heard that the (chicken) parts may come from a damaged bird. It is more hazardous. I buy the whole bird because I know it is not damaged. Then I cut it up myself."

Focus group discussions

Focus group discussions provide insight into consumer thinking that is difficult to obtain through a questionnaire. Individual participants found some statements more useful than others. Some felt comparing risk to the risk associated with different foods, such as peanut butter, was helpful because it provided perspective; serving a peanut butter sandwich was a common practice that led to no observable ill effect. If the pesticide risk was comparably low, it was considered by some to be virtually non-existent. Others

TABLE 10. Statements scored to promote eating produce when risk is very small

Abbreviated stotement	Meon*
Heolth benefits of eoting the food outweighs risks	12.2[a]
Lifetime exposure results in 1/mil cancer risk	13.0[ab]
Without pesticides food costs more	13.1[ab]
Risk is less thon eoting peonut butter sondwich	13.6[bc]
Animols given lorge doses develop concer	14.1[c]
Pesticide prevents development of risky natural chemicals	14.3[cd]
Pesticide couses concer	15.1[d]
Risk is less thon driving o car	15.2[d]

n=69

The meon rotings for believability, likelihood to eot, to serve the food to children, and usefulness were summed for each stotement ond the totols compared using F tests

A low score promotes eating the food even though it hos o pesticide residue

*Stotements with different superscripts differ significontly (P <0.05)

thought the comparison to peanut butter was ridiculous; they were not aware of potential dangers from aflatoxin and thought the risk may relate to choking, or could not believe there was risk related to this food.

Some participants complained that information about laboratory animals was not useful. Participants recognized that many substances given in large doses could cause cancer. These individuals wanted to know how the quantity related to human exposure.

The few who valued comparing pesticides to driving a car noted the comparison acknowledged a potential risk people were willing to take. Others felt it compared two different types of risks, the necessary risk one takes to go from place to place and the voluntary risk of choosing one food over another. They also noted that the risk of driving varied by where you live and therefore wasn't the same for everyone.

Most felt the cost information was not useful because it was well known. Some believed that food grown without pesticides shouldn't cost more. A few believed costs would be less if everyone bought organic produce. Several believed they were avoiding pesticides by purchasing organic produce, even though certain pesticides are allowed in organic products.

That pesticides can prevent development of natural toxins was new information for many, and it was considered useful; others, however, found it difficult to believe. Participants appreciated hearing that the benefits of eating a food could outweigh risks from pesticides. Some, however, considered this "propaganda" and did not believe any of the statements. These consumers believed that pesticides must be bad for you and no one could predict the effect of long-term consumption. Others noted they were concerned about the environment, not just food safety. Participants wanted to hear that alternative farming practices were being used because of environmental impact.

Some participants were unaware that pesticides were regulated. Several were confused about the difference between *worker* safety, when pesticides are applied, and *food* safety, when a product is consumed. Most felt comfortable about the safety of California- and U.S.- grown products but feared that "anything could be used" on imported products.

Participants wanted information on the health effects of pesticide use, including how pesticides were tested for safety and what standards were used. They wanted to know the effect of pesticides on nutritional value and the cumulative effect of eating food with low levels of residue. Participants were especially interested in how they could reduce exposure to residues. They wondered whether rinsing with water really worked or if soap or detergent should be used, if it was necessary to peel everything, and if cooking reduced residues.

Several participants felt food production should consider both food and environmental safety. They sought information as to both benefits and risks of pesticide use. Although some felt that pesticides should never be used and advocated alternative farming methods, most sought a balance between excessively stringent regulations, food safety, and food production costs. Some participants wanted extensive information on food and environmental safety while others preferred safety highlights condensed into "plain English."

Application in consumer education

A food safety risk message should accurately inform consumers about the magnitude of a risk, provide useful and believable information, and lead to consumption of a food item if the consumer believes the potential risks are outweighed by potential benefits.

As has been demonstrated, participant response varied considerably among statements and response categories. For example, with statements comparing the pesticide risks to the risks from eating a peanut butter sandwich or driving a car, participants were not as likely to believe the statements and didn't feel that they were particularly useful but also indicated that they considered the risks to be lower and were more likely to consume food treated with the pesticide.

To assess the overall response of consumers to the various risk messages, the mean ratings for believability, likelihood to eat, likelihood to serve the food to children, and usefulness were summed for each statement and F tests were used to compare the risk messages for statistical differences. These results are summarized in Table 10.

The most effective risk messages in encouraging produce consumption were the statements that the health benefits of eating the food outweigh the risks, that lifetime exposure results in a one-in-a-million cancer risk, and that produce grown without pesticides costs more. Less effective, in order, were the statements that the risk is less than that from eating a peanut butter sandwich, that animals given large doses develop cancer, and that pesticides prevent development of more risky natural chemicals. The least effective messages were that the pesticide causes cancer and that the risk is lower than that from driving a car.

DISCUSSION

Although consumers considered themselves informed about food safety, their responses indicated lack of awareness of potential hazards from natural sources and lack of understanding of the complexities of risk analysis as applied to pesticides. A science-based assessment would show that the risk related to *Salmonella* is significantly greater than that related to pesticide residues, yet a similar percentage of consumers expressed major concern in these two cases. This suggests that either consumer information is not accurate or people are responding to the "outrage" component of risk.

These findings illustrate that participants do indeed respond differently to different pesticide/food safety risk messages. With respect to the scientific depiction of the risks, the simple statement that the pesticide causes cancer, as commonly observed in media coverage and in advocacy group literature, caused participants to be more cautious about consuming produce than the statement concerning the doses of chemical necessary to cause cancer in laboratory animals. Providing additional information regarding the estimated magnitude of the health risks and the resulting uncertainties of analysis decreased caution about consumption of produce even further.

Assessing consumer response was complicated by the different levels of knowledge among consumers. Some did not believe some of the information and therefore considered it not useful. For others, comparisons to common occurrences, such as eating a peanut butter sandwich, put pesticide risk in perspective and was very useful. Future research would be useful to identify the most useful information based upon consumer knowledge base.

Responses to statements about risk comparisons varied considerably. In general, consistent with the findings of Covello *(2)*, risk comparisons that were more closely related, such as the risks/benefits from eating one food compared with another, were considered more acceptable to participants than those from less closely related risks, such as the risk from food consumption compared with the risk of driving a car. Additionally, statements about the economic implications of the risk (food costs more without pesticides) were considered reasonably useful to participants and encouraged greater consumption of produce than several of the other statements.

Respondents were highly educated, with all but 14% having at least some college. Findings may differ among different demographic groups. Low income consumers say they will pay a higher price for pesticide-free produce *(5)*. The economic information may be less useful for these consumers, while other information would be more valuable.

CONCLUSIONS

These findings support the value of providing background information to consumers concerning risk assessment practices, economic impacts of pesticides, and suitable risk comparisons. Focus group discussions indicated that some participants are likely to change their food consumption behavior based upon media presentation and others seek information to increase their effectiveness in evaluating controversies.

The effectiveness of the communication of these issues will be influenced by the degree of trust in the source of the information as well as to the suitability of the information. People wanted relative risk explained in clear English. Many objected to comparisons to foods consumers believed to be safe, such as a peanut butter sandwich. People also objected to comparing food risks to risks from non-food situations, such as driving a car. Respondents indicated an interest in better understanding the existing regulatory/monitoring framework, understanding how consumers could handle food to reduce potential risks, and understanding new developments in environmental systems for pest control such as integrated pest management and sustainable agriculture approaches.

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REFERENCES

1. Bruhn, C. M., S. Peterson, P. Phillips, and N. Sakovich. 1992. Consumer response to information on integrated pest management. J. Food Safety 12:315–326.
2. Covello, V. T., P. M. Sandman, and P. Slovic. 1988. Risk communication, risk statistics, and risk comparisons: A manual for plant managers. Chemical Manufacturers Association, Washington, D.C.
3. Dittus, K. L. and V. N. Hillers. 1993. Consumer trust and behavior related to pesticides. Food Technol. 47:87–89.
4. Dunlap, R. E. and C. E. Beus. 1992. Understanding public concern about pesticides: An empirical examination. J. Consumer Affairs. 26:155–171.
5. Eom, Y. S. Consumers respond to information about pesticide residues. Food Review. 15:6–10.
6. National Research Council. 1989. Improving risk communication. National Academy Press, Washington, D.C.
7. Natural Resources Defense Council. 1989. Intolerable risk: Pesticides in our children's food. NRDC, New York.
8. Opinion Research Corporation. 1993. Trends: Consumer attitudes, and the supermarket. Food Marketing Institute, Washington, D.C.
9. Opinion Research Corporation. 1994. Trends: Consumer attitudes, and the Supermarket. Food Marketing Institute, Washington, D.C.
10. Roth, E., M. G. Morgan, B. Fischhoff, L. Lave, and A. Bostrom. 1990. What do we know about making risk comparisons? Risk Anal. 10:375–387.
11. Sachs, D., D. Blair, and C. Richter. 1987. Consumer pesticide concerns: A 1965-1984 comparison. J. Consumer Affairs 21:96107.
12. Slovic, P. 1987. Perception of risk. Science 236:280–285.
13. Winter, C. K. 1991. A toxicological perspective on risk. Proceedings: Protecting drinking water quality at the source conference, sponsored by the University of California Water Resources Center, Riverside, CA.
14. Winter, C. K. 1994. Lawmakers should recognize uncertainties in risk assessment. California Agric. 48:21–29.

Dairy, Food and Environmental Sanitation, Vol. 18, No. 5, Pages 288-293

HACCP Implementation by the Meat and Poultry Industry: A Survey

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SUMMARY

In September 1997, the American Meat Institute Foundation surveyed its meat and poultry slaughter and processing members on their status and experiences in complying with the USDA Pathogen Reduction, Hazard Analysis and Critical Control Point (HACCP) Systems regulation. The survey included questions on facilities' experience in compliance with the new regulatory requirement for sanitation standard operating procedures (SSOPs), expectations for compliance with other requirements of the regulation, status of HACCP implementation, experiences in developing and implementing HACCP, and the role of HACCP in the customer/supplier relationship. Responses were evaluated by facility size and by type of operation and products produced.

INTRODUCTION

To some in the United States Department of Agriculture (USDA)-inspected meat and poultry industry, HACCP has been a familiar concept for many years. For the majority, however, the acronym and the food safety system it stands for became important only relatively recently. USDA's efforts to incorporate HACCP into food safety practices first became noticeable in the mid-1980s. When the Agency held a HACCP Roundtable in 1993, it became clear that HACCP would figure prominently in future food safety requirements. The USDA Food Safety and Inspection Service (FSIS) published proposed HACCP-based requirements for all USDA-inspected meat and poultry producers on 3 February, 1995 *(2)*, then published the final rule on 25 July, 1996 *(3)*.

In addition to requiring HACCP compliance, the final rule included requirements for sanitation standard operating procedures (SSOPs) for all facilities, microbiological process control criteria (for generic *E. coli*) for slaughter operations, and microbiological performance standards (for *Salmonella*) for slaughter and raw ground meat-producing operations. The SSOP and *E. coli* testing requirements became mandatory on 27 January, 1997. Compliance deadlines for the HACCP requirements (i.e., the requirement for each facility to have and operate under a HACCP system) and *Salmonella* performance standards were staggered over three years: 26 January, 1998 for about 314 meat or poultry processing facilities with 500 or more employees; 25 January, 1999 for about 3,500 facilities with ten or more but fewer than 500 employees; and 25 January, 2000 for the remaining 3,500 or so facilities with fewer than ten employees.

In September 1997, the American Meat Institute (AMI) Foundation surveyed its members in the meat and poultry industry to determine the status of HACCP implementation and related issues.

THE SURVEY

The AMI Foundation survey included 31 questions that solicited opinions on the following broad topics: the respondent facility's experience in complying with the SSOP requirements; expectations for compliance with the HACCP requirements; the current status of HACCP implementation at the respondent's facility; the current status of HACCP training and training needs at the respondent's facility; and the current

TABLE 1. Survey respondents

Facility size (No. employees)	Overall	Operation / Product Type: Slaughter operation	Intermediate (non-consumer)	Consumer-ready, cooking required	Consumer-ready, ready-to-eat
Small (<100)	22	6	4	13	11
Medium (100-1,000)	57	19	15	42	38
Large (>1,000)	14	12	8	11	9

TABLE 2. Anticipated difficulties in compliance with USDA FSIS HACCP rule

Potential Compliance Issue	Percent (%) of Facilities Responding[a] Very Likely	Likely	Not Likely
Disagreements with USDA inspector	31	21	48
Records review before shipment	17	48	35
Employee compliance	15	45	40
Having employees trained by deadline	13	27	61
Keeping up with product changes	6	37	56
Having HACCP plans written by deadline	5	6	88
Microbiological performance standards[b]	11	17	72

[a]rounding of percentages in this and subsequent tables may result in totals being more or less than 100%

[b]includes only responses from 36 facilities with slaughter operations

and expected role of HACCP in the customer-supplier relationship. The confidential survey also included several questions to allow categorization of respondents. Where practical, the actual wording used in the survey appears in this report in quotes.

THE RESPONDENTS AND DATA ANALYSIS

The survey was sent to principal contacts at processing facilities belonging to AMI member companies. The survey was completed by 99 respondents. Among those respondents were two facilities that were not under USDA inspection (i.e., non-meat, non-poultry suppliers). The responses of those two were considered separately from those of the USDA-inspected facilities. Twelve respondents indicated that they came under the jurisdiction of both USDA and FDA; the responses of those facilities were included with those of USDA-only-inspected facilities. Four multiple responses from the same facilities were merged by facility. Thus, unless described otherwise, the responses presented here represent the survey responses from 93 USDA-inspected processing facilities.

Some respondents provided multiple answers for some questions, and/or left some questions unanswered. Where respondents provided more than one answer to a question, all responses were included in the analysis. This resulted in a total of more than 93 answers to some questions and less than 93 answers to other questions.

Among the 93 USDA-inspected facilities, 14 indicated that they had fewer than 1,000 employees (described by AMI as "large" facilities), 57 had 100 to 1,000 employees ("medium" facilities) and 22 had fewer than 100 employees ("small" facilities). The 93 facilities were further categorized by the following operation and product categories: 37 indicated that they had slaughter operations; 27 produced intermediate products for further processing by customers (i.e., ingredients not for sale to consumers); 66 produced consumer-ready, raw or must-be-cooked products; and 58 produced consumer-ready, no-cooking-required products (Table 1). Of the two non-USDA-inspected facilities, one was medium and the other was small; both indicated that they produced intermediate products for further processing by customers.

REGULATORY COMPLIANCE: HACCP

A fundamental question asked in the survey was, "How would you describe your understanding of the USDA HACCP regulation?" Apparently, the respondents considered themselves well acquainted with the

TABLE 3. When facilities "got serious" about implementing HACCP

Facility size	Percent (%) of Facilities Responding, by Size Before February 1995 (Pre-prapased rule)	February 1995 - July 1996 (Prapased rule periad)	After July 1996 (Past-final rule)
Large	29	57	14
Medium	32	39	30
Small	10	29	62

TABLE 4. HACCP implementation status

Facility size	Percent (%) of Facilities Responding, by Size Up and running	Running but needs wark	Laaks gaad an paper but questianable	Need lats af help	Nat yet started
Large	29	36	29	0	7
Medium	15	35	18	12	21
Small	9	27	9	23	32

regulation: 90 of the 93 facilities (97%) indicated that they either had "complete understanding" or "understand most of what's required." Only two respondents indicated that they didn't understand it, and only one indicated not having yet read it.

The survey asked respondents to rank where they thought their facility will be most likely to have difficulty in complying with the regulation: having written HACCP plans by deadline, having employees trained by deadline, employee compliance (e.g., in monitoring, corrective actions, record keeping), record review before product shipment, keeping up with product changes (HACCP plan revision), disagreements with the USDA inspector, microbiological performance standards, or "other."

The strongest concerns were in regard to disagreements with the USDA inspector; 31% of respondents cited this category as "very likely" to pose compliance difficulties and another 21% indicated it was "likely" to pose difficulties (Table 2). The remaining 48% of facilities either did not indicate this as a potential source of difficulty or indicated that such disagreements were "not likely" to be a source of difficulty.

Although fewer facilities indicated "record review before product shipment" and "employee compliance" as "very likely" to pose compliance difficulties, a majority of repondents thought that these two categories were likely or very likely to be potential sources of difficulty, and 65% and 60% of respondents cited them, respectively. All other categories were cited by less than half of the respondents as either likely or very likely to result in compliance difficulties.

Microbiological performance standards pertain only to slaughter facilities and producers of raw ground meat. Among the 36 respondents with slaughter facilities, only 10 (28%) indicated that compliance with the microbiological performance standards was likely or very likely to be a source of difficulty. The ten respondents anticipating some level of difficulty included four of the 12 large facilities with slaughter operations, three of the 18 medium facilities, and three of the six small facilities.

The survey asked facilities for their expectations of how "operating under the USDA HACCP regulation will compare with the current USDA inspection system." Fifty-seven (63% of the respondents expressing an opinion) indicated that the "HACCP system will be better." Twenty-nine facilities (32%) indicated "no difference/business as usual." Only four facilities thought that the current system would be better. Of these four, two had not yet started to implement HACCP.

Asked how complying with the USDA HACCP regulation will affect the safety of their products, 48% of the facilities thought that their products "will be more safe." The remaining 52% were of the opinion that there will be "no change" in product safety. However, comments to this question indicated that facilities re-

Figure 1. Difficulties in HACCP plan development

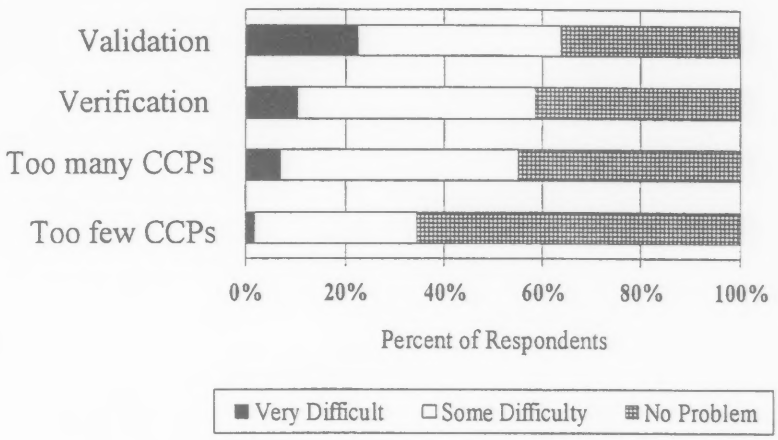
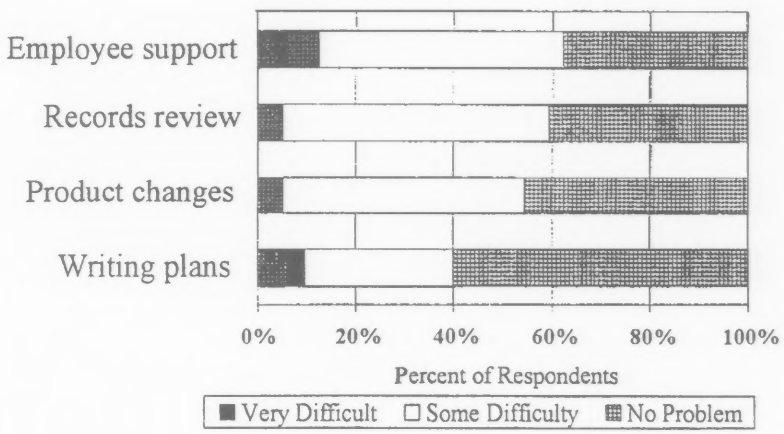


Figure 2. Difficulties in HACCP implementation



plying "no change" generally already had HACCP systems in place, and therefore product safety should not change with implementation of the regulation. None of the facilities thought that their products will be "less safe."

REGULATORY COMPLIANCE: SSOPS

One of the activities mandated by the USDA HACCP rule is that facilities must operate according to pre-operational and operational sanitation SOPs (SSOPs). At the time of the survey, SSOPs had been a requirement in USDA-inspected facilities for seven months. The survey asked several questions regarding the new requirement and facilities' compliance experiences.

Facilities were asked when they got "serious about implementing SSOPs." Twenty-five (27%) indicated that they got serious before the USDA regulation was proposed (i.e., before February 1995); 39 facilities (41%) indicated that they got serious between February 1995 and July 1996 (i.e., during the comment period or before the final rule was published); the remaining 29 facilities (32%) waited until after the final rule was published (i.e., after July 1996) before getting serious about SSOPs.

Among the respondents, complying with the SSOP requirement did not appear to be difficult. Eighty-eight facilities replied that the experience had "some rough spots but [was] generally good" or "no problems." Only two facilities thought that complying with the requirement was "difficult." In answer to a separate question, "Where did you have the most problems?" the category cited most often was regulatory (e.g., inspector disagreement with SSOP adequacy), which was cited by 33 (35%) of the facilities. The category cited next most often, employee compliance (e.g., irregular compliance, incomplete records, excessive deviations), was cited by only 19 (20%) of the facilities. The two facilities that found complying with the SSOP requirement "difficult" also indicated these two areas as being "the most problem."

The new regulation requires a change in responsibilities for FSIS in-plant inspectors, whose role will be less pre-approval (aka, "command and control") and more verification that the facility is following its own procedures. Consequently, the survey asked, "Has anything changed in the way your in-plant FSIS inspectors do their job?" Forty-three (47%) of the facilities answered "yes" and 49 (53%) answered "no." This question generated more write-in comments than any other in the survey. Some of the more positive comments included "inspectors are relying more on us," "(the inspector) will review SSOP before writing deficiencies," and "USDA communicates with HACCP coordinator in correcting problems." Less encouraging comments included "inspectors still performing old tasks and new tasks," "layering," "instant PDRs without discussion or time to correct," "inconsistencies," and "seems inspectors are trying to 'protect' their jobs."

Concurrent with this survey, FSIS was performing an independent survey on implementation of SSOP requirements. Their results mirrored the findings of the AMIF survey: although there was considerable progress among USDA inspectors in

making the culture shift to inspection under the new rule, there were also examples of inconsistency in following SSOP inspection procedures and in interpreting of SSOP regulatory requirements *(1)*. A minority of inspectors were having difficulty "letting go" of obsolete inspection responsibilities, and about 50% of FSIS personnel thought that additional training would help them carry out their roles in SSOP inspection and enforcement matters.

HACCP IMPLEMENTATION: STATUS

As it had asked with regard to SSOP initiation, the survey asked "When did your facility get serious about implementing HACCP?" Twenty-four facilities "got serious" before publication of the USDA HACCP proposal, 35 facilities between February 1995 and July 1996, and 33 facilities after publication of the final rule. Initiation of SSOP and HACCP programs appears to be linked, with 72% of the facilities indicating the same time frame for HACCP as for SSOP.

When sorted by facility size, four (29%) of the large facilities inicated getting serious about HACCP prior to February 1995 and another eight (57%) prior to July 1996 (Table 3). Only two facilities (14%) waited until after the final rule was published, with one of those still not having started. Among medium facilities, a greater percentage (32%) got serious prior to the HACCP proposal, but a greater percentage (30%) waited until after the final rule. Among small facilities, the majority (62%) waited until after July 1996.

Facilities were asked to place their current HACCP implementation status in one of the following groups; up and running; running but needs some work; looks good on paper but questionable; need lots of help; or not yet started. Almost two-thirds of the fourteen large facilities considered their HACCP programs to be "running" at some level, with only 7% (one plant) not yet started (Table 4).

Half of the medium facilities (29) were likewise "running," but 21% (12 facilities) were not yet started. Early efforts appeared to have been rewarded by early implementation; of the 29 facilities that reported their HACCP systems were running, 24 reported they had gotten serious prior to publication of the final rule.

Small facilities were lagging in implementation; 55% (12 facilities) indicated that they either "need lots of help" or were "not yet started." Only four of these reported they had gotten serious about HACCP prior to publication of the final rule, and none had gotten serious prior to February 1995.

Facilities were also asked "What is/was the primary driving force for your facility to develop HACCP?" Several facilities provided more than one response to this question. The response most often given was "regulations," cited by 41 respondents, whereas, only 24 respondents indicated "benefits of HACCP" as a primary driving force. "Customer requirement" was cited by 21 facilities, indicating that HACCP is developing a role in the customer/supplier relationship. Twenty-two respondents indicated only "corporate decision." No other response was given.

Several questions were directed to those facilities that already had HACCP implemented; these were answered by fifty-eight respondents. Asked "which company group has primary or overall responsibility for HACCP at your facility (e.g., writing plans, HACCP implementation, HACCP leadership)," several facilities gave multiple responses. Quality Assurance was cited by 39 (67%) facilities, while Operations was cited by 17 (29%). Other company groups (e.g., Sanitation, Regulatory) were each cited by four or fewer of the 58 respondents.

One question asked facilities to rank the difficulty level of developing sections of their HACCP plans. Validation and verification were most often cited as difficult. Over 20% of respondents indicated that "HACCP plan validation activities" were "very difficult to do," and less than 40% considered this activity "not a problem" (Fig. 1). "Developing verification activities" was described by 59% of the respondents as posing some level of difficulty.

Asked how often facilities have verified their HACCP system, 57% of the fifty-eight facilities indicated "not yet verified." Others responded "annually" (18%) or "more often than annually" (25%). Fifty-five percent of the respondents reported that their HACCP system verification is (or will be) performed by "in-house or corporate auditors only," and 43% reported that "either in-house or external auditors" would be used. None of the facilities expected to rely on "external auditors only."

In terms of HACCP plan development, 57% of respondents reported that having too many Critical Control Points (CCPs) in their HACCP plan was a source of difficulty, while having too few CCPs was the least often cited (35%) (Fig. 1). Thirty-six facilities reported having between 1 and 5 CCPs on average, and 15 reported 6 to 12 CCPs. Five facilities reported having more than 12 CCPs on average; three of these reported "too many CCPs" as a source of difficulty.

Other activities (i.e., understanding the role of prerequisite programs, performing the hazard analysis, setting critical limits, or developing monitoring, corrective action, or record keeping activities) were each considered "not a problem" by a majority of respondents and were each described as "very difficult" by four or fewer facilities.

In another question, facilities were asked to rank the level of difficulty in implementing their HACCP plans. "Lack of employee support (e.g., acceptance of HACCP-driven changes in procedures)" was most often cited as either having "created some difficulty" (50%) or being a "significant problem" (13%) (Fig. 2). Although only 5% (i.e., three of 58 facilities) reported either "record keeping and records review (on-time, accurate, complete)" or "keeping up with product changes (HACCP plan revisions)" as having been a significant problem, less than half of the respondents found them to be "not a problem." Although 10% (six facilities) reported that "writing the HACCP plans" was a significant problem, the majority of respondents (60%) did not indicate any difficulty. Likewise, "lack of management support," "getting technical support (e.g., lack of tech-

nical information)," and "costs (e.g., new equipment, new hire)" were cited by 35% or fewer of the respondents as creating some level of difficulty at their facility. No other difficulties were reported.

Respondents were asked for their opinion on how operating under HACCP affects the cost of making products at their facility. Forty-eight percent of 87 respondents thought that HACCP increases or will increase the cost of making products, whereas 23% thought the costs would be about the same. Only 14% of the respondents thought there would be a net decrease in costs when operating under HACCP.

HACCP AND THE CUSTOMER/ SUPPLIER RELATIONSHIP

As more facilities implement HACCP, it is likely that there will be an increased expectation for suppliers of those facilities also to operate under HACCP. As previously described, 16% of respondents in this survey indicated that "customer requirement" was the primary driving force for HACCP implementation at their facility. In response to a more direct question, two-thirds of the facilities indicated that at least some of their customers already require them to have HACCP systems in place; 51% reported "some customers (less than half)" and 16% reported "most or all of our customers"; these included all 27 facilities that produce intermediate products for non-consumer customers. The other 33% of respondents reported "none."

When asked, "What is your expectation for HACCP implementation by your suppliers?", the number responding "none" dropped to only 4%, with 48% indicating "require (or will require) some suppliers to have HACCP" and 47% indicating a HACCP requirement of "all suppliers."

A HACCP requirement of a supplier can be relied upon only if a facility verifies that the supplier has an effective HACCP system in place and is continuously operating under that system. Asked how each facility's HACCP compliance is currently being verified by their customers, 27 facilities indicated that their customers don't verify (i.e., "they accept our assurance"). Fourteen facilities indicated that their customers perform or require "finished product testing" as a verification activity. Thirty-two facilities reported that their customers perform some degree of records review, while 32 facilities reported that on-site audits were performed by or for their customers to verify HACCP compliance.

Asked how they currently, or expect to, verify their suppliers' compliance with HACCP, only 14 facilities indicated that they accept or will accept their assurance without further verification; these included three of the four facilities that will not expect HACCP of their suppliers. Forty-nine facilities indicated they use or will use testing to verify compliance; seven facilities test or will test every lot, 42 do or will do "periodic testing." Thirty-one facilities do or will do a "periodic review of (supplier's) HACCP plan and monitoring records," while 43 (46%) intend to verify compliance through "periodic on-site audits."

CONCLUSIONS

Those AMI members responding to the survey appear cautiously optimistic about operating under the USDA FSIS Pathogen Reduction/ HACCP regulation. A majority of respondents were of the opinion that the new regulation would be preferable to the current system, and a majority thought that the safety of their products either would be enhanced when produced under HACCP, or would not be different because they are already produced under HACCP. Although most respondents thought that production costs would be higher under the HACCP system, only a few thought that costs would pose any difficulty. Although about half of the respondents thought that disagreements with in-plant inspectors would likely pose some difficulty during HACCP rule compliance, all but two facilities reported generally good experiences during SSOP implementation. The only other specific compliance concerns cited by a majority of respondents were keeping and reviewing records according to the requirements of the rule, and consistent compliance by employees.

Among facilities that had already implemented HACCP, developing verification and validation activities were reported as the most difficult aspects of preparing HACCP plans. Gaining consistent employee support, record keeping and review, and keeping HACCP plans current with product and process changes were the only issues described by a majority of respondents as posing some level of difficulty during HACCP implementation, and these were described as "very difficult" by 13% or fewer respondents.

Implementation readiness mirrors the requirements of the regulation. Large facilities are nearing readiness. More of the medium size facilities have their HACCP systems running, but more have yet to get serious. Small facilities appear to be approaching HACCP with a "just in time" attitude, with a majority waiting until after the final rule was published to get serious about HACCP, and a majority reporting that they still need "lots of help" or have not yet started HACCP implementation.

Although the HACCP rule will not be fully implemented until January 2000, economic factors may force a faster implementation by medium and small facilities, and non-meat facilities, that supply ingredients to other meat or poultry facilities. If HACCP systems are required by customers, only suppliers that can meet that requirement will be able to compete.

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REFERENCES

1. Axtell, J. 1997. SSOP Implementation Follow-Up. Presented at Worldwide Food Expo 97, Chicago, IL, 31 October 1997.
2. Food Safety and Inspection Service, USDA. 1995. Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems; proposed rule. Federal Register 60:6774–6889.
3. Food Safety and Inspection Service, USDA. 1996. Pathogen Reduction; Hazard Analysis and Critical Control Point (HACCP) Systems; final rule. Federal Register 61:38806–38989.

Dairy, Food and Environmental Sanitation, Vol. 18, No. 4, Pages 294-298

Passivation of Stainless Steel

Robert R. Maller

SUMMARY

Passivation is an important surface treatment that contributes to the corrosion resistance of stainless steel. This article provides basic information and guidelines relative to stainless steel passivation. A general discussion of passivation, equipment fabrication concerns, inspection procedures, surface preparation, and safety precautions, as well as examples of passivation procedures and degreasing procedures, are given.

INTRODUCTION

Manufacturers and users of modern food and pharmaceutical processing equipment demand that stainless steel be used as the predominant construction material. Stainless steel has become the standard material of construction because of its ability to maintain a high level of performance and to undergo minimum corrosion. Passivation is an important surface treatment that helps to assure the successful corrosion resistant performance of stainless steel used for food product contact surfaces.

Scope

The purpose of this document is to provide manufacturers, users, and regulatory personnel with basic information and guidelines relative to stainless steel passivation. The document has been approved by the 3-A and the EHEDG.

General examples of typical cleaning and passivation procedures described in this document may not be the only methods of achieving adequate passivation and should not be relied on for specific applications without first securing expert advice.

Passivation

Stainless steel derives its corrosion resistance from a thin, durable layer of chromium oxide that forms at the metal surface and gives stainless steel its characteristic "stainless quality" *(6)*. The passive film on a stainless steel surface consists of a mixture of oxides of iron, chromium and, if present, molybdenum. The chromium oxide film can form in air instantaneously if the stainless steel is clean and dry. Further exposure to air does not yield additional corrosion protection. Complete passivation cannot be achieved if product contact surfaces are not clean or if they contain surface defects. Moreover, interaction between the different oxides and their relation to passivation/corrosion characteristics of stainless steel are complicated and not yet fully understood.

The passivation process will enhance the chromium fraction in the passive film *(4, 5)*. The main mechanism for this process is selective dissolution of iron, predominantly *(3)*. Although increase in the chromium fraction in the passive film is an important factor in the corrosion resistance of steel, it has less influence on the ability of the steel to repassivate spreading pit corrosion. On the other hand, a properly performed passivation process will use up a number of possible initiation sites for pitting by dissolving surface sulphides. This type of mechanism adds value to the effects of surface passivation.

FABRICATION CAUTIONS

Hygienic fabrication techniques must be used to prevent iron particles from being imbedded in the stainless steel surface from ferrous-containing grinding and polishing materials. In addition, finished surfaces should be free from oil, machine lubricants and shop dirt.

Equipment delivered from equipment manufacturers (especially vessels) will sometimes have an oil (mineral, organic, silicone) covered interior surface. Product contact surfaces also can contain high carbon tramp steel, grease, dust, and other manufacturing residue that if not removed can lead to pitting, rusting, and crack and crevice corrosion.

Treatment of stainless steel with nitric or a mild organic acid is useful

after machining to enhance the protective nature of the chromium oxide. Nitric acid enhances the level of chromium in the protective film on stainless steels. ASTM A 380 describes eight nitric acid-based cleaning/passivation treatments and four cleaning treatments that use other chemicals *(1)*.

Corrosion potentials created during fabrication

Defects and contaminants that can lead to corrosion are encountered during the manufacturing process. Surfaces must be cleaned of the following corrosion potentials:

- Embedded iron particles: These will be picked up from forming rollers, carbon steel wire brushes, layout and cutting tables, and grinding.
- Heat tint: Welding heats the base metal, causing heavy oxide films (scale) to develop in the area of the applied heat. The oxide films range in color from straw yellow to black. The color variation in the base metal is also dependent on the amount of oxygen (O_2) present during the welding process. Heat tint will result in lower corrosion resistance of the stainless steel.
- Weld flux: Produced by welding with coated electrodes and forming along the sides of the weld bead, weld flux is difficult to remove and requires brushing with stainless steel wire brushes, use of abrasive discs, or flapper wheel grinding. These methods may leave small flux particles at the side of the bead head, which are excellent crevice formers.
- Arc strikes and spatter: Arc strikes produce small pinpoint surface defects in the protective film, as does weld spatter; the defects become areas of corrosion.
- Scratches and paint: Deep scratches, paint, and crayon marks, or other instructional markings will initiate corrosion if they are not removed.

Other surface treatments

Passivation treatments are not designed to remove heat tint, embedded iron particles, heat treating scale, and other surface defects produced during fabrication. Because nitric acid does not corrode or remove the surface layers having these embedded defects, use of nitric hydrofluoric acid pickling may be needed to eliminate these defects and remove the normal protective oxide layers along with 25 to 40µm of the substrate metal.

Electro-cleaning and electro-polishing techniques are useful alternatives to the pickling treatment previously mentioned. Electro-cleaning can be used to remove imperfections from the surface of stainless steel after fabrication. Electro-cleaning removes embedded iron particles; however, unlike pickling, electro-cleaning makes the substrate surface smoother. Electro-polishing is the same process as electro-cleaning but it is generally performed for longer periods of time. Pickling, electro-cleaning, and electro-polishing surface treatments are beyond the scope of this document.

THE COMPLETE PASSIVATION PROCESS

The complete passivation process consists of mechanical cleaning, degreasing, inspection, the actual passivation by immersion or spraying, and rinsing.

Mechanical cleaning

Many mechanical methods are used to clean welds, such as chipping, brushing, grinding, and blasting. However, these methods may harm the stainless steel surface if not performed properly. For example, grit blasting can be extremely detrimental because it is difficult to keep grit from becoming embedded in the surface being blasted. Grit blasting roughens the surface and creates small cracks and crevices that allow localized crevice corrosion. Shot-peening with clean stainless steel shot produces compressed stresses and reduces the risk of stress cracking; however, it does not eliminate crevice corrosion due to the roughened surface. Sand blasting should be avoided unless no other cleaning method is available. If sand blasting is used, only new, uncontaminated sand should be used. Glass bead blasting is an effective method for local and large area cleaning. Grinding with clean aluminum oxide discs or clean flapperwheels is effective in removing heat tint and other weld-related defects. However, even light grinding leaves a cold worked, smeared surface that may contain micro cracks, laps, seams and other defects that can initiate crevice corrosion. During heavy grinding, grinding wheels overheat the surface of stainless steel. Excess heat will degrade the corrosion resistance of the stainless steel to depths greater than 25 to 50µm. Grinding should be used only when removal of the weld crown is critical to optimizing corrosion resistance. Normally, chipping is used between welding passes to remove weld slag and to eliminate any damaging effects of the welding process. Chipping is not an acceptable final surface finishing technique for product contact surfaces.

Degreasing

Passivation cannot form or enhance the protective film when grease, oil, fingerprints, or other forms of organic contamination are present on the stainless steel surfaces. Moreover, when polishing stainless steel to meet hygienic standards, some mills use an oil that contains an extreme pressure (EP) additive that although yielding an aesthetically pleasing finish, is difficult to remove. All manufacturing oils, EP additive and mineral oil must be removed completely prior to passivating to prevent stains, streaks, and future corrosion. Oil and soil prevent the acid and oxygen from reaching the metal surface. Degreasing and general cleaning may be accomplished by immersing, swabbing, or spraying an alkaline cleaner, solvent or detergent cleaners or a combination of these.

Also, vapor degreasing, ultrasonics using various alkaline cleaners, and steam (with or without cleaner or high-pressure water-jetting) will clean and degrease stainless steel. An example of a degreasing procedure is in Appendix 2. General preparations before general cleaning are in Appendix 1.

Inspection

The water-break test, ASTM A 380 *(1)*, is easy to use and is effective in detecting residual organic matter that was not removed during degreasing. A sheet of water directed over the surface will bead around residual oil, grease, and other organic contaminants. A surface that exhibits good sheeting is free of oil.

Water can detect iron contamination. Rust streaks and spots will form on wetted surfaces over a period of several hours if contamination is present. However, the copper sulfate and ferroxyl tests are much more sensitive than the water test. These tests are specified when the surface must be free of iron. They are easy to use, but the test solutions do not have a long shelf life.

Passivation by immersion or spraying

The part to be passivated is immersed or sprayed, depending on the size of the piece, with a solution selected from ASTM A 380 *(1)*. In addition to the standard nitric acid solution, there are a number of different solutions appropriate for all grades and finishes of stainless steel, including 200, 300, and 400 series *(2)*. An oxidizing acid, such as nitric acid, used for passivation dissolves any high carbon tramp steel and assures a uniform, clean surface that results in the consistent formation of the chromium oxide film. An example of a passivation process is given in Appendix 3.

Rinsing

Immediate and thorough rinsing in potable water at pH 6 to 7 is critical. In many cases, neutralization of the acid prior to rinsing is helpful. Immersion, neutralization, and rinsing must be completed without allowing surfaces to dry between steps.

ENVIRONMENTAL CONCERNS

Highly concentrated acid solutions used for passivation should not be discharged to plant sewers without dilution or neutralization. If possible, salvage the acid for further use or neutralization prior to discharge. Do not discharge onto concrete or tile-grouted floors, as the acid will damage the floor material. Any leaks should be diluted immediately with large volumes of potable water. Do not neutralize nitric acid solution in product vessels. Because of the high corrosivity of acid, it is important that all non-stainless steel accessories are removed from the system being passivated. This includes all pressure gauges, thermometers, diaphragms, level controls, etc. Failure to remove these items will result in their destruction, which can lead to potentially dangerous leaks of the passivation solution. All remaining components are constructed either of 304 or 316 stainless steel. Also, all gasket materials in the system, including any HTST gaskets or door gaskets, are compatible with high concentrations of nitric acid.

REFERENCES

1. Anonymous. 1994. Cleaning and descaling stainless steel parts, equipment and systems: ASTM A 380-94, American Society for Testing and Materials, West Conshohocken, PA.
2. DeBold. 1988. Passivation of Stainless Steel Parts. TAPPI Journal (1):196–198.
3. Jin, S., and A. Atrens. 1987. ESCA Studies of the structure and composition of the passive film formed on stainless steel by various immersion times in 0.1m sodium chloride solution. Appl. Phys. A 42:149–165.
4. Olefjord, I., and L. Wegrelius. 1996. The Influence of nitrogen on the passivation of stainless steels. Corr. Sci. 38:1203–1220.
5. Olsson, C. O. A., and S. E. Hornstrom. 1994. An AES and XPS study of the high alloy austenitic stainless steel 2545mo tested in a ferric chloride solution. Corr. Sci. 36:141–151.
6. Tuthill, A. H., and R. E. Avery. 1992. Specifying stainless steel surface treatments. The Nickel Development Institute, Technical Series No. 10068, Toronto, Ontario, Canada.

APPENDIX 1

SAFETY (REFER TO APPROPRIATE MATERIAL SAFETY DATA SHEETS [MSDS])

Strong oxidizing acids are powerful cleaners and are dangerous products to use at high temperature and high concentrations. For example, 20% nitric acid is required to achieve thorough passivation. This high concentration dictates that the utmost care be employed to insure safety of individuals and prevention of damage to the equipment involved.

All users must thoroughly understand the following concerns:

1. Strong oxidizing acids, such as nitric acid, are highly corrosive.
2. Strong oxidizing acids can be harmful or fatal if swallowed.
3. Strong oxidizing acids cause severe burns to eyes, mucous membranes and skin immediately upon contact. Inhalation of nitric acid vapors or mist causes irritation to mucous membranes, eyes, nose, throat, and skin.
4. Strong oxidizing acids should not be mixed with anything but water, except that an approved defoaming agent can be added to control excessive foam during spray recirculation. **Add acid to water only.**
5. Strong oxidizing acid vapors that form during heating and recirculating require proper venting. Because passivated vessels retain vapors, entry to an area must be prevented until it is thoroughly rinsed and cooled and until thorough atmospheric testing shows that the area is safe for entry.
6. Personal protective gear is mandatory and includes rubber gloves, goggles, face shields, and protective clothing to provide protection of

skin, eyes, mucous membranes, and clothing from contact with nitric acid. Clothing or personal protective equipment that has been contaminated with nitric acid solution should be flushed with water. Any non-impervious clothing should be placed in a closed container for storage until it can be discarded appropriately or until acid can be removed from the clothing.

7. Appropriate respiratory equipment should be available for use, by trained individuals only, when they are using concentrated products or entering closed vessels. Lock out and confined space entry procedures and regulations must be followed. Depending on the concentration of the chemicals used, additional ventilation may be needed to insure that the prescribed respiratory exposure limit is not exceeded. If use of ventilation controls is not feasible, then use of appropriate respirators will be needed.
8. Chlorine and nitric acid vapors will be produced if nitric acid is mixed with any chlorinated detergent or sanitizer. Do not mix any chlorine-containing material with any acid; otherwise, deadly poisonous gasses will result. Insure that all chemical pumps are disconnected from CIP systems when the system is used on a spray passivation procedure.
9. Violent reactions may occur if strong oxidizing acids come in contact with organic materials or solutions. Spontaneous combustion may occur if these acids contact is made with paper, sawdust, or some chemicals.
10. In case of a spill, immediately flush the contaminated area with cold water. Isolate the area to prevent personnel from walking through the spill.

First aid

If exposed to passivation solutions, get medical attention immediately. Refer to manufacturer's MSDS for the treatment appropriate to the material used.

If exposed to passivation solutions, flush the affected area immediately with large amounts of water (at emergency shower or eyewash) for a minimum of 15 minutes. Remove any contaminated clothing and get immediate medical attention.

In case of inhalation of vapors, remove exposed individual to fresh air at once. Get medical attention immediately.

APPENDIX 2

GENERAL PREPARATIONS

1. Prior to initial clean-up of new equipment, it should be inspected. Use a bright light to examine the equipment for rust, corrosion, scratches, surface scuffing, pitting, cracks, crevices, deficient welds, fabrication markings (e.g., markings from crayons, grease pencil, permanent markers) or other unusual damage. Document damage and where it was observed.
2. Circulate water and check system for leaks. Repair all leaks prior to charging the systems with chemicals.
3. Review the instruction manual furnished by the equipment manufacturer. Note specific instructions for initial cleaning and/or passivating of the equipment, such as temperature limitations imposed by choice of insulating materials.
4. The operator must identify those parts that must be routinely disassembled for manual cleaning so that they can be properly passivated either before or after the entire assembly is passivated.
5. Review pertinent first aid procedures and Material Safety Data Sheets (MSDS).
6. Review precautions that must be observed when handling the cleaning and passivating chemicals.
7. Examine the entire system, including fittings of CIP control instrumentation, to make sure all metallic components are stainless steel. Examine it carefully. Don't make assumptions. Remove and/or replace non-stainless steel parts with stainless steel parts as needed.
8. Determine CIP solution volumes required.
9. Before starting the cleaning and passivation operation, have a water hose running or a hose with a self-closing nozzle ready for immediate use, and have first aid materials readily available for emergency use.
10. Be sure the materials used in construction of gaskets and seals can withstand the passivation chemicals, temperatures, and times.

APPENDIX 3

EXAMPLE OF A DEGREASING PROCEDURE

SAFETY NOTE: Highly caustic products require that operators follow all safe handling procedures. Wear splash-proof goggles, face shield, rubber gloves, and impervious protective clothing such as apron, suit and boots.

ENVIRONMENTAL NOTE: Be sure strong caustic solutions are properly disposed of or adequately neutralized to meet regulatory standards.

PROCEDURE

1. Charge system with cleaning solution (follow manufacturer's recommended concentrations and mixing instructions).
2. Circulate cleaning solution for one hour at 70°C (160°F), following the specifications of the chemical manufacturer.
3. Flush cleaning solution to drain:

   For tanks, execute at least 10 burst rinses until required neutral pH is achieved.

   Execute burst rinses and line flushes until foaming is eliminated. Determine that pH and titration are equivalent to the values of rinse water at its source.

   Execute additional burst rinses and line flushes as needed until pH equals that of rinse water. This can be observed by noting the elimination of foam from the rinse water.
4. Allow 10 minutes drainage time and inspect for good water sheeting action. If water beading is observed, repeat cleaning procedure. Observations should include easy-to-observe surfaces such as interior surfaces of tanks, as well as nonpermanent pipe connections, valve housings and connections, interior surfaces of pumps, and in-line instrument connections.
5. Do not attempt passivation unless all oil is removed, as shown by good water sheeting action and the absence of water beading.

Note: Extreme Pressure oil removal will require use of a special cleaner or solvent. Consult your cleaning chemical supplier for guidance.

EXAMPLE OF A PASSIVATION PROCEDURE

SAFETY NOTE: When using a strong oxidizing acid, follow proper safety procedures. Wear splash-proof goggles, face shield, rubber gloves, and impervious protective clothing, such as apron, suit, and boots.

ENVIRONMENTAL NOTE: Be sure strong oxidizing acids are properly disposed of and adequately neutralized to meet regulatory standards.

PROCEDURE

1. Charge system with acid solution (typically 20 to 40%). Follow manufacturer's recommendations for optimum concentration.
2. Circulate solution for one hour at 60°C (140°F) or higher. Follow manufacturer's time and temperature specifications.
3. After treatment is complete, either collect solution for reuse or neutralize before flushing to drain.

   For tanks, execute at least 10 burst rinses until required neutral pH is achieved.

   Execute burst rinses and line flushes until neutrality is achieved as determined by pH measurement or until pH titration shows that values of flushes are equivalent to the values of rinse water at its origin.

   Execute additional burst rinses and line flushes as needed to achieve neutral pH.
4. Drain all equipment surfaces and allow equipment to completely air dry.
5. Prior to equipment startup for food processing, perform a complete cleaning and sanitizing program.

Prepared on behalf of the 3-A and the EHEDG, Member of the 3-A Steering Committee, the Sanitary Standards Subcommittee of the Dairy Industry Committee/Farm Industry Committee and the European Hygienic Equipment Design Group.

ABOUT THE AUTHOR

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Jim Dickson

Dickson Elected IAMFES Secretary

Jim Dickson is Interim Department Executive Officer and Associate Professor for the Department of Microbiology, Immunology and Preventative Medicine at Iowa State University, Ames, Iowa. Prior to his employment with Iowa State University, Dr. Dickson held positions as Research Food Technologist and Lead Scientist at USDA-ARS Meat Animal Research Center, Clay Center, Nebraska; Microbiologist, Tony's Pizza Service, Salina Kansas; and Manager, Food Irradiation Applications, Radiation Technology, Inc., Rockaway, New Jersey.

Dr. Dickson received his Ph.D. from the University of Nebraska-Lincoln in 1984. He began his academic career at Clemson University where he received his B.S. in 1977. He received his M.S. from the University of Georgia in 1980.

Research interest for Dr. Dickson includes the microbiological safety of foods of animal origins. Within this area, his interest is in the growth and physiological activity of bacteria of public health concern, especially the Gram negative bacteria, as affected by food processing and storage. He has also conducted reseach on bacterial attachment to food and food contact surfaces. The result of this research has led to a patent on a process to reduce bacterial contamination on animal carcasses.

Dr. Dickson has been an active member of IAMFES since 1987. His involvement includes serving on the Nominating Committee in 1995 and 1996; Vice-Chair of the Applied Laboratory Methods Professional Development Group in 1991-92; Current Vice-Chair of the Meat Safety and Quality Professional Development Group; and a member of the *Journal of Food Protection* Management Committee. He has also published numerous articles in the *Journal of Food Protection* and serves on its Editorial Review Board. Other professional involvement includes membership in the American Academy of Microbiology, American Society for Microbiology, Institute of Food Technologists and the International Meat and Poultry HACCP Alliance Expert Committee on Certification.

An outstanding performance award and three certificates of merit for outstanding performance in research from the USDA are among the numerous honors Dr. Dickson has achieved. Others include a Fellow in the American Academy of Microbiology, and a member of Phi Kappa Phi, Phi Tau Sigma, and Gamma Sigma Delta.

Announcement

of the 1998 IAMFES Awards

Black Pearl Award:

Kraft Foods, Inc.

Honorary Life Membership:

Henry V. Atherton

David D. Fry

Harry Haverland Citation Award:

Anna M. Lammerding

Educator Award:

Ronald H. Schmidt

Sanitarian Award:

Terry B. Musson

New Members

CANADA

Gil Geere
IG Micromed Environmental Inc.
Richmond, BC

Christine Greasley
Quaker Oats Co.
Trenton, Ontario

Kellie Jackson
Charlottetown, PEI

Michael Simard
Ste-Foy, Quebec

Judy Strazds
Canadian Food Inspection Agency
Toronto, Ontario

INDIA

Rahul G. Warke
Mumbai, Maharashtra

KOREA

Yunhee Chang
Myong Ji University
Yongin, Kyungigi-Do

MEXICO

Zúñiga-Estrada Armida
Universidad Autónoma Del Edo
De Hgo, Pachuca, Hidalgo

SPAIN

Maria Jose Peris Andres
Paterna, Valencia

UNITED STATES

ARKANSAS

James Denton
University of Arkansas
Fayetteville

CALIFORNIA

Colin Campbell
Columbia Food Laboratories
Anaheim

Kevin Hall
University of California-Davis, Auburn

Sui-Sheng T. Hua
Western Regional Research Center
Albany

Joel E. Kolling
C.D.F.A., Riverside

Narain Naidu
Cal-Poly State University
Pomona

Alvin S. Oey
Guittard Chocolate, Burlingame

Henry Robles
Fullerton Foods, Fullerton

Bill Steiner
Lord Label, Pleasanton

COLORADO

Rungtip Chaunchuen
Colorado State University
Fort Collins

DISTRICT OF COLUMBIA

Ann Marie McNamara
USDA-FSIS-OPHS, Washington

FLORIDA

Ronald H. Schmidt
University of Florida, Gainesville

GEORGIA

Lance F. Bolton
University of Georgia, Athens

ILLINOIS

Hea-Ran L. Ashraf
Southern Illinois University
Carbondale

Shale Susin
Redi-Cut Foods, Franklin Park

Liangji Xu
Praxair, Inc., Burr Ridge

INDIANA

Amy M. Tinkey
Purdue University
West Lafayette

IOWA

Candace Anderson
Wapsie Valley Creamery Inc.
Independence

KANSAS

Karen Penner
Kansas State University
Manhattan

MARYLAND

Leon Josowitz
Sterilex Corporation, Owings Mills

MASSACHUSETTS

David W. Acheson
New England Red Center
Boston

R. Victor Lachica
U.S. Army/DOD, Natick

D. S. Paull
Crescent Ridge Inc., Sharon

MICHIGAN

Stephanie L. Davis
Michigan State University
Lansing

MINNESOTA

Ann Husgen
Quest International, Rochester

MISSISSIPPI

Louis Honeycutt
Flav-o-Rich Dairy, Canton

MISSOURI

Kimberly J. Schmidt
Nabisco, St. Louis

NEW JERSEY

James L. Budd
Prepchek, Seaville

OHIO

Steven R. Ferreira
Warren Taylor Services, Athens

Tom W. Pfau
AVCA Corporation
Maumee

OREGON

Jock Gibson
Lochmead Dairy, Inc.
Junction City

Mary Kim Snyder
Clermont Inc., Hillsboro

PENNSYLVANIA

Joseph D. Noro
Schneiders Dairy, Pittsburgh

TENNESSEE

Tim Cox
Morning Star Foods
Arlington

Mona A. Elgayyar
University of Tennessee, Knoxville

VERMONT

L. S. Donnelly
Wyeth Nutritionals Inc., Georgia

Ronald Myers
Vermont Science & Education
Center, St. Albans

WASHINGTON

Andrea L. Childress
Pacific Rim Foods Inc., Tacoma

WISCONSIN

George H. Nelson
Menomonie

Catherine A. Yogerst
Bruce

New IAMFES Sustaining Member

Shawn A. Johnson
Universal Sanitizers & Supplies, Inc.
Knoxville, TN

New Members

CANADA

Gil Geere
IG Micromed Environmental Inc.
Richmond, BC

Christine Greasley
Quaker Oats Co.
Trenton, Ontario

Kellie Jackson
Charlottetown, PEI

Michael Simard
Ste-Foy, Quebec

Judy Strazds
Canadian Food Inspection Agency
Toronto, Ontario

INDIA

Rahul G. Warke
Mumbai, Maharashtra

KOREA

Yunhee Chang
Myong Ji University
Yongin, Kyungigi-Do

MEXICO

Zúñiga-Estrada Armida
Universidad Autónoma Del Edo
De Hgo, Pachuca, Hidalgo

SPAIN

Maria Jose Peris Andres
Paterna, Valencia

UNITED STATES

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James Denton
University of Arkansas
Fayetteville

CALIFORNIA

Colin Campbell
Columbia Food Laboratories
Anaheim

Kevin Hall
University of California-Davis, Auburn

Sui-Sheng T. Hua
Western Regional Research Center
Albany

Joel E. Kolling
C.D.F.A., Riverside

Narain Naidu
Cal-Poly State University
Pomona

Alvin S. Oey
Guittard Chocolate, Burlingame

Henry Robles
Fullerton Foods, Fullerton

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Quest International, Rochester

MISSISSIPPI

Louis Honeycutt
Flav-o-Rich Dairy, Canton

MISSOURI

Kimberly J. Schmidt
Nabisco, St. Louis

NEW JERSEY

James L. Budd
Prepchek, Seaville

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UpDates

AFFI Promotes Krese to Vice President of Communications

The American Frozen Food Institute (AFFI) has promoted Christopher P. Krese to Vice President of Communications. Previously, Krese was AFFI's Director of Communications.

Krese directs the communication of AFFI's positions on legislative and regulatory issues which impact the frozen food industry, directs member communications activities, and serves as the Staff Liaison for AFFI's Public and Trade Relations Council, 5-A Day Committee and Nutrition Advisory Council.

Krese also directs AFFI's efforts to promote the frozen food category to consumers, the retail and foodservice trades and the media. Among these efforts, he coordinates AFFI's successful Public and Trade Relations Program and 5-A Day – the Cool Way! Program, which promotes frozen fruits and vegetables as the high quality, convenient way to consume five servings of fruits and vegetables each day for better health.

Prior to joining AFFI, Krese worked on Capitol Hill in both media relations and legislative capacities. He served as Press Secretary for former U.S. Rep. Bill Clinger (R-PA), Chairman of the U.S. House of Representatives Government Reform and Oversight Committee and Vice Chairman of the Transportation and Infrastructure Committee. Previously, he was a Legislative Aide for the House Committee on Education and the Workforce, which has jurisdiction over the National School Lunch Program as well as nutrition and workplace policy issues.

Krese is a 1993 graduate of Georgetown University, Washington, D.C., and is originally from Cleveland, OH. He is a member of the American Society of Association Executives (ASAE).

Educational Foundation Announces Staff Appointments

The Educational Foundation of the National Restaurant Association announces the appointment of Michael Johnson, Sales Director; Linda Hoops, Academic Marketing Leader; Carol Sheetz, Product Development Director, and Samantha Tubekis, Communications Leader.

Michael Johnson joined The Educational Foundation in 1995 as Group Product Manager and was promoted to Director of Sales in 1997. In his position, Johnson provides leadership for all sales activities of The Foundation. Johnson received his bachelor of science degree in finance from Temple University.

Linda Hoops comes to The Foundation from National Food Service Management, where she served as Director of the Education and Training Division. Hoops also served on The Educational Foundation's board of trustees for the 1994-1997 term. In her new position, Hoops provides educational, industry, and governmental knowledge, expertise and leadership in the business development of The Foundation's school-to-career program, ProStart. Hoops has a doctorate in education, public administration, planning and policy, a master's degree in science, hotel and restaurant administration and foods from Oklahoma State University and received her bachelor of science degree in home economics, food and nutrition from the University of the Philippines.

Carol Sheetz joined The Educational Foundation in 1997 as Information Technology Leader and has been promoted to Product Development Director. In her new position, Sheetz oversees the development of new products, marketing and sales for select new and existing Foundation programs. Sheetz holds a master's degree in instructional technology from Northern Illinois University. She is also a graduate of Illinois Sate University, with a bachelor of science degree in speech communication education and business/industrial psychology.

Samantha Tubekis comes to The Foundation from Preferred Meal Systems where she served as Marketing Communications Manager. Tubekis will serve as Communications Leader, and will be responsible for enhancing awareness and recognition of The Foundation's mission, initiatives and accomplishments among all key constituencies and audiences. Tubekis received her bachelor of arts degree in journalism from Northern Illinois University.

Silliker Names C. J. Valenziano Manager of Marketing and Business Development

Silliker Laboratories Group, Inc., North America's leading network of food testing and consulting laboratories, has hired Catherine J. "C. J." Valenziano as Manager of Marketing and Business Development.

Valenziano will be responsible for Silliker's marketing and communications programs. With 11 years experience in the meat and pet food industry, Valenziano's expertise in crisis management and supplier and customer communications on nutrition and food safety issues will provide Silliker's clients with a new dimension of support.

Previously, as the Director of Public Relations for the National Cattlemen's Beef Association, Valenziano was responsible for crisis and issues management programs specifically on *E. coli* O157:H7 and cancer and meat and fat consumption. She also managed consumer nutrition and food safety education campaigns.

Prior to NCBA, Valenziano was an Account Supervisor at the John Volk Agency in Chicago on Ralston Purina veterinary pet foods and other animal health and diagnostic testing products.

Valenziano is currently involved with the Beef Industry Food Safety Council. A Chicago-area native, Valenziano has a bachelor of science degree from Northern Illinois University. She has received numerous awards, including first place from the National Agri-Marketing Association and the Publicity Club of Chicago for beef industry crisis management efforts.

Satoh Joins Neogen

Neogen Corporation (NASDAQ: NEOG) announced that Dr. Paul S. Satoh, a long-time Senior Scientist and Research Manager at Pharmacia & Upjohn Inc., has joined the company as Vice President for Research & Development. Dr. Satoh joins Neogen after serving nearly six years on the company's Scientific Review Council as an Immunology Specialist.

During his 25-year career at Upjohn, Satoh took a year's sabbatical to serve as Senior Visiting Scientist in immunopharmacology at the University of Michigan in Ann Arbor, and also served as an Adjunct Associate Professor in general studies in chemistry and social issues in biology at Western Michigan University. His most recent position at Upjohn was that of a Senior Scientist responsible for strategic information analysis and competitive intelligence.

A native of Osaka, Japan, Satoh emigrated to the United States in 1960, and earned his doctorate in biochemistry from Wayne State University. He remains fluent in both English and Japanese, and, during his "off hours" is working on a machine translator that would translate documents sent between the two languages.

Penn State Names Barry L. Zoumas as Alan R. Warehime Professor of Agribusiness

Barry L. Zoumas, recently retired as Vice President of Science and Technology with Hershey Foods Corp., has been named Alan R. Warehime Professor of Agribusiness in Penn State's College of Agricultural Sciences.

The professorship was endowed in 1989 by Alan R. Warehime, the late President of Hanover Foods, to enhance the college's commitment to the development of agribusiness leaders. The Warehime Professor will develop a program integrating business, economics, and international perspectives into the college's academic courses and act as a catalyst for collaborative projects in agribusiness education and research across departments in the college and the University.

Zoumas spent most of his business career at Hershey Foods, starting as the Manager of Nutritional Sciences in 1970. Until his Penn State appointment, he was the Chief Technical Officer at the corporation for 16 years, serving on the staff of three Chief Executive Officers. As a member of the Corporate Planning Committee, he participated in strategic decisions that expanded the company ten-fold.

During his career, Zoumas was responsible for all agribusiness programs, including a cocoa plantation in Central America. He also directed the corporate milk procurement program, supervising contracts with more than 800 Pennsylvania dairy farmers. He served as Hershey's liaison and spokesman to governmental regulatory agencies and was the company's principal contact with trade associations and scientific organizations.

His international experience is extensive. He served as Principal Advisor to U.S. Aid for Agricultural Development in the Caribbean area and worked in Belize, Haiti, the Dominican Republic, Guatemala, and Brazil. He was Visiting Scientist for six months at the Food and Agricultural Organization of the United Nations in 1997.

He earned his B.S. in chemistry from Kutztown University in 1964. Continuing his education at Penn State, Zoumas earned a M.S. in nutrition in 1966 and a Ph.D. in nutrition in 1969.

George Uhe Company Named as Exclusive U.S. Agent/Distributor

The George Uhe Company of Paramus has been named by Medichem S.A. of Barcelona, Spain, as the exclusive U.S. agent and distributor for its Chlorhexidine Base and Chlorhexidine Salts, used in human and animal disinfection.

George Uhe Co., Inc. established in 1921, is a leader in essential oil brokerage and a supplier of speciality chemicals, pharmaceuticals, flavor and fragrance raw materials, and nutritional ingredients.

Approval Sought for Ground Beef Irradiation

The Canadian Cattlemen's Association (CCA) has submitted a petition to Health Canada requesting approval for the irradiation of ground beef. The petition requests approval for the irradiation of fresh and frozen ground beef to minimize risks associated with *E. coli* O157:H7.

"Food safety is of paramount importance to Canadian cattlemen. We view irradiation as another option to provide a safe, wholesome product to the consumer," according to Ben Thorlakson, CCA President.

"CCA is very supportive of the consumer's right to choose between irradiated and non-irradiated products. The Food & Drug Act requires consumer labeling to indicate that the ground beef is irradiated," according to Dennis Laycraft, CCA Executive Vice President.

Irradiation is currently approved for spices in Canada. Worldwide it has been approved for over 50 products in 36 countries. A similar petition was approved in the United States in December 1997. Irradiation is recognized as one of the most effective methods to reduce the risks from pathogenic bacteria such as *E. coli* O157:H7. The petition was developed with the input from industry, academia, government and consumer representatives.

New Detector Spots Unseen Fecal Contamination on Meat

A new way to detect unseen fecal contamination on fresh meat could help industry meet new food safety regulations designed to control disease-causing bacteria.

Feces are the major source of bacterial contamination in livestock and poultry slaughterhouses, according to Agricultural Research Service Microbiologist Mark A. Rasmussen at the National Animal Disease Center in Ames, IA.

After the 1993 *E. coli* O157:H7 outbreak in the Pacific Northwest, USDA developed new sanitation requirements for slaughterhouses, including stiffer inspections for fecal contamination and tests for *E. coli*.

According to ARS microbiologist Thomas A. Casey, these have not been easy tasks to accomplish using current methods. Using fluorescent spectroscopy, the ARS researchers and Iowa State University chemist Jacob W. Petrich built a detector that illuminates unseen fecal contamination on meat. Petrich says the device is adaptable to any size packing plant. As a hand-held unit, similar to metal detectors used in airports, the instrument could alert meat packers to fecal contamination within seconds. The contaminated carcass could then be sanitized before the contamination spreads. Meat packers now visually inspect carcasses for fecal contamination. With the new technology, this job will be easier, faster and more accurate.

The ARS/ISU research is timely because USDA Service (FSIS) is enforcing a zero tolerance standard for fecal contamination on livestock and poultry carcasses. The researchers are patenting their technology, and discussions are under way with industry cooperators on possible commercial development.

USDA Researchers Create New Product that Reduces *Salmonella* in Chickens

A new product created by researchers at the U.S. Department of Agriculture significantly reduces potential *Salmonella* contamination in chickens, Agriculture Secretary Dan Glickman announced in a speech at the National Press Club.

In U.S. field tests involving 80,000 chickens, the product, called PREEMPT, reduced *Salmonella* from about seven percent in untreated chickens to zero percent in the treated. The Food and Drug Administration this week approve PREEMPT, marking the first time FDA has approved a mixture of bacteria as a product preempts the growth of *Salmonella* in chickens' intestines by introducing a blend of 29 live, non-harmful bacteria naturally present in healthy adult chickens.

It has long been known that mature chickens at least three weeks old have a natural resistance to *Salmonella* colonization in the intestines. Scientists have also known that administering baby chicks the bacteria from mature chickens protected the chicks from *Salmonella*. But scientists did not know exactly which of the intestinal bacteria were most effective. The newly developed mixture can be sprayed in a mist over newly hatched chicks to give them the same level of *Salmonella* resistance that develops in an older bird.

PREEMPT is the successful result of a public-private partnership. USDA scientists worked with MS Bioscience of Dundee, IL to develop PREEMPT.

USDA has patented the mixture. MS Bioscience has a licensing agreement to market the product. A similar product, developed by the same research group, is now being tested in pigs. *Salmonella* may be transmitted to people via contaminated poultry. While PREEMPT can help poultry producers reduce the risk of *Salmonella* contamination, it should be used as part of a compre-

hensive series of proper food handling and preparation measures designed to minimize the risk posed by all potential foodborne pathogens. Chicken must still be properly handled and thoroughly cooked to be safe. There are an estimated 2 million cases of *Salmonella* poisoning each year. Of these, about 40,000 cases are culture-confirmed. Most exposure is from raw or undercooked meat, poultry, milk and eggs. The human health care bill for salmonellosis averages about $4 billion annually.

AFFI Challenges Proposed Food Processor "Shutdown" Policy

The American Frozen Food Institute (AFFI) urged the U.S. Department of Agriculture's Food Safety and Inspection Service (FSIS) to rethink a proposal which could result in increased and unjustified disruptions of meat and poultry processing plant operations even in the absence of any threat to the public health.

In comments submitted to FSIS regarding proposed "rules of practice" that apply to the refusal, suspension or withdrawal of Federal inspection services, AFFI detailed the proposal's potentially devastating impacts on frozen food companies and other food processors. The decision of Federal inspectors to withhold the mark of inspection effectively halts a company's operations. In some cases, companies are unable to recover and are forced to close permanently.

AFFI expressed the following concerns:

1. The proposed rules do not provide notice and an opportunity to correct alleged deficiencies before institution of regulatory action. Due to the severity of an inspection suspension or withdrawal, AFFI said "every effort should be made to address cooperatively alleged deficiencies prior to a suspension or withdrawal action."

"Prior to institution of inspection suspension or withdrawal, plants should be given explicit warning as to the deficiencies alleged and why they warrant suspension or withdrawal of inspection, and an opportunity both to respond to the alleged deficiencies as well as a reasonable time period within which to do so."

2. The proposal fails to provide adequate notice and opportunity to appeal inspection suspension or withdrawal prior to institution of such extreme regulatory action. Under the proposal, FSIS could shut down a facility for alleged noncompliance and the plant would have no opportunity for appeal prior to the withholding of the mark of inspection or the suspension of inspection services.

AFFI said, "Absent a demonstrated and imminent public health risk including the need to prevent the distribution of product shown to be adulterated FSIS should not be authorized to take such extreme action without first providing plants an opportunity to seek an administrative appeal of the agency's decision." AFFI said the proposal would "deprive companies of fundamental due process rights, impose substantial economic penalties, and cast doubt on the integrity of company practices in furtherance of no overriding public health objective."

3. The proposed rules are overly broad. According to AFFI, the proposal oversteps the grounds for inspection suspension or withdrawal as established in the Federal Meat Inspection Act and Poultry Products Inspection Act.

While urging modifications to the proposal, AFFI emphasized the safety of frozen food products and the frozen food industry's paramount interest in providing safe products.

"The frozen food industry supports a strong Federal commitment to working in partnership with industry, consumers, regulators and other stakeholders to ensure that the American food supply remains the safest and most wholesome in the world," AFFI said.

John Farquharson Urges Industry to Step Up Commitment to Serving Safe Food

The International Food Safety Council has revealed the findings of a 1997 consumer food safety study determining consumer perceptions of food safety. The study was presented by John Farquharson, FMP, President of the Council, last week at a food safety session, hosted by the Council at the Chain Operators Exchange Conference (COEX '98).

The survey was co-sponsored by the International Food Safety Council and CMF&Z, a consulting firm that has been tracking consumer understanding of food safety issues since 1993. The survey determined consumer perceptions of food safety. The research revealed that:

- Over the past year, 52% of consumers indicated that food safety has become more important to them today than it was a year ago. And, more people are concerned today about safe food handling and food preparation than they are about the fat or sodium content of food.
- Ninety-six percent of consumers hold restaurants the most responsible for food safety along with food processors/manufacturers and meat packers. However, only 46% of consumers think that restaurants are doing a good job of ensuring a safe food supply.

- Consumers ranked restaurants fifth as the food industry segment that does the best job of ensuring that food is safe. Producers and farmers, supermarkets and food processors even consumers – rated higher than restaurants. This finding has been trending downward over the past three years. In 1997, 46% of consumers ranked restaurants as doing an excellent job of ensuring a safe food supply down from 50% in 1995.
- Sixty percent of consumers think that restaurant workers are somewhat knowledgeable about food safety; 31% think that they are not knowledgeable; and only 7% think they are very knowledgeable.
- Action-oriented visual cues have the most impact in making consumers very confident that restaurant food is safe, like, not seeing dirty dishes, seeing the food prepared, and seeing employees wash hands in restrooms.

Farquharson also cited recent National Restaurant Association research that indicated that 97% of consumers say that knowing that restaurant workers are trained in food safety is most important in making them feel confident in the industry's ability to serve safe food.

The research indicates just how seriously the industry must take this responsibility, and why it's more important than ever to reassure consumers that our industry is committed to serving safe food.

The International Food Safety Council President told the audience that the industry needs to do more. In his remarks, Farquharson reiterated the Council's position that every restaurant and foodservice establishment should have a manager certified in food safety, who, in turn, would train employees and institute proper food safety practices. He also told the audience of the recent resolution passed by the National Restaurant Association's Board of Directors stating that every manager in the industry should be certified in food safety.

"Food safety is not an option, it's an obligation," claimed Farquharson. "We need to do everything we can to ensure that our customers are served safe food. It's what they expect and it's what we owe them."

Silliker Laboratories Acquires DFL Laboratories

Silliker Laboratories Group, Inc. announced that it has acquired DFL Laboratories, northern California's leading dairy and food testing laboratory.

Over the next six months, Silliker and DFL will combine their five California laboratories into two full-service labs in Modesto and Carson. Currently, Silliker operates labs in Hayward/Fresno, and Carson; DFL operates labs in Modesto and Valencia. This Silliker/DFL combination will create the largest food testing and consulting lab in California.

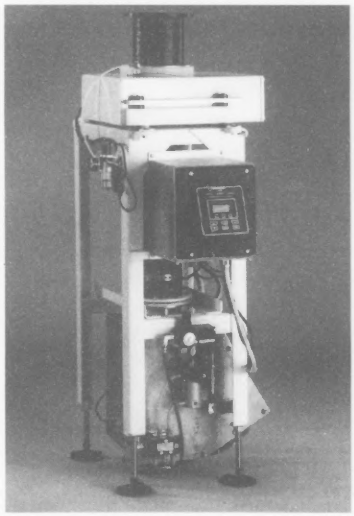
"DFL has a nearly 75-year history of expertise and excellent service. From a geographical and technical standpoint, DFL is an excellent addition to our network of labs," said Dr. Russell S. Flowers, President of Silliker Laboratories Group, Inc. "DFL brings exceptional expertise in dairy testing, and, together, we'll provide the West Coast food industry unparalleled scientific resources and testing capabilities." Randy Young, President of DFL, said DFL will benefit from being part of the Silliker network. "Silliker's commitment to quality and service is consistent with DFL's long history. As part of the Silliker network, we'll have access to additional resources to continue our rapid growth and provide our customers with an even wider array of services," he said.

California represents one of the largest food processing and food testing markets in the U.S. In 1994, California became the nation's leading dairy producing state, reaching 25.8 million pounds of fluid milk production, according to USDA Milk Facts 1997. California is also the largest agricultural producer in the U.S. and accounts for 55 percent of the nation's fruit, nut and vegetable production.

Videojet Announces Acquisition of Marsh Company

Videojet Systems International, Inc., announces the acquisition of Marsh Company of Belleville, IL. Marsh Company will operate as a wholly-owned subsidiary of Videojet, with Thomas G. Barnett continuing as President of Marsh Company. Barnett will report directly to Craig E. Bauer, President and CEO of Videojet.

Videojet and Marsh are both leaders in their respective industries – Videojet in the small character coding equipment market and Marsh in the large character marking and coding industry. The strategic alliance of the two firms creates new opportunities for growth and strengthens the companies' global competitiveness.



Romsey, A Thermo Sentron Co.

MetalScout IIe "VFS" Vertical Fall Metal Detector System Now Available

Ramsey/Icore introduces its most advanced metal detector ever – the MetalScout IIe. This metal detector is a micro processor-based instrument designed for use in the food processing, food packaging, and pharmaceutical industries. The MetalScout IIe provides the user with progressive metal detection technology.

The MetalScout IIe "VFS" is a superior metal detection system designed specifically for use in vertical fall systems. With its special design the MetalScout IIe "VFS" offers superior performance while inspecting powder and granular products in a gravity fed operation. Ramsey/Icore continues to set the pace by designing systems that require minimal space while providing maximum sensitivity.

The MetalScout IIe offers a complete metal detection solution with several new features. These features include the AuditCheck Automatic Performance Verification System, Digital Signal Processing for maximum sensitivity in difficult applications, and the MetalNet communications package. The MetalScout IIe also features an enhanced Autolearn capability for easy operator setup. Other features include stainless steel construction, automatic balance control, auto tracking, designed for USDA approval, 50 product setups and password protection.

Ramsey, A Thermo Sentron Co., Minneapolis, MN

Reader Service No. 381

G&H Products Introduces New GHH-70 Centrifugal Pumps

The new GHH-70, the newest addition to the GHH line from G&H Products, combines higher flow rates and discharge pressures.

The GHH-70 has a front-loaded, externally-balanced mechanical seal that includes a conical spring, eliminating the need for the notch in the rotating seal. This enables service people to change the seal from the front of the back plate, saving valuable service time.

Its low NPSH requirement means that lower inlet pressure is needed to operate the pump. And, off-set loads are eliminated with the GHH-70's balanced design through self-centering compression coupling.

Some of the other features of this new centrifugal pump include: unique, modular design, heavy-duty construction, high efficiency, extended service intervals and easy maintenance, gentle product treatment, low power consumption, and authorized to carry the 3-A symbol.

G & H Products Corp., Pleasant Prairie, WI

Reader Service No. 382

Salmonella Testing: Rapid Results with Culture Confirmation

Dynabeads® anti-Salmonella is designed for rapid, immunomagnetic selective enrichment (IMS) of *Salmonella* directly from pre-enrichment broths. The rapid and simple protocol (less than 30 minutes) saves 24 hours of valuable testing time compared to standard culture methods because Dynabeads® anti-Salmonella simply replaces the use of selenite or tetrathionate selective enrichment broths. Isolated *Salmonella* colonies (or negative results) are achieved in 48 hours from receipt of sample.

Dynabeads® anti-Salmonella are uniform, superparamagnetic microspheres (2.8 microns in diameter) with affinity purified

antibodies on their surface. When incubated with a sample, Dynabeads® will bind their target bacterium forming a bacterium: magnetic bead complex. This complex is separated from the heterogeneous sample by performing the test in a magnetic test tube rack (Dynal MPC®-M). The isolated and concentrated bacterium:bead complex can then be cultured on any selective culture medium.

This highly sensitive system will detect as few as 100 organisms/ml of pre-enriched sample. Complete detection is achieved: over 200 serotypes (1,400 strains) of *Salmonella* have been tested. The concentration and purification of the sample by immunomagnetic separation (IMS) improves bacterial isolation and thus is useful for cultural confirmation of other presumptive methods. The protocol is simple and reagents are shelf stable. The versatility provided by this methodology will allow testing of many different sample types while enhancing the efficiency of existing manual and automated detection methods.

Dynal, Inc., Lake Success, NY

Reader Service No. 383

New Barrier® 250 Release Agent Makes Equipment Cleaning Easy

Ecolab just made it easier to clean food processing and packaging equipment. The company has introduced Barrier® 250, a proprietary release agent used to prevent food from sticking on surfaces during cooking and food processing operations.

Barrier 250, a ready-to-use organic pretreatment, is sprayed onto clean surfaces to permit easy removal of soils after food processing. Authorized by the U.S. Department of Agriculture as a release agent (3H), Barrier 250 can be used on graters, grinders, molds, kettles, and conveyors, as well as other food processing equipment. The release agent is especially effective for baked-on soils from cream soups, cheese, barbecue sauces, and other hard-to-remove products.

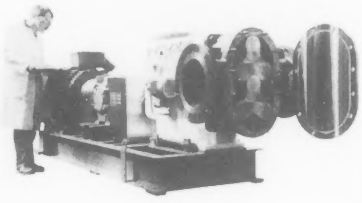
Barrier 250 can also be used to remove adhesives. It is patented for use with packaging machine equipment. When applied to clean equipment surfaces prior to production, Barrier 250 can aid in the removal of hot melt and cold set adhesives. This eliminates time-consuming manual scraping that is the current practice for glue removal.

The release agent also contributes to improved safety for plant workers. Because manual scrubbing is nearly eliminated, worker contact with supplemental cleaning products is greatly reduced. Barrier 250's convenient aerosol package permits easy application in hard-to-reach areas, eliminating special manual dispensing techniques.

Barrier 250 is currently available in an aerosol can and is effective at temperatures up to 350°F.

Ecolab Inc., St. Paul, MN

Reader Service No. 384



Tri-Clover Inc.

Tri-Clover to Expand T Series Pump Line with New, Large Models

A major expansion of its line of T Series heavy-duty positive rotary displacement pumps will be made in 1998 by Tri-Clover Inc. It will see the introduction of five additional models regarded to be the largest pumps of their type in the world. The first models in the new line of pumps were previewed during Worldwide Food Expo.

The new pumps will feature 316 stainless steel and will handle capacities to 3000 GPM and 250 psi in high-hygiene, sanitary industries. Designed for CIP use, the new pumps will incorporate tri-lobe rotors that minimize product entrapment in the pumping chamber.

The new pumps are patterned after the AP range of industrial pumps marketed by Alfa Laval, Tri-Clover's parent company, which have earned a worldwide reputation for efficiency in high-capacity industrial markets. Rugged, compact construction of the pumps provides durable operation in a range of processing environments and enables use in compact areas.

Product designs incorporate features that ensure high performance, long service and ease of maintenance. The tri-lobe rotors are manufactured with the optimum profile for high volumetric efficiency and interchangeability. Taper roller bearings optimize shaft support and bearing life as well as facilitate maintenance. Accessible timing gears, mounted outboard of the bearings, allow shafts to be withdrawn individually. A range of application-matched seals is available for each new pump model.

Tri-Clover Inc., Kenosha, WI

Reader Service No. 385

Cooper Introduces the International Series HACCP Manager

Cooper Instrument Corporation is announcing the reintroduction of the HACCP Manager, Model HT3000. The reason simply is that in order to comply with NAFTA and our export customer's needs, it has been determined that all export packaging be in 5 languages (Spanish, French, German, Italian, and English) and to be in compliance with NAFTA all packaging will be in 3 languages (Latin American

Spanish, French Canadian, and English). Now when ordering the HT3000 you can specify your choice of language software. Software for the HACCP Manager is available in the above mentioned languages, plus Japanese.

The HACCP Manager is a temperature management system that records temperature, time, and location for any food preparation plant or facility. With easy-to-use downloading capabilities and storage for up to 1,000 data points, any operator can collect and chart data for analysis and corrective actions. The customized identification system allows operations management to decide which locations will be monitored and recorded. Then by touching the sensor to the station identification tab, verification or the quality check is completed.

Designed with the operator in mind, the HT3000 has a multitude of standard features: automatic field calibration for onsite accuracy; a water resistant casing ideal for applications within wet/steam filled environments; an easy cleaning, sealed keypad that eliminates food entrapment between keys 9 (often a breeding ground for food bacteria); type J, K, or T probe compatibility for various applications including food, air, between pack, patch, liquid, and surface temperature measurement and, automatic shut off after 15 minutes of non use.

Specifications of the HACCP Manager include a wide temperature range of -58° to 999°F with accuracy of ±1°F or 1%. Each unit comes with software, cable, 12 reader tabs, a new quick response needle probe, HACCP Temperature/Time Guide, 9V battery, and carrying case.

Cooper Instrument Corporation, Middlefield, CT

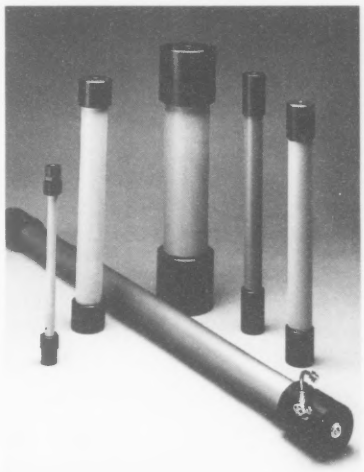
Reader Service No. 386

Handsfree Water Control can Eliminate Cross-Contamination

Studies show that improper handwashing is a key factor in spreading foodborne illness and contributes to cross-contamination. Encourage your employees to use the All Quality Assurance Products, Inc. "handwash helpers" to help eliminate cross-contamination. Choose an infrared unit that senses hands and automatically turns on and then off when no hands are sensed, or a hand activated unit. The hand activated unit has a self-cleaning water flow lever pertruding from the attachment head. When the lever is pushed to the right or left, water automatically comes on.

All QA Assurance Products, Inc., Gainesville, FL

Reader Service No. 387



Whatman Inc.

DuraDRY™ Compressed Air Dryers for the OEM User

OEM designers now have available a concise choice for point-of-use and utility compressed air drying. Whatman's Industrial Products OEM group has available for immediate delivery the DuraDRY product line through their extensive network of field specialists.

Compact and lightweight, the DuraDRY Compressed Air Dryer has no moving parts and zero wear components. Available with dewpoints to -40°F at flow rates from <1 scfm to over 100 scfm.

Typical applications include: point-of-use instrument air, protection of fluid power components like cylinders and valves, especially for permanently lubricated parts, air bearings or spindles, medical equipment, positioning air systems as in medical analysis equipment, paint application, and general pneumatic air purification.

Whatman Inc., Haverhill, MA

Reader Service No. 388

Compact Ultrasonic Homogenizer Offers Laboratory Flexibility

The Misonix XL2000 MICROSON™ is a compact, powerful ultrasonic homogenizer that features a convenient thumb-activated pulsing switch that permits a wide variety of applications in the food, pharmaceutical, and related markets.

The unit is ideal for cell disruption, particulate dispersion, mixing and homogenizing samples, as well as focused cleaning of intricate instrument parts or production equipment.The 100 watt portable unit measures to 7.5" × 13" × 7" and features automatic tuning, variable amplitude control, and a digitally displayed wattmeter. The MICROSON comes supplied with a 1/8" tip diameter × 5" long titanium alloy probe, and is also available with diameters of 3/32", 3/16", and 1/4".

Misonix, Inc., Farmingdale, NY

Reader Service No. 389

BusinessExchange

Services/Products

Department of Health and Human Services, Food and Drug Administration, Center for Veterinary Medicine is seeking a research biologist to conduct research in environmental microbiology associated with the aquaculture production environment. This research will investigate the ecology of human foodborne pathogens associated with preharvest aquaculture production and phenomena related to resistance development in pathogens from antibiotic usage. The position requires experience in environmental microbiology. Candidates with a Ph.D. and 0-5 years experience preferred. Positions are permanent and salary is commensurate with experience ($55,969 - $101,142). Positions are subject to peer review. Positions are located at Laurel, Maryland. U.S. Citizenship required. Please contact (301) 827-4287 to receive a faxed copy of vacancy announcement FDA-84013 or contact Mary Goodson at (301) 594-0195 . Candidates should submit an Application for Federal Employment and/or resume with transcripts to: **FDA, OHRMS, Room 211, Metro Park North I, HFA-423, 7520 Standish Place, Rockville, MD. 20857**. Applications will be accepted through June 1, 1998. FDA is an equal opportunity employer and has a smoke free environment.

ADVERTISING INDEX

Preliminary Program
of the IAMFES 85th Annual Meeting

MONDAY MORNING — AUGUST 17, 1998

Basic Dairy Field Workshop Part 1

- Dairy Farm Regulations and Inspection — CHARLES PRICE, FDA, Chicago, IL, U.S.A.
- Industry Quality Control Bacterial Standards — RUTH FUQUA, Quality Chekd Dairy Products Assn., Mt. Juliet, TN, U.S.A.
- Somatic Cell Count — NORM CORLETT, Dairy Farmers of America, Strongsville, OH, U.S.A.
- Drug Residues — JOE SMUCKER, FDA, Washington, D.C., U.S.A.

Change and Unintended Microbial Consequences — Along the Farm to Fork Continuum

- Historical Perspectives on Inadvertent Changes that Led to Foodborne Microbial Hazards: Lessons to be Learned — DON ZINK, Nestlé, U.S.A., Inc., Glendale, CA, U.S.A.
- Aquaculture: Practices with Unintended Consequences — SPENCER GARRETT, National Marine Fisheries Service, Pascagoula, MS, U.S.A.
- Bovine Spongiform Encephalopathy: Opportunities for Emergence with Altered Animal Food Preparation Practices — NORMAN SIMMONS, Guy's Hospital, London, England, UK
- *Pfisteria*: Creating the Niche for Its Emergence — KEVIN SELLNER, National Oceanographic and Atmospheric Adm., Silver Springs, MD, U.S.A.
- *Cyclospora*: A New Pathogen to a Non-Immune Population — BARBARA HERWALDT, CDC, Atlanta, GA, U.S.A.

Food Safety & Quality of Meat & Poultry — Technical Session

- Determination of End-Point Temperature in Cooked Ground Beef Patties by Near-Infrared Reflectance Spectroscopy — WILLIAM WINDHAM, USDA-ARS-RRC-QARU, Athens, GA, U.S.A.
- Acid Phosphatase Activity and Myoglobin Denaturation as End-Point Temperature Indicators in Cooked Ground Beef Patties — CARL DAVIS, USDA-ARS-RRC-PPMQ, Athens, GA, U.S.A.
- Recovery of *Salmonella*, *Campylobacter jejuni* and *Clostridium perfringens* from a Poultry Broiler House — PAULA FEDORKA-CRAY, USDA-ARS-RRC-PMSRU, Athens, GA, U.S.A.
- Nonthermal Inactivation Models for *S. typhimurium* in Poultry Processing — LI MA, University of Arkansas, Fayetteville, AR, U.S.A.
- Quantitative Risk Assessment for *Campylobacter jejuni* in Fresh Chicken — AAMIR FAZIL, Health Canada, Guelph, Ontario, Canada
- Experimental Infection of Birds with *Arcobacter butzleri* — IRENE WESLEY, USDA-ARS-NADC, Ames, IA, U.S.A.
- Occurrence of *E. coli* O157:H7, *Salmonella* and Other Shiga-Like Toxin-Producing *E. coli* in Retail Fresh Ground Beef — MARK BARBOUR, Qualicon, Inc., Wilmington, DE, U.S.A.
- Improved Isolation of Verotoxin – Producing *E. coli* from Ground Beef — LESLIE MACDONALD, Health Canada, Guelph, Ontario, Canada
- Immunoassays for the Detection of Spinal Cord in Product from Advanced Meat Recovery Systems — LYNDA KELLEY, PMSRU-USDA-ARS, Athens, GA, U.S.A.
- Triclosan-Incorporated Plastic for Reducing Bacteria on Meat Surfaces — CATHERINE CUTTER, USDA-ARS-Roman L. Hruska, Clay Center, NE, U.S.A.
- Studies to Characterize and Optimize the *E. coli* Sponge Sampling Method for Slaughter Process Control Monitoring — RANDY PHEBUS, Kansas State University, Manhattan, KS, U.S.A.
- Ecology and Control Strategies for Salmonellae in Broiler Chickens — STAN BAILEY, USDA-ARS-RRC, Athens, GA, U.S.A.

Seafood HACCP: Reflections after Implementation

- FDA's Reflection on HACCP Implementation — DONALD KRAEMER, FDA, Washington, D.C., U.S.A.
- SSOP Reflections — Eight Months after Implementation — DEBRA DEVLIEGER, FDA, Bothell, WA, U.S.A.
- Web-HACCP and Seafood Safety Communication — ROBERT PRICE, University of California-Davis, Davis, CA, U.S.A.
- HACCP Implementation — Perspectives of a Small Family-Owned Business — JAMES JOHNSON, Washington Crab Co., Inc., Washington, D.C., U.S.A.
- FDA Seafood HACCP Implementation — A Large Processor Experience and Key Learnings — RAYMOND JONES, Rich Seapak Corp., Simons Island, GA, U.S.A.
- Seafood HACCP Alliance: Reflections and Goals to 2000 — STEVEN OTWELL, University of Florida, Gainesville, FL, U.S.A.
- Emerging Pathogens and HACCP — DONN WARD, North Carolina State University, Raleigh, NC, U.S.A.
- *Pfisteria* – An Emerging Environmental Concern — JOANN BURKHOLDER, North Carolina State University, Raleigh, NC, U.S.A.

A Symposium on Fresh-Cut Produce: Field Sanitation, Packaging, Microbiology, Control, Programs, and Regulations — Part I

- The Future of the Produce Industry — To be announced
- Current Microbiological Concerns in the Produce Industry — JEFFREY FARBER, Health Canada, Ottawa, Ontario, Canada
- Methods of Controlling and/or Eliminating Foodborne Pathogens in Produce — LINDA HARRIS, University of California-Davis, Davis, CA, U.S.A.
- Epidemiological Investigation of Outbreaks Associated with Produce Items — JEFF FERRAR, California Dept. of Health Services, Sacramento, CA, U.S.A.
- Evolution of Packaging Films in Extended the Shelf life of Produce Items — ALAN HATHCOX, Cryovac GRACE Packaging, Duncan, SC, U.S.A.
- The Development and Implication of a Field Sanitation Program — DONNA GARREN, Boskovich Farms, Inc., Oxnard, CA, U.S.A.

Foodborne Pathogens — Poster Session

- Effectiveness of Trisodium Phosphate for Inactivation of *E. coli* O157:H7 on Apples — ATOBUNDU ATUGHONU, North Carolina A&T State University, Greensboro, NC, U.S.A.
- Cold Shocked *E. coli* O157:H7: Impact on Survival and Injury Following Either Freezing or Heating — JILL BOLLMAN, University of Manitoba, Manitoba, Canada
- Irradiation Inactivation of *E. coli* O157:H7 in Apple Juice — GLENN BOYD, USDA-ARS-ERRC, Wyndmoor, PA, U.S.A.
- Effect of pH-Dependent, Stationary Phase Acid Resistance on the Thermal Tolerance of *E. coli* O157:H7 — ROBERT BUCHANAN, USDA-ARS-ERRC, Wyndmoor, PA, U.S.A.
- Contamination of Intact Apples after Immersion in an Aqueous Environment Containing *E. coli* O157:H7 — SHARON EDELSON, USDA-ARS-ERRC, Wyndmoor, PA, U.S.A.
- Fate of *E. coli* O157:H7 in Four Varieties of Ground Apples Used in Cider Production — TOMEKA FISHER, The University of Tennessee, Knoxville, TN, U.S.A.
- Persistence of *E. coli* O157:H7 in Dairy Cattle Drinking Water — CLIFFORD JOHNSON, USEPA, Cincinnati, OH, U.S.A.
- Heat Inactivation of *E. coli* O157:H7 in Turkey, Pork and Lamb — VIJAY JUNEJA, USDA-ARS-ERRC, Wyndmoor, PA, U.S.A.
- Survival and Growth of *E. coli* O157:H7 during Sprouting of Inoculated Alfalfa Seeds — MARK KANTOR, University of Maryland at College Park, College Park, MD, U.S.A.
- Influence of Acidulant Identity on the Effects of pH and Acid Resistance on the Radiation Resistance of *E. coli* O157:H7 — BENNE MARMER, USDA-ARS-ERRC, Wyndmoor, PA, U.S.A.
- Antibiotic Resistance of *E. coli* O157:H7 Isolated from Animals, Foods and Humans — JIANGHONG MENG, University of Maryland at College Park, College Park, MD, U.S.A.
- Growth and Recovery of *E. coli* O157:H7 in Reconditioned Wastewater — KATHLEEN RAJKOWSKI, USDA-ARS-ERRC, Wyndmoor, PA, U.S.A.
- Attachment of *E. coli* O157:H7 to Lettuce Leaf Surfaces — KUN-HO SEO, University of Georgia, Athens, GA, U.S.A.

- Direct Observation of Viability of *E. coli* O157:H7 on Intact Lettuce — KUN-HO SEO, University of Georgia, Athens, GA, U.S.A.
- Enumeration of Verotoxigenic *E. coli* in Ground Beef — KRISTIN SLOAN, Health Canada, Guelph, Ontario, Canada
- Reduction of *E. coli* O157:H7 on Apples Using Acetic Acid, Hydrogen Peroxide, and Phosphoric Acid Wash Treatments — JIM WRIGHT, Virginia Tech, Blacksburg, VA, U.S.A.
- Tolerance of Acid-Adapted and Non-Adapted *E. coli* O157:H7 to Reduced pH as Affected by Type of Acidulant — L. R. BEUCHAT, University of Georgia, Griffin, GA, U.S.A.
- Antibacterial Effect of Lactoperoxidase System against *L. monocytogenes* and *E. coli* O157:H7 — C. I. CHUNG, Kon Kuk University, Seoul, South Korea
- Survival of *E. coli* O157:H7 in Apple Cider Containing Dimethyl Dicarbonate, Sulfur Dioxide, and Sodium Benzoate — TOMEKA FISHER, The University of Tennessee, Knoxville, TN, U.S.A.
- Suitability of Selective Media for Recovery of Heat-Stressed *E. coli* O157:H7 — TOMEKA FISHER, The University of Tennessee, Knoxville, TN, U.S.A.
- Thermal Resistance of *Salmonella* sp. in Chicken Broth as Defined by D- and Z-Values — VIJAY JUNEJA, USDA-ARS-ERRC, Wyndmoor, PA, U.S.A.
- Effect of Refined Liquid Smoke on Attachment of *Salmonella* sp. on Pork Skin — JOHN KOTROLA, Kansas State University, Manhattan, KS, U.S.A.
- Reduction of *Salmonella* spp. in Cut Cantaloupe — CARL OLSEN, University of California, Davis, CA, U.S.A.
- Enhanced Thermal Destruction of *S. enteritidis* in Liquid Egg Products Using Lysozyme, Lactoferricin-ß, and EDTA — SARAH LEWIS, Tuskegee University, Tuskegee, AL, U.S.A.
- Effect of Inoculum Cell Phase, Heat Shock, and Osmolytes on the Lag Phase Duration of *L. monocytogenes* Scott A at 6°C — JEFFREY CALL, USDA, Wyndmoor, PA, U.S.A.
- Control of *L. monocytogenes* on Ground Turkey by Irradiation and Modified Atmosphere Packaging — DONALD THAYER, USDA-ARS-ERRC, Wyndmoor, PA, U.S.A.
- Fat Content, Storage Temperature and Background Microflora Influence the Growth of *L. monocytogenes* in Vacuum-Packaged Ground Beef — RUPINDER PANAYACH, University of Alberta, AFNS, Edmonton, AB, Canada
- Acid Adaptation of *L. monocytogenes* Offers Cross-Protection against an Activated Lactoperoxidase System — SADHANA RAVISHANKAR, University of Georgia, Athens, GA, U.S.A.
- The Effects of Varying Thermal Processing Schedules on *L. monocytogenes* and Indicative Microorganisms in Blue Crab (*Callinectes sapidus*) Meat — JENNIFER SMITH, Virginia Tech, Blacksburg, VA, U.S.A.
- Sensitivity of Strains of *L. monocytogenes* to Temperature and Lysozyme in Liquid Egg Products — YIBEI ZHANG, Tuskegee University, Tuskegee, AL, U.S.A.
- Evaluation of ISSC Interim Control Plan for Limiting *Vibrio vulnificus* Growth in Oysters — DONGJIN SHIN, University of Florida, Gainesville, FL, U.S.A.
- Inhibition of *Clostridium botulinum* by Phosphate-based Salts in Media and Process Cheese Spread — KATHLEEN GLASS, University of Wisconsin, Food Research Institute, Madison, WI, U.S.A.
- Prevalence of *Bacillus* Diarrhoeal Enterotoxin – Producing Organisms in Dairy Products — JILL GEBLER, Murray Goulburn Co-op Co. Ltd., Yarram, Vic, Australia

MONDAY AFTERNOON

Basic Dairy Field Workshop — Part 2

- Troubleshooting Quality Problems on Dairy Farms — PAUL DERSAM, Alden, NY, U.S.A.
- Dairy Farm Waste Management — ROBERT BURNS, University of Tennessee, Knoxville, TN, U.S.A.
- Milk Hauling — ROGER NORDTVEDT, Land O'Lakes, Inc., Arden Hills, MN, U.S.A.
- Dairy Field Person's Pocket Guide — CHARLES PRICE, FDA, Chicago, IL, U.S.A.

Farm to Table: Ecology of Pathogens Associated with Poultry

- *Salmonella* in Poultry — MARK BERRANG, Russell Research Center, Athens, GA, U.S.A.
- An Assortment of Other Foodborne Pathogens in Poultry — DON CONNER, Auburn University, Auburn, AL, U.S.A.
- *Clostridium perfringens* in Poultry — STEVE CRAVEN, Russell Research Center, Athens, GA, U.S.A.

- *Clostridium perfringens* in Poultry — JAMES LINDSAY, University of Florida, Gainesville, FL, U.S.A.
- Indicator Organisms to Some Foodborne Pathogens in Poultry — SCOTT RUSSELL, University of Georgia, Athens, GA, U.S.A.
- *Campylobacter* in Poultry — SIMON SHANE, Louisiana State University, Baton Rouge, LA, U.S.A.
- Hong Kong Flu in Poultry — DAVID SWAYNE, Southeast Poultry Research Laboratory, Athens, GA, U.S.A.

Microbiological Methods — Technical Session

- Characterization of the Antibiotic Resistance Locus in *S. typhimurium* DT 104 — LANCE BOLTON, USDA-ARS-PMS, Athens, GA, U.S.A.
- Response Surface Models for Effects of Previous pH, Temperature, and pH on Lag Time and Growth Rate of *S. typhimurium* — THOMAS OSCAR, USDA-ARS, Princess Anne, MD, U.S.A.
- Use of an Autobioluminescent *S. hadar* to Monitor the Effect of Decontamination Methods — DERRICK BAUTISTA, University of Saskatchewan, Saskatoon, Saskatchewan, Canada
- Evaluation of a PCR-TaqMan™ Assay for Detection of *E. coli* O157:H7 and *Salmonella* from Ground Beef — LALIT BOHRA, Kansas State University, Manhattan, KS, U.S.A.
- A Rapid and Specific Fluorogenic PCR-Based System for the Detection of Shiga Toxins Producing *E. coli* from Different Food Samples — MICHAEL HO, Perkin Elmer Applied Biosystems, Foster City, CA, U.S.A.
- *In vitro* Pathogenicity Assay of *Bacillus cereus* Using Hybridoma Cells — DEBORAH HOYT, University of Arkansas, Fayetteville, AR, U.S.A.
- Comparison between Automated Ribotyping and RAPD Analysis for 44 Different *Bacillus cereus* Isolates from the Dairy Industry — ANNIKA ANDERSSON, SIK Institute of Food & Biotechnology, Gothenburg, Sweden
- Use of Automated Ribotyping to Trace Sources of *Pseudomonas* in a Ready-to-Eat Food Product — PATRICK GUSTAVSSON, SIK Institute of Food & Biotechnology, Gothenburg, Sweden
- Development of a PCR Assay for the Detection of *Listeria* spp. in Food Production Environments — MARK BARBOUR, Qualicon, Inc., Wilmington, DE, U.S.A.
- *Campylobacter* Recovery and Enumeration from Broiler Carcasses — ERIC LINE, USDA-ARS-RRC-PMSRU, Athens, GA, U.S.A.

The Leading Edge of Foodborne Disease Surveillance

- Coordination of Local, State/Provincial and National Surveillance Systems for Foodborne Disease — JOHN GUZEWICH, USFDA, Washington, D.C., U.S.A.
- Pulsed-field Gel Electronic Surveillance Network for *E. coli* O157:H7 — TIMOTHY BARRETT, CDC, Atlanta, GA, U.S.A.
- Active Surveillance for Foodborne Disease: The U.S. FoodNet Surveillance Program — DREW VOETSCH, CDC, Atlanta, GA, U.S.A.
- The Canadian Information Highway for the Surveillance of Foodborne, Waterborne and Enteric Disease — Information in Real Time — PAUL SOCKETT, Health Canada, Health Protection Branch, Ottawa, Ontario, Canada
- The Enteric Disease 4-Year Study in England and Wales — PAUL SOCKETT, Health Canada, Health Protection Branch, Ottawa, Ontario, Canada

A Symposium on Fresh-Cut Produce: Field Sanitation, Packaging, Microbiology, Control, Programs, and Regulations — Part 2

- The Food Safety Programs of a Fresh-Cut Produce Processor, LARRY BELL, Fresh Express Farms, Salinas, CA, U.S.A.
- The Role of Outside Laboratories in Developing Food Safety Programs for Produce Companies, JEAN ROBERTS, DFL Laboratories, Modesto, CA, U.S.A.
- UFFVA Efforts in Developing Produce Safety Guidelines, STACY ZAWEL, United Fresh Fruit and Vegetable Association, Alexandria, VA, U.S.A.
- A Discussion of the FDA and USDA Food Safety Guidelines for the Produce Industry, LEEANNE JACKSON, Washington, D.C., U.S.A.
- The Development and Implementation of Food Safety Guidelines by IFPA and the Western Growers Association for the Produce Industry, EDITH GARRETT, IFPA, Alexandria, VA, U.S.A.
- Discussion of the USDA Qualification Through Verification (QTV) Program, ERIC FOREMAN, USDA, Washington, D.C., U.S.A.

General Food Microbiology — Poster Session

- Development of Hybridoma Cell Line for the Production of Monoclonal Antibody to Residual Herbicide Atrazine — DUCK-HWA CHUNG, Gyeongsang National University, Chinju, Kyoungnam, Korea

- Partial Characterization of Aflatoxin B_1 Removal by Crude Extract from *Flavobacterium aurantiacum* — RONALD SMILEY, The University of Tennessee, Knoxville, TN, U.S.A.
- Screening of T-2 Toxin Producing Fungi from Agricultural Commodities in Korea by ELISA Method — DUCK-HWA CHUNG, Gyeongsang National University, Chinju, Kyoungnam, Korea
- Monte Carlo Simulation of Milk Spoilage as Influenced by Temperature and Initial Population — DONALD SCHAFFNER, Rutgers — The State University of New Jersey, New Brunswick, NJ, U.S.A.
- Predictive Model to Determine the Effects of Milkfat, pH, and Temperature on the Thermal Inactivation of *L. monocytogenes* — AMY TINKEY, Purdue University, West Lafayette, IN, U.S.A.
- Microbiological Quality and Safety of Ready-to-Eat Street Foods in Johannesburg City — FRANCINA MOSUPYE, University of the Witwatersrand, South Africa
- Efficacy of Lactate-Based Compounds as Bread Preservatives — TRACEY PATTISON, University of the Witwatersrand, South Africa
- Effect of Chemical Sanitizers on Bacterial Cell Morphology — ALEX VON HOLY, University of the Witwatersrand, South Africa
- Relative Hydrophobicity and Charge of Planktonic and Adhered Cells of *Enterococcus faecium* — NELIO ANDRADE, University of Minnesota, St. Paul, MN, U.S.A.
- Bacteriocidal Activity of Sanitizers against *Enterococcus faecium* Attached to Stainless Steel as Determined by Plate Count and Impedance Methods — NELIO ANDRADE, University of Minnesota, St. Paul, MN, U.S.A.
- Characterization of Two Bacteriocins Produced by Atypical *Enterococcus* Species — MARLENE JANES, University of Arkansas, Fayetteville, AR, U.S.A.
- Development of Whey Beverage Using Lactic Acid Bacteria — Y. K. JHA, G. B. Pant University of Agriculture and Technology, Pantnagar, India
- Comparison of Diluents and Media for Recovering *Zygosaccharomyces rouxii* in High-Sugar Foods — YONGSOO JUNG, University of Georgia, Griffin, GA, U.S.A.
- Effect of Heating Extract of *Angelica acutiloba* and *Glycyrrhiza uralensis* on Growth of Intestinal Microorganisms — KOOK-HEE KANG, Sungkyankwan University, Seoul, Korea
- Effect on Selected Pathogens of Exposure to Naturally Occurring Volatile Compounds — ABIGAIL VILLALBA, University of Kentucky, Lexington, KY, U.S.A.
- Effect of Sugar and Citric Acid on the Quality of Canned Lychee — MING WU, University of Science and Technology, Pingtung, Taiwan, U.S.A.
- Growth of *Alicyclobacillus acidoterrestris* in Acid Products — ISABEL WALLS, National Food Processors Assn., Washington, D.C., U.S.A.
- Model for the Implementation of HACCP in the Food Industry of Developing Countries — JAIRO ROMERO, Association Colombiana Cien, Bogota, Colombia
- Developing HACCP Training Materials for Food Service Employees — HEA-RAN ASHRAF, Southern Illinois University, Carbondale, IL, U.S.A.
- Indicative Microbial Quality of Gulf Coast Shucked Oysters Prior to Implementation of FDA Seafood HACCP Regulation — CUSTY FERNANDES, Mississippi State University, Pascagoula, MS, U.S.A.
- Biogenic Amine Analysis and Characterization of Histaminogenic Bacteria from Frozen Albacore — JORGE BARROS-VELÁZQUEZ, University of Santiago de Compostela, E.P.S., Lugo, Spain
- The Effect of Refrigerated Storage on the Safety and Quality of Raw Oysters (*Crassostrea virginica*) — TATIANA LORCA, Virginia Tech., Blacksburg, VA, U.S.A.
- Antimicrobial Spray of Poultry Carcasses: A Pilot Plant Study — ZHONGPING YANG, University of Arkansas, Fayetteville, AR, U.S.A.
- Microbiological Changes during Swine Carcass Dressing — SAMUEL PALUMBO, USDA, Wyndmoor, PA, U.S.A.
- Fate of *Arcobacter* spp. to Environmental Stresses of Temperature, pH and NaCl Levels — ELAINE D'SA, University of Georgia, Athens, GA, U.S.A.
- Antibiotic Resistance of Bacteria Isolated from Slaughtered and Retail Chickens in South Africa — PIETER GOUWS, University of the Western Cape, Bellville, South Africa
- Comparison of Two Molecular Techniques for Epidemiological Tracing of *Campylobacter jejuni* — NORMAN STERN, USDA-ARS-RRC-PMSRU, Athens, GA, U.S.A.
- Phenotyping and Genotyping of Foodborne *Campylobacter* from Recurrent Disease —

JORGE BARROS VELÁZQUEZ, University of Santiago de Compostela, E.P.S., Lugo, SPAIN

- Detection and Distinction of *C. jejuni* and *A. butzleri* in Contaminated Food Products by Multiplex PCR — DEBRA WINTERS, University of Arkansas, Fayetteville, AR, U.S.A.
- Reduction in Microbiological Counts of Beef Variety Meats Exposed to Various Decontamination Treatments — ROBERT DELMORE JR., Colorado State University, Fort Collins, CO, U.S.A.
- Effect of Environmental and Substrate Factors on Survival and Growth of *Helicobacter pylori* — XIUPING JIANG, University of Georgia, Griffin, GA, U.S.A.

TUESDAY MORNING — AUGUST 18, 1998

Current Perspectives on the Use of Antibiotics in Animal Production Systems

- Relationship of Antibiotic-Resistant Bacteria in Foods to Antibiotic-Resistant Bacteria in Humans — STUART LEVY, Tufts University, Boston, MA, U.S.A.
- Veterinary Perspective on the Use of Antibiotics in Animal Production Systems — PAULA CRAY, USDA-ARS, Athens, GA, U.S.A.
- Antimicrobial Use and the Development of Resistance — FRED ANGULO, University of Georgia, Atlanta, GA, U.S.A.
- Update on *Salmonella* DT 104 — JOHN THRELFALL, Public Health Laboratory Service, London, England, U.K.
- World Health Organization Perspective on the Use of Antibiotics in Animal Production Systems — KLAUS STOHR, World Health Organization, Geneva, Switzerland

Food Safety Education/Safety & Quality of Produce — Technical Session

- Effect of Brief Blanching Treatments on the Microflora of Fresh Cucumbers — FREDERICK BREIDT, JR., USDA-ARS, North Carolina State University, Raleigh, NC, U.S.A.
- Outgrowth of *Bacillus coagulans* in Various Tomato Purees as Affected by pH and Acidity — ROCELLE CLAVERO, National Food Processors Association, Washington D.C., U.S.A.
- Deposition of Salmonellae from Soil and Blossoms into Internal Tissue of Tomatoes — DONALD CONNER, Auburn University, Auburn, AL, U.S.A.
- Allyl Isothiocyanate as a Preservative in Non-Acidified, Refrigerated, Pickled Vegetables — BRIAN SHOFRAN, Oklahoma State University, Stillwater, OK, U.S.A.
- Pasteurization Process for Dairy Products — JOHN STAUFFER, Stauffer Technology, Greenwich, CT, U.S.A.
- Comparison of Chemical Treatments to Eliminate *E. coli* O157:H7 on Alfalfa Seeds — PETER TAORMINA, University of Georgia, Griffin, GA, U.S.A.
- Food Safety and Water Sanitation in Cambodia and China — EWEN TODD, Health Canada, Ottawa, Ontario, Canada
- Sensitivity of *E. coli* O157:H7 to Storage in Frozen Apple Juice — SHERYL YAMAMOTO, University of California, Davis, CA, U.S.A.
- Evaluation of the Food Safety Network as an Educational Tool — SARAH GRANT, University of Guelph, Guelph, Ontario, Canada
- The Provision and Evaluation of Daily Electronic Information Summaries to Identify Public and Scientific Animal Agricultural Issues Warranting Risk Analysis Activities: the Animal Network — JANIS HAZLEWOOD, University of Guelph, Guelph, Ontario, Canada
- An Evaluation of Food Safety Network (FSnet) as a Risk Analysis Tool — AMANDA WHITFIELD, University of Guelph, Guelph, Ontario, Canada

Pest Management as We Approach 2000

- Integrated Pest Management Technology Update — JIM SARGENT, Copesan Services, Inc., Brookfield, WI, U.S.A.
- Heat Treatment as an Alternative to Chemical Fumigation for Pests — OLE DOSLAND, Copesan Services, Inc., Brookfield, WI, U.S.A.
- Ants — A Pest to Detest — KIM KELLEY TUNIS, McCloud Pest Control, Indianapolis, IN, U.S.A.
- Pest Management — A View from the Client Perspective — MARTY GUSHWA, Nestlé U.S.A., Inc., Glendale, CA, U.S.A.

Viral and Parasitic Foodborne Disease Associated with Produce: Epidemiology, Detection, and Control

- Detection of *Cyclospora* in Foods — GEORGE JACKSON, FDA, Washington, D.C., U.S.A.
- *Cryptosporidium* in Foods — Epidemiology, Detection and Typing — JIM TROUT, USDA-ARS, Beltsville, MD, U.S.A.

- Epidemiology of a 1997 Outbreak of Hepatitis A Virus Associated with the Consumption of Frozen Strawberries — MIRIAM ALTER, U.S. CDC, MS G37, Atlanta, GA, U.S.A.
- Detection and Thermal Inactivation of Hepatitis A Virus in Foods — SYED SATTAR, University of Ottawa, Ottawa, Ontario, Canada
- Surface Inactivation of Hepatitis A Virus on Strawberries Using Chlorine — MARK SOBSEY, University of North Carolina, Chapel Hill, NC, U.S.A.

Microbiological Methods — Poster Session

- Resazurin as an Indicator of Growth in a New Medium for Measuring the Aerobic Plate Count in Food — CATHERINE SMITH, IDEXX Laboratories, Westbrook, ME, U.S.A.
- Rapid Detection (1 to 4 h) of Total and Thermotolerant Coliforms on Carcasses — GRO ØFJORD, Colifast Systems, ASA, Lysaker, Norway
- Development of an Impedance Selective Method for the Enumeration of Lactic Acid Bacteria — FABIEN DUBOEUF, bioMérieux Vitek, Inc., Hazelwood, MO, U.S.A.
- A Rapid Method for the Detection of Gram Negative Organisms in Pasteurized Dairy Products — ANNE DAVIES, Celsis-Lumac, Evanston, IL, U.S.A.
- Practical Application of ATP-bioluminescence for the Estimation of Microbial Populations in Pork — MARK CARTER, Celsis-Lumac, Evanston, IL, U.S.A.
- Evaluation of Methods Used for Enumeration of Thermophilic and Mesophilic *Bacillus* Spores in Milk Powder — EDEN BELLENSON, Cal Poly State University, San Luis Obispo, CA, U.S.A.
- Rapid Detection *Staphylococcus aureus* Using a Membrane Biosensor — JIANMING YE, University of Rhode Island, W. Kingston, RI, U.S.A.
- Detection of *Clostridium botulinum* Type A Toxin in Culture Media and Food Systems by an Improved Colony Immunoblot Procedure — MICHELE PALMERTREE, University of Georgia, Athens, GA, U.S.A.
- Rapid Detection of Cytolethal Distending Toxin Genes in *Campylobacter* Isolates by Polymerase Chain Reaction — AYSEGUL EYIGOR, University of Kentucky, Lexington, KY, U.S.A.
- Improved Enrichment Protocol for Rapid Detection of Low Levels of *Salmonella* in Foods — MADELINE VELAZQUEZ, University of Minnesota, St. Paul, MN, U.S.A.
- Automated One-Day, Two-Step Detection of *S. enteritidis* in Eggs — WEI TAN, Wayne State University, Detroit, MI, U.S.A.
- Evaluation of a Novel 24-Hour Timed Release Enrichment System for the Rapid Isolation of *Salmonella* from Foods — PETER STEPHENS, OXOID Ltd., Basingstoke, Hampshire, U.K.
- Development of an Immunoassay for Detecting *Salmonella* on Chicken Carcasses — ROBERT HOLTSLANDER, Health Canada, Guelph, Ontario, Canada
- A Polymerase Reaction Procedure for the Detection of *S. enteritidis* — PIETER GOUWS, University of the Western Cape, Bellville, South Africa
- Isolation and Simultaneous PCR Detection of *E. coli* O157:H7 and *Salmonella* spp. from Enrichment Cultures of Foods and Other Samples — PINA FRATAMICO, USDA, Wyndmoor, PA, U.S.A.
- Detection of *Salmonella* in Dairy Samples Using BIND® — ELIZABETH EHRENFELD, IDEXX Laboratories, Cape Westbrook, ME, U.S.A.
- Selective Enrichment Procedures for the Bacterial Ice Nucleation *Salmonella* Detection (BIND®) System to Detect Salmonellae in Environmental Drag Swab Samples from Poultry Houses — CHUN-MING CHEN, IDEXX Laboratories, Inc., Westbrook, ME, U.S.A.
- Automated One-Day Screening Method to Detect Low Levels of *L. monocytogenes* in Milk — HUI PENG, Wayne State University, Detroit, MI, U.S.A.
- *Vidas Listeria* Assay: Environmental Surface Challenge Study — DEBORAH MCINTYRE, R-TECH Laboratories, St. Paul, MN, U.S.A.
- Evaluation of an Automated Immunoassay for the Detection of *Listeria* in Foods — THOMAS ARMSTRONG, bioMérieux Vitek, Inc., Hazelwood, MO, U.S.A.
- Evaluation of Different Selective and Differential Media for Direct Quantitation of *E. coli* O157:H7 from Irradiated Hamburger Meat — ANANTA DESSAI, Tuskegee University, Tuskegee, AL, U.S.A.
- Development of a Homogeneous PCR Assay for the Detection of *E. coli* O157:H7 in Food Samples — SUSAN TSENG, Qualicon, Inc., Wilmington, DE, U.S.A.
- Inhibitory Effect of Gamma Irradiation and Efficacy of Plating Media for Recovering Irradiated *E. coli* O157:H7 — DEOGHWAN OH, Kangwon National University, Chuncheon, Kangwon, Korea

- Effect of Surface Finish on the Cleanability of Stainless Steel — JOSEPH FRANK, University of Georgia, CFSQE, Athens, GA, U.S.A.
- A Comparative Evaluation of Sponging and Excising as Sampling Procedures for Microbiological Analysis of Beef Carcass Tissue — LORENZO WARE, Colorado State University, Fort Collins, CO, U.S.A.
- Shipping, Storage and Sampling-Sponge Effects on Bacterial Numbers Detected from Pork Carcass Skin and Fat Surfaces — JOHN SOFOS, Colorado State University, Fort Collins, CO, U.S.A.
- Recovery of *E. coli* Pure Culture Suspensions from Sponges Following Shaking or Stomaching — MINDY KAIN, Colorado State University, Fort Collins, CO, U.S.A.
- Survival of *Salmonella* During 4°C Storage in Sponge Bags Hydrated with Different Media — SCOTT RUEGER, Kansas State University, Manhattan, KS, U.S.A.

TUESDAY AFTERNOON — AUGUST 18, 1998

Crisis Communication

- To be announced

IAMFES Business Meeting

WEDNESDAY MORNING — AUGUST 19, 1998

Bringing Science to the Restaurant Inspection

- The Reality of Cooling Foods in Restaurant Setting — GERALD BARNES, Multnomah County Health Dept., Portland, OR, U.S.A.
- Recipe-Based HACCP — PETE SNYDER, Hospitality Institute, St. Paul, MN, U.S.A.
- Tools for the Sanitarian — DANIEL MAXON, Clark County Health District, Las Vegas, NV, U.S.A.
- Teaching Science to the Operator — GREIG WARNER, Multnomah County Health Dept., Portland, OR, U.S.A.
- Implementing a HACCP System — FRANK BRYAN, Lithonia, GA, U.S.A.

Computerized Process Control and Record Keeping in the Dairy Industry

- Plant Modernization with Computerized Process Control — ROBERT COUTLEE, Dean Foods Technical Center, Rockford, IL, U.S.A.
- Proper Maintenance and Calibration of Electronic Instruments — WILLIAM WILSON, Anderson Instruments Co., Fultonville, NY, U.S.A.
- HACCP-Based Monitoring in the Dairy Plant — KENNETH ANDERSON, Harold Wainess and Associates, Northfield, IL, U.S.A.
- Acquisition, Storage and Review of Safety Data from a Commercial System for High Temperature, Short Time Pasteurization System — JOSEPH SCHLESSER, USDA-NCFST, Summit, IL, U.S.A.
- Regulations for Computerized Process Control and Recordkeeping — STEVEN SIMS, USDA, Washington, D.C., U.S.A.

Factors Affecting Bacterial Attachment to Meat Surfaces

- Mechanisms of Bacterial Attachment to Meat Surfaces: An Overview — JAMES DICKSON, Iowa State University, Ames, IA, U.S.A.
- The Role of Biofilm Formation/Colonization on Meat Surfaces — TOM MCMEEKIN, University of Tasmania, Hobart, Tasmania, Australia
- Methods for Preventing Bacterial Attachment to Meat Surfaces — JUDY ARNOLD, Russell Research Center, Athens, GA, U.S.A.
- Real Time Visualization of Bacteria on Meat Surfaces — GREGORY SIRAGUSA, USDA-ARS, Clay Center, NE, U.S.A.
- Direct Microscopic Observation of Tissue-Pathogen Interactions — JOSEPH FRANK, University of Georgia, Athens, GA, U.S.A.
- Effect of Sampling Methodologies and Bacterial Recovery from Meat Surfaces — WARREN DORSA, USDA-ARS, Clay Center, NE, U.S.A.

ILSI North America-Sponsored Research Update

- Effect of Diet and Rumen Microenvironment on the Proliferation and Fecal Shedding of *E. coli* O157:H7 in Calves: Preliminary Studies — CATHY BROWN, University of Georgia, Athens, GA, U.S.A.
- Effect of Dietary Stress and Antibiotic Use on *E. coli* Floral Stability and Prevalence of *E. coli* O157:H7 — DALE HANCOCK, Washington State University, Pullman, WA, U.S.A.
- Differentiation of Shiga-like Toxin Producing *E. coli* (SLTEC) that are Pathogenic for Humans from Those that are Nonpathogenic — CARLTON GYLES, University of Guelph, Guelph, Ontario, Canada
- Molecular Tools for Identification of Serotype 4b Strains and for Detection of the "Epidemic Clone" of *Listeria monocytogenes* — SOPHIA KATHARIOU, University of Hawaii at Manoa, Honolulu, HI, U.S.A.

- PCR Assay for the Detection of *Cryptosporidium* in Foods — MANSEL GRIFFITHS, University of Guelph, Guelph, Ontario, Canada
- Extension of Quantitative Microbial Risk Assessment Methods to Foodborne Pathogens: Preliminary Studies — CHARLES HAAS, Drexel University, Philadelphia, PA, U.S.A.
- Quantitative Risk Assessment for *E. coli* O157:H7, Verotoxigenic *E. coli* (VTEC) and *Listeria monocytogenes* — ANNA LAMMERDING, Health Canada, Guelph, Ontario, Canada

WEDNESDAY AFTERNOON

Symposium of Sensory Characteristics of Dairy Foods

- Principles and Pitfalls of the Sensory Evaluation of Dairy Foods — JOHN BRUHN, University of California-Davis, Davis, CA, U.S.A.
- Fluid Milks — ELLEN SPEAR, EMS Associates, Corpus Christi, TX, U.S.A.
- Cottage Cheese — ROBERT BRADLEY, University of Wisconsin, Madison, WI, U.S.A.
- Hard and Specialty Cheeses — MARK BATES, Washington State University, Pullman, WA, U.S.A.
- Frozen Dairy Desserts — ROBERT MARSHALL, University of Missouri, Columbia, MO, U.S.A.
- Profiles of Nutrients in Frozen Dairy Desserts — There is More than Sensory Pleasures — CHRISTINE BRUHN, University of California, Davis, CA, U.S.A.

Food Worker Hand Hygiene: A Factor in Foodborne Illness

- The Role of Hands in Transmission of Foodborne Illness — BERT BARTLESON, Olympia, WA, U.S.A.
- Handwashing and the Final Rule on Pathogen Reduction — JOHN DAMARE, Compounds Reg. Branch, FSIS, Washington, D.C., U.S.A.
- Foodworker Hand Disinfectants: Products, Uses and Regulatory Consideration — MICHAEL DOLAN, GoJo Industries Inc., Cuyahoga Falls, OH, U.S.A.
- Field Experience with Automated Handwashing — NOEL SEGAL, Forestville, MD, U.S.A.
- Gloves and Pathogen Control on Hands — DWANE CHARBONNEAU, Procter and Gamble, Mason, OH, U.S.A.

Microbiological Issues Associated with Pork

- Use of Risk Assessment for Preharvest Control of Zoonotic Parasites in Swine — RAY GAMBLE, USDA-ARS, Beltsville, MD, U.S.A.
- Occurrence of *Salmonella* in Swine — PAULA FEDORKA CRAY, USDA-ARS-RRC, Athens, GA, U.S.A.
- Association and Incidence of *Arcobacter*, *Helicobacter*, and *Campylobacter* in Pork — IRENE WESLEY, USDA-ARS, Ames, IA, U.S.A.
- Results of FSIS's Microbiological Baseline Surveys of Market Hog Carcasses and Raw Ground Pork Sausage — ANN MARIE MCNAMARA, USDA-FSIS-OPHIS, Washington, D.C., U.S.A.
- FoodNet — Active Surveillance Related to Pork — DREW VOETSCH, CDC, Atlanta, GA, U.S.A.
- Beyond Microbiology: Applying Our Studies to Effective Food Safety Interventions — ANNE PETERSON, Oakton, VA, U.S.A.

Risk Management of Food from Farm to Fork

- Risk Management of Food from Farm to Fork — DON SCHAFFNER, Rutgers University, New Brunswick, NJ, U.S.A. and PETER SNYDER, Hospitality Inst. of Technology & Management, St. Paul, MN, U.S.A.
- "Eating Out: Will the Risk Manage Us or Will We Manage the Risk?" — FRANK YIANNAS, Walt Disney World Co., Lake Buena Vista, FL, U.S.A.
- A Consumer's Perspective of Acceptable Food Risk — CAROLINE SMITH DEWAAL, Center for Science in the Public Interest, Washington, D.C., U.S.A.
- A Food Manufacturer's Perspective of Food System Risk Management — DANE BERNARD and JENNY SCOTT, National Food Processor's Assoc., Washington, D.C., U.S.A.
- Food System Risk Management: The European Perspective — S. H. W. NOTERMANS, Bilthoven, The Netherlands
- The Role of HACCP as a Regulatory Tool for Risk Management — MICHAEL TAYLOR, King and Spalding, Washington, D.C., U.S.A.

GENERAL INFORMATION

IAMFES 85th ANNUAL MEETING AUGUST 16-19, 1998 NASHVILLE, TENNESSEE

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

■ Meeting Information

Register today to obtain valuable information on advancing food protection worldwide through the most contemporary methods of food microbiology, processing, safe handling, and current regulatory aspects of food safety. Registration fee includes all technical sessions; symposia; poster presentations; a Cheese and Wine Reception; admittance to the exhibit hall; and a program and abstract book containing general program information and abstracts of symposia, technical papers, and posters. Appropriate dress for the Meeting is business casual.

■ Registration Information

Please mail the registration form with payment today. Registrations post-marked after July 15, 1998 must pay the late registration fee. Checks should be made payable to: IAMFES, Inc., 6200 Aurora Avenue, Suite 200W, Des Moines, IA 50322-2863, U.S.A. For faster service, use your credit card and call 800.369.6337, or fax the completed registration form with credit card information to 515.276.8655.

■ Refund/Cancellation Policy

Requests for cancellations must be received in writing no later than July 31, 1998 (registration fee less a $50 processing charge will be refunded). Cancellations received after July 31, 1998 will not receive a refund, but the registration may be transferred to a colleague with written notification.

■ New Membership Fees

$ 75.00 *Dairy, Food and Environmental Sanitation*

$ 120.00 *Dairy, Food and Environmental Sanitation* and *Journal of Food Protection*

$ 37.50 *Student Membership with *Dairy, Food and Environmental Sanitation* or *Journal of Food Protection*

$ 60.00 *Student Membership with *Dairy, Food* and *Environmental Sanitation* and *Journal of Food Protection*

***Full-time student verification required.*

SHIPPING CHARGES: OUTSIDE THE U.S.
SURFACE RATE – $ 22.50 per journal title
AIRMAIL – $ 95.00 per journal title

TICKET INFORMATION

■ Cheese and Wine Reception (August 16, 1998)

Share in what has become an IAMFES tradition for Annual Meeting attendees and guests. The Cheese and Wine Reception begins immediately following the Ivan Parkin Lecture on Sunday evening in the IAMFES exhibit hall. Enjoy conversation with exhibitors, colleagues, and friends.

■ Monday Night Social Event Hot Country Night — (August 17, 1998)

There's no time like a good time, and the Wildhorse Saloon is just the place to find it. The evening includes dinner, music, dancing, and a few surprises. Children ages 14 and under must be accompanied by an adult.

■ Awards Banquet — (August 19, 1998)

The IAMFES Annual Meeting concludes with an evening of recognition for deserving food safety professionals. A reception opens the evening outside the banquet hall. Dinner is served in an elegant setting prior to the award presentations. Additional tickets are available. Business attire is requested for this special evening.

■ Other Events

Grand Ole Opry — Saturday, 8/15
IAMFES Golf Tournament — Sunday, 8/16
Music City Sites — Sunday, 8/16
Historic Nashville — Monday, 8/17
Jack Daniel's Distillery — Tuesday, 8/18
Children's Banquet — Wednesday, 8/19

HOTEL INFORMATION

For reservations, call 800.327.6618 and identify yourself as an IAMFES attendee to receive a special rate of $116 per night, single or double.

Renaissance Nashville Hotel
611 Commerce Street
Nashville, Tennessee 37203
Phone: 615.255.8400; Fax: 615.255.8163

CHILD CARE

Adult supervised activities for children ages 4 to 12 will be available Monday through Wednesday, 8:30 a.m. to 12:00 p.m. and 1:30 p.m. to 5:00 p.m. A pre-registration fee of $20.00 per day for each child is required; snacks will be provided. The room is subject to a minimum attendance. Participants will be notified if cancellation is necessary by July 24, 1998.

REGISTRATION FORM

❒ Please register me for the IAMFES 85th Annual Meeting – Nashville, Tennessee – August 16-19, 1998

FOR OFFICE USE
Member # _____
Registration # _____
First initial _____ Last name _____
DFES

First Name (please print — will appear on badge) M.I. Last Name

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Mailing Address (Please specify: ❒ Home ❒ Work)

City State/Province Country Postal/Zip Code

Telephone # Fax # E-mail

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Status (Please check applicable boxes)

❒ 20 Yr. Member ❒ 30 Yr. Member ❒ 50 Yr. Member ❒ Past President ❒ Speaker ❒ Honorary Life Member ❒ Sustaining Member

REGISTER BY JULY 15, 1998 TO AVOID LATE REGISTRATION FEES

REGISTRATION:	MEMBERS	NONMEMBERS	AMOUNT
Registration (Awards Banquet included)	$ 230 ($280 late)	$335 ($385 late)	
Student IAMFES Member	$ 35 ($ 45 late)	Not Available	
Retired IAMFES Member	$ 35 ($ 45 late)	Not Available	
One Day Registration: ❒ Mon. ❒ Tues. ❒ Wed.	$ 115 ($140 late)	$150 ($170 late)	
Spouse/Companion (Name): _____	$ 35 ($ 35 late)	$ 35 ($ 35 late)	
Children (15 & Over, Names): _____	$ 25 ($ 25 late)	$ 25 ($ 25 late)	
Children (14 & Under, Names): _____	FREE	FREE	
Child Care (Ages 4 to 12): ❒ Mon. ❒ Tues. ❒ Wed.	$ 20 per child/per day		

OTHER EVENTS:			
Grand Ole Opry (Sat., 8/15)	$ 25	_____	
IAMFES Golf Tournament (Sun., 8/16)	$ 80 ($ 95 late)	_____	
Music City Sites (Sun., 8/16)	$ 28 ($ 33 late)	_____	
Historic Nashville (Mon., 8/17)	$ 41 ($ 46 late)	_____	
Hot Country Night (Mon. Night Social, 8/17)	$ 36 ($ 41 late)	_____	
Children's Rate (14 & Under)	$ 21 ($ 26 late)	_____	
Jack Daniel's Distillery (Tues., 8/18)	$ 29 ($ 34 late)	_____	
IAMFES Awards Banquet (Wed., 8/19)	$ 40 ($ 45 late)	_____	
Children's Banquet (Wed., 8/19)	$ 20 ($ 25 late)	_____	

JOIN IAMFES TODAY AND SAVE!!! (Attach a completed membership application) _____

TOTAL AMOUNT ENCLOSED _____
(CHECK PAYABLE TO IAMFES — U.S. FUNDS DRAWN ON U.S. BANK)

International Association of Milk, Food and Environmental Sanitarians
6200 Aurora Avenue, Suite 200W
Des Moines, IA 50322-2863, U.S.A.
Phone: 800.369.6337; 515.276.3344
Fax: 515.276.8655; E-mail: iamfes@iamfes.org

Credit Card Payments:

❒ VISA ❒ MasterCard ❒

Card # _____
Exp. Date _____
Name on Card _____
Signature _____
Total Amount Enclosed $ _____

EXHIBITORS DO NOT USE THIS FORM

The Workshops

August 15, 1998 – Nashville, Tennessee

WORKSHOP I — Proper Cleaning and Uses of Stainless Steel in the Food and Beverage Industries

This workshop will discuss the proper uses and cleanability of stainless steel as related to the food and beverage industries. Discussions will include guidelines for the use in sanitary services including metallurgy, physical and mechanical properties, and corrosion resistance of stainless steel commonly used in the food and beverage industries. Also included will be proper procedures for quality welding of stainless steel equipment; manual and automatic shielded metal arc, tungsten metal arc and gas metal techniques; and the influence of welding, forming and post-fabrication cleaning on corrosion. Other topics include the significance of the surface finish on cleanability and product purity; various surface cleaning and sanitizing steps needed in order to obtain clean surfaces; metal ion contamination after cooking; and health and environmental effects of nickel.

WORKSHOP PRESENTERS:

Richard Avery, Nickel Development Institute and Avery Consulting Associates, Inc.

Mr. Avery is a consultant for the Nickel Development Institute. His industrial experience includes several years with Inco Alloys International in Huntington, WV. His specialty is the fabrication and joining of stainless steels and nickel alloys. He has authored over 20 articles on welding and metallurgy.

Roger Covert, Nickel Development Institute and Covert Consulting, Inc.

Mr. Covert is a consultant for the Nickel Development Institute. He has been involved with the properties and applications of metals for almost 50 years. He retired as Vice President of Marketing from International Nickel, Inc. after 30 years of working in a variety of technical and marketing areas. Special interests for Mr. Covert were metallic corrosion, nickel electroplating, and material selection.

WHO SHOULD ATTEND:

Quality Control Managers, Sanitation Inspectors, Plant Engineers, Plant Design Engineers, Plant Managers, Regulatory Officers or anyone interested in expanding their knowledge and understanding of the applications for stainless steel in the food and beverage industries.

WORKSHOP II — ICMSF's Proposal for the Management of the Microbiological Safety of Foods

The International Commission on Microbiological Specifications for Foods (ICMSF) is a nonprofit, scientific advisory body established in 1962. ICMSF membership consists of microbiologists from more than 10 countries. Since its founding, ICMSF has had a profound impact on the field of food microbiology by addressing such issues as methods development, sampling plans, microbiological criteria, and Hazard Analysis and Critical Control Points.

The ICMSF has recommended six steps for the management of microbiological hazards in foods in international trade. These same principles can be applied to food in domestic trade. The steps incorporate existing Codex documents that can be applied in a logical sequence. This workshop will discuss the six steps for management of the microbiological safety of foods. The relationships of acceptable or tolerable risk, food safety objectives, and performance criteria will be discussed in detail. Examples of how to establish FSOs based on risk assessments, and industry's development of performance criteria to assure FSOs are met will be presented. A significant portion of the workshop will be dedicated to the application of HACCP, GMP/GHP and microbiological criteria to assure performance criteria are met.

WORKSHOP PRESENTERS:

Russell S. Flowers, Ph.D., Silliker Laboratories Group, Inc.

Dr. Flowers is President of Silliker Laboratories Group, Inc. and a leading researcher, lecturer, and writer on the "Development of Rapid Methods for the Detection of Foodborne Pathogens." He has authored numerous article, seminars, and presentations.

R. Bruce Tompkin, Ph.D., ConAgra Refrigerated Prepared Foods

Dr. Tompkin joined ConAgra in 1997 as Vice President of Product Safety of ConAgra Refrigerated Prepared Foods. He began his career with Swift & Company in 1964 as a research microbiologist moving up to Vice President of Product Safety.

Robert L. Buchanan, Ph.D., Food and Drug Administration

Dr. Buchanan is a Senior Scientist with the Food and Drug Administration's Center for Food Safety and Applied Nutrition and a member of the U.S. Public Health Service's Senior Biomedical Research Service. Prior to this appointment, Dr. Buchanan was a senior investigator with USDA-ARS in Philadelphia, PA.

WHO SHOULD ATTEND:

Microbiologists, Quality Assurance and Control Managers, HACCP Coordinators and Team Members, Food Safety Managers, Food Safety Auditors, Risk Management Coordinators or anyone interested in learning more about ICMSF and its Proposal for the Management of the Microbiological Safety of Foods.

1998 IAMFES Workshops • Registration Form •

❑ **WORKSHOP 1: Proper Cleaning and Uses of Stainless Steel in the Food and Beverage Industries**

❑ **WORKSHOP 2: ICMSF's Proposal for the Management of the Microbiological Safety of Foods**

Renaissance Nashville Hotel, Nashville, Tennessee – Saturday, August 15, 1998

First Name (will appear on badge) PLEASE PRINT Last Name

Title Employer

Address City State/Province Zip/Postal Code

Area Code & Telephone Fax E-mail

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Signature: _____

For further information, please contact IAMFES at 800.369.6337; 515.276.3344; Fax: 515.276.8655; E-mail: jcattanach@iamfes.org.

Refund/Cancellation Policy

Registration fees, minus a $50 processing fee, will be refunded for written cancellations post-marked by July 31, 1998. **No refunds will be made for cancellations post-marked after July 31, 1998,** however, the registration may be transferred to a colleague with written notification to IAMFES. **NOTE:** IAMFES reserves the right to cancel workshops if minimum enrollment is not met by July 15, 1998.

• REGISTRATION •

WORKSHOP 1: Proper Cleaning and Uses of Stainless Steel in the Food and Beverage Industries

	Before 7/15/98	After 7/15/98
IAMFES Member	$180	$210
NonMember	$245	$275

GROUP DISCOUNT: Register 3 or more people from your company and receive a 15% discount. Registrations must be received as a group.

WORKSHOP 2: ICMSF's Proposal for the Management of the Microbiological Safety of Foods

	Before 7/15/98	After 7/15/98
IAMFES Member	$295	$325
NonMember	$360	$390

TOTAL AMOUNT ENCLOSED: $ _____

(U.S. Funds on U.S. Bank)

Tours and Special Events
of the IAMFES 85th Annual Meeting

Saturday, August 15, 1998 — 5:00 p.m. - 9:30 p.m.
The Grand Ole Opry
Registration: $25

Experience a true Southern tradition with a night at the world famous Grand Ole Opry. With your reserved seating at the Opry you can sit back and relax or jump in and clap along as renowned musicians, singers and comedians delight you with their talents. You never know who you'll see at the Grand Ole Opry.

Sunday, August 16, 1998 — 6:00 a.m. - 1:30 p.m.
IAMFES Golf Tournament
Registration: $80 (Late $95)

Join your colleagues for a great round of golf. Board the bus to travel to the Hermitage Golf Course located near President Andrew Jackson's stately Hermitage along the banks of the Cumberland River. Enjoy a continental breakfast before teeing off in the IAMFES BEST-BALL golf tournament. After your game, join us for prizes while eating lunch. Golf, breakfast, lunch and transportation all included! Tournament is open to golfers of all skill levels. To request a golf registration form, call IAMFES at 800.369.6337 or 515.276.3344.

Sunday, August 16, 1998 — 9:00 a.m. - 1:00 p.m.
Music City Sites
Registration: $28 (Late $33)
Lunch on your own

Don't miss this exciting tour of downtown Nashville, Second Avenue, Tennessee State Capitol, Governor's Mansion, and numerous other points of interest. The tour will also include a drive down the world famous Music Row and a stop at the Country Music Hall of Fame.

Sunday, August 16, 1998
Opening Session — 7:00 p.m.
Ivan Parkin Lecture

Lecturer: Christine Bruhn, University of California-Davis, Center for Consumer Research, Davis, CA.

Cheese and Wine Reception — (Exhibit Hall)
8:00 p.m. - 10:00 p.m.

Join friends and colleagues for complimentary refreshments while viewing the educational exhibits.

Exhibit Hall Hours

Sunday, August 16 – 8:00 p.m. - 10:00 p.m.
Monday, August 17 – 9:30 a.m. - 1:30 p.m.
3:00 p.m. - 6:30 p.m.*
Tuesday, August 18 – 9:30 a.m. - 2:00 p.m.

**Social Reception — 5:00 p.m. - 6:30 p.m.*

Monday, August 17, 1998 — 9:00 a.m. - 3:00 p.m.
Historic Nashville
Registration: $41 (Late $46)
Lunch included

This historic view of Nashville begins with a stop in Centennial Park and a tour of the Parthenon. You will then enjoy a wonderful buffet lunch at the Hermitage, the beloved home of President Andrew Jackson. Following lunch you will tour the Hermitage and its grounds.

Monday, August 17, 1998 — 6:00 p.m. - 9:00 p.m.
Hot Country Night
Registration: $36 (Late $41)
Children's Rate (14 & Under) $21 (Late $26)

There's no time like a good time, and the Wildhorse Saloon is just the place to find it. The evening includes dinner, music, dancing, and a few surprises. Children ages 14 and under must be accompanied by an adult.

Tuesday, August 18, 1998 — 9:00 a.m. - 4:30 p.m.
Jack Daniel's Distillery
Registration: $29 (Late $34)
Lunch on your own

Settle back as you wind through the beautiful Tennessee countryside to Shelbyville, home of Tennessee walking horses and the Walking Horse Museum. Then you will travel on to Lynchburg where you will step back in time on the historic square. You'll have a chance to stroll around the square and grab a bite to eat before your entertaining tour of the world famous Jack Daniel's Distillery.

Wednesday, August 19, 1998
IAMFES Annual Awards Banquet
Reception: 6:00 p.m. - 7:00 p.m.
Banquet: 7:00 p.m.
Registration: $40 (Late $45)

Wednesday, August 19, 1998
IAMFES Children's Banquet
Time: 6:30 p.m. - 9:30 p.m.
Registration: $20 (Late $25)

Child Care

Adult supervised activities for children ages 4 to 12 will be available Monday through Wednesday, 8:30 a.m. to 12:00 p.m. and 1:30 p.m. to 5:00 p.m. A pre-registration fee of $20.00 per day for each child is required; snacks will be provided. The room is subject to a minimum attendance. Participants will be notified if cancellation is necessary by July 24, 1998.

Committee Day Meetings
at the IAMFES 85th Annual Meeting

SUNDAY, AUGUST 16, 1998

COMMITTEE/PROFESSIONAL DEVELOPMENT GROUPS/TASK FORCES

Affiliate Council, *(Ryman)* ..... 7:00 a.m. - 10:00 a.m

Applied Laboratory Methods, *(Ryman South)* ..... 11:00 a.m. - 12:00 p.m.

Audio/Visual Library, *(Director 1)* ..... 10:00 a.m. - 12:00 p.m.

Awards, *(Ryman North)* ..... 11:00 a.m. - 12:00 p.m.

Communicable Diseases Affecting Man, *(Boardroom I)* ..... 10:00 a.m. - 5:00 p.m.

Constitution And By Laws, *(Director 2)* ..... 10:00 a.m. - 12:00 p.m.

Dairy Quality & Safety, *(Davidson A)* ..... 3:00 p.m. - 5:00 p.m.

DFES Management, *(Ryman North)* ..... 1:30 p.m. - 3:00 p.m.

Education, *(Director 4)* ..... 1:30 p.m. - 3:30 p.m.

Food Safety Network, *(Director 4)* ..... 10:00 a.m. - 12:00 p.m.

Food Sanitation, *(Director 5)* ..... 1:30 p.m. - 3:00 p.m.

Foundation Fund, *(Director 1)* ..... 1:30 p.m. - 3:00 p.m.

Fruit & Vegetable Safety & Quality, *(Davidson A)* ..... 1:30 p.m. - 3:00 p.m.

JFP Management, *(Ryman North)* ..... 3:00 p.m. - 4:30 p.m.

Meat & Poultry Quality & Safety, *(Ryman South)* ..... 1:30 p.m. - 3:30 p.m.

Microbial Food Safety Risk Assessment, *(Director 5)* ..... 10:00 a.m. - 12:00 p.m.

Nominating, *(Director 1)* ..... 3:00 p.m. - 4:30 p.m.

Past Presidents' Advisory, *(Director 5)* ..... 3:00 p.m. - 4:00 p.m.

Program Advisory, *(Ryman North)* ..... 4:30 p.m. - 5:30 p.m.

Sanitary Procedures, *(Director 2)* ..... 1:30 p.m. - 3:00 p.m.

Seafood Safety & Quality, *(Davidson A)* ..... 10:00 a.m. - 12:00 p.m.

Viral Foodborne, *(Director 2)* ..... 3:00 p.m. - 4:30 p.m.

Exhibitors

of the IAMFES 85th Annual Meeting

(Companies scheduled to exhibit as of March 27, 1998)

3-A Sanitary Standards Symbol Council
3020 Bluff Road
Columbia, SC 29209
Phone: 803.783.9258
Fax: 803.783.9265

3M Microbiology Products
3M Center, Bldg. 275-4E-1
St. Paul, MN 55144
Phone: 612.733.0942
Fax: 612.737.7678

ABC Research Corporation
3437 S.W. 24th Ave.
Gainesville, FL 32607
Phone: 352.372.0436
Fax: 352.378.6483

Advanced Instruments, Inc.
Two Technology Way
Norwood, MA 02062
Phone: 781.320.9000
Fax: 781.320.8181

AOAC International
481 N. Frederick Ave., Suite 500
Gaithersburg, MD 20877-2417
Phone: 301.924.7077
Fax: 301.924.7089

Applied Research Institute
P.O. Box 810
Newtown, CT 06470
Phone: 888.324.7900
Fax: 888.324.7911

Aquionics, Inc.
P.O. Box 18395
Erlanger, KY 41018
Phone: 606.341.0710
Fax: 606.341.0350

Atkins Technical, Inc.
3401 S.W. 40th Blvd.
Gainesville, FL 32608-2399
Phone: 352.378.5555 ext. 208
Fax: 352.335.6736

Becton Dickinson Microbiology Systems
7 Loveton Circle
Sparks, MD 21152
Phone: 410.316.4472
Fax: 410.316.4906

BioControl Systems, Inc.
19805 North Creek Parkway
Bellevue, WA 98011
Phone: 425.487.2055
Fax: 425.487.1476

Biolog, Inc.
3938 Trust Way
Hayward, CA 94545
Phone: 510.785.2564
Fax: 510.782.4639

bioMérieux Vitek
595 Anglum Drive
Hazelwood, MO 63042-2320
Phone: 314.506.8073
Fax: 314.506.8097

Capitol Vial, Inc.
151 Riverside Drive
Fultonville, NY 12072
Phone: 800.772.8871
Fax: 518.853.3409

Charm Sciences, Inc.
36 Franklin St.
Malden, MA 02148
Phone: 781.322.1523
Fax: 781.322.3141

Copesan Services
3490 North 127th St.
Brookfield, WI 53005
Phone: 800.267.3726
Fax: 414.783.6267

Decagon Devices
P.O. Box 835
950 N.E. Nelson Court
Pullman, WA 99163
Phone: 509.332.2756
Fax: 509.332.5158

DFL Laboratories
3401 Crow Canyon Road, Suite 110
San Ramon, CA 94583
Phone: 510.830.0350
Fax: 510.830.0379

DiverseyLever Inc.
255 E. 5th St., Suite 1200
Cincinnati, OH 45202-5508
Phone: 513.762.6794
Fax: 800.433.5508

DQCI Services, Inc.
5205 Quincy St.
Mounds View, MN 55112
Phone: 612.785.0484
Fax: 612.785.0584

DYNAL, Inc.
5 Delaware Drive
Lake Success, NY 11042
Phone: 516.326.3270 ext. 224
Fax: 516.326.3298

Ecolab Pest Elimination
370 Wabasha
St. Paul, MN 55102
Phone: 612.293.2590
Fax: 612.225.3088

Elsevier Science
655 Avenue of the Americas
New York, NY 10010
Phone: 212.633.3756
Fax: 212.633.3764

Food Quality Magazine
208 Floral Vale Blvd.
Yardley, PA 19067
Phone: 215.860.7800
Fax: 215.860.7900

Foss North America, Inc.
10355 W. 70th St.
Eden Prairie, MN 55344
Phone: 612.941.8870 ext. 126
Fax: 612.941.6533

GENE-TRAK Systems
94 South St.
Hopkinton, MA 01748
Phone: 508.435.7400
Fax: 508.435.0025

Gist-brocades
N93 W14560 Whittaker Way
Menomonee Falls, WI 53051
Phone: 414.255.7955
Fax: 414.255.7732

Glo-Germ Company
P.O. Box 537
150 E. Center
Moab, UT 84532
Phone: 435.259.5693 ext. 119
Fax: 435.259.5930

Great Western Chemical Company
5700 N.W. Front Ave.
Portland, OR 97210
Phone: 503.227.1616
Fax: 503.227.7377

IDEXX Laboratories
One IDEXX Drive
Westbrook, ME 04092
Phone: 207.856.0300
Fax: 207.856.0630

International BioProducts, Inc.
14780 N.E. 95th St.
Redmond, WA 98052
Phone: 425.883.1349
Fax: 425.881.6880

Lloyd's Register Quality Assurance
33-41 Newark St.
Hoboken, NJ 07030
Phone: 201.963.1111
Fax: 201.963.3299

Michelson Laboratories, Inc.
6280 Chalet Drive
Commerce, CA 90040
Phone: 562.928.0553
Fax: 562.927.6625

MicroBioLogics, Inc.
217 Osseo Ave. North
Saint Cloud, MN 56303
Phone: 320.253.1640
Fax: 320.253.6250

NASCO
901 Janesville Ave.
Fort Atkinson, WI 53538-0901
Phone: 920.563.2446
Fax: 920.563.8296

Exhibitors continued

Nelson-Jameson, Inc.
P.O. Box 647
2400 E. 5th St.
Marshfield, WI 54449
Phone: 715.387.1151 ext. 365
Fax: 715.387.8746

New Horizons Diagnostics Corporation
9110 Red Branch Road
Columbia, MD 21045
Phone: 410.992.9357
Fax: 410.992.0328

Norton Performance Plastics Corp.
P.O. Box 3660
2664 Gilchrist Road
Akron, OH 44309-3660
Phone: 330.798.9240
Fax: 330.798.6968

NSF International
3475 Plymouth Road
Ann Arbor, MI 48105
Phone: 313.769.8010
Fax: 313.769.0109

Organon Teknika
100 Akzo Ave.
Durham, NC 27712
Phone: 919.620.2377
Fax: 919.620.2615

Oxoid, Inc.
123 Huntmar Drive
Stittsville, ON K2E 7K3 Canada
Phone: 613.226.1318
Fax: 613.836.5386

PRISM
8300 Executive Center Drive
Miami, FL 33166
Phone: 800.888.5777
Fax: 305.594.9280

Q Laboratories, Inc.
1400 Harrison Ave.
Cincinnati, OH 45214
Phone: 513.662.1300
Fax: 513.662.1380

Qualicon, Inc.
P.O. Box 80357/1024A
Rt. 141 & Henry Clay Road, Building 357
Wilmington, DE 19880-0357
Phone: 302.695.9400
Fax: 302.695.9027

R-TECH Laboratories
P.O. Box 64101
St. Paul, MN 55164-0101
Phone: 800.328.9687
Fax: 612.481.2002

REMEL, Inc.
12076 Santa Fe Drive
Lenexa, KS 66215
Phone: 800.255.6730
Fax: 800.447.5750

Silliker Laboratories Group
900 Maple Road
Homewood, IL 60430
Phone: 708.957.7878
Fax: 708.957.8449

Sparta Brush Co.
402 S. Black River St.
Sparta, WI 54656
Phone: 608.269.2151
Fax: 608.269.3293

Spiral Biotech, Inc.
7830 Old Georgetown Road
Bethesda, MD 20814
Phone: 301.657.1620
Fax: 301.652.5036

TRI-DIM Filter Corporation
999 Raymond St.
Elgin, IL 60120
Phone: 847.695.2600
Fax: 847.695.7938

VICAM LP
313 Pleasant St.
Watertown, MA 02172
Phone: 617.926.7045
Fax: 617.923.8055

Warren Analytical
P.O. Box G
650 'O' St.
Greeley, CO 80632
Phone: 800.945.6669
Fax: 970.351.6648

Weber Scientific
2732 Kuser Road
Hamilton, NJ 08691
Phone: 609.584.7677
Fax: 609.584.8388

ZEP Manufacturing Company
1310 Seaboard Industrial Blvd.
Atlanta, GA 30318
Phone: 404.352.1680
Fax: 404.350.6232

ComingEvents

JUNE

·**3-5, Fermentation Microbiology Workshop,** sponsored by the American Type Culture Collection. For more information, contact ATCC, Workshop Coordinator, 12301 Parklawn Dr., Rockville, MD 20852; Phone: 301.231.5566; 800.359.7370; Fax: 301.816.4364; E-mail: workshops @atcc.org.

·**3-5, Practical HACCP for Food Processors,** Chicago, IL. For further information, contact Silliker Laboratories, Phone: 800.829.7879; Fax: 708. 957.8405.

·**4-5, Tennessee Assn. of Milk, Water & Food Protection Annual Meeting,** Ellington Center, Nashville, TN. For additional information, contact Ann Draughon, Phone: 423. 974.7425.

·**7-12, 4th World Congress Foodborne Infections and Intoxications,** in Berlin. The continued increase of foodborne diseases and the emergence of new or newly recognized agents of diseases all over the world underline the importance of the Congress. For further information, contact Congress Office 4th World Congress, Federal Institute for Health Protection for Consumers and Veterinary Medicine, Diedersdorfer Weg 1, D-12277 Berlin; Phone: 49. 30.8412.2158; Fax:49.30.8412.2957; E-mail: 4.wkoffice@bgvv.de.

·**8-10, Mykotoxin Workshop,** in Detmold, Germany. The workshop is organized by the Institute for Biochemistry of Cereals and Potatoes, Federal Centre for Cereal, Potato, and Lipid Research, Schutzenberg 12, D-32756 Detmold, Germany. For information, contact Dr. Wolff at Phone: 49.5231.741.121 (131); Fax: 49. 5231.741.130 (100); E-mail: betsche. bagkf@t-online.de.

·**9-10, Dairy Fieldperson & Sanitarians Workshop,** Radisson Hotel, Bloomington, IL. New developments in milk marketing and the dairy futures market and today's Illinois Dairy Industry will be followed by University of Illinois extension specialists who will provide information on animal health issues. For further information, contact Nicolette Oates, Secretary/Treasurer AIMFES, 11920 S. 74th Ave., Palos Heights, IL 60463; Phone: 773.722.7100; Fax: 773.722.3230.

·**9-10, Food Plant Sanitation Workshop,** Atlanta, GA. This workshop focuses on the essential elements of today's rigid requirements for food safety and sanitation programs. For additional information, contact AIB International, 1213 Bakers Way, P.O. Box 3999, Manhattan, KS 66505-3999; Phone: 785.537.4750; 800.633.5137; Fax: 785.537.1493.

·**16-18, Hazard Analysis & Development of Your HACCP Plan,** Guelph. A practical, business approach to help you in designing your own HACCP plan. You'll build product descriptions, conduct a hazard analysis, determine critical limits and control measures—all on your own processing line. For additional information, contact Guelph Food Technology Centre, 88 McGilvray St., Guelph, Ontario, N1G 2W1; Phone: 519.767.5036; Fax: 519. 836.1281.

·**18-19, HACCP Workshop,** Cherry Hill, NJ. This format provides for an intensive evaluation of the HACCP principles and elements for developing a successful program at your facility. For additional information, contact AIB International, 1213 Bakers Way, P.O. Box 3999, Manhattan, KS 66505-3999; Phone: 785.537.4750; 800.633.5137; Fax: 785.537.1493.

·**19-20, IFT's 1998 Basic Symposium,** Atlanta, GA. Reaction flavors, biosynthesis, taste masking, interaction between flavors and food components, challenges in flavoring nutraceuticals, and flavor analysis are among the new developments to be covered. For more information, contact Dean Duxbury at 312.782.8427 ext. 171 or visit IFT's Web site: www. ift.org.

JULY

·**10, HACCP Train the Trainer for the Foodservice Sector,** held in Guelph. In this living laboratory, you'll see and practice the adult learning techniques you'll need to develop your own HACCP training plan, making your training interactive, increasing learning retention, and reducing anxiety. For further information, contact GFTC at 88 McGilvray St., Guelph, Ontario, N1G 2W1 or Phone: 519. 767.5036; Fax: 519.836.1281

·**10-11, 18th International Workshop on Rapid Methods and Automation in Microbiology,** at Kansas State University, Manhattan, KS. Hands-on experiments, demonstrations, lectures, colloquium, scientific poster sessions and competition will occur. For scientific content, contact: Daniel Y. C. Fung, Director; Phone: 785.532.5654; Fax: 785.532. 5681; E-mail: dfung@oz.oznet.ksu. edu. For registration information, contact: Janice Nikkel, U.S. Phone: 800.432.8222; Outside the U.S. 785.532.5575; Fax: 785.532.5637; E-mail: ksucon@dce.ksu.edu.

·**21-22, Food Product Safety for Packaging Suppliers Seminar,** Embassy Suites, Kansas City. The course is designed to show packaging suppliers how to develop an effective product safety program that consistently meets the demands of customers. The goal is to provide a working knowledge of how to develop and manage product safety programs, quality systems, preventive pest control, and HACCP. For further information, contact AIB Food Safety, 1213 Bakers Way, P.O. Box 3999, Manhattan, KS 66505-3999 or Phone: 785.537.4750; Fax: 785.537.1493.

·**27-31, Laboratory Methods in Food Microbiology,** South Holland, IL. For further information, contact Silliker Laboratories, Phone: 800. 829.7879; Fax: 708.957.8405.

AUGUST

·16-19, **IAMFES Annual Meeting,** in Nashville, Tennessee at the Renaissance Nashville Hotel. Registration information available in this issue of *DFES* on pages 320-321 or contact Julie Cattanach at Phone: 800.369.6337; 515.276.3344; Fax: 515.276.8655; E-mail: jcattanach@iamfes.org.

·24-28, **The 10th International Conference on Production Diseases in Farm Animals,** Utrecht, The Netherlands. For additional information, contact the Congress Secretariat: Royal Netherlands Veterinary Association, P.O. Box 14031, 3508 SB Utrecht, The Netherlands; Phone: 31 30 251 01 11; Fax: 31 30 251 17 87; E-mail: knmvd@pobox.ruu.nl; Internet: www.knmvd.nl.

SEPTEMBER

·6-9, **InterMopro 98, International Trade Fair for Dairy Products,** in Düsseldorf, Germany. For further information, contact Dusseldorf Trade Shows, Inc., 150 N. Michigan Ave., Suite 2920, Chicago, IL 60601; Phone: 312.781.5180; Fax: 312.781.5188; Web site: www.dtsusa.com/dts/.

·23-25, **Microscopy/Photomicrography Workshop,** sponsored by the American Type Culture Collection. For more information, contact ATCC, Workshop Coordinator, 12301 Parklawn Dr., Rockville, MD 20852; Phone: 301.231.5566; 800.359.7370; Fax: 301.816.4364; E-mail: workshops@atcc.org.

·25-29, **China Brew & Beverage '98,** at China International Exhibition Centre, Beijing, China. For details, contact Rebecca Chan or Ling Chan of Business & Industrial Trade Fairs Ltd., Unit 1223, 12/F Hongkong International Trade & Exhibition Centre, 1 Trademark Dr., Kowloon Bay, Hong Kong or Phone: 852.2865.2633; Fax: 852.2866.1770, 2866.2076.

OCTOBER

·26-29, **Penn State Foodborne Fungi and Mycotoxins Short Course** at the Berks Campus of the Pennsylvania State University, University Park, PA. For additional information, contact The Pennsylvania State University, 306 Ag Administration Bldg., University Park, PA 16802-2601; Phone: 814.865.8301; Fax: 814.865.7050; E-mail: shortcourse@psu.edu.

NOVEMBER

·2-6, **Aseptic Better Process Control Certification School and Aseptic Symposium,** at North Carolina State University, Raleigh, NC. For further information, contact Lisa Gordon at 919.515.2956; Fax: 919.515.7124; E-mail: lisa_gordon@ncsu.edu.

·8-12, **1998 International Exposition for Food Processors,** Chicago, IL. For more information, contact Cheryl Clark at Phone: 703.684.1080; Fax: 703.548.6563; E-mail: fpmsa@clark.net.

·9-11, **ASI Food Safety Consultants HACCP Workshop,** held at the Holiday Inn-Downtown Riverfront, St. Louis, MO. For further information, contact ASI Food Safety Consultants, Inc., Vorrie Strong or Christine VerPlank, Phone: 314.725.2555; 800.477.0778; Fax: 314.727.2563.

·16-18, **1st NSF International Conference on Food Safety: HACCP – Science, Art, and Industry,** Hyatt Regency Albuquerque, Albuquerque, NM. For additional information, contact Wendy Raeder at Phone: 734.769.8010, ext. 205; Fax: 734.769.0109; E-mail: raeder@nsf.org.

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IAMFES ANNUAL MEETING
GOLF TOURNAMENT
AT THE
HERMITAGE GOLF COURSE

Sunday, August 16, 1998
6:00 a.m. – Bus Leaves the Hotel

Come early and enjoy 18 holes of golf at the famous Hermitage Golf Course

Before we deal with problems involving food safety and protection, let's get together for some fun and a GREAT round of golf! IAMFES has organized a FUN, BEST-BALL tournament with you in mind. EVERYONE IS WELCOME, regardless of skill.

About the Golf Course:

We have arranged to play the Hermitage Golf Course on the banks of the Cumberland River, near President Andrew Jackson's stately Hermitage home. The Hermitage Golf Course hosts many tournaments during the year, but is best known for the LPGA's Sara Lee Classic. Its large bent-grass greens, bermuda tees and cool seasonal grasses give the course a rich, green presentation year-round. The course is designed by internationally prominent Course Architect Gary Roger Baird and is 6,800 yards of championship golf at its best!

To join your friends and colleagues in a round of golf, call the IAMFES office at 800.369.6337 (or 515.276.3344) or Fax us at 515.276.8655 to request a registration form. Hurry! Registration deadline is July 15, 1998!

Companies:

Are you looking for a unique way to promote your company at the IAMFES Annual Meeting? IAMFES is looking for sponsorship support for this event. If you will consider providing quality prizes (or cash prizes) for the IAMFES Golf Tournament, we would like to hear from you. Call David Tharp at the phone numbers listed above for more details.

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